DEPARTMENT OF THE ARMY TECHNICAL MANUAL
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SOVIET MINE WARFARE EQUIPMENT

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CONTENTS

PART ONE

INTRODUCTION TO FOREIGN MINE WARFARE EQUIPMENT

CHAPTER 1

GENERAL

1. Scope and Purpose

a. This manual covers Soviet mine warfare equipment in detail. The various types of fuzes; mines; antilifting devices; booby traps; mine laying, marking, and recording equipment and supplies; and mine detecting and clearing equipment are described and illustrated.

b. This manual on Soviet foreign mine warfare equipment is a basic guide to be used in

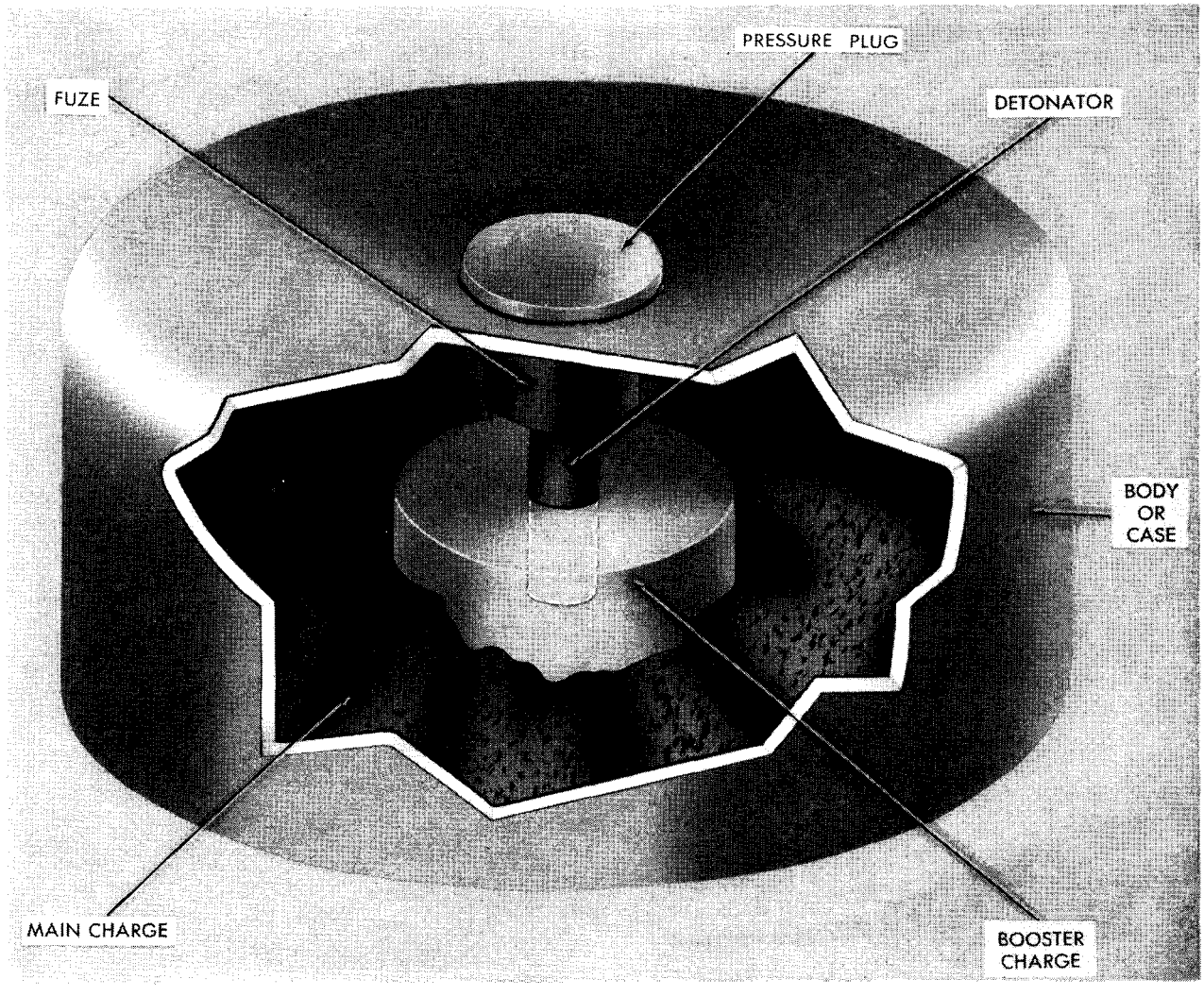


Figure 1. Elements of a mine.

the identification and employment of Soviet mine warfare equipment and for the neutralization of foreign mines and fuzes.

c. Information on foreign mine warfare policies and tactics is contained in FM 5–32.

2. Development of Mine Warfare

Originally mine warfare consisted of tunneling beneath the enemy and using explosives to destroy otherwise impenetrable positions. This type of mine warfare continued through World War I. During the latter part of World War I, when tanks made their appearance, both the Germans and the Allies began to use land mines constructed of artillery shells. The importance of mine warfare was not definitely established until World War II. Large mine fields placed in key locations helped the British hold back the Germans in North Africa. Extensive use of mines by the Soviet Army contributed materially to delaying the German advance into Russia. Mines were also extensively used in the fighting in Italy and during campaigns in France and Germany. In Korea mines have been employed extensively.

3. Mine Terminology

a. A *mine* is an encase charge of explosive placed under water, laid on the ground, or buried. To detonate the mine, it is necessary to provide one or more detonating devices. The elements of a mine are shown in figure 1. The types of mines used in foreign mine warfare are discussed in paragraph 5.

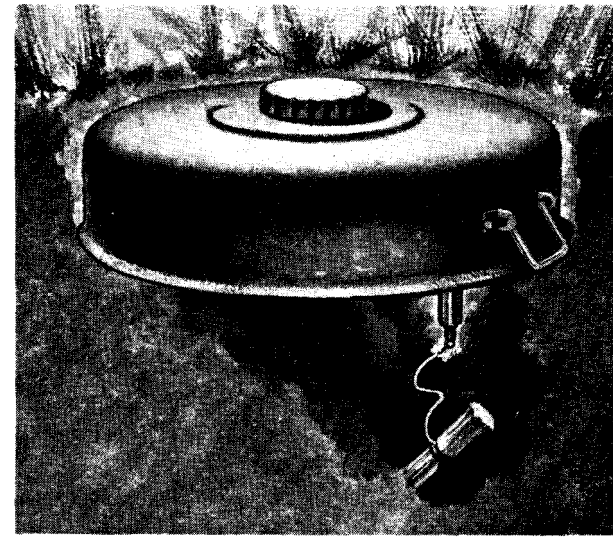


Figure 3. Activated mine.

b. A *fuze* is a mechanical, chemical, or electrical device which starts the firing chain of a mine (par. 4). Fuzes are classified according to use (instantaneous or delayed-action), the type of initating action required to start the fuze functioning (par. 4*a*), and the internal action which produces the flame or spark (par. 4*b*).

c. Installing the fuze is the insertion of the detonator and fuze assemblies into a mine.

d. Arming is the removal of all safety devices so the mine is ready to function (fig. 2).

e. Neutralizing is rendering a mine ineffective.

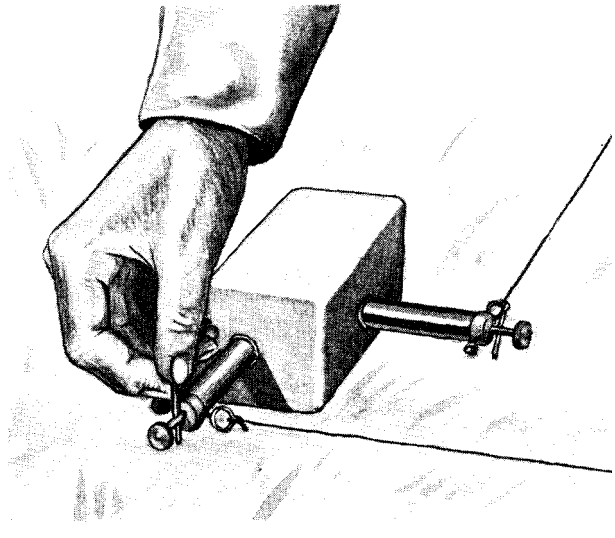


Figure 2. Arming a mine.

Figure 4. Sympathetic detonation of mines.

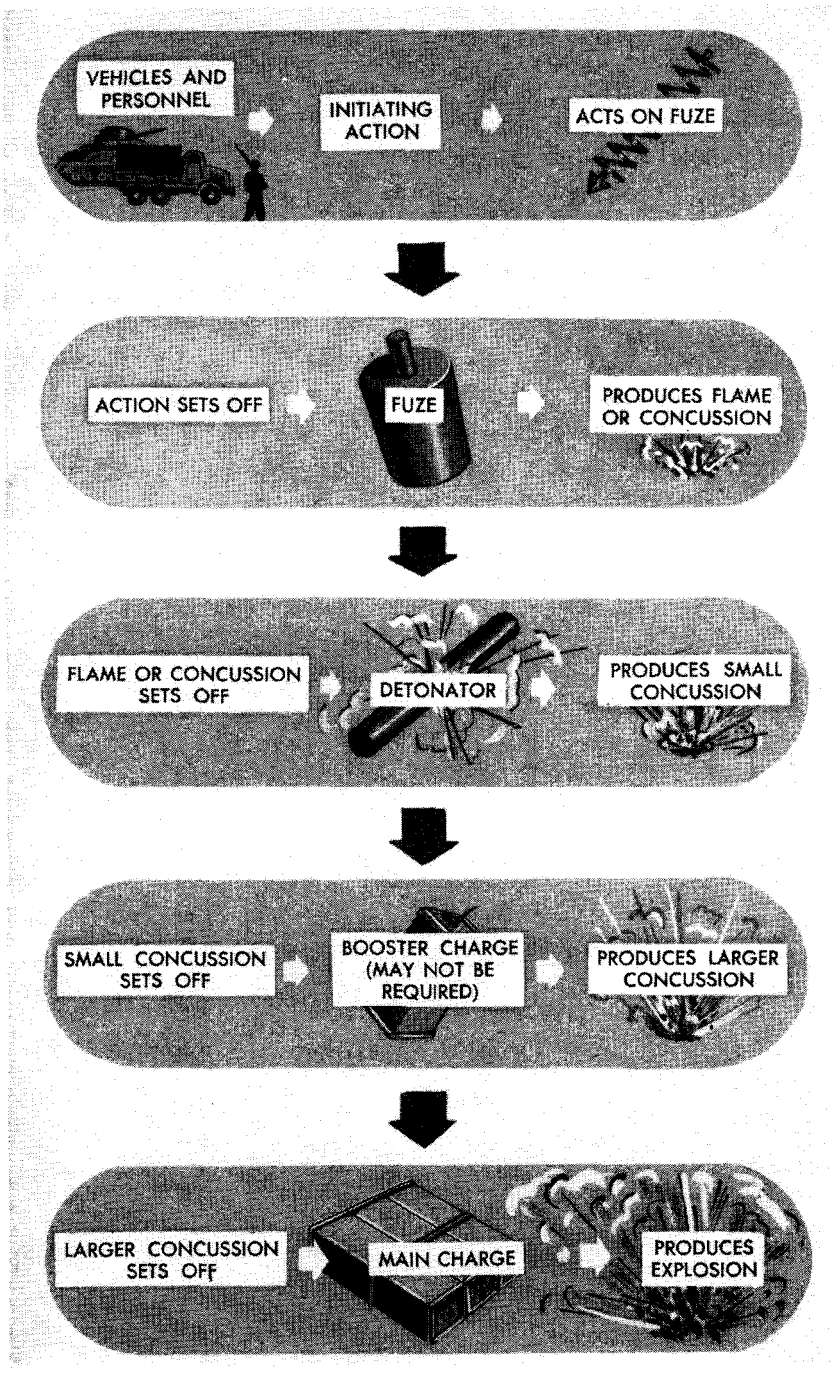


Figure 5. Firing chain of a mine.

f. An *activated mine* has a secondary fuze which will cause detonation when the mine is moved. The device can be attached either to the mine itself or to a second mine or auxiliary charge beneath or beside the mine (fig. 3).

g. *Sympathetic detonation* is the detonation of one or more charges induced by the explosion of another charge (fig. 4).

h. The *effective casualty radius of a mine* is that radius within which 50 percent of all personnel will become casualties when a mine is detonated. It is expressed in yards.

i. The *danger area of a mine* is that area within which fragments of a mine may produce casualties; however, personnel in this area, but outside the effective casualty radius, are relatively safe.

4. Firing Chain of a Mine

(fig. 5)

a. INITIATING ACTION. Personnel or vehicles, including tanks, initiate the action in the fuze by one of the following methods (fig. 6).

(1) *Pressure* on the fuze (fig. 6).

(2) *Pull* on a pin or pull ring attached to the fuze by means of a trip wire (fig. 6).

(3) *Pressure release* by removing an object from a compressed spring-actuated lever or plunger (fig. 6).

(4) *Tension* release by cutting a taut wire tied to a compressed spring-actuated striker (fig. 6).

(5) *Setting delayed-action mechanism* to actuate a fuze. This is nor-

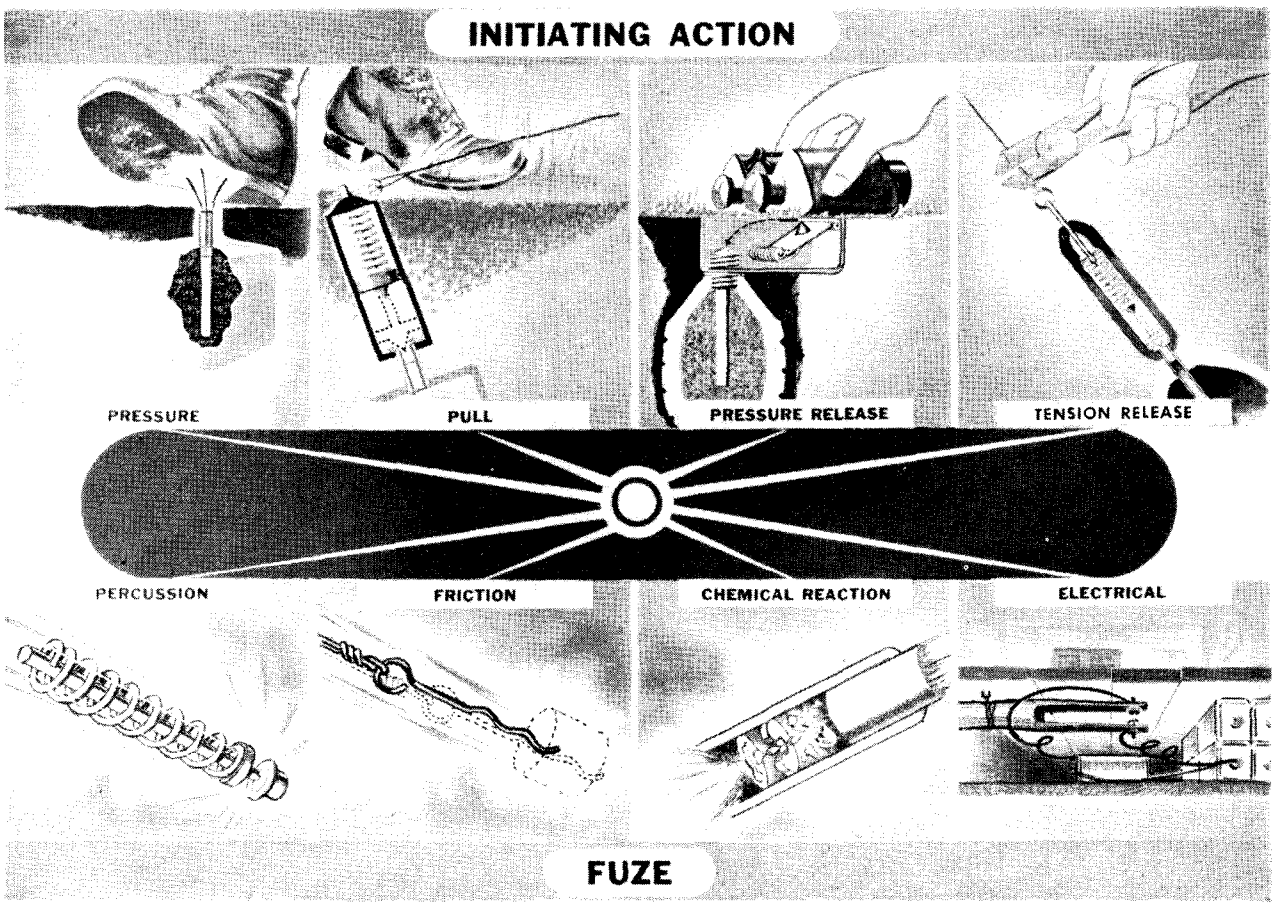


Figure 6. Various initiating actions and fuzes.

mally accomplished by setting a clock mechanism for a desired time delay in the actuation of a fuze (fig. 7). Sometimes this delayed-action mechanism consists of a vial containing a chemical which upon being released corrodes a striker-retaining pin or wire. Another way of obtaining a delayed action is to provide a chemical vial within the fuze. An application of any of the previously mentioned initiating actions will result in the chemical vial being broken. The desired time delay is the time required for the chemical to corrode the striker-retaining pin or wire.

(6) *Vibrations* induced by movement in water, air, ground, or structure, where a vibration-contact fuze is laid (fig. 8).

(7) *Frequency induction by—*

(*a*) Operating an electric mine detector over a pick-up coil of an induction fuze.

(*b*) Sending radio signals on the same frequency as that of the induction fuze (fig. 9).

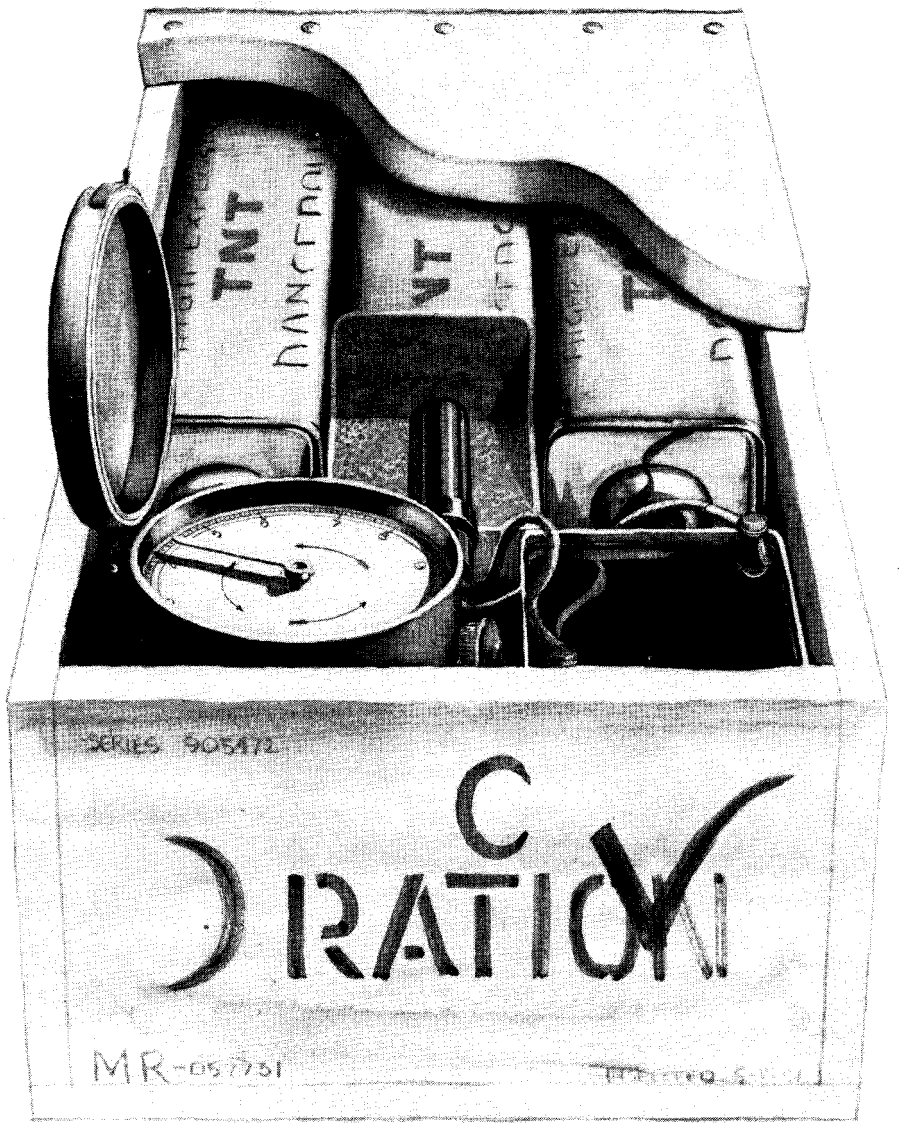


Figure 7. Clockwork delay mechanism.

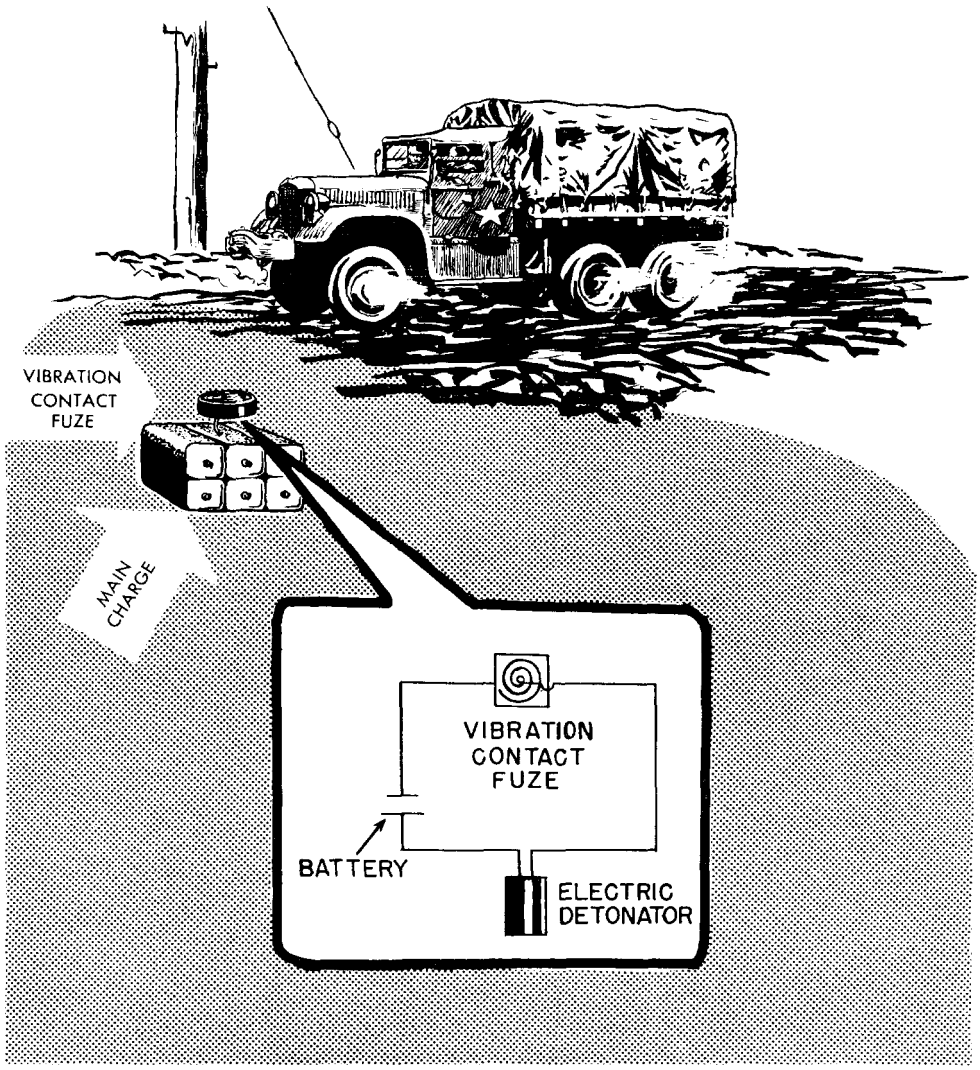


Figure 8. Vibration-contact fuze closes an electrical circuit.

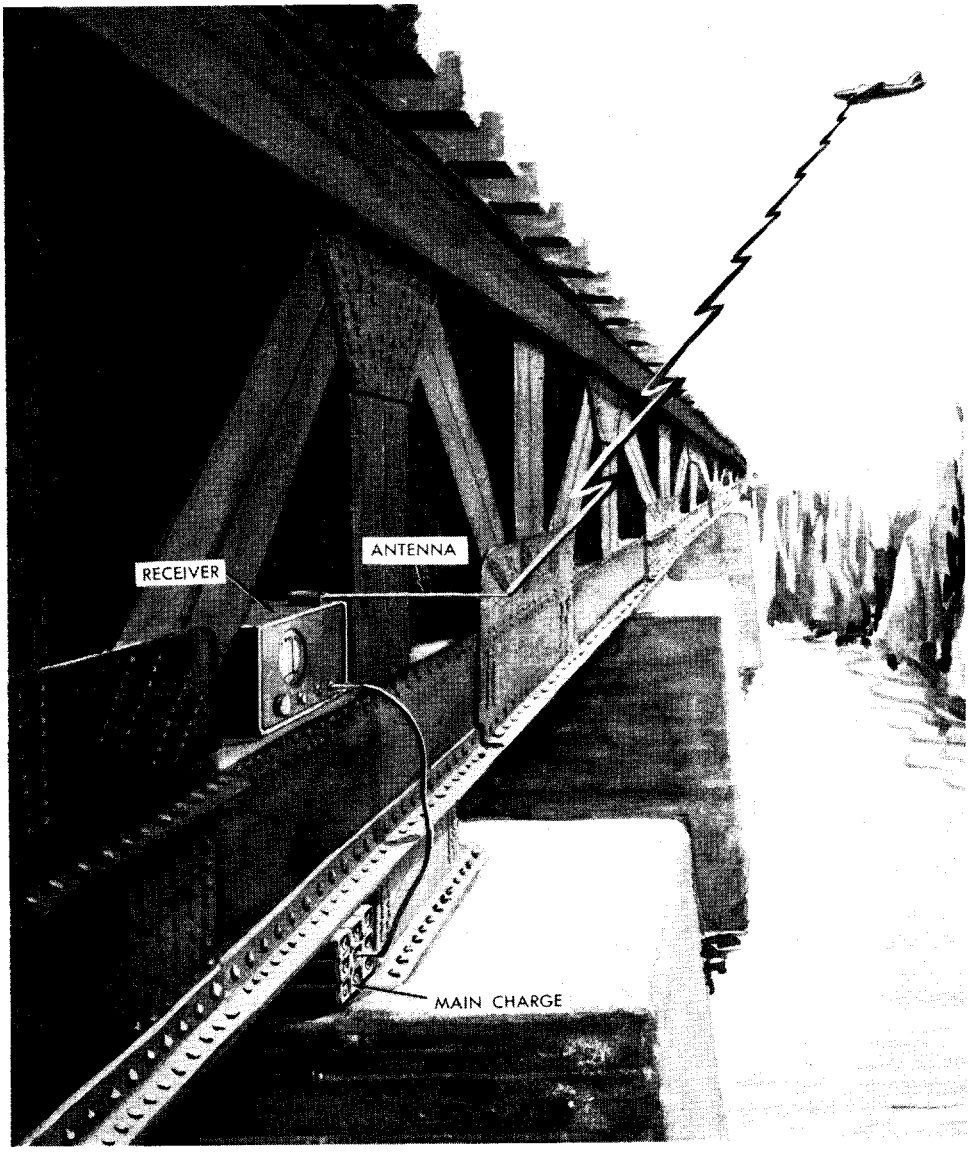


Figure 9. Radio receives signal from transmitter and relays impulse to detonator.

(8) *Magnetic induction* by moving a metallic mass over a magnetic type fuze (fig. 10).

(9) *Breaking a light beam* or otherwise completing an electric circuit (fig. 11).

b. FUZE. The initating action starts the fuze functioning. The fuze, in turn, ignites the detonator by one of the following means:

(1) *Mechanical.* A percussion cap within the fuze is fired by a mechanically released striker (fig. 6). The percussion cap in turn ignites a detonator. Ignition by friction, as shown in figure 6, is another mechanical method.

(2) *Chemical.* A small vial containing acid is broken. The chemical reaction of the acid with the explosive generates heat which sets off the explosion (fig. 6).

(3) *Electrical.* The closing of a circuit fires an electric detonator (figs. 6 and 12).

(4) *Chemical-electrical.* A chemical reaction causes an electric circuit to close.

(5) *Mechanical-chemical.* A chemical is used to corrode a pin holding a spring-loaded striker. When the pin is suffi-

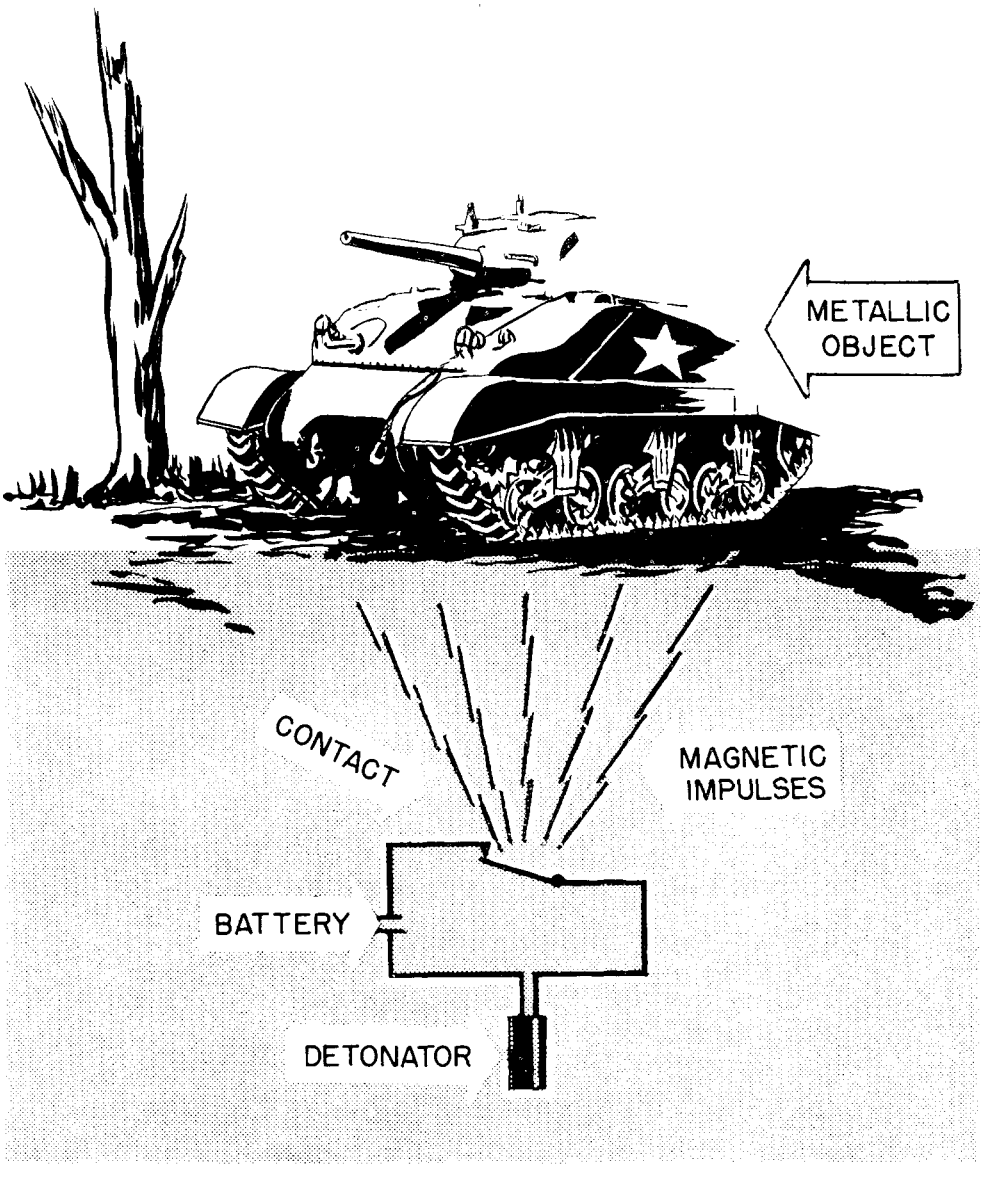


Figure 10. A metallic mass swings a magnetized lever to close a circuit.

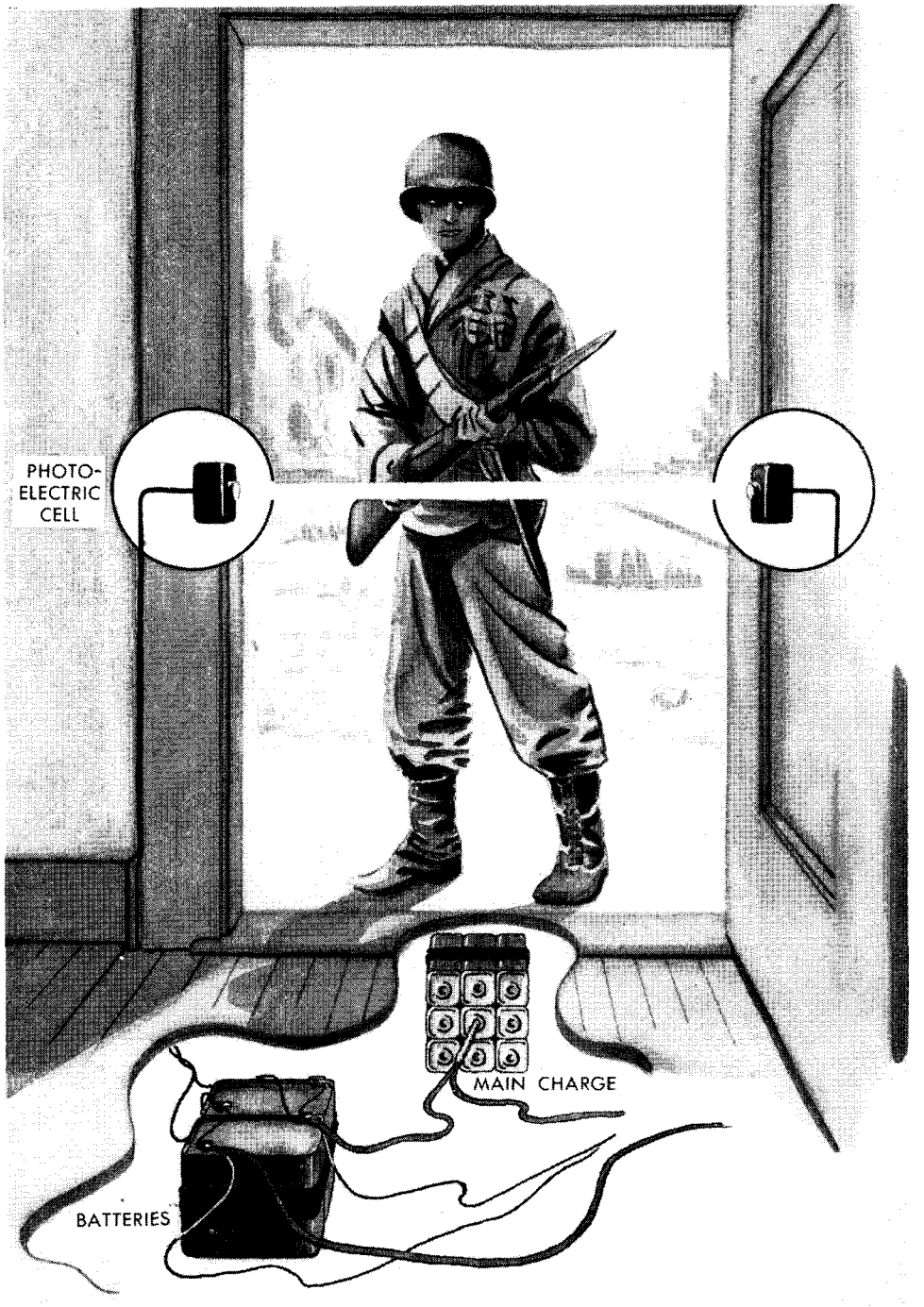


Figure 11. Electric circuit is completed when light beam is broken.

ciently corroded to break, it releases the spring-loaded striker.

c. DETONATOR. The detonator, a highly sensitive explosive, is set off by the flame or concussion of the fuze (fig. 5).

d. BOOSTER CHARGE. The booster charge consists of a less sensitive but more powerful explosive than that in the detonator and produces an intermediate explosion (fig. 5). A booster charge is not necessary in some mines.

e. MAIN CHARGE. The main charge, a relatively insensitive explosive surrounding and detonated by the booster charge or detonator, provides the destructive power of the mine (fig. 5).

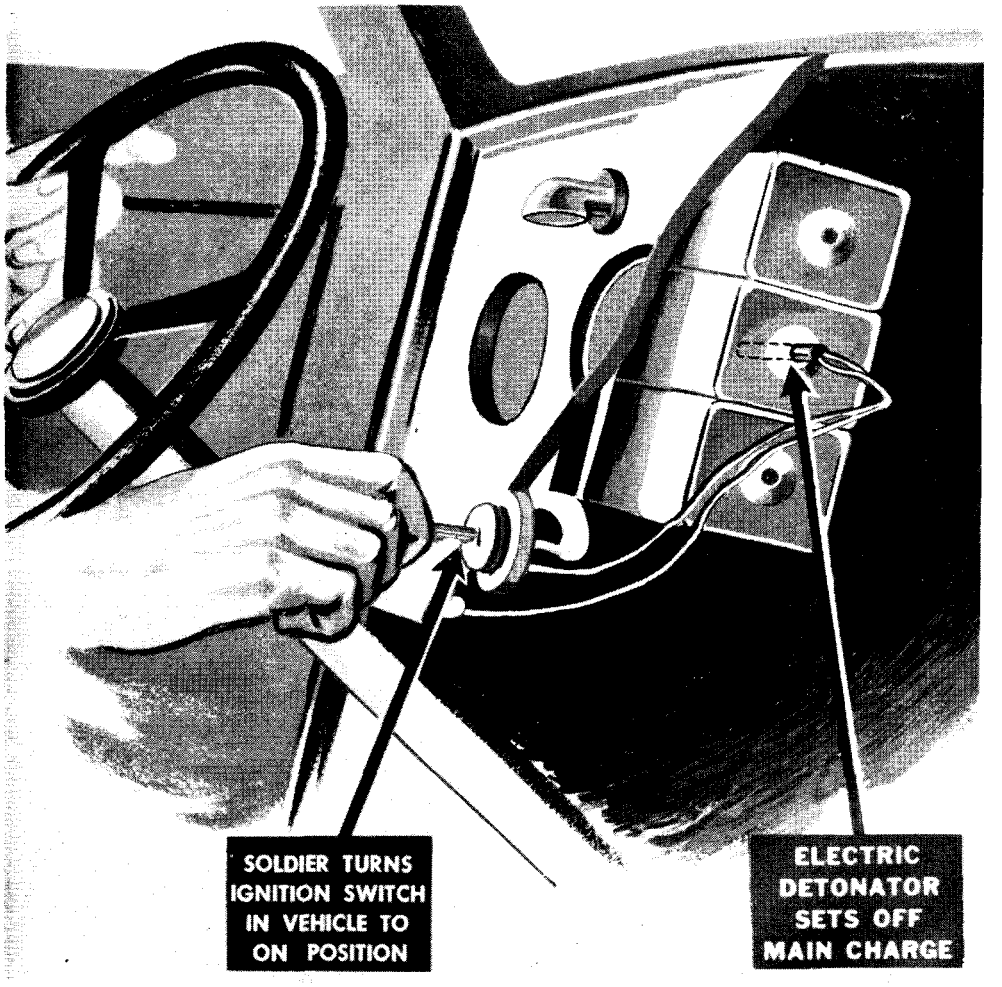


Figure 12. Ignition by electrical means.

CHAPTER 2

FOREIGN MINE WARFARE EQUIPMENT

5. Types of Mines

a. ANTITANK MINES. Antitank mines are designed primarily for immobilizing tanks. Although all of the major foreign armies have antitank mines, the amount of explosive in one mine is not sufficient in most cases to immobilize a tank. To accomplish the mission two or more mines are placed together.

b. ANTIVEHICULAR MINES. Antivehicular mines are designed primarily for immobilizing tracked or wheeled vehicles other than tanks. However, two or more of these mines are often placed together to immobilize tanks. All of the major foreign armies employ antivehicular mines. They are referred to as antitransport mines in the Soviet Army.

c. DUAL-PURPOSE MINES. Dual-purpose mines are designed both to immobilize vehicles and to produce casualties among personnel. Normally, these mines can be distinguished by the pressure-pull fuze used in them. The fuze is designed to be detonated by vehicles (pressure) and by personnel (pull). Many of the foreign armies use dual-purpose mines.

d. ANTIPERSONNEL MINES. Antipersonnel mines are used primarily to produce casualties to personnel. They may be placed to protect antitank mine fields and other obstacles, to give local security and warning, or as nuisance mines to harass and delay the enemy. Normally, they are not effective against armored vehicles but may inflict some damage on other vehicles. Antipersonnel mines found in foreign armies are of two general types—shrapnel mines which are designed to injure or kill more than one person and concussion mines designed to kill or injure only the person who steps on or actuates the mine. Antilifting devices and booby traps are classified as antipersonnel mines since they are primarily designed to inflict injuries upon personnel. All of the major foreign armies employ antipersonnel mines.

(1) *Antilifting devices.* An antilifting device is a mechanical or a combination mechanical and explosive device designed specifically to cause a mine to detonate when an attempt is made to lift or move the mine (fig. 13). Antilifting devices are primarily designed for an antipersonnel role. Certain types of fuzes, particularly pressure-released fuzes, are in effect antilifting devices as well as booby-trap mechanisms. Some armies, notably the German and Soviet, have produced antilifting devices for the

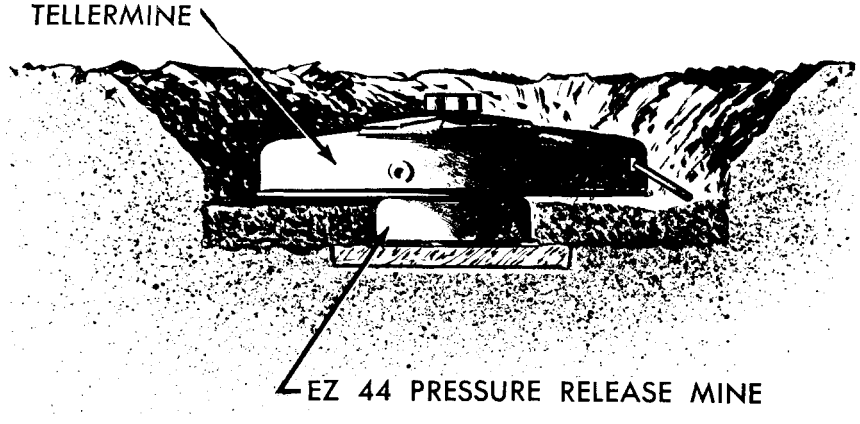


Figure 13. Antilifting device placed under a mine.

specific purpose of placing them under antitank and antivehicular mines to prevent safe removal of the mines.

(2) *Booby traps.*

(*a*) A booby trap is a hidden mine or charge with its firing mechanism placed in such a way that an unsuspecting person disturbing an apparently harmless object causes the mine or charge to detonate (fig. 14).

(*b*) Booby traps are especially intended to inflict casualties on and to destroy the morale of opposing forces. They are normally installed during a retrograde movement or during raids or patrols into the positions of the opposing forces. Booby traps may be encountered under any circumstances. They may be found attached to equipment, dead soldiers, and supplies. They may also be installed in abandoned buildings. Ingenuity of installation largely determines their effectiveness.

e. RAILROAD MINES. Railroad mines are designed specifically to wreck trains. In most instances, railroad mines incorporate a delay rather than an instantaneous type of fuze and are used as initating mines to detonate large charges buried in railroad beds. Germany, Italy, and Russia employed railroad mines in World War II.

f. BEACH MINES. Beach mines are primarily designed to destroy landing craft and amphibious vehicles, to hinder the landing of an opposing force, and to disable landed vehicles. They vary greatly in size, explosive content, and types of fuze used. The Japanese, in particular, employed beach type mines in World War II.

g. RIVER MINES. River mines are used to destroy floating bridges, fixed bridge piers, and river shipping. They vary considerably in size and explosive content. The usual method of functioning is by the use of pressure or pull fuzes. Germany and Russia employed river mines in World War II.

h. IMPROVISED MINES. Improvised mines are used when standard mines are unsuitable or unavailable for a particular mission. They are made by filling with an explosive any type of container, such as bottles, crates, sacks, barrels, and tin cans. Improvised mines may also be made of bombs, shells, or grenades fitted usually with a pressure or pull fuze. They are extremely dangerous to handle. The Soviet Army places much emphasis on improvised mines.

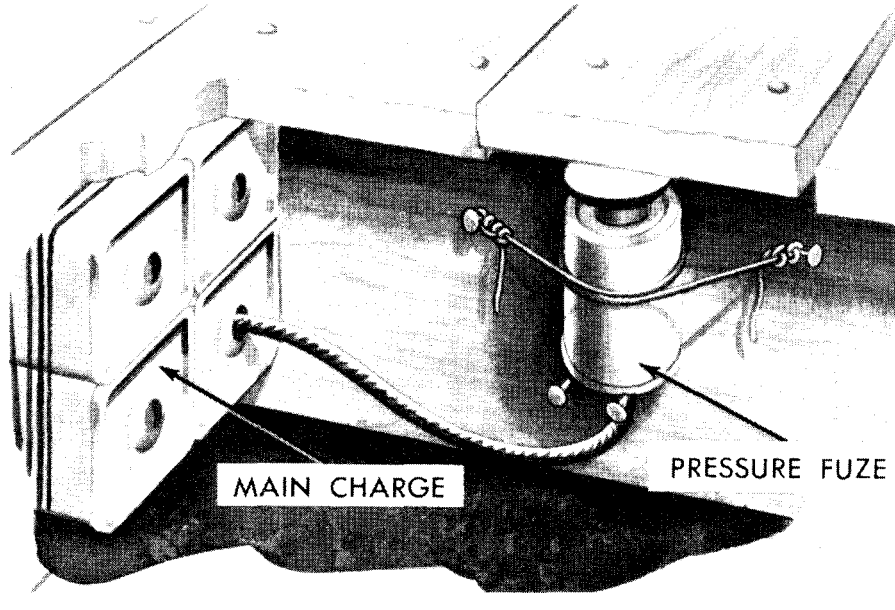


Figure 14. Booby-trap installation.

i. DUMMY MINES. Dummy mines can be made of any material available. They may be installed in dummy mine fields or may be used to supplement real mines in a live mine field to delay and confuse the enemy by making it necessary for him to consume time in investigating and removing them.

j. TRAINING MINES. Mines used in training contain no explosive charges but are similar in construction to standard mines. Various means are available for simulating detonation of the training mines. Training mines are called practice mines in United States mine warfare terminology.

k. OTHERS. A number of other types of mines are found in some of the foreign armies but the types listed above are common in most foreign armies and are employed in the greatest numbers.

6. Mine Laying, Marking, and Recording Equipment and Supplies

a. MINE LAYING DEVICES. Most armies today rely upon manpower to fuze mines, to prepare holes for them in the ground, and to arm and conceal them. Mine spacing cords and special tools are used by many armies to aid in spacing mines within a mine field and in actually preparing holes for individual mines. Some countries are experimenting with mechanical mine laying devices. The Germans developed a mine laying vehicle in the early part of World War II, but the device proved impracticable.

b. MINE MARKING EQUIPMENT. Mine marking equipment includes all items, such as special tags, flags, and tracing tape, used to mark mine fields and individual mines.

c. MINE RECORDING SUPPLIES. This type of material usually includes special reports, forms, maps, and other pictorial aids used to record the location of mine fields and individual mines.

7. Mine Detecting Equipment

Mine detecting equipment includes all devices, such as probes and electronic mine detectors, designed specifically for locating mines. Some countries experimented with substituting trained dogs for equipment to detect mines, but such practices proved impracticable.

8. Mine Clearing Equipment

Mine clearing equipment includes vehicle-mounted devices, such as tank-mounted flails, rollers, and drags, and propelled explosive devices. Manually operated mine clearing devices include grapnels, rollers, and explosive charges.

CHAPTER 3

NEUTRALIZATION AND REMOVAL OPERATIONS

9. Hand Neutralization of Mines and Fuzes

Troops must know how to neutralize foreign mines and fuzes. Although normally a mine field contains only a few activated mines, during a clearing operation it must be assumed that all mines are activated. Furthermore, troops must be familiar with the types and location of safeties on mines and fuzes. They must also know how to cut the firing chain of a mine to render the mine harmless.

a. SAFETIES. Organic safeties are built into practically all mines and fuzes (fig. 15). They are designed to nullify the initating action.

b. CUTTING THE FIRING CHAIN. A mine is harmless if the firing chain is cut. This is done by cutting any link in the chain, that is, by separating any two of its elements (fig. 16).

c. STEPS IN HAND NEUTRALIZING. The steps in hand neutralizing a buried mine are as follows:

(1) Carefully probe to locate the mine exactly.

(2) Carefully search around and under the mine, locating and neutralizing all secondary fuzes.

(3) Neutralize the mine by making the main fuze safe. Some foreign mines contain fuzes that cannot be made safe in any way. These mines should be neutralized either by destroying them in place with a prepared charge or by carefully lifting and carrying them to a safe place, where they are destroyed.

10. Removal of Mines

a. The following general rules should be applied when removing foreign mines.

(1) Handle all mines and fuzes with care at all times.

(2) Use only one man to work on a mine.

(3) Carefully examine the ground around a mine before starting to work on it.

(4) Constantly be on the lookout for booby traps.

(5) Prior to lifting a mine, neutralize all fuzes and cut any *slack* trip wires.

(6) When detonation of a mine in place is objectionable pull the mine clear with 50 yards of rope or signal cable.

(7) Take cover before you pull a mine, and do not come out for at least 10 seconds after you have pulled it. There may be a delay fuze. Examine the covered position for booby traps before occupying it.

(8) Never use force on a mine or booby trap. If a part cannot be removed without applying an undue amount of force, discontinue further attempts to remove the part.

(9) If you must leave a mine or booby trap unlifted, mark the location prominently.

(10) Never cut a taut wire; never pull a slack one. Look at *both* ends of a wire before you touch it.

(11) Neutralize antipersonnel mines by replacing all safety pins before you lift them.

(12) Keep your eyes on the ground in front of you when walking in a mine infested area.

(13) When cutting the wires of an electrical detonator cut them one at a time.

b. Mines can be removed by pulling them out from defilade with a long rope (fig. 17) or signal wire. If no defilade is at hand, a safe pulling distance is at least 50 yards. With this method, always remain in a prone position. Activated mines are normally detonated in this manner.

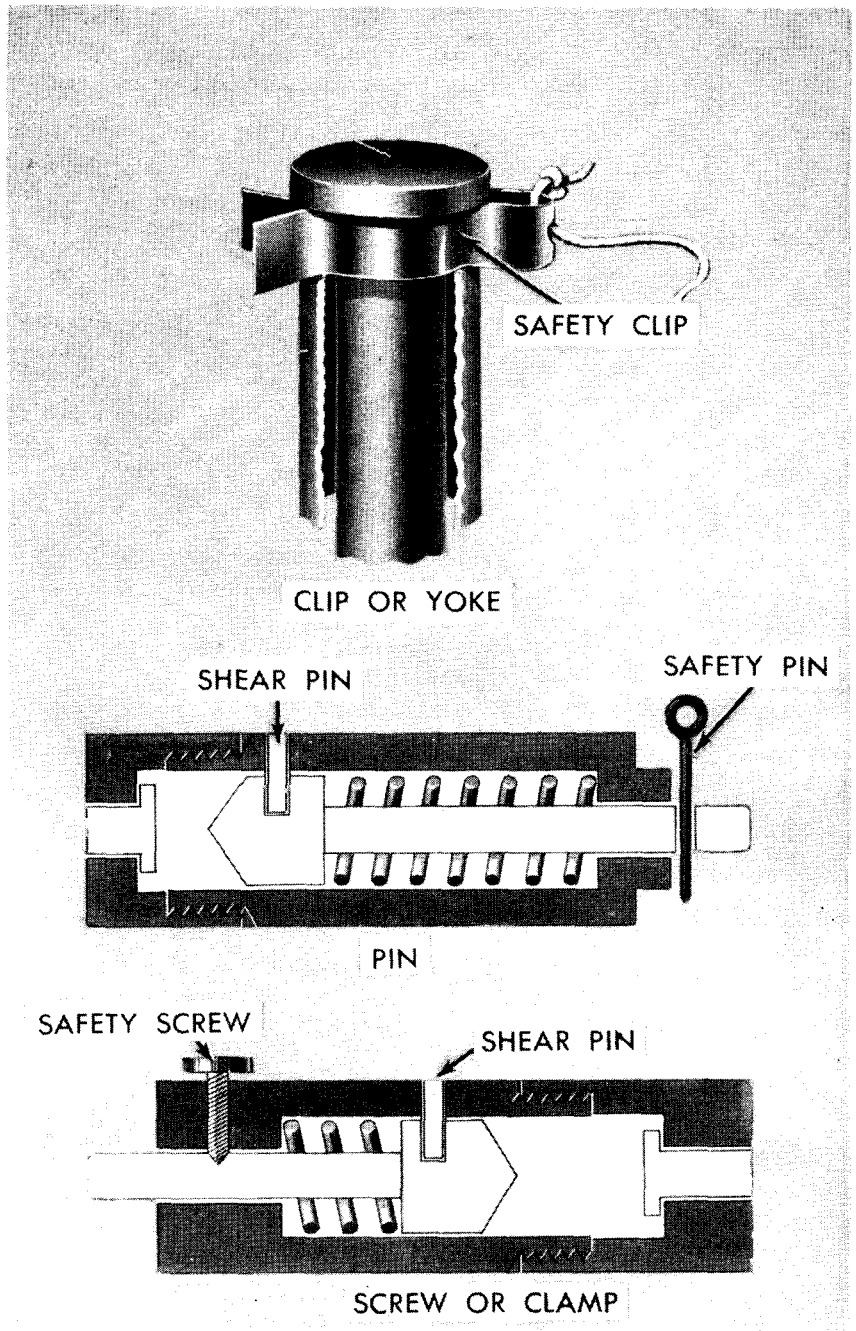


Figure 15. Types of safeties on different fuzes.

c. Mines can be neutralized by destroying them in place with hand-placed charges. The charges are placed on or beside the mines to be destroyed (fig 18). The mines themselves are not handled.

d. Improvised grapnels can be used to actuate charges fastened to trip wires. The grapnel is thrown out over the field and then pulled back. As it comes back, it trips the wires or cords, setting off the charges.

e. Mechanical and blast methods have been developed to neutralize mines by exploding them. Such mechanical and explosive devices are the scorpion or flail, various pressure-roller

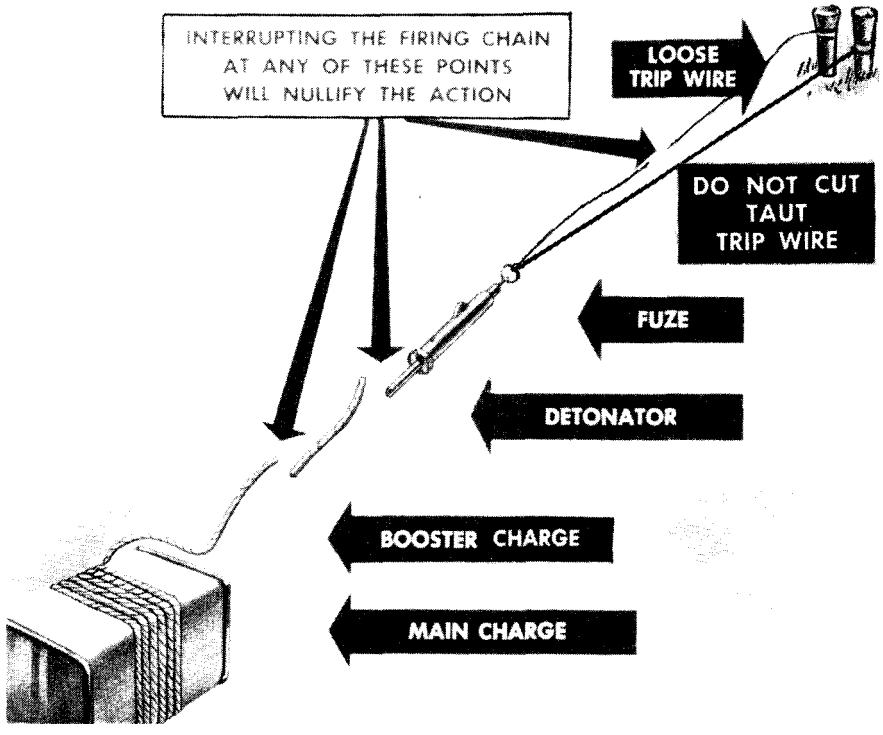


Figure 16. Interrupting the firing chain of a mine.

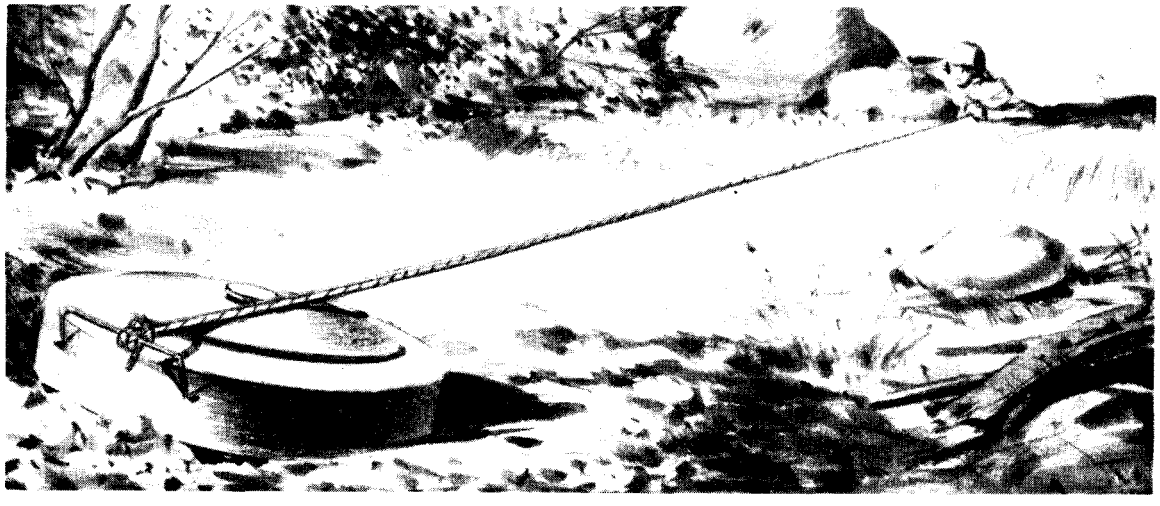


Figure 17. Removing a mine by rope from a safe distance of 50 yards.

devices, the various demolition snakes, bangalore torpedoes, and explosive mats or carpet rolls.

Figure 18. Placement of charges on mines to be destroyed in place.

f. In World War II, both the Germans and the Soviets employed artillery to clear gaps through known mine fields. Some countries have experimented with area bombing by aircraft to clear gaps through mine fields.

g. Wooden and cardboard mines that have been buried for long periods are dangerous to remove. Experience has shown that mines composed of wood or cardboard will deteriorate rapidly under humid or damp-soil conditions. If a wooden mine is subjected to alternate periods of dampness and dryness, the mine will undergo serious deformations resulting in large cracks which will permit the entrance of soil moisture into the explosive chamber. In some wooden and cardboard mines the explosive filler hole is sealed with tar. This tar will develop cracks after continuous exposure. Wooden pressure lids that contain grooves to assist detonation will rot in the grooves and will detonate readily when pressure is brought to bear on the pressure lid with a mine probe. Mine field clearing personnel must be cautioned in the use of the mine probe when the mines are known to be in an advanced state of deterioration. The mine probe should be held at the smallest practicable angle to the ground so as to come into contact with the side of the mine instead of the pressure lid. In many cases the only practicable method of mine removal will be the use of demolition charges. Care must be taken to see that all personnel are removed from the area before any demolition charges are detonated. Entire mine fields have known to explode from sympathetic detonation. Mine fields composed of wooden and cardboard mines which are deteriorated are particularly susceptible to sympathetic detonation.

h. Metallic mines that have been buried for long periods of time are dangerous to remove. They will rust to such an extent that it becomes impossible to detect their location with the mine detector. In general, mines of metallic construction which use waterproof seals will withstand the action of soil moisture better than wooden or cardboard mines. Eventually, however, the mine body will rust and the explosive will become contaminated.

i. Some types of fuzes become extremely sensitive when they are exposed to soil moisture. These types should be removed by placing demolition charges or using tank rollers and other devices which will permit the removal of the mines without undue exposure of personnel.

PART TWO

SOVIET MINE WARFARE EQUIPMENT

CHAPTER 4

INTRODUCTION

11. Data Presented

The majority of the data presented here on Soviet mine warfare equipment is based on World War II German combat reports. Data from available Soviet manuals, Korea, and other foreign sources have been included. Discrepancies, chiefly in weights and dimensions, have been discovered in information from several sources on the same item of equipment. Wherever possible, information in this manual is based on actual equipment from Korea or is taken from Soviet manuals. Although the camouflage operation is not outlined in installing and arming procedures it will be accomplished at all times. It is requested that any reader possessing information that modifies or contradicts the data contained in this manual or who encounters Soviet mine warfare equipment not discussed herein forward such information to—

Office of Assistant C/S, G 2
Washington 25, D.C.

or

The Office, Chief of Engineers
Attn: Engineer Intelligence Division
Washington 25, D.C.

12. Soviet Mine Warfare Doctrine

The Soviet Army placed so much importance on mine warfare that special mine units of up to battalion size were organized and employed in World War II. Unlike many armies, the Soviet Army teaches field improvisation of mines and the employment of captured mines. German combat reports state that the average Soviet combat soldier is adept in the use of mine warfare equipment and is particularly ingenious in installing improvised mines and booby traps.

13. Soviet Mine Warfare Equipment Glossary

The glossary gives Russian terms and abbreviations with their English transliteration and translation. It will aid in identifying and using Soviet mine warfare equipment from the markings stamped or painted on such equipment.

CHAPTER 5

FUZES

Section I. GENERAL

14. Soviet Classification of Fuzes

Soviet fuzes are classified as mechanical, chemical, or electrical, depending on the type of internal action used to explode the detonator. The Soviets use the term *exploders* for all types of mechanical and chemical fuzes and *circuit closers* for electrical fuzes.

15. Types of Fuzes Used

During World War II, the Soviets used either the MUV or the MV 5 mechanical fuze in the majority of their land mines. They also used a wide variety of electrical and chemical types of instantaneous and delayed-action fuzes in their improvised mines and booby traps. In Korea only the MUV and the MV 5 have been used, although the CHMV 10 and the CHZ 10 delay fuzes have been found in captured supply dumps. In World War II, the electric-contact types of fuzes most frequently encountered by the Germans were the ChVZ vibration fuze, the F. 10 radio-controlled fuze, and the PZ 12 railroad fuze.

Section II. MECHANICAL FUZES

16. Wooden Pressure Fuze

a. DESCRIPTION. The Soviet wooden pressure fuze (fig. 19) is an instantaneous, mechanical, pressure type fuze containing a friction-match ignition with a shear-pin release. It has two parts. The lower part contains a pressure plug, a storm match (friction compound on one end of a small, thin stick), and a percussion cap. A cardboard encased detonator fits into the bottom of this compartment. The upper part consists of a wooden pressure cap, 1 inch in diameter, containing a safety pin. The fuze (less detonator) is 2 3/32 inches high.

b. EMPLOYMENT. This fuze is used in nonmetallic improvised mines and in pressure-actuated booby traps.

c. FUNCTIONING.

(1) Pressure on the wooden pressure cap depresses the pressure plug, driving the storm match through the hole lined with friction material.

(2) The match ignites, firing the percussion cap.

(3) The percussion cap fires the detonator.

d. INSTALLING AND ARMING.

(1) Insert the cardboard detonator in the fuze.

(2) Place the fuze in the charge or mine.

(3) Remove the safety pin.

e. NEUTALIZING.

(1) Insert a safety pin or wire into the pressure cap and through the pressure plug.

(2) Remove the fuze.

(3) Remove the detonator.

17. Wood-Capped Metallic Pressure Fuze

a. DESCRIPTION.

This fuze (fig. 20) is an instantaneous, mechanical, pressure type containing a spring-loaded striker with a shear-pin release. It closely resembles the wooden pressure fuze (par. 16) but has a metallic body which houses a spring-loaded striker. A plunger is held in position by a shear pin and the striker shaft slides into the hollow end of the plunger. The striker is also held by a shear pin. A spring-retain-

ing cap is attached to the end of the hollow plunger. The dimensions are the same as for the wooden pressure fuze.

b. EMPLOYMENT. This fuze is used in nonmetallic improvised mines and in pressure-actuated booby traps.

c. FUNCTIONING.

(1) Pressure on the wooden pressure cap shears the shear pin holding the plunger.

(2) The released plunger rides down under further pressure until the spring-retaining cap bears against the striker head.

(3) Continuing pressure shears the striker-retaining shear pin and releases the spring-loaded striker.

d. INSTALLING AND ARMING.

(1) Insert the cardboard detonator in the fuze.

(2) Place the fuze in the charge or mine.

(3) Remove the safety pin.

e. NEUTRALIZING.

(1) Insert a safety pin or wire into the pressure cap and through the plunger.

(2) Remove the fuze.

(3) Remove the detonator.

18. MV-3 Pressure Fuze

a. DESCRIPTION. This fuze (fig. 21) is an instantaneous, mechanical, pressure type containing a spring-loaded striker with a ball release. It is made of aluminum alloy and is cylindrical in shape. It measures about 3¼

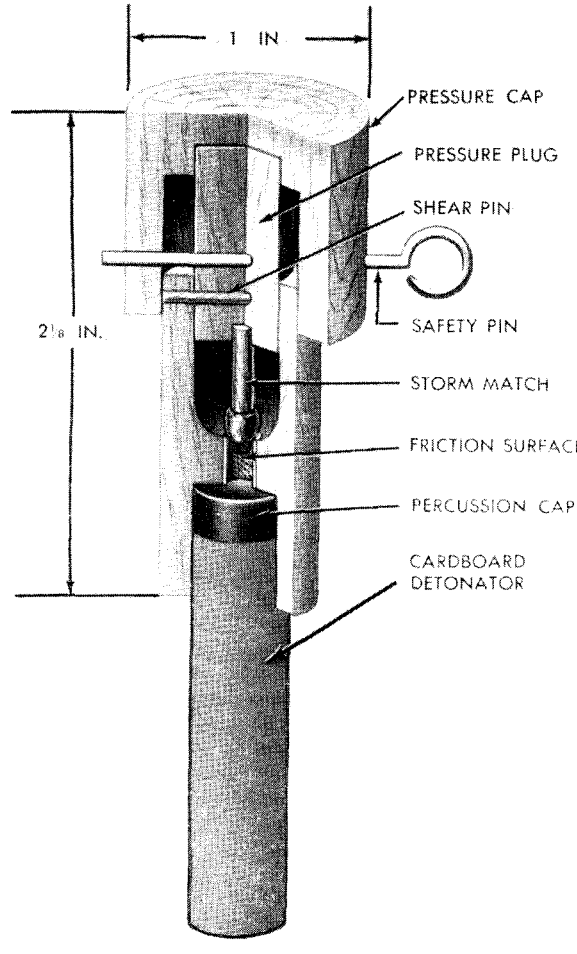


Figure 19. Wooden pressure fuze.

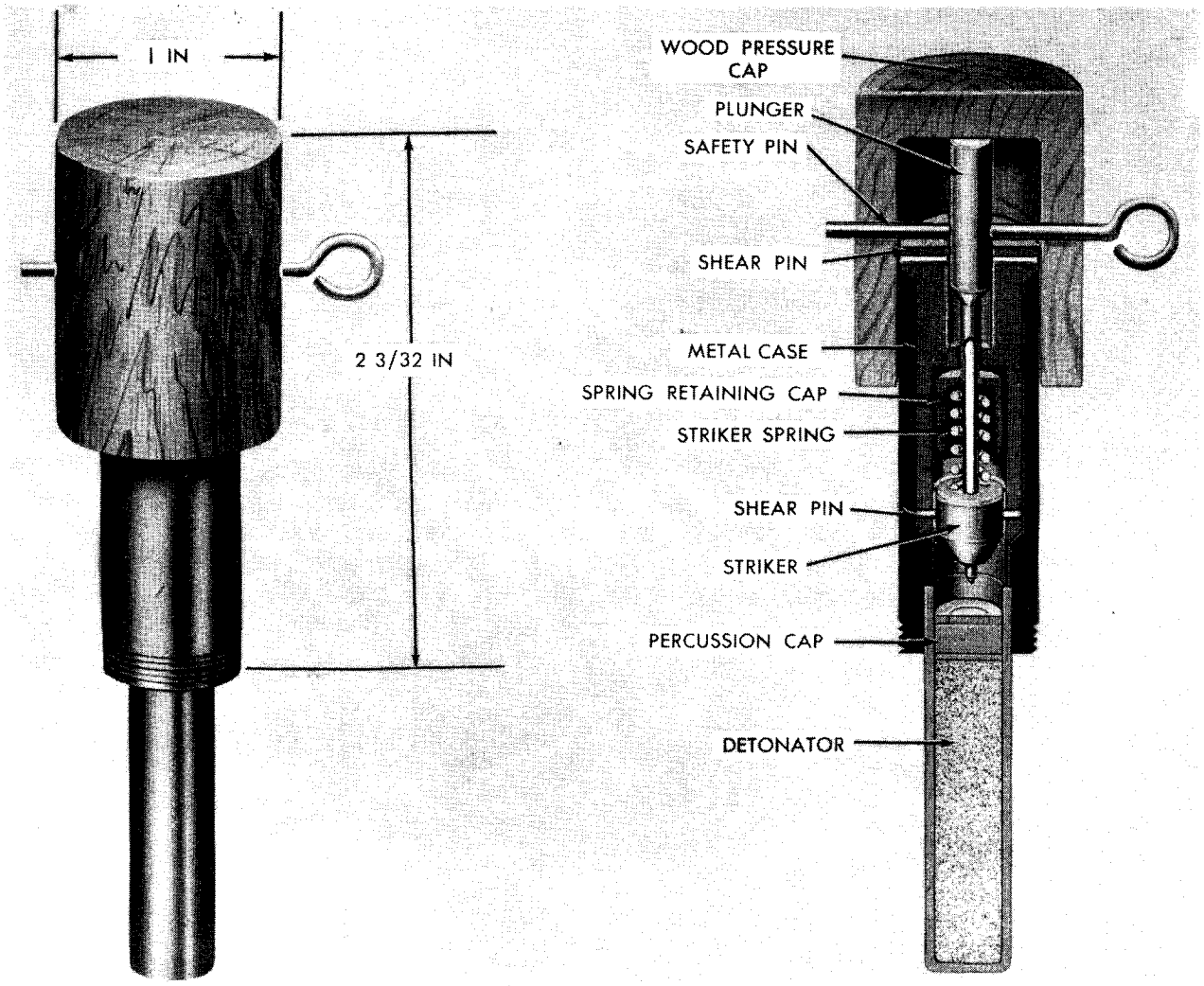


Figure 20. Wood-capped metallic pressure fuze.

inches in height and 1½ inches in diameter and weighs about 12 ounces. A spring-loaded striker is held by two striker-retaining balls to a hollow plunger, the upper end of which projects through the top of the fuze in the form of a square plunger bolt. A hemispherical, soft sheet-metal head is soldered to the fuze and to the plunger bolt. One horizontal recess and two vertical recesses are provided in the fuze housing for entry of the striker-retaining balls. A metal encased booster charge is screwed on the base of the fuze as a part of the fuze. The fuze has no safety device.

b. EMPLOYMENT. This fuze was designed specifically for use in the PMZ–40 dual-purpose mine.

c. FUNCTIONING.

(1) *Under pressure.* Pressure of about 150 pounds on the pressure bolt crushes the soft sheet-metal head, depressing the plunger and striker until the striker-retaining balls release the striker by escaping into the horizontal recess (fig. 21).

(2) *Turning the pressure bolt.* Turning the pressure bolt results in the escape of the striker-retaining balls into the vertical recesses, thus releasing the striker (fig. 21).

d. INSTALLING AND ARMING. The fuze comes armed and is merely inserted in the fuze well of the mine.

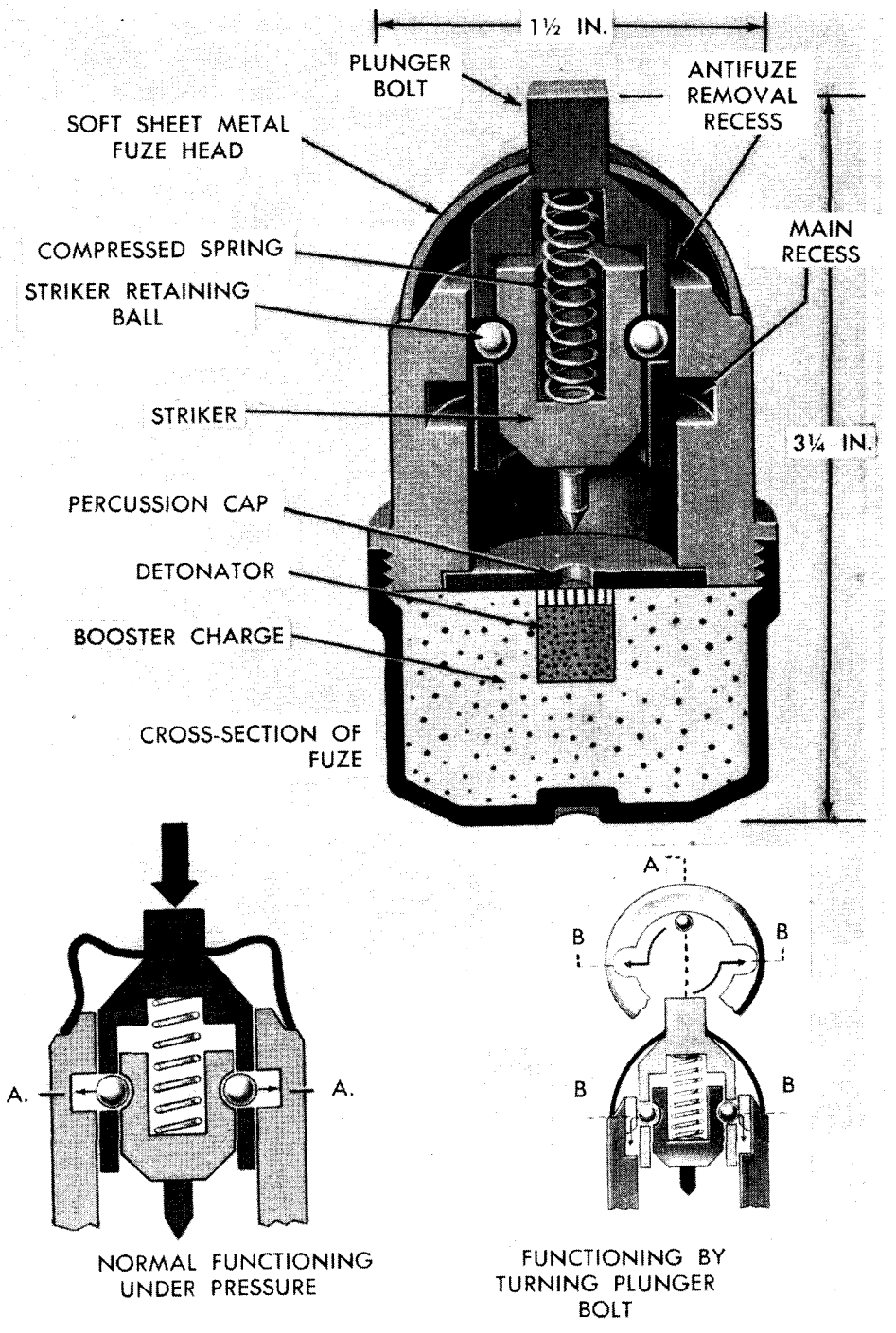


Figure 21. MV-3 pressure fuze.

c. NEUTRALIZING. See paragraph 83.

19. MV-5 Pressure Fuze

a. DESCRIPTION. The MV 5 pressure fuze (fig. 22) is an instantaneous, mechanical, pressure type containing a spring-loaded striker with a ball release. It has a metallic pressure cap and a metallic body. A plastic model of this fuze, called the MV 5K, exists in the Soviet Army.

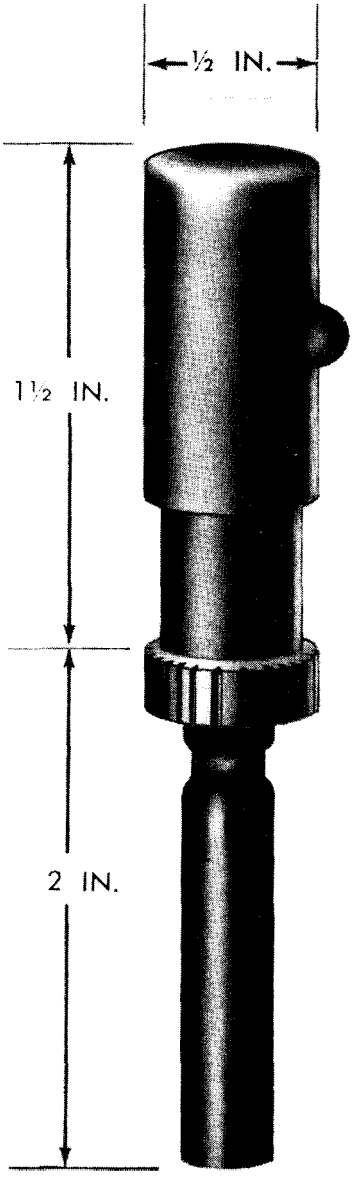


Figure 22. MV-5 pressure fuze.

b. EMPLOYMENT. This fuze is the most commonly employed Soviet pressure fuze and is used in the following mines: the TM 41, TM 44, TMB 1, TMB 2, TMSB, and TMD B antitank mines; and the PMZ 40 and horseshoe dual-purpose mines.

c. FUNCTIONING. Pressure of at least 22 pounds on the metallic pressure cap depresses it and at the same time compresses the striker spring, until the striker-retaining ball moves into the ball-escape recess in the metallic pressure cap and releases the striker against the percussion cap.

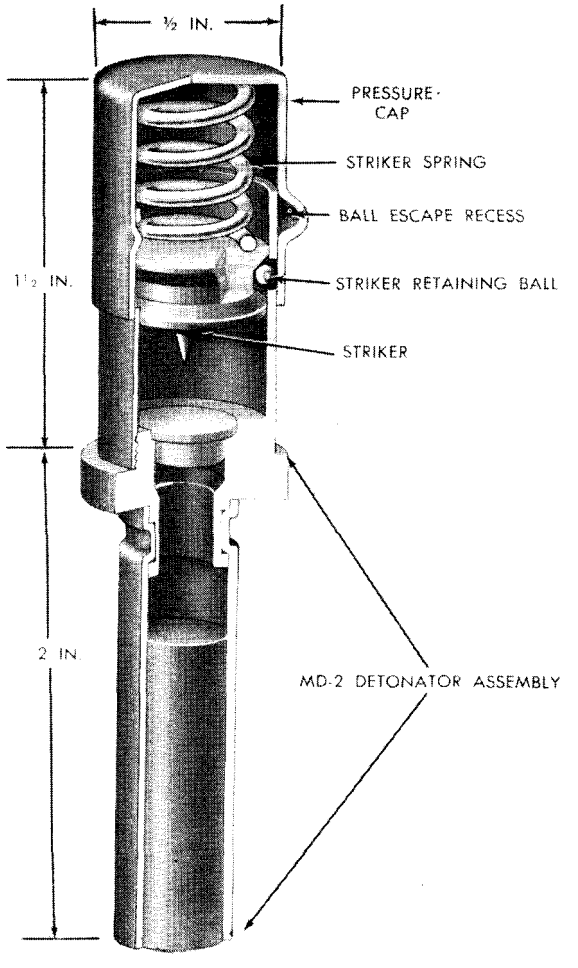


Figure 22.—Continued.

d. INSTALLING AND ARMING. Screw an MD 2 detonator assembly into the base of the fuze. There are no safety devices in this fuze.

e. NEUTRALIZING. Without exerting any pressure on the pressure cap, unscrew the detonator assembly from the fuze.

20. PV-42 Railroad Pressure Fuze

a. DESCRIPTION. This fuze (fig. 23) is an instantaneous, mechanical, pressure type containing a spring-loaded striker with a trigger release. It consists of a rectangular metal case with a hinged lid. A two-section metal rod is screwed into the middle of the lid. The top half for height adjustment. The body of the fuze contains a metal striker-release trigger in a housing. The trigger rests on two springs at one end of the box. The bottom of the trigger engages in a recess in the end of the striker and holds the striker and its spring under compression. The other end of the fuze is recessed and threaded to receive an MD-2 detonator assembly. A safety pin prevents the trigger from moving.

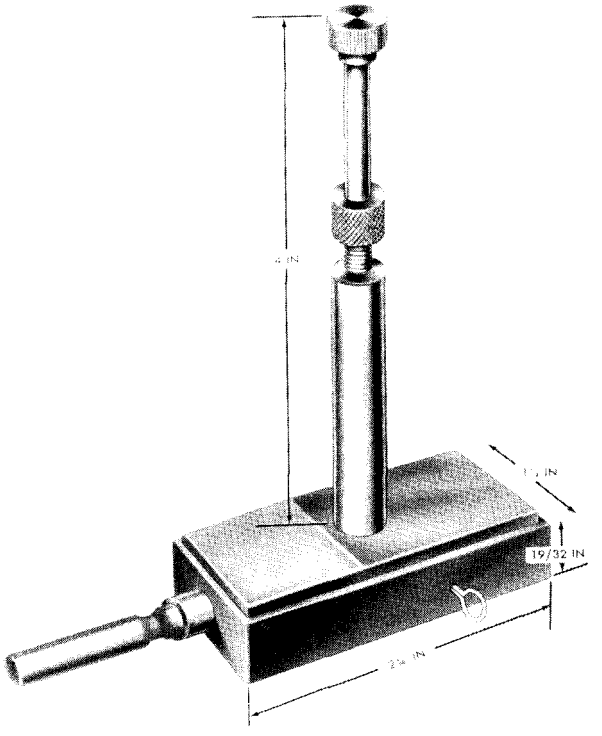


Figure 23. PV-42 railroad pressure fuze.

b. EMPLOYMENT. The Soviets used this fuze primarily with improvised railroad mines. The rod is adjusted under the rail until the top of the rod is flush with the bottom of the rail. The fuze was also used with improvised mines under bridges. Sometimes the fuze was installed with the detonator directly inserted into the charge; at other times, detonating cord was inserted between the detonator and charge, the length depending upon the desired distance between the charge and fuze.

c. FUNCTIONING. Pressure of 25 to 40 pounds on the pressure rod depresses the hinged lid which, in turn, presses on the trigger, compressing the springs until the bottom of the trigger is pushed out of the recess in the end of the striker. This releases the spring-loaded striker against the percussion cap.

d. INSTALLING AND ARMING.

(1) Arm the fuze at the place of use by inserting the striker and spring into the open end of the fuze with the recess in the striker facing downward.

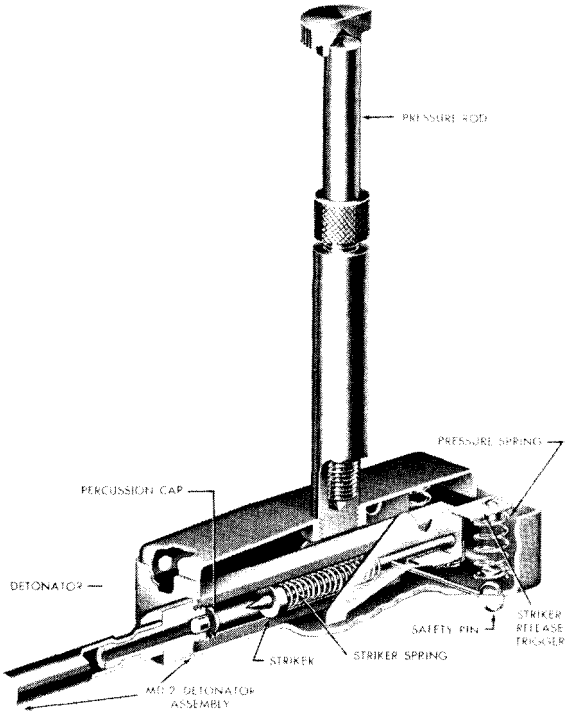


Figure 23.—Continued.

(2) Unscrew the top of the pressure rod and use it to push the striker back, compressing the spring, until the recess in the end of the striker engages in the bottom of the trigger and cocks the striker.

(3) Insert the safety pin.

(4) Replace the pressure rod.

(5) Screw the MD 2 detonator assembly into the fuze and insert the fuze into the charge, or connect the detonator to the charge with the detonating cord.

(6) Adjust the pressure rod so it will be flush with the bottom of the rail (par. 28*d* (1) and (4)), board, or other elastic surface.

(7) From defilade, remove the safety pin by pulling it out with a cord.

e. NEUTRALIZING.

(1) Uncover the fuze.

(2) Insert a nail or wire through the safety-pin hole.

(3) Cut the detonating cord, if any.

(4) Unscrew the pressure rod without pressing on the lid of the fuze.

(5) Unscrew the MD 2 detonator assembly.

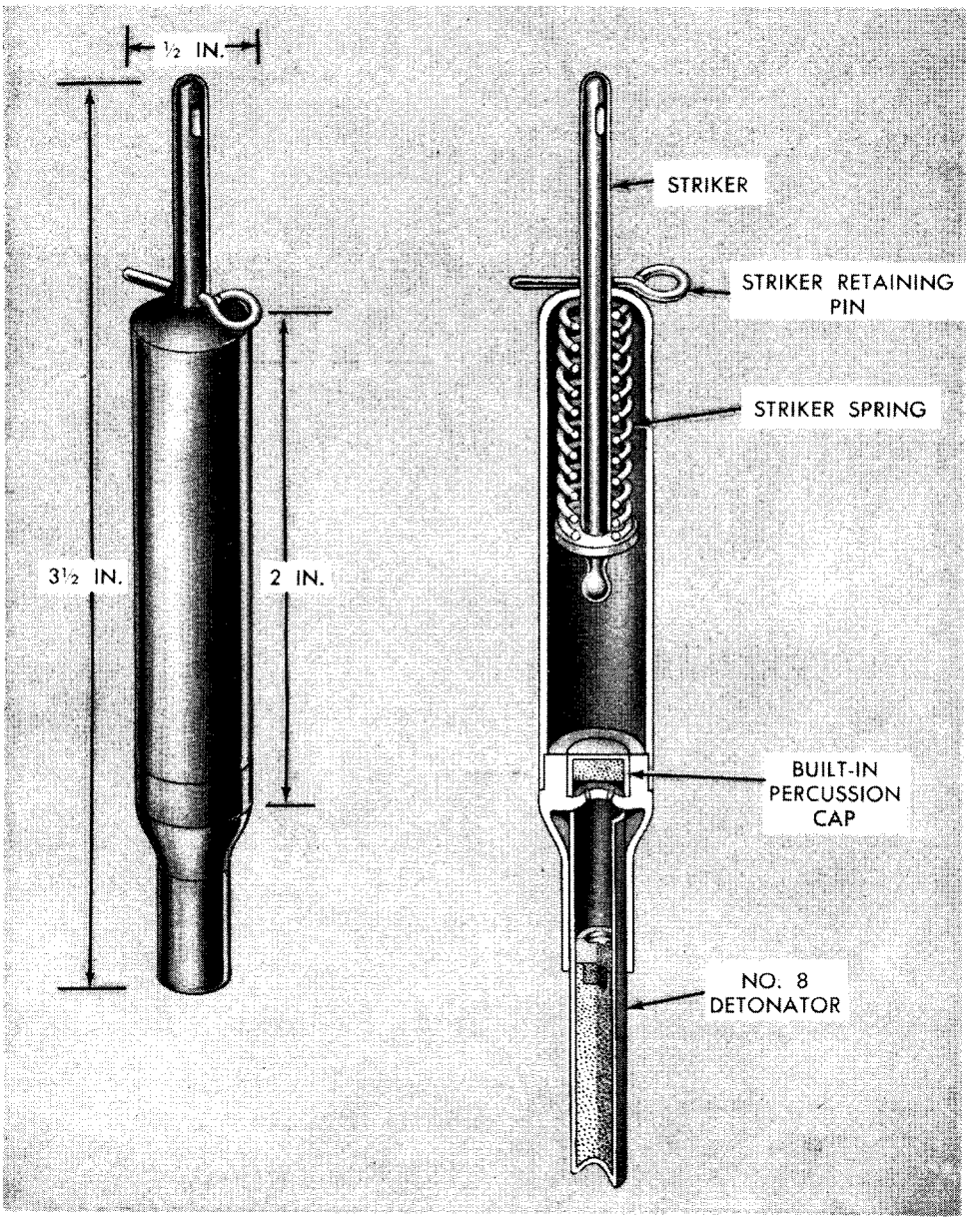


Figure 24. UV pull fuze.

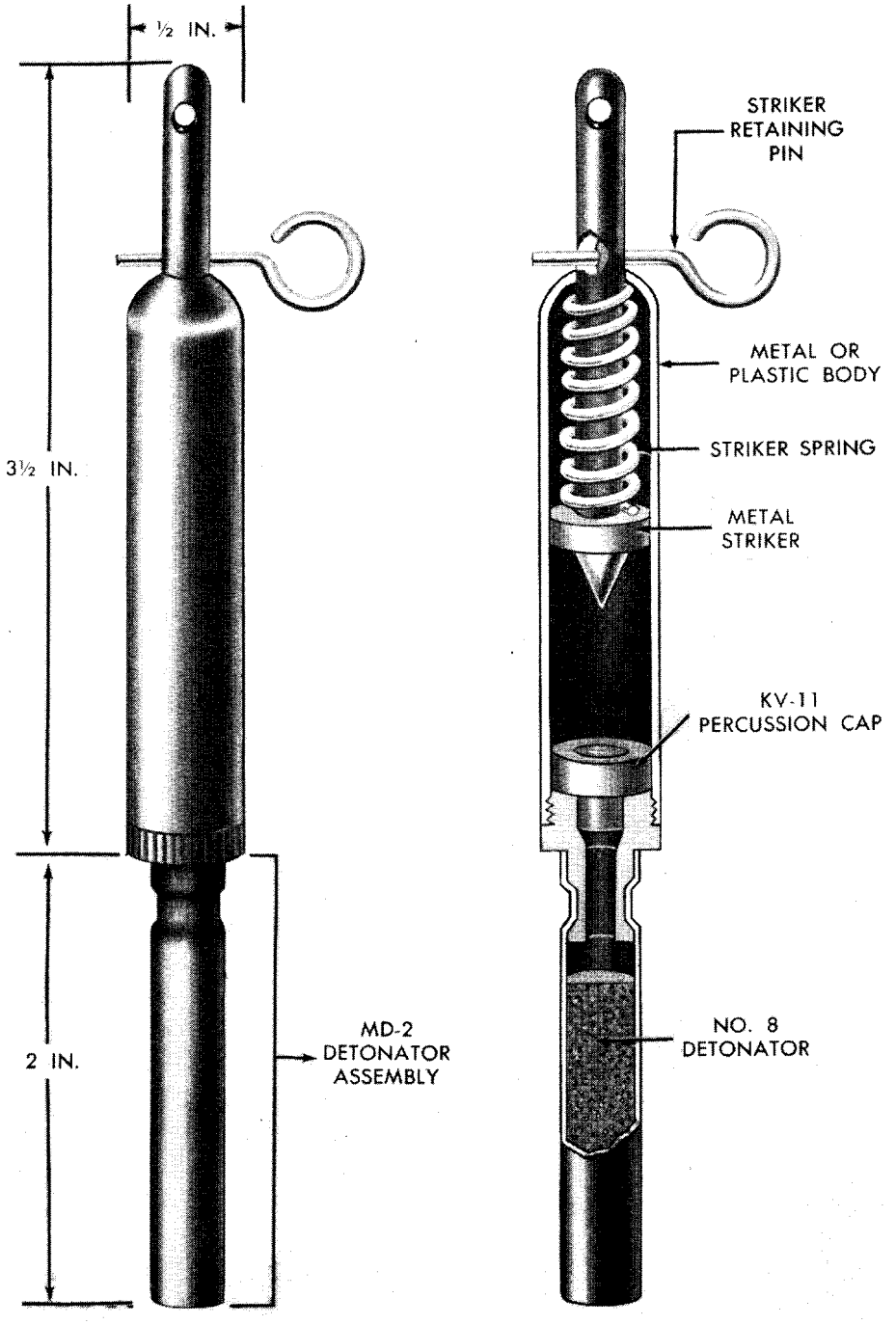


Figure 25. MUV pull fuze.

21. UV Pull Fuze

a. DESCRIPTION. The oldest Soviet fuze of its type, the UV (fig. 24) is an instantaneous, mechanical, pull type containing a spring-loaded striker with a striker-retaining-pin release. It consists of a metal tube, about 2 inches long and ½ inch wide, containing a spring-loaded striker. The end of the striker bolt projects through the top of the fuze housing and has two holes through it. The outermost hole is for a transit pin while the fuze is being carried uncocked. The inner hole is exposed by pulling on the striker end. It is the hole through which the striker-retaining pin is inserted to hold the striker in the armed or cocked position (fig. 24). A percussion cap is built into the base of the fuze. The base is narrowed and just large enough in diameter to permit a nonelectric detonator to be inserted, open end first.

b. EMPLOYMENT. This fuze was used in World War II Soviet pull action mines and booby traps. It was replaced by the MUV pull fuze.

c. FUNCTIONING. Pull of a few pounds on the striker-retaining pin pulls the pin out of the striker, releasing the striker against the percussion cap.

d. INSTALLING AND ARMING.

(1) Pull the striker outward with the transit pin and insert the striker-retaining pin in the lower hole.
(2) Remove the transit pin.
(3) Insert a detonator, open end first, into the base of the fuze.

e. NEUTRALIZING.

(1) Cut any trip wires attached to the eye of the striker-retaining pin.
(2) Pull the fuze out of the mine or charge and pull out the detonator.

22. MUV Pull Fuze

a. DESCRIPTION. The MUV pull fuze (fig. 25) is an instantaneous, mechanical, pull type containing a spring-loaded striker with a striker-retaining-pin release. It is a modernized UV pull fuze (par. 21). It differs from the UV fuze by having an internally threaded base into which an MD 2 detonator assembly is screwed when the fuze is to be inserted in a mine or charge. The striker head is slightly different from the UV fuze (compare figs. 24 and 25). A safety sleeve may be provided for carrying the fuze in the cocked position (fig. 26). Some models of this fuze employed in Korea have had plastic bodies with metallic strikers and mainsprings. The fuze is nearly identical with the British percussion pull fuze, the German ZZ 42 fuze, the Italian 1-pound antipersonnel mine fuze, and the Finnish pull fuze used in their antipersonnel shrapnel and wooden antipersonnel mines. The MUV pull fuze may be provided with a loop and wing type striker-retaining pin.

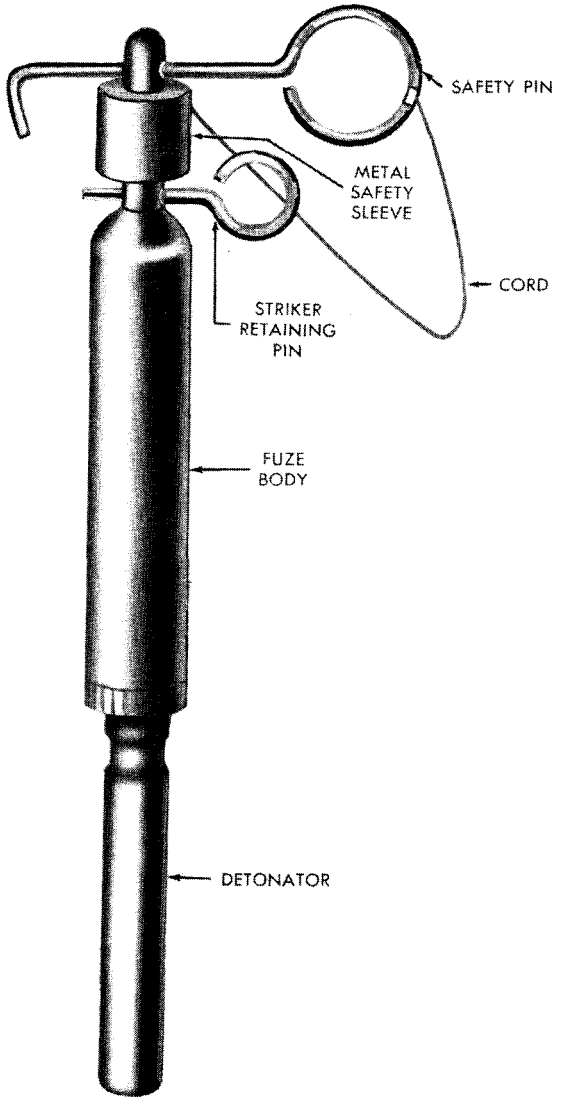


Figure 26. Safety attachment for MUV pull fuze.

b. EMPLOYMENT. This is the most commonly used mechanical pull fuze in the Soviet Army. It is employed in the following mines: TM-35, TM-38, T IV, TM 39, TM 35(M), dog mine, asbestos mine, YaM series of antitank mines, Ovtsinnikov mine, lever mine, VMG see-saw winter mine, tilt rod mine, vise mine, fragmentation and tread mine, POMZ 2 mine, pot mine, PMD series of mines, and the wooden box mine. The fuze is also used in many improvised mines.

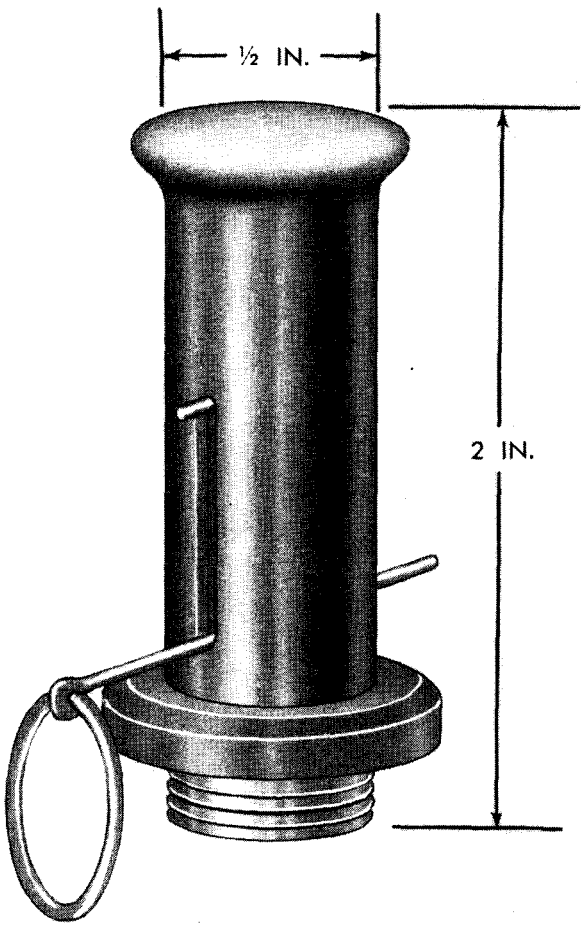


Figure 27. Kaveshnikov pull fuze.

c. FUNCTIONING. Pull of a few pounds on the striker-retaining pin pulls the pin out of the striker, releasing the striker against the percussion cap.

d. INSTALLING AND ARMING.

(1) Pull the striker upward with the transit pin and insert the striker-retaining pin in the lower hole.

(2) Remove the transit pin. If desired, slip the metal safety sleeve over the end of the striker and insert a safety pin in the outer hole until the fuze is ready for use (fig. 26).

(3) Screw an MD 2 detonator assembly into the base of the fuze.

e. NEUTRALIZING.

(1) Cut any trip wires attached to the eye of the striker-retaining pin.

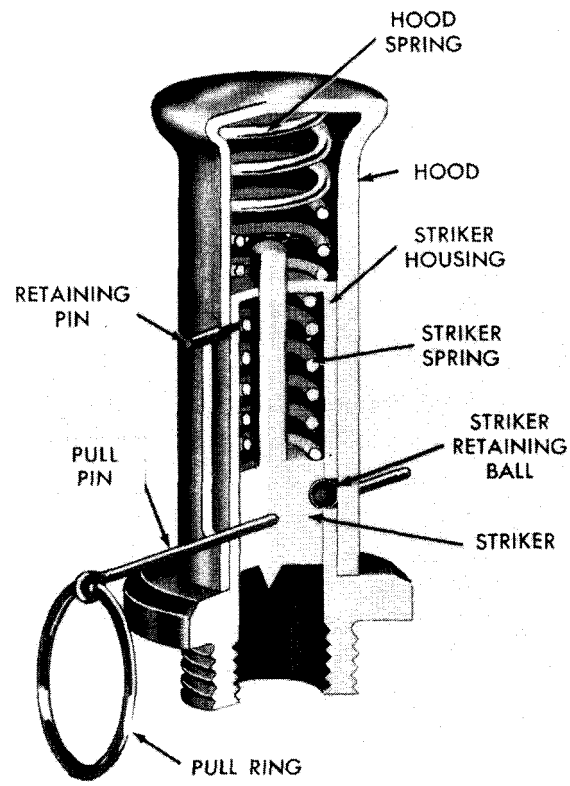


Figure 27.—Continued.

(2) Pull the fuze out of the mine or charge and unscrew the detonator assembly.

23. Kaveshnikov Pull Fuze

a. DESCRIPTION. This fuze (fig. 27) is an instantaneous, mechanical, pull type containing

a spring-loaded striker with a ball release. It consists of a cylindrical metal case which houses a spring-loaded striker. The striker is held in place by a small metal ball which is kept from falling out by a sleevelike metal hood which slides over the striker housing. A compressed spring is located under the hood and rests on top of the striker housing. The hood is kept from rising under pressure of the hood spring by a pull pin which passes through the hood, the striker housing, and the striker. A retaining pin projects out of the striker housing and prevents the hood from sliding off the striker housing. A groove in the hood permits the hood to slide above the retaining pin to the limit of the groove.

b. EMPLOYMENT. The Germans usually found this fuze laid with trip wires to operate by pull. It could also be used as a pressure-release fuze and placed under a weight with the pull pin removed.

c. FUNCTIONING. Pull on the pull ring releases the pull pin and allows the hood to rise under pressure of its spring until the striker-retaining ball is uncovered and forced out of the hole in the striker housing by the spring-loaded striker. The striker is thus released and fires the percussion cap.

d. INSTALLING AND ARMING.

(1) Screw an MD 2 detonator assembly into the base of the fuze and screw the fuze into a charge or mine.

(2) Tie a trip wire to the pull ring and anchor the other end of the wire.

e. NEUTRALIZING.

(1) Cut any wires attached to the pull ring and remove the fuze from the charge or mine.

(2) Unscrew the detonator assembly.

24. VPF Pull Fuze

a. DESCRIPTION. This fuze (fig. 28) is an instantaneous, mechanical, spring-loaded striker type with a clasp-end release. It is a metal fuze consisting of a cylindrical, metal, spring-loaded striker housing with a circular metal holder soldered to the housing. A safety pin holds the striker in the cocked position. The end of the striker is ball-shaped and projects above the striker housing. A hollow, cylindrical metal striker-retaining clamp with flexible prongs grips the ball-shaped portion of the striker so that, when the safety pin is removed, the striker is still prevented from moving. A pull ring is attached to the top of the clamp. The bottom of the fuze is threaded to receive an MD 2 detonator assembly.

b. EMPLOYMENT. This fuze is used with improvised mines of all types, on land or in water.

c. FUNCTIONING. Lateral pull or pressure of about 3 pounds, or axial pull of about 9 pounds, on the pull ring attached to the clamp pulls the clamp off the ball-shaped end of the striker and releases it against the percussion cap.

d. INSTALLING AND ARMING.

(1) Cock the fuze at the place of use by pushing the striker bolt up through the base of the fuze to compress the striker spring, and insert the safety pin when the striker bolt emerges through the top of the fuze.

(2) Push the clamp over the ball-shaped end of the striker.

(3) Screw an MD 2 detonator assembly onto the base of the fuze.

(4) Insert the fuze in the charge or mine and attach the pull cord to the pull ring on the clamp.

(5) Remove the safety pin.

Note. When installing the fuze under water, remove the safety pin before the charge is placed in the water. To secure the fuze for a short period after the safety pin is removed, insert a small lump of sugar or other soluble substance between the striker and the percussion cap. Then screw the detonator assembly only partially into the base of the fuze to allow water to penetrate and dissolve the substance.

e. NEUTRALIZING.

(1) Carefully insert a nail or wire through the safety-pin hole.

(2) Cut any pull wires.

25. ChMV-10 and ChMV-16 Delay Fuzes

a. DESCRIPTION. These fuzes are of the delay, mechanical or electrical, spring-loaded striker type, with a clockwork mechanism. The

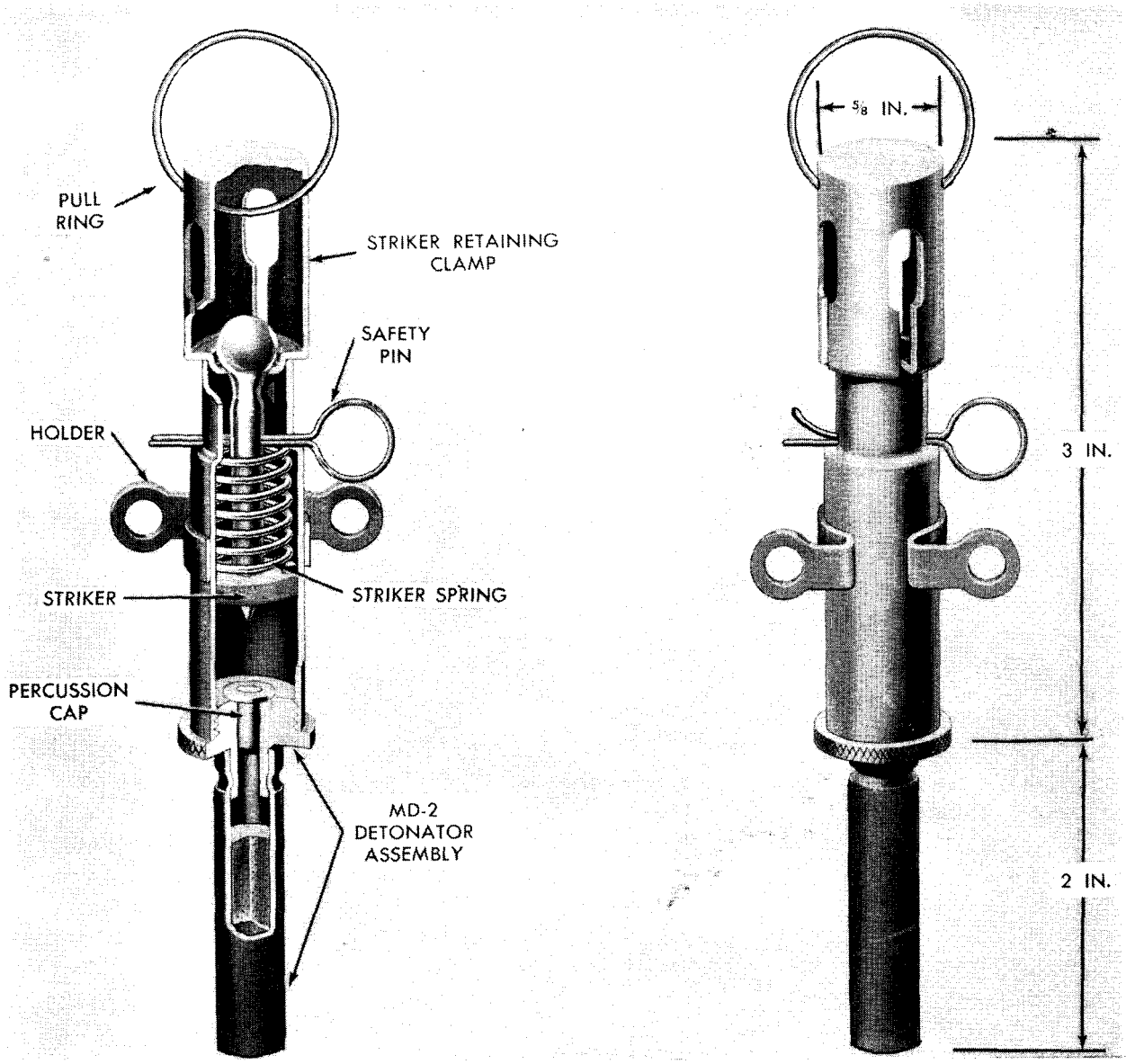


Figure 28. VPF pull fuze.

ChMV 10 has a 10-day delay mechanism, while the ChMV 16 (fig. 29) has a 16-day delay mechanism. The only difference in appearance is the numbering on the dials. The numerals indicate days and the divisions between numerals indicate 2 hours each. The clockwork is contained in the mushroom-shaped head of the fuze. Geared to the clockwork is the striker-release lever which holds the spring-loaded striker under tension in the narrow base of the fuze. A standard MD 2 detonator assembly or an electric-contact cap with leads for wiring into an electrical circuit (fig. 29) may be screwed into the base of the fuze and the joint made watertight by a rubber washer. The top of the fuze is closed with a threaded cap, made waterproof by a rubber washer. A glass window is located in the side for reading the time-setting dial. The World War II models of this fuze had a cardboard body and were about 3⅞ inches in length (without the detonator) and 2 inches in diameter. Recent models of this fuze have been found in Korea and have a steel clock housed in a bakelite body. They measure 4¼ inches in height and 2⅛ inches in diameter.

b. EMPLOYMENT. The fuze is used for setting off delayed-action charges in areas given over to an opposing force.

c. FUNCTIONING. After lapse of preset delay period, the striker-release lever trips the spring-loaded striker which either fires the MD 2 detonator assembly or closes the circuit between the two contacts on the top of the contact cap.

d. INSTALLING AND ARMING.

(1) Unscrew the cap from the fuze and wind the clock by turning the milled wheel clockwise until the desired time

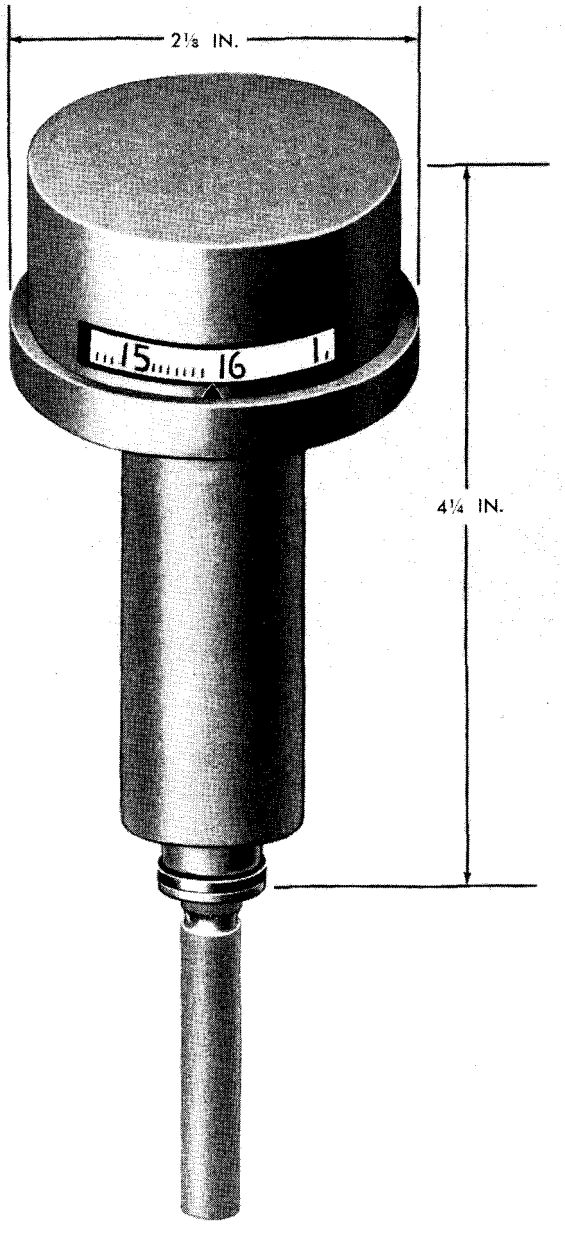


Figure 29. ChMV 16 delay fuze.

setting on the dial coincides with the indicator mark.

Note. Do not set the clock for a period of *less* than 6 hours. The mechanism was designed for longer periods and is unreliable when set for less than a 6-hour delay.

(2) Replace the cap.

(3) For mechanical firing, screw an MD 2 detonator assembly into the base of the fuze and then insert it into a charge; for electrical firing, screw an electric-contact cap into the base of the fuze and wire the terminals of the cap into an electrical detonating circuit.

e. NEUTRALIZING. Gently unscrew the detonator assembly or electric-contact cap from the fuze.

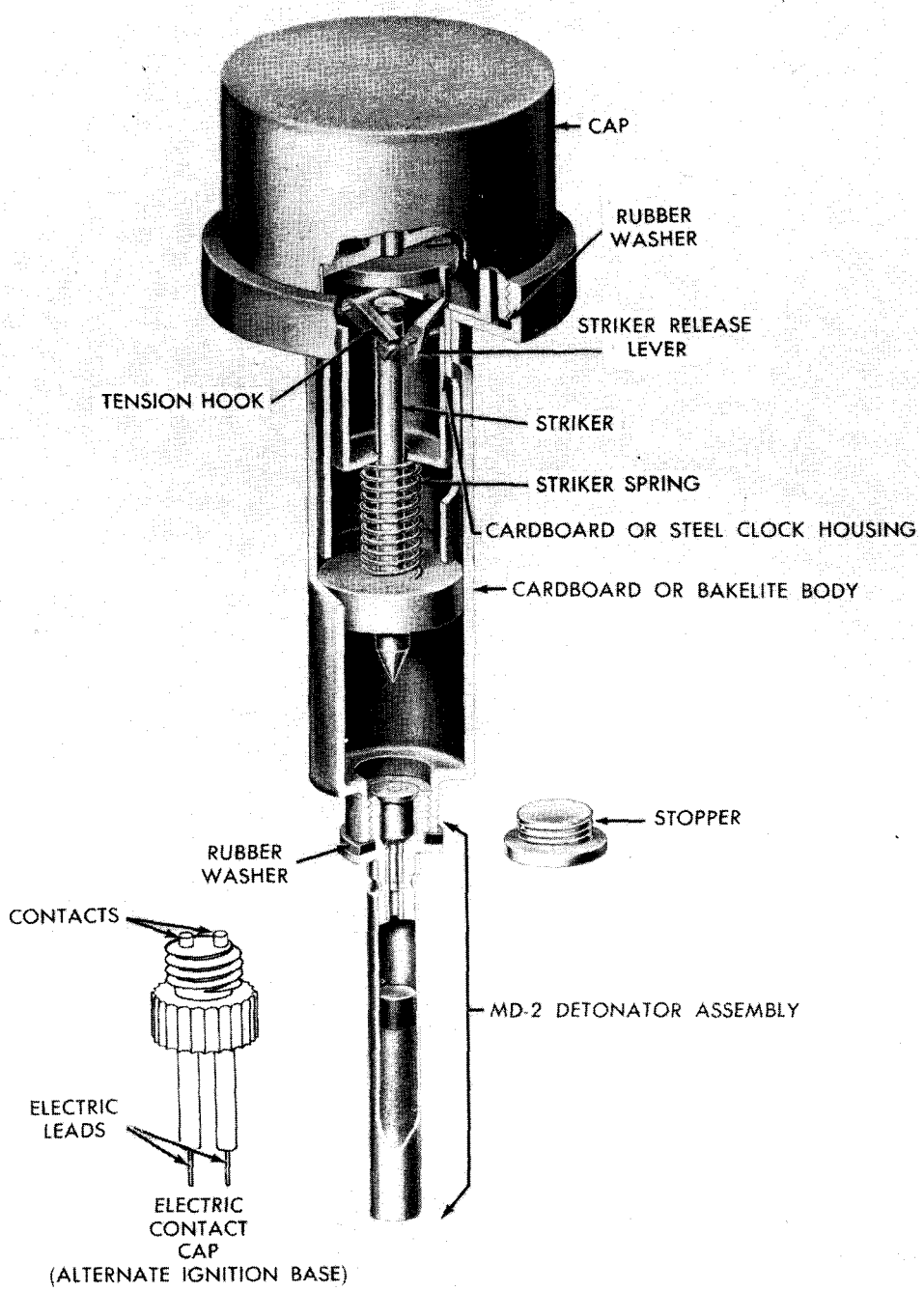


Figure 29.—Continued.

Section III. CHEMICAL FUZES

26. EKhV Chemical-Electrical Delay Fuze

a. DESCRIPTION. This fuze (fig. 30) is of the delay, chemical-electrical, handset type, containing a spring-loaded striker with a chemical-action release. It outwardly resembles the ChMV 10 and 16 clockwork fuzes. It consists of a bakelite case with a threaded cap and measures $6\frac{1}{2}$ inches in height and $2\frac{1}{2}$ inches in diameter. An MD 2 detonator assembly is normally used and is screwed into the base of the fuze. The case houses a 1.4-volt dry-cell battery, a copper capsule filled with a copper sulfate solution, and a spring-loaded striker held by a copper striker-retaining wire. The retaining wire is insulated from the copper capsule which it passes through the connects to one of the battery terminals. The other battery terminal is wired to one of the arming terminals. The other arming terminal is wired to the copper capsule. A resistance coil is inserted between the two arming terminals and is marked with two numbers. The upper number indicates the delay in days and the lower number, the delay in hours. This fuze has a maximum life of about 6 months limited by the life of the dry-cell battery. It is effective in a temperature range of from −4 to +140 degrees Fahrenheit.

b. EMPLOYMENT. This fuze is used for delayed detonation of mines and charges.

c. FUNCTIONING. The circuit is closed when the resistance coil is inserted between the arming terminals. The copper capsule acts as an anode, the copper striker-retaining wire as a cathode, and the copper sulfate solution as an electrolyte. Electrolysis begins and corrodes the copper wire, releasing the spring-loaded striker against the percussion cap. The resistance coil determines the amount of current or amperage which, in turn, governs the time (between 12 hours and 120 days) it takes for electrolysis to corrode the copper wire.

Note. This fuze may also be fitted with an electric-contact plug which screws in the base instead of an MD-2 detonator assembly, like that shown in figure 29 for the ChMV-16 delay fuze.

d. INSTALLING AND ARMING.

(1) Test the voltage between the terminals; it should be a minimum of 1.25 volts.

(2) Insert the fuze into an explosive charge or mine (or into an electric detonating circuit).

(3) Insert a resistance coil between the two arming terminals. One of ten different resistances may be used depending upon the length of delay desired.

e. NEUTRALIZING. Neutralizing by hand is not recommended since the fuze has no safety device. However, if gently handled, the detonator assembly (or electric-contact base) may be unscrewed from the fuze.

f. PACKING. The fuzes are packed 5 to a box with 10 resistance coils of various delays. Twenty boxes are packed in a large crate which contains an additional 100 resistance coils. The date of manufacture is marked under the lid of each box.

27. VZDKh Mechanical-Chemical or Electrical Delay Fuze

a. DESCRIPTION. This fuze (fig. 31) is a delay, mechanical-chemical or electrical, handset type with a spring-loaded striker with chemical-action release. It is a cylindrical metal tube about 6 inches in height and $1\frac{1}{8}$ inches in diameter. A threaded faucet type safety screw is located in the side of the fuze. The spring-loaded striker assembly is located in the upper half of the fuze. The striker bolt is retained by a wire which is passed through the hollow striker shaft and attached to a metal disk located at the top of the fuze. This disk has a seep hole through it, leading into the hollow striker, so that sulfuric acid may be poured into the hollow striker. A circuit closer, or an ampoule of acid with a nonelectric detonator, forms the base of the fuze. The circuit closer (electrical base) consists of threaded ebonite and metal bases with a spring-loaded contact rod and two screw contacts for connecting the electric wires (fig. 32). The chemical base consists of a metal nonelectric detonator holder with a small ampoule of acid fixed to a hollow metal shoulder above a chemical powder (fig. 32).

b. EMPLOYMENT. This fuze is used for delayed detonation of mines and charges.

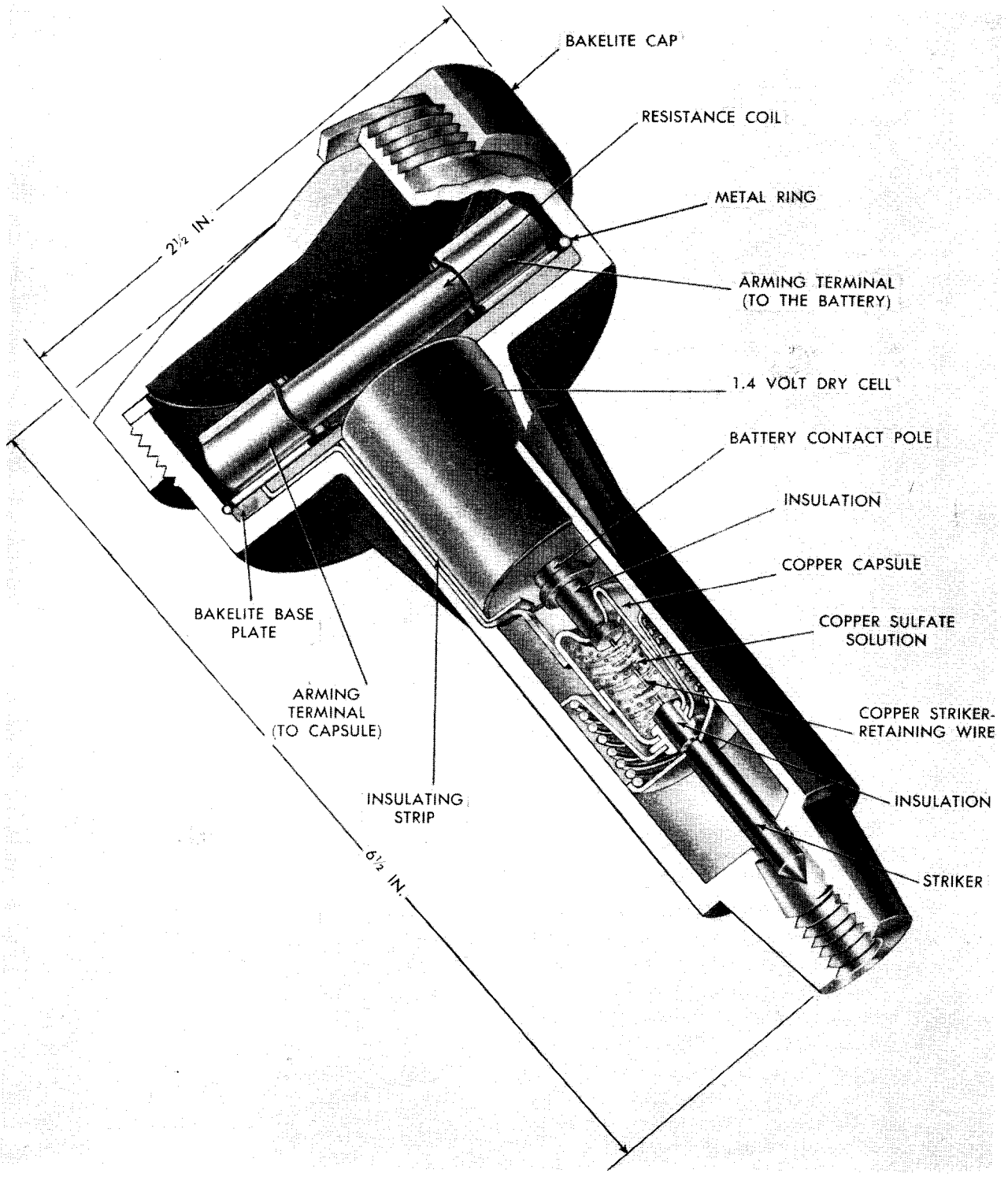


Figure 30. EKhV chemical-electrical delay fuze.

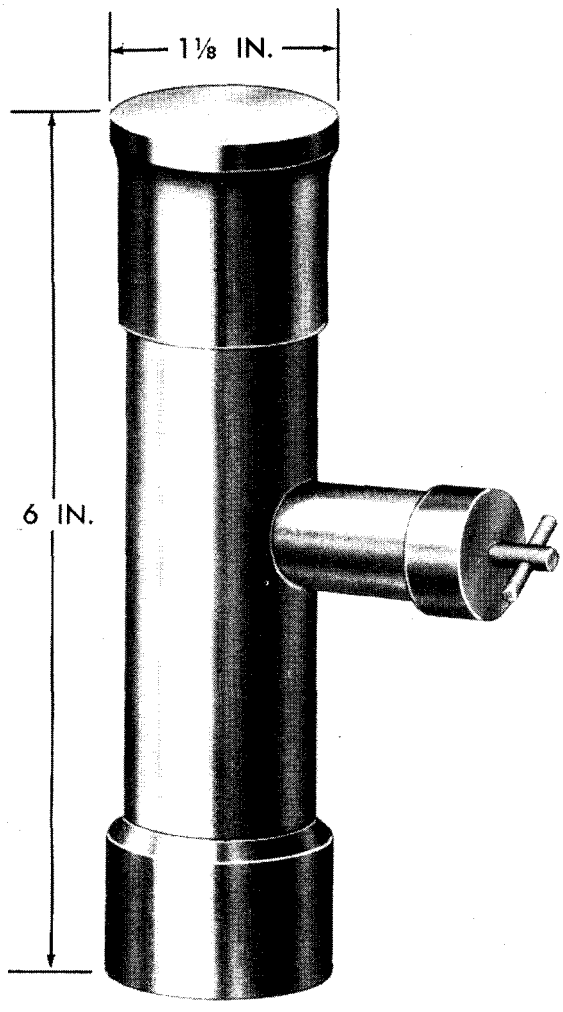


Figure 31. VZDKh mechanical-chemical or electrical delay fuze.

c. FUNCTIONING. Chemical action of the sulfuric acid poured into the hollow striker shaft corrodes the striker-retaining wire and releases the spring-loaded striker against the electrical base or the chemical base of the fuze.

(1) *Electrical base.* When the striker hits the spring-loaded contact rod, the rod is pushed down until it strikes the metal screw contact in the metal base, completing the circuit.

(2) *Chemical base.* When the striker hits the glass ampoule, the ampoule breaks and the acid mixed with the chemical power creates a flash which ignites the detonator.

d. INSTALLING AND ARMING.

(1) Screw either a chemical nonelectric base or an electrical base into the base of the fuze. If the chemical base is used, a nonelectric detonator must be fitted into the detonator holder after the base is screwed to the fuze.

(2) Place the fuze in the charge, or attach it to an electrical detonating circuit.

(3) Unscrew the cap and pour sulfuric acid into the hole in the cylinder.

(4) Replace the cap and turn the safety screw to the left to *dangerous* (OTTACHO).

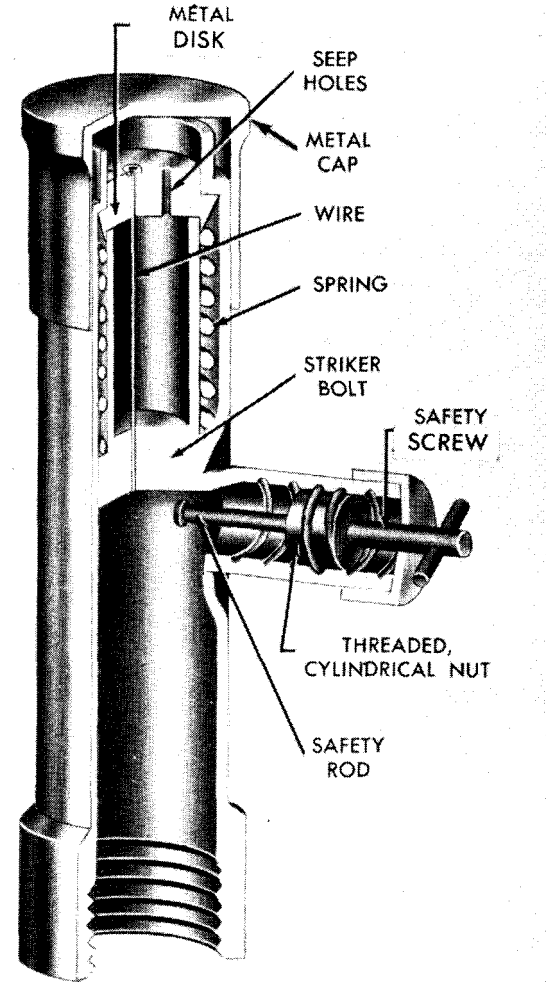


Figure 31.—Continued.

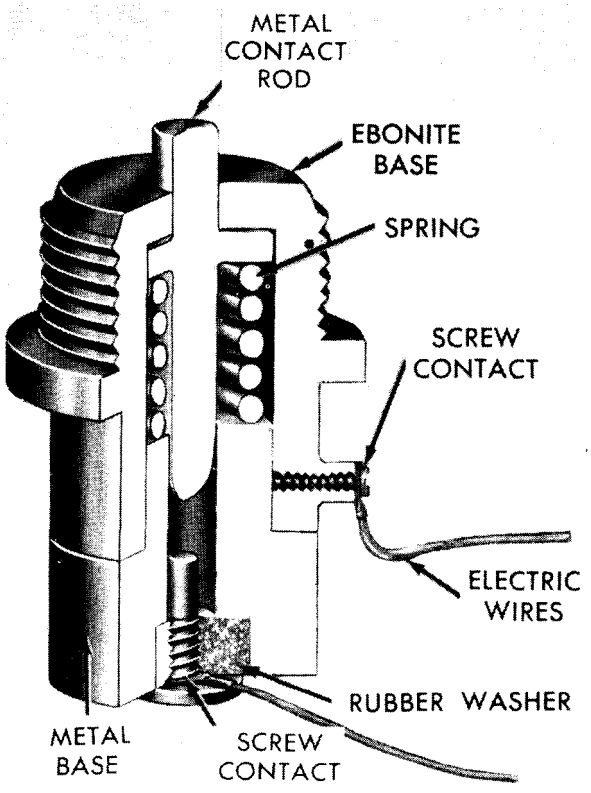


Figure 32. Electrical and chemical base for VZDKh fuze.

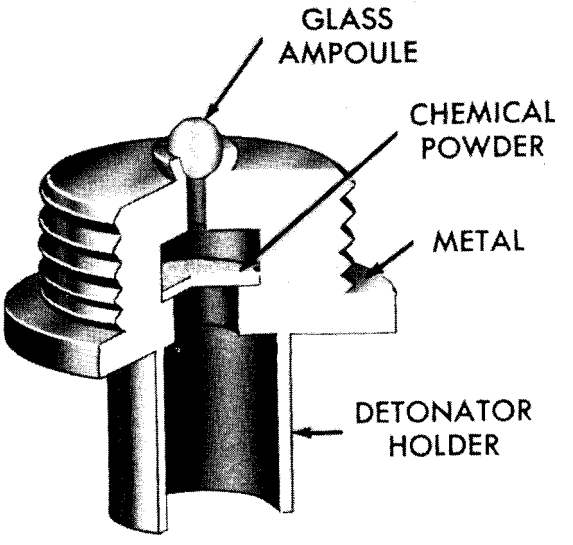


Figure 32.—Continued.

e. NEUTRALIZING.

(1) Turn the safety screw to the right, to *safe* (6e30TTACHO).

(2) Disconnect or remove the fuze.

Section IV. ELECTRICAL FUZES

28. PZ-12 Railroad Electrical Fuze

a. DESCRIPTION. This fuze (fig. 33) is an instantaneous, mechanical, pressure type, with a spring-loaded lever electric contact. It consists of a spring-loaded brass plunger contained in a brass housing fixed to a metal base with the electric contact poles. The contact-rod end of the plunger projects at right angles through a slot in the housing. A spring-clip type of contact is fixed to the base of the fuze, outside the plunger housing. This fuze may or may not be contained in a wooden box with the lead wires running out and connected to a battery and electric detonator. A clock time device may be inserted in the circuit as shown in figure 33.

b. EMPLOYMENT. This fuze was most often employed in mining sections of railroad tracks, the head of the plunger being flush or nearly flush with the underside of the rail or tie (fig. 37).

c. FUNCTIONING. With the safety pins removed, pressure on the plunger head depresses the plunger until its attached contact rod slides into the spring-clip contact and closes the circuit.

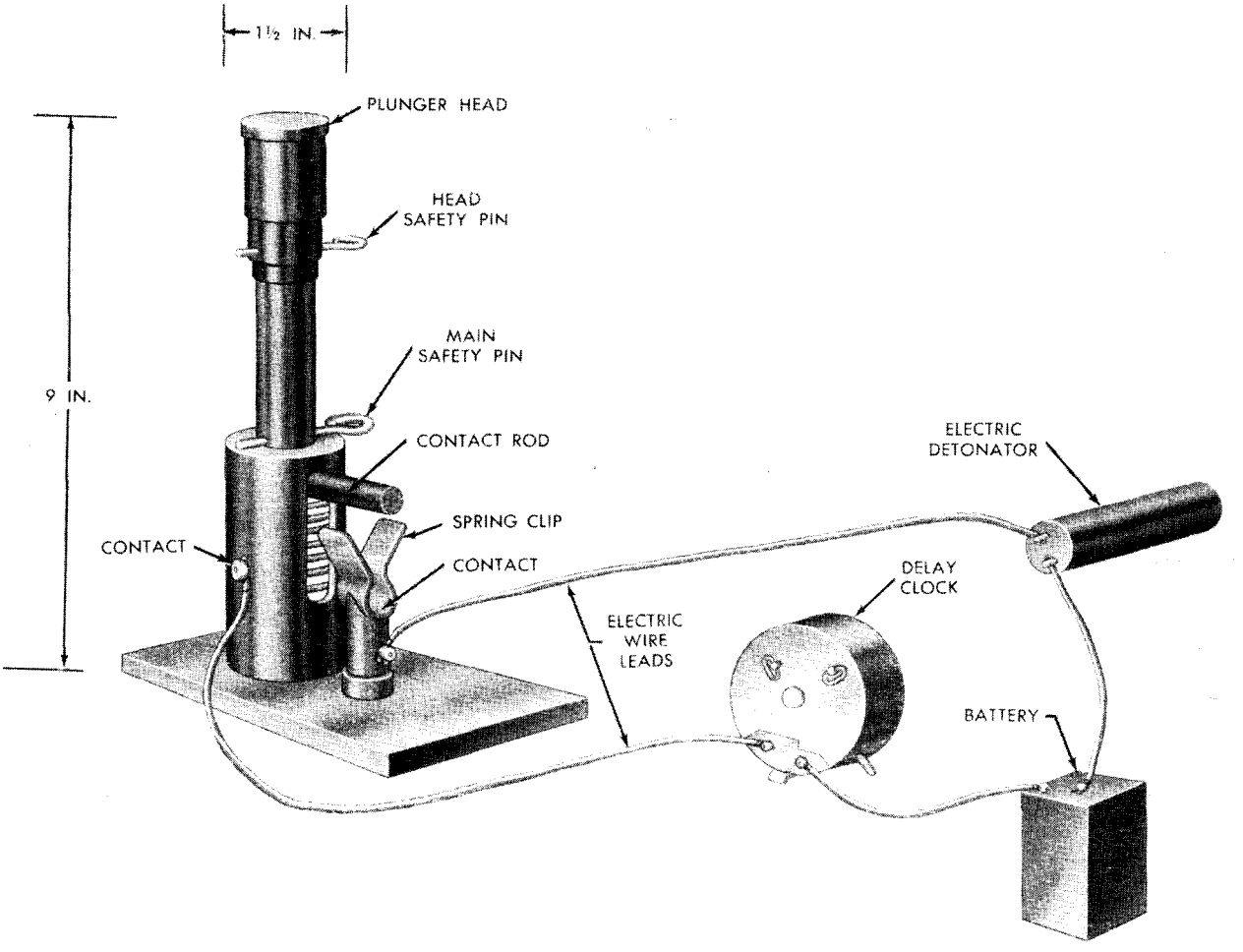


Figure 33. PZ 12 railroad electrical fuze.

d. INSTALLING AND ARMING.

(1) Dig a hole about 10 inches deep under a railroad rail or tie.

(2) Place an 8-by 12-inch board in the bottom of the hole. Place the fuze on it so that the head of the fuze is nearly flush with the bottom of the rail or tie.

(3) Connect the fuze to an electric detonating circuit, as shown in figure 40. The delay clock may or may not be included.

(4) Remove the safety pins.

e. NEUTRALIZING.

(1) Insert a pin or nail through the holes for the head safety pin and the main safety pin.

(2) Cut the wires.

29. ChZ-10 Electrical Delay Fuze

a. DESCRIPTION. This fuze (fig. 34) is of the delay, mechanical, handset type where a clockwork-release lever closes an electric circuit. It is housed in a cylindrical steel case with a hinged lid. In the top of the case is a dial with a setting indicator and arrows showing the direction to turn the indicator. A knurled knob on the side of the case locks the lid in closed position. A knob in the center of the clock face, attached to the setting indicator dial, is used to set the clock at the desired time delay. On the face of the clock is the inscription in Russian, "To set, use only knob on face of dial." A winding post is located on the bottom of the case and a winding key is provided. Two electric wire leads project out of the base of the case. This fuze is about 5 inches in diameter and more than 3½ inches in

height. It weighs about 1.5 pounds. The fuze is accurate to within 4 hours at a 10-day delay setting.

b. EMPLOYMENT. This fuze is used for electrical detonation of mines and charges at any preset time within 10 days.

c. FUNCTIONING. After lapse of a preset delay period, the clockwork-release lever trips the spring-loaded striker which closes the circuit between the two electric leads in the bottom of the fuze.

d. INSTALLING AND ARMING.

(1) Test the fuze by setting the indicator at zero and connecting a pocket ohmmeter to the electric leads; the needle should swing to the right. Set the indicator on any number and reconnect the ohmmeter. The needle should swing to the left.

(2) Wind the clock with a key.

(3) Set the dial at the setting for the desired time delay.

(4) Close and lock the lid.

(5) Tie the fuze into an electric circuit.

e. NEUTRALIZING. Cut the cable from the fuze to the electric circuit.

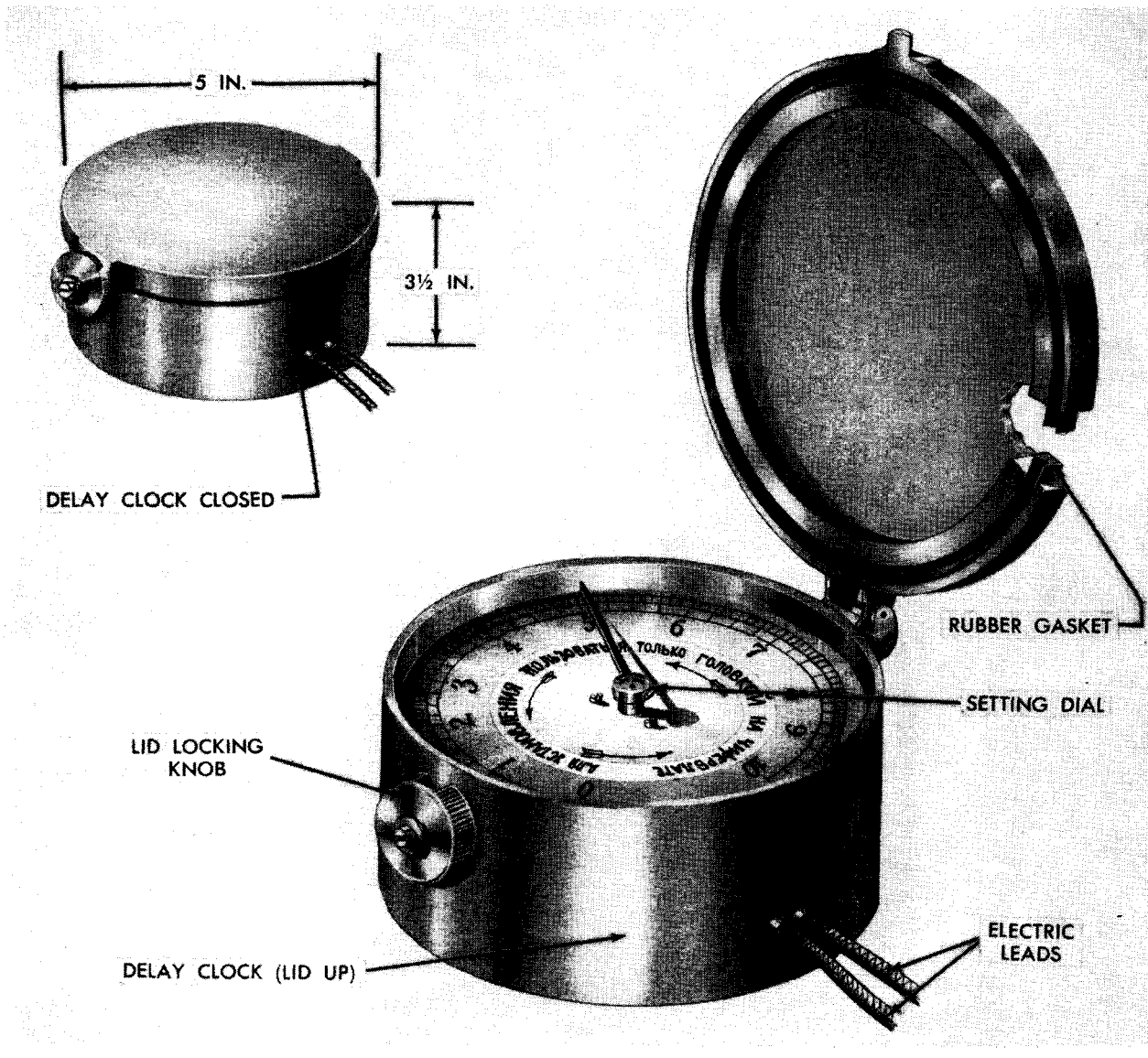


Figure 34. ChZ–10 electrical delay fuze.

30. ChZ-35 Electrical Delay Fuze, Cylindrical

This delay fuze (fig. 35) is very similar to the ChZ 10 electrical fuze (par. 29) except that it is larger. It is about 7½ inches in diameter and 3½ inches in height. It weighs about 7.5 pounds. It differs from the ChZ 10 in that the winding key and winding post are located in the top instead of the bottom. It is accurate to within 6 hours.

31. ChZ-35 Electrical Delay Fuze, Rectangular

This fuze is a delay clock (fig. 36) similar to the ChZ 35 described in paragraph 30, except that it is rectangular rather than cylindrical. It is about 6½ inches long, 3½ inches wide, and 3½ inches high. It weighs about 4.5 pounds.

32. ChZ-B Alarm Clock Fuze

a. DESCRIPTION. This fuze (fig. 37) is a delay, mechanical type where a handset clockwork release lever closes an electric circuit. It is a commercial alarm clock with a knife switch attached to the alarm mechanism on the back. A housing with two contact arms, each insulated from the other, is also attached to the back of the clock. Two terminals, each wired to one of the contact arms, project from

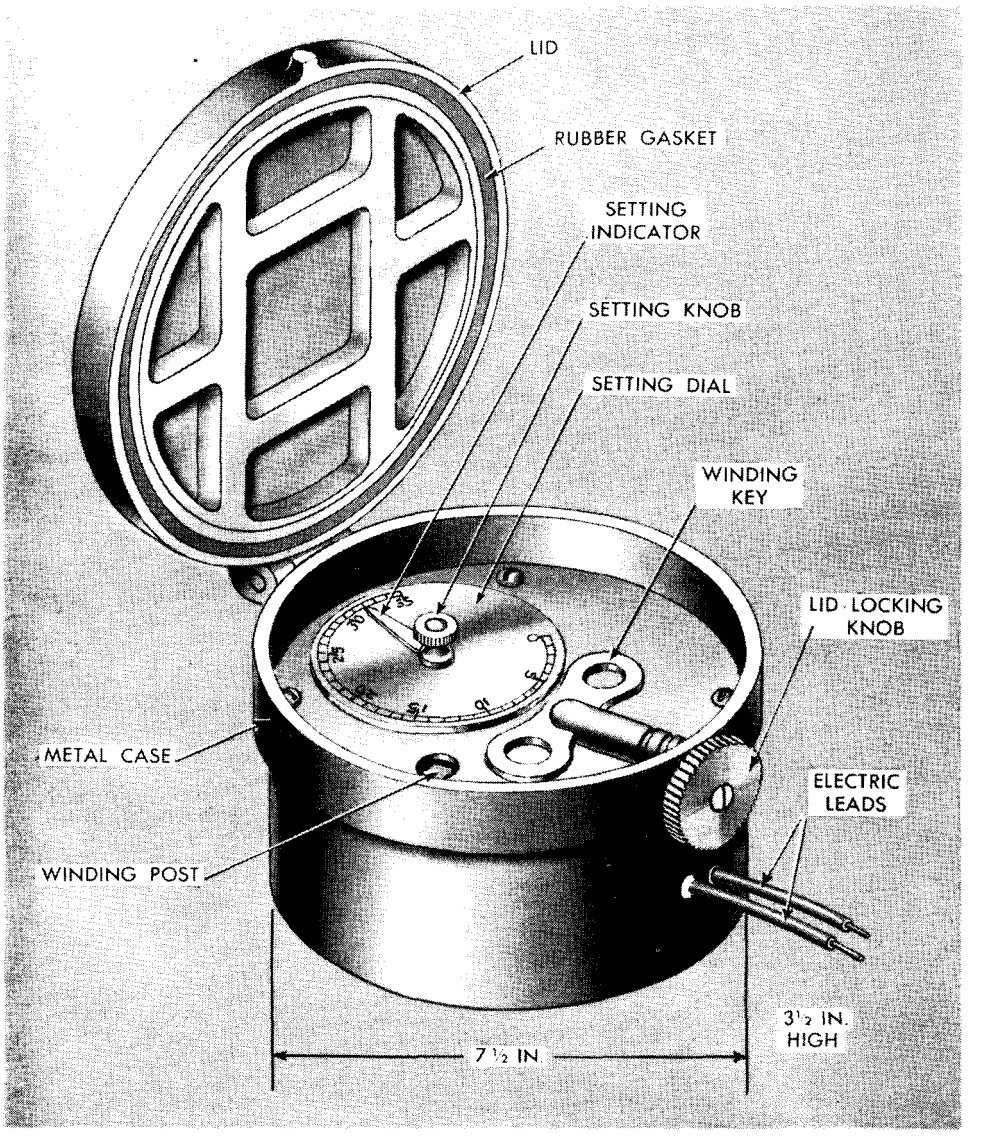


Figure 35. ChZ 35 electrical delay fuze, cylindrical.

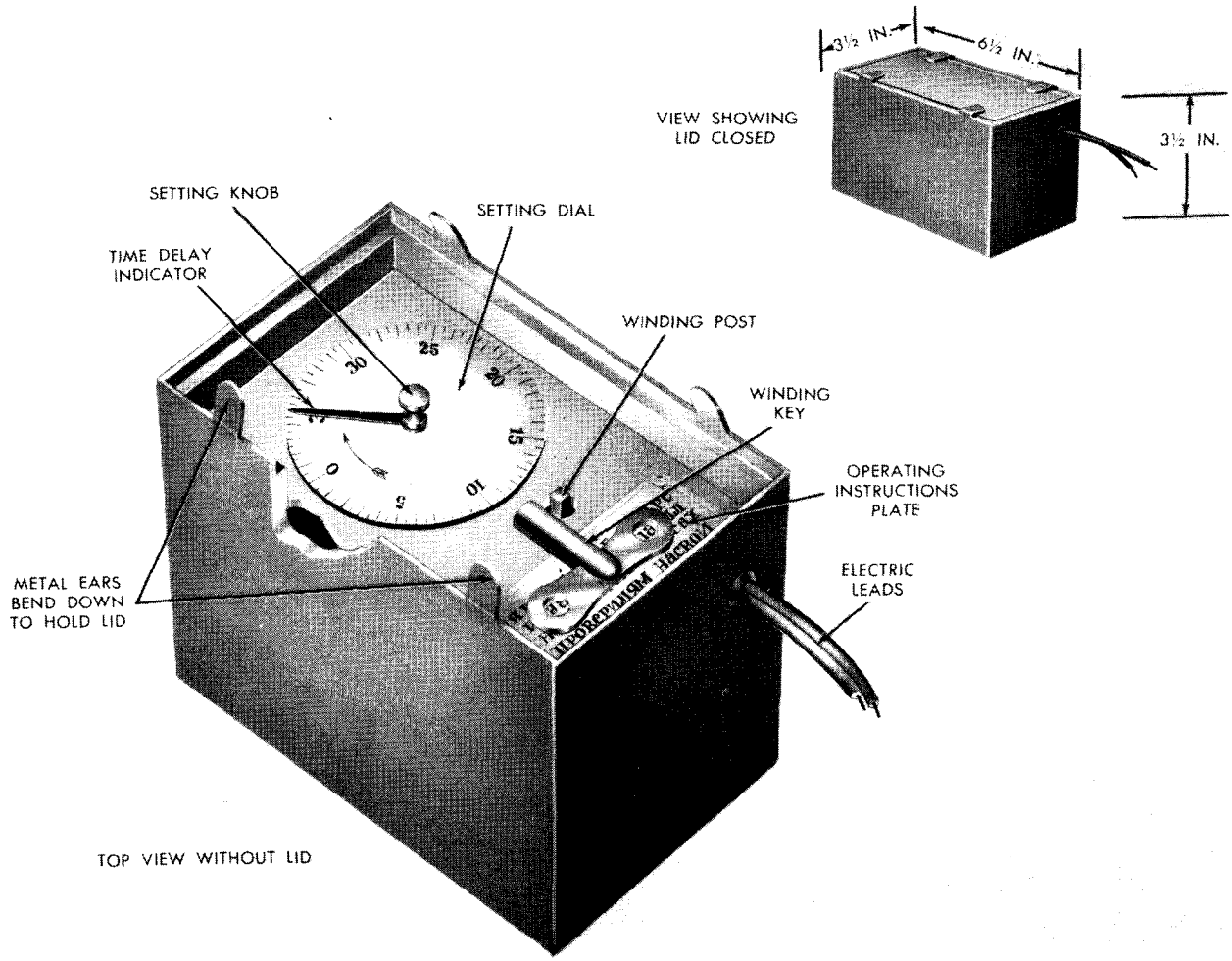


Figure 36. ChZ–35 electrical delay fuze, rectangular.

the housing and are used to wire the clock into a detonating circuit.

b. EMPLOYMENT. The alarm clock can be used as the only fuze in an electric circuit (fig. 37) or it can be used with an instantaneous electrical fuze, such as the PZ 12 railroad fuze (fig. 33).

c. FUNCTIONING. At the expiration of the preset time, the alarm mechanism trips the knife switch which closes the circuit between the two contact arms, thus exploding the detonator.

d. INSTALLING AND ARMING.

(1) Set the hour and minute hands at the number 12 on the large dial.

(2) Set the hand on the small dial at the number corresponding to the number of hours delay desired.

(3) Set the knife switch so that the circuit is interrupted (fig. 37).

(4) Wind the clock.

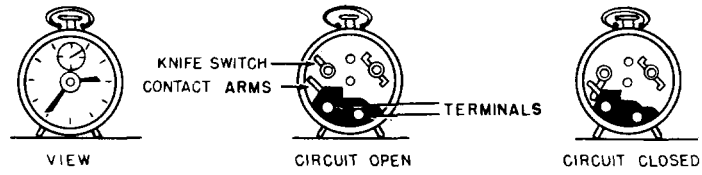
(5) Connect one terminal of the alarm clock with a terminal of the battery and the other terminal of the clock with one of the wires of the electric detonator.

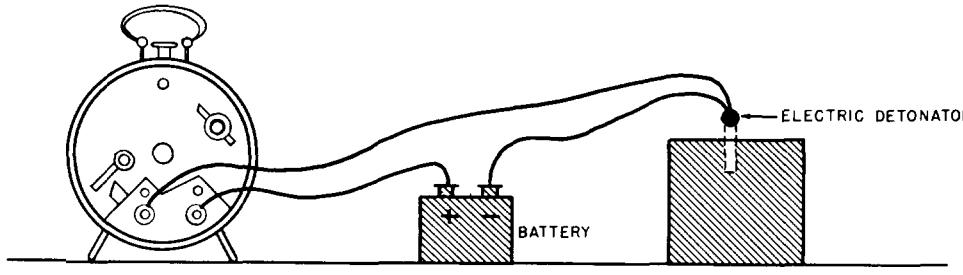
(6) Connect the second wire of the detonator with the second terminal of the battery.

e. NEUTRALIZING. Cut the wire leads.

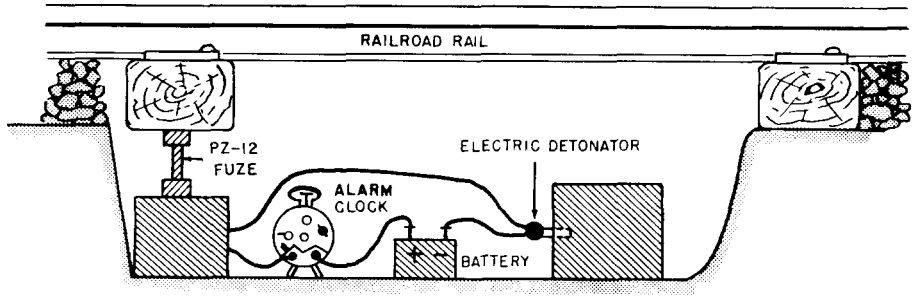
33. EKhZ Chemical-Electrical Fuze

a. DESCRIPTION. This fuze (fig. 38) is of the instantaneous, chemical, pressure type with a chemical-reaction ignition. It consists of a brass tube containing zinc and copper battery





CLOCK WIRED TO BATTERY AND ELECTRIC DETONATOR



CLOCK AS AN INTERMEDIATE FUZE WIRED INTO AN ELECTRIC CIRCUIT WITH A PZ-12 PRESSURE CONTACT FUZE, BATTERY, AND ELECTRIC DETONATOR.

Figure 37. ChZ–B alarm clock fuze.

plates. These plates are separated from a glass ampoule filled with sulfuric acid by a stopper with seep holes in it. The ampoule is surrounded by a lead sheath. Two wire leads are connected to the base of the fuze and may be connected to an electric detonator.

b. EMPLOYMENT. Although this fuze is the standard Soviet fuze for naval mines, it has also been employed with improvised land mines, such as the oil-drum mine shown in figure 97.

c. FUNCTIONING. Impact or pressure of 20 pounds or more on the lead sheath crushes the glass ampoule, allowing the sulfuric acid to seep down into the battery chamber. The acid acts as an electrolyte and closes the circuit which detonates an electrical detonator connected to the lead wires.

d. INSTALLING AND ARMING. The fuze comes armed and has no safeties. Connect the electric leads to a detonating circuit.

e. NEUTRALIZING. Cut the electric lead wires below the brass tube and remove the fuze.

34. EKhZ Mercury Delay Electrical Fuze

a. DESCRIPTION. This fuze (fig. 39) is a delay, chemical, handset type with a mercury contact. The EKhZ mercury delay fuze is about 1 inch in diameter and 5 inches in height.

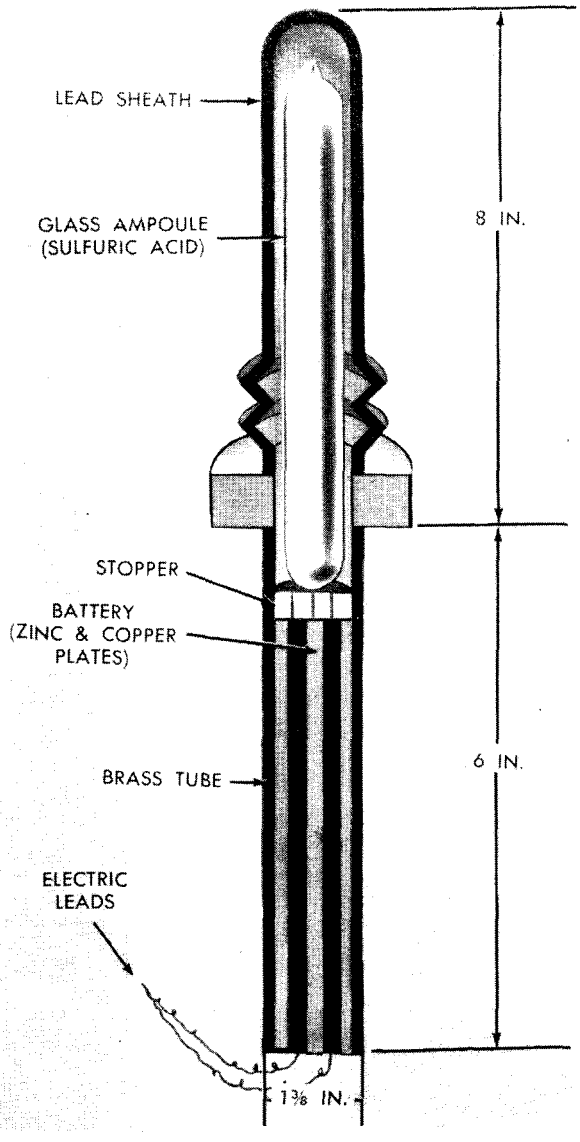


Figure 38. EKhZ chemical-electrical fuze.

It consists of a cylindrical, nickel-plated steel body with a threaded cap, a hollow rubber cylinder, and an ebonite base. A chamber in the top of the fuze is for insertion of the mercury. Between the rubber cylinder and the mercury chamber is a fiber disk with a zinc wire closing a hole in the center of the disk. The base of the fuze is a hollow ebonite plug with two contact posts projecting out of the base, opposite each other. An electric wire lead is connected to each of these contact posts.

b. EMPLOYMENT. The fuze is used with

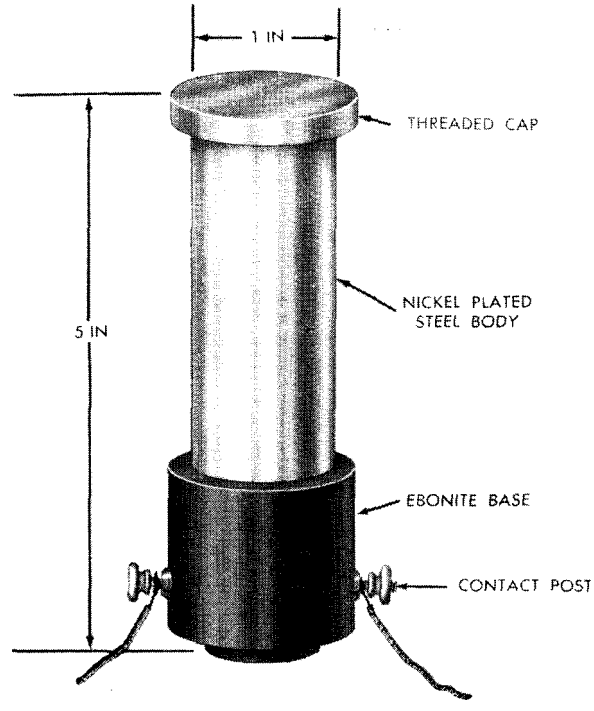


Figure 39. EKhZ mercury delay electrical fuze.

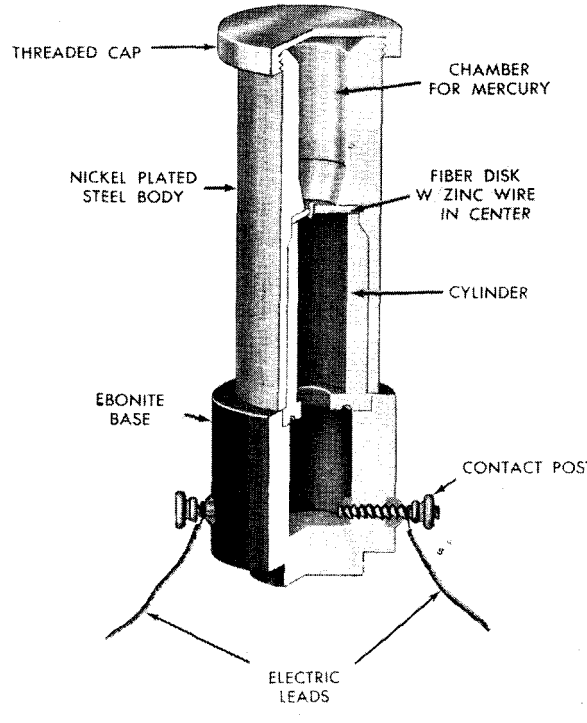


Figure 39.—Continued.

improvised mines in areas being abandoned to an opposing force.

c. FUNCTIONING.

(1) The mercury erodes the zinc wire in the center of the disk in from 1 to 5 days.

(2) Mercury flows down into the ebonite contact chamber through the hole formed by erosion of the zinc wire.

(3) When the mercury rises high enough to touch both contacts, the circuit is completed.

d. INSTALLING AND ARMING. The fuze is assembled at the place of use.

(1) Attach an electric lead wire to each of the contact posts.

(2) Unscrew the cap and pour some mercury into the top chamber.

(3) Replace the cap.

e. NEUTRALIZING. Cut the electric lead wires attached to the contact posts.

35. EKhP Chemical-Electrical Safety Delay Element

a. DESCRIPTION. This element (fig. 40) is a delay, chemical-electrical type fuze containing a spring-loaded striker with a chemical release. Internally, it is similar to the EKhV fuze (fig. 30). It is housed in a cylindrical tar-impregnated cardboard container. Two electric lead wires project from one end of the fuze. One green-covered wire and one red-covered wire project from the other end of the fuze. There are two sizes of this fuze. The larger size is 5 inches in length and $1\frac{3}{8}$-inches in diameter, while the smaller size is 2 inches in length and $\frac{5}{8}$-inch in diameter.

b. EMPLOYMENT. This fuze is used as a safety delay element in any electric detonating circuit for providing delay from 10 minutes to 4 hours with the smaller fuze and up to 4 months with the larger fuze (temperature affects the delay, the lower the temperature the longer the delay). The fuze is employed in the MZD 4 delayed-action mine.

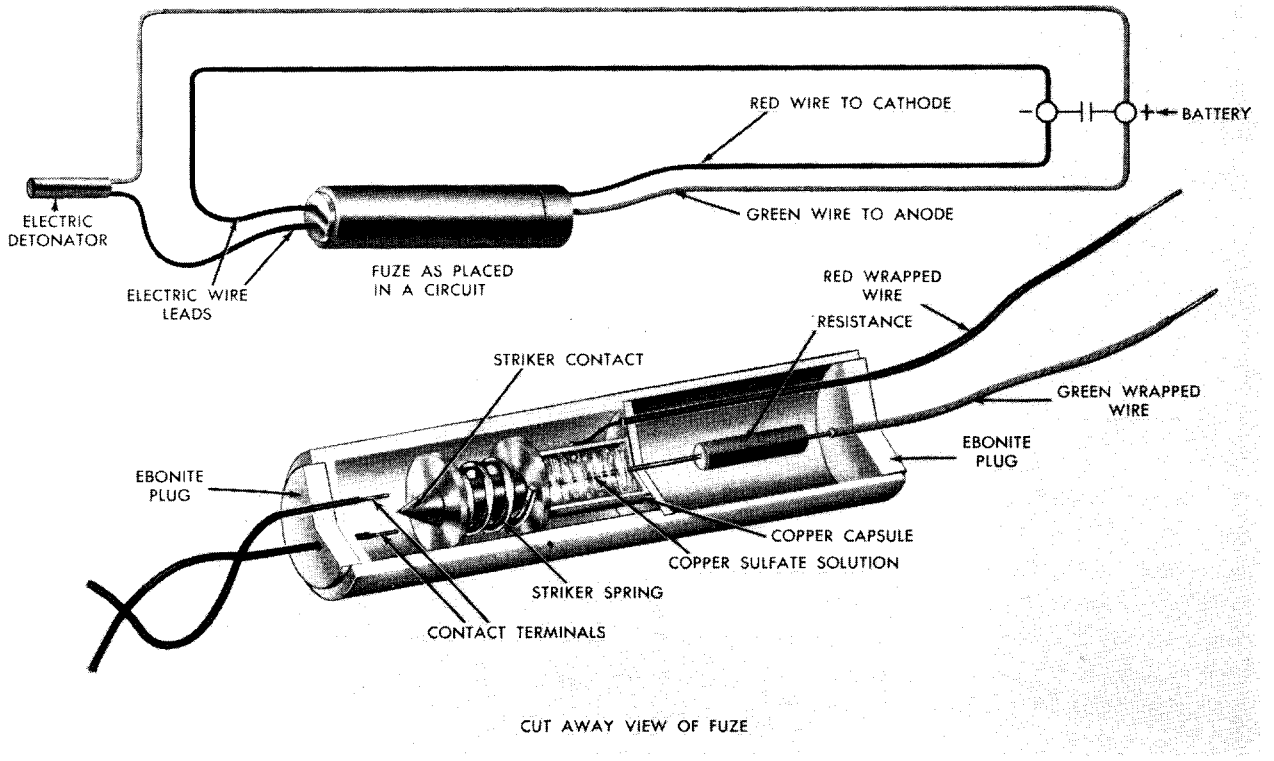


Figure 40. EKhP chemical-electrical safety delay element.

c. FUNCTIONING. When connected to a battery in an electric detonating circuit as shown in figure 40, electrolysis begins. After a time lapse, the striker-retaining wire is eroded, thus releasing the striker and closing the circuit.

d. INSTALLING AND ARMING.

(1) Connect the red-covered wire and one of the leads from the other end of the fuze to the cathode of a battery (fig. 40).

(2) Connect the green-covered wire with the anode of the battery.

(3) Connect the other electric lead from the fuze to one of the leads from an electric detonator.

(4) Connect the other electric lead from the detonator to the anode of the battery.

e. NEUTRALIZING. Cut the wire leads from the fuze.

36. German SM-12 Frequency-Induction Fuze

a. DESCRIPTION. This fuze (fig. 41) is of the instantaneous, electrical, frequency-induction type. It closes an electric circuit. Although the Soviets designed the fuze, the Germans worked on captured models of the fuze and perfected it. A modified and simplified model was produced by the Germans just before the end of World War II. Two models were made. The earlier models are housed in a black, cylindrical laminated-wood case and the later models in a brown, cylindrical bakelite case (fig. 41). Both models are 6¾ inches in diameter and 3¾ inches in height. They weigh about 2.5 pounds. The interior elements of the fuze are mounted on sponge-rubber pads and are bolted to the case. A tube for the detonator cable passes through the fuze and out at both the top and bottom of the fuze. It is closed by a cork on the top and by a transit cap on the bottom. An arming nut is located on the top of the case and a white arrow indicates the direction to turn the screw for arming the fuze. A cable connects the fuze with the electric detonator (fig. 42). The contents of the two models are—

Item	*Wood case*	*Plastic case*
Sensitive relay	3	1
Dry-disk rectifier	1	1
Pickup coil	1	1
Condenser	2	2
Resistor	2	2
Leaf type arming switch	2	1
Electrolytic-delay arming switch	0	1
1.5-volt dry-cell battery	2	2

b. EMPLOYMENT. This fuze is designed to explode a mine or charge, when a signal is emitted by an electronic mine detector sweeping over it.

c. FUNCTIONING. When the search coil of a frequency-bridge type mine detector, operating in the frequency range of between 800 and 2,000 cycles, is passed over an armed fuze within a maximum distance of 17 inches, its signal is picked up by the pick-up coil in the fuze. This closes the secondary or "safety" arming switch, completing the circuit and firing the electric detonator (fig. 43).

d. INSTALLING AND ARMING. Turn the arming screw in the top of the case in the direction of the white arrow. This action completes the circuit to the "safety" delay switch which becomes armed after a delay of 1½ to 2 hours.

e. NEUTRALIZING.

(1) *Method 1.*

(*a*) Uncover the cable leading to the mine or charge. Without shaking or jarring the fuze, carefully remove the detonator from the mine or charge.

(*b*) Bury the end of the cable, with the detonator attached, in the ground and then cut the cable. This acts as a safeguard in case the detonator explodes.

(2) *Method 2.* Insert a wooden stick or plug in the initial arming hole and force apart the initial arming switch contacts; then pull the detonator from the charge.

(3) *Precautions.* Recent development may have made this type of fuze impossible to hand neutralize, either by method 1 or 2, without detonating the mine or charge.

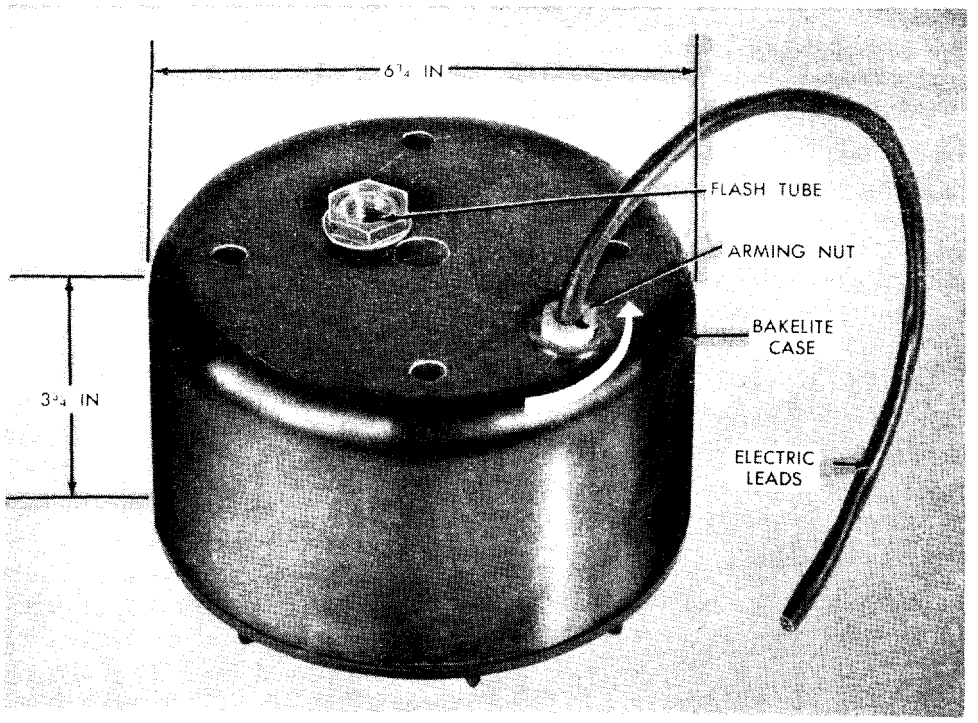


Figure 41. Bakelite model of the German SM 12 frequency-induction fuze.

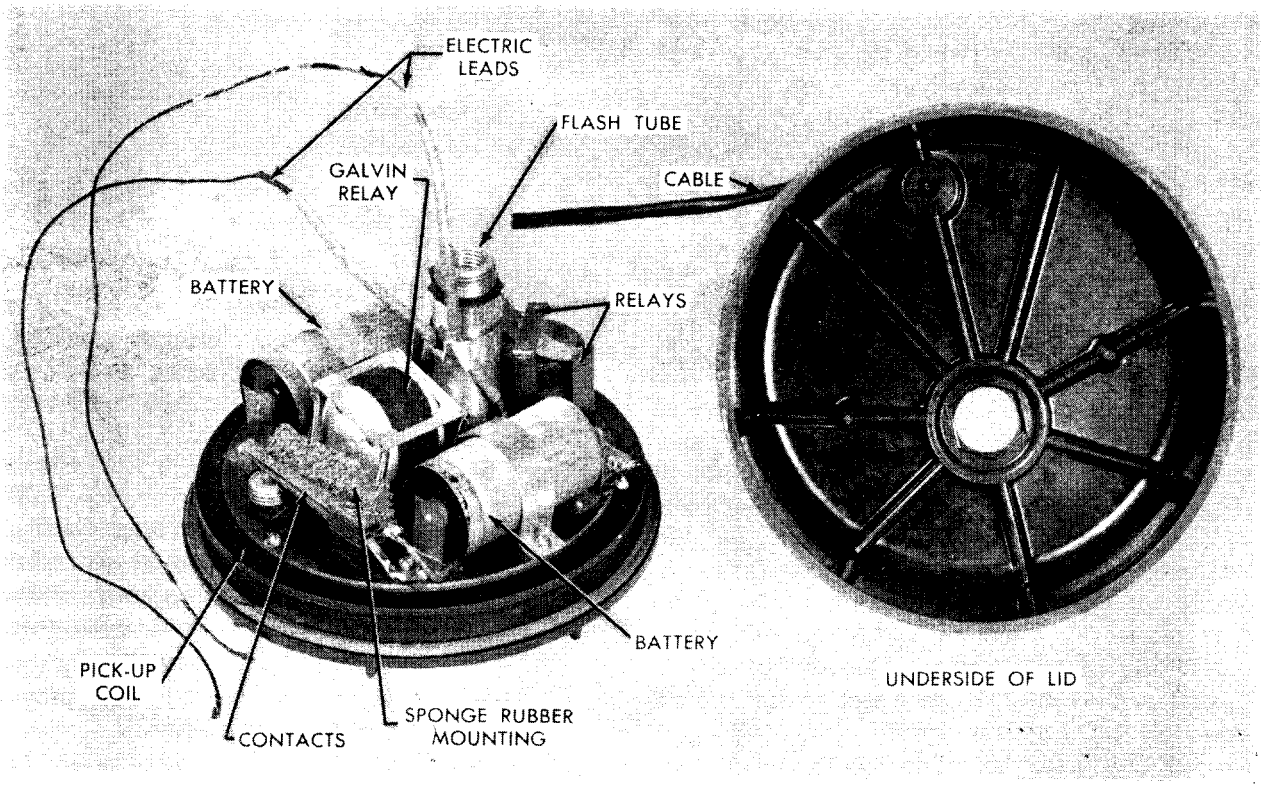


Figure 42. Interior view of the SM-12 fuze.

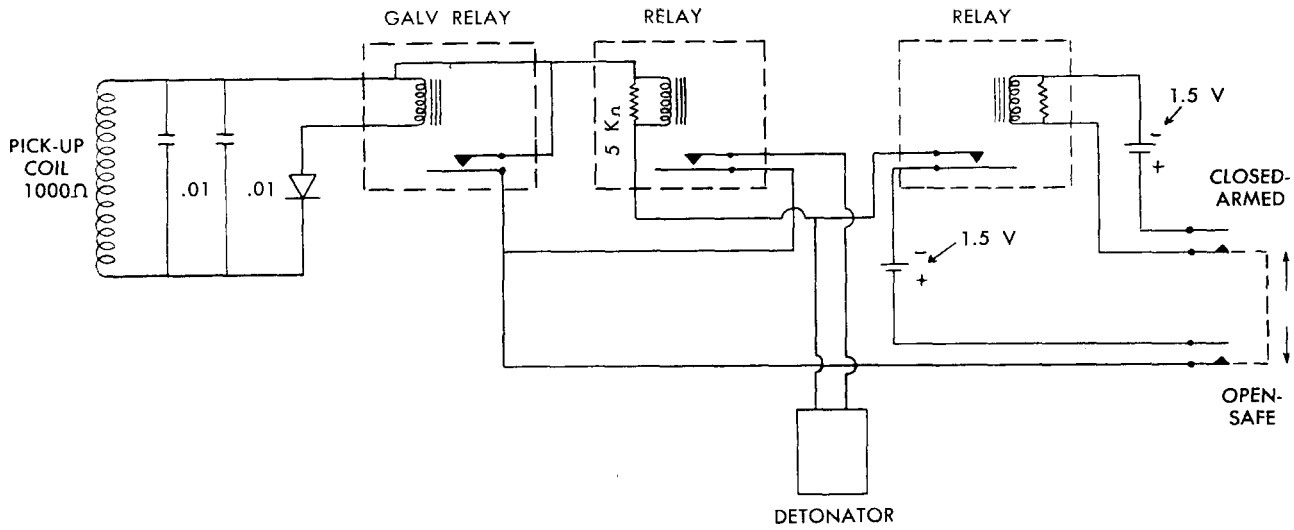


Figure 43. Circuit diagram of the SM-12 fuze.

(*a*) A battery may be connected in series to the cable wires leading from the fuze to the detonator. If so, these wires must be cut one at a time; otherwise, the mine will explode when the two cable wires are shorted by the cutter.

(*b*) The arming contacts may be activated in such a way that insertion of a stick into the arming hole closes the contacts and sets off the mine or charge. Although in the majority of the cases it may be safe to use this method ((2) above), it is best to assume that these fuzes are unsafe to neutralize in this manner.

f. COUNTERMEASURES.

(1) The SCR-625 mine detector may be modified so it can be safely used to locate the SM-12 fuze. Modification is accomplished by reducing the power of the SCR-625 so that it will not actuate the detonator. Power can be reduced by placing a 2500-ohm resister across terminals 4 and 5 of the 1G6G oscillator tube. See TM 11-1122 for detailed instructions.

(2) Although the SCR 625 operates on reduced power, it is still able to locate either the SM-12 fuze or standard metal mines from a distance of 2 to 3 feet.

37. VZ-1 Vibration Fuze

a. DESCRIPTION. The VZ 1 vibration fuze (fig. 44) is of the instantaneous, mechanical type. It consists of a circular, cardboard case, about 3 inches in diameter and 1¼ inches in height, containing a thick, rubber, hollowed-out disk. A Y-shaped metal vibrator is suspended in the center of the disk by three fine spiral springs. A contact screw is fastened to the top of the disk and is attached to one of the electric wire leads. The other wire lead is attached to one of the springs so that the circuit is broken only by the short space between the vibrator and the contact screw. The wire leads are tied into an electric circuit for ignition of a charge. The Russian word for "top" (Bepx), the model number (VZ-1), and manufacturer's symbols are stenciled in black on the top of the fuze.

b. EMPLOYMENT. This fuze is used on some MZD delayed-action mines and improvised types of mines.

c. FUNCTIONING. Traffic rumbling over the ground or bridge causes the vibrator in the fuze to vibrate until it makes contact with the contact screw. This closes the circuit and fires the charge.

d. INSTALLING AND ARMING. The fuze has no safety device and is merely wired into the detonating circuit. Normally, some type of delayed-action fuze is also wired into the circuit to provide security for the man installing the mine.

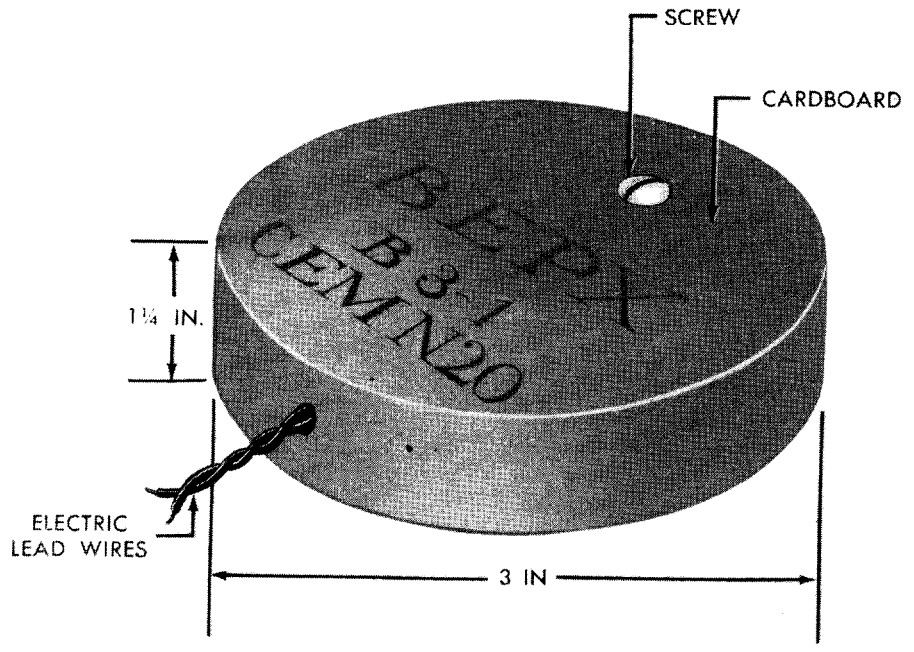


Figure 44. VZ 1 vibration fuze.

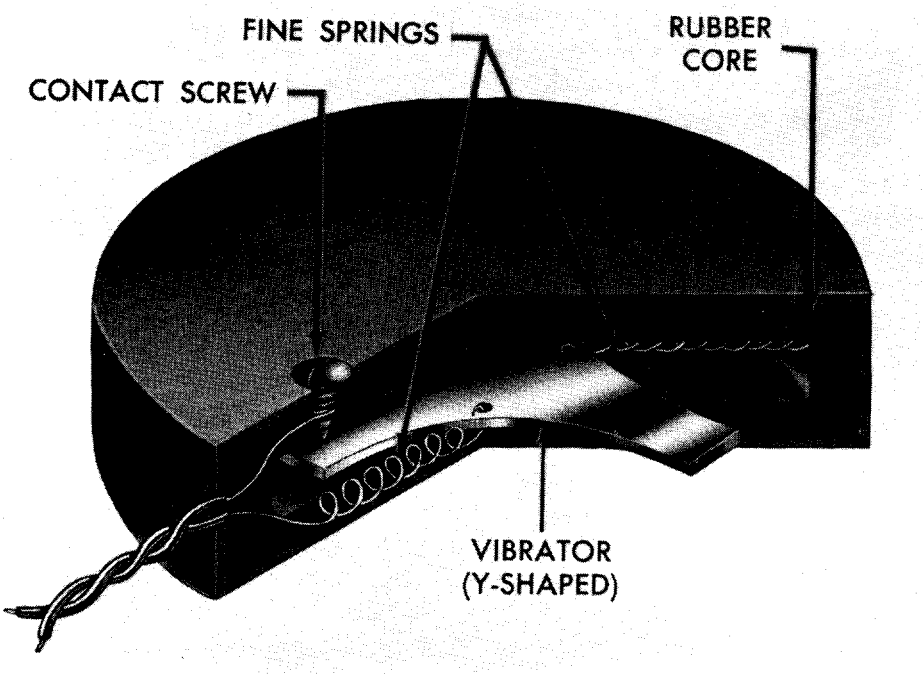


Figure 44.—Continued.

c. NEUTRALIZING. Neutralizing by hand should be attempted only if the fuze is wired to the circuit in such way that the electric lead wires may be cut without disturbing, moving, or jarring the fuze.

38. ChVZ Vibration Delay Fuze

a. DESCRIPTION. This fuze (fig. 45) is of the mechanical, delay type. It is housed in a cylindrical sheet-metal case about 4¾ inches in diameter and 2¼ inches in height. It consists of a safety clockwork mechanism, two copper spiral-spring vibration contacts (one horizontal and one vertical) each in an aluminum housing, and a 4-volt flashlight battery (fig. 45). The circuit (fig. 46) is interrupted at the clockwork and at the vibration contact.

b. EMPLOYMENT. This fuze is used primarily in the DM vibration road mine. It may be used with any charge or improvised mine.

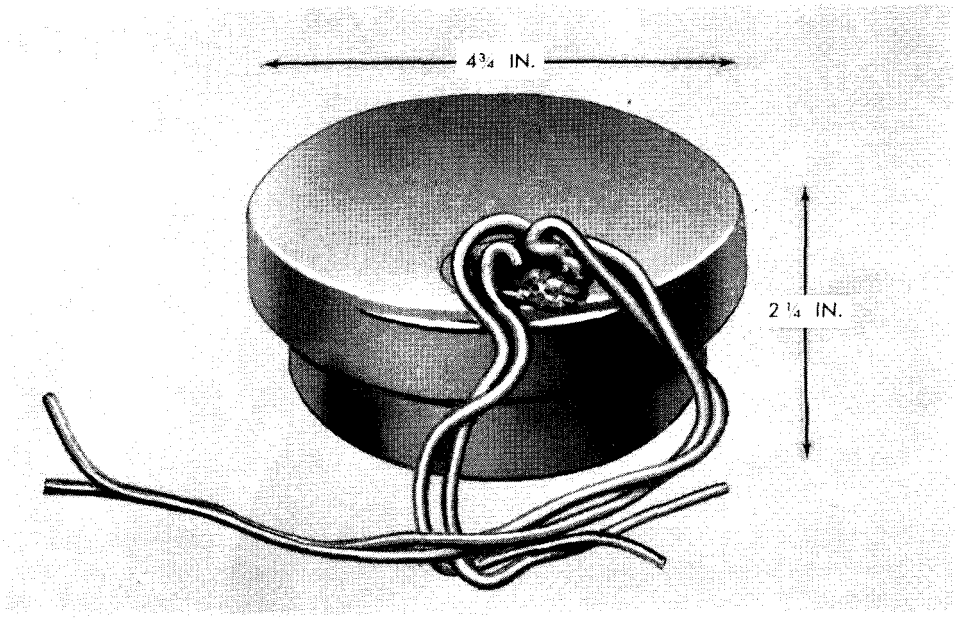


Figure 45. ChVZ vibration delay fuze.

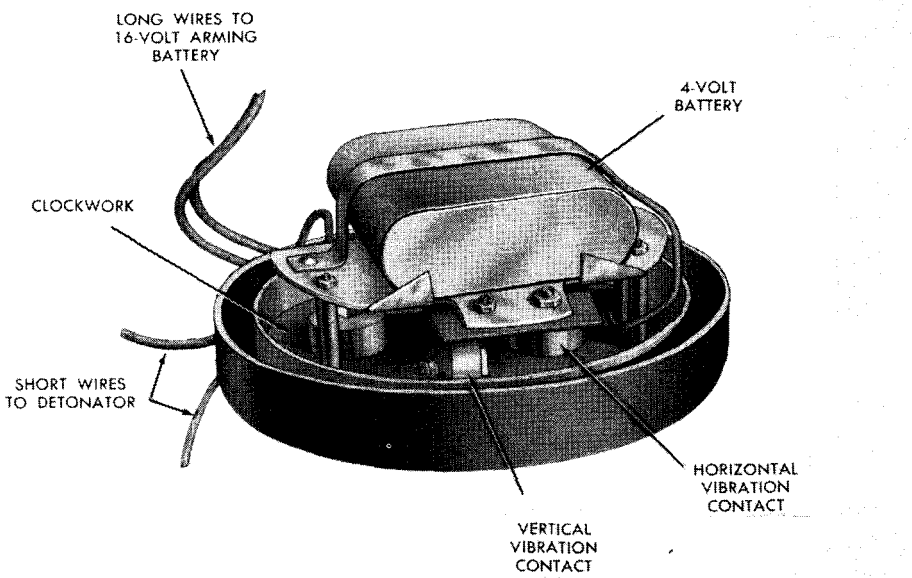


Figure 45.—Continued.

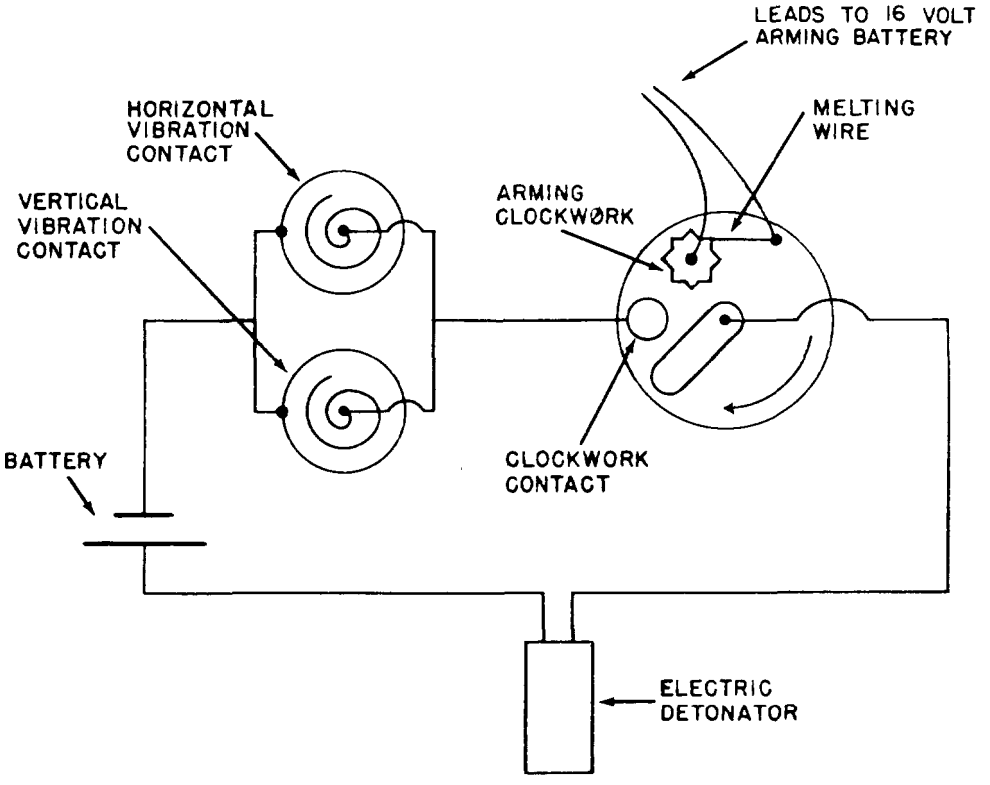


Figure 46. Circuit diagram of the ChVZ fuze.

It is particularly effective when placed in bridges or in rough terrain where passing vehicles set up considerable vibration.

c. FUNCTIONING. Vibration causes the copper spiral springs to vibrate until one of them touches a contact inside its aluminum housing, completing the circuit which fires the detonator.

d. INSTALLING AND ARMING.

(1) Attach the two short wires protruding from the fuze case to an electric detonator and insert the detonator in a charge.

(2) For 5 to 10 seconds touch the two long wires protruding from the fuze case to the poles of a battery of at least 16 volts. The current melts a wire holding the cogwheel of the clockwork safety mechanism and thus permits the clockwork to run. After a delay of about 4 minutes, the clockwork closes a switch which completes the circuit except for the vibration contact.

e. NEUTRALIZING. The fuze is extremely sensitive once armed. If there is no way to cut the short wires attached to the detonator without moving or jiggling the fuze, the fuze must be destroyed in place. The Germans, who had considerable experience with this fuze in World War II, destroyed mines fitted with this type of fuze in place by hand grenades or demolition charges. Neutralizing it by cutting the short wires to the detonator was not a recommended practice.

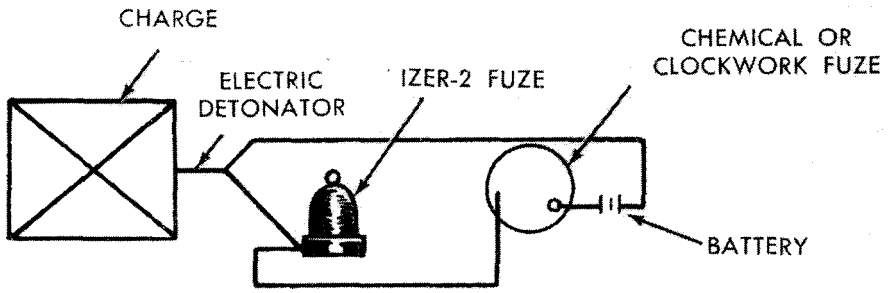
39. IZER-2 Vibration-Inertia Fuze

a. DESCRIPTION. This fuze (fig. 47) is of the instantaneous, mechanical type. It consists of an electromagnetic arming contact and a vibratory circuit-closer mechanism mounted on a cylindrical metal base. A brass bell-shaped hood covers the mechanism and is bolted to the base. The fuze is sealed and may be used under water. The fuze is 4 inches in diameter and 8⅛ inches in height. It weighs 6.1 pounds. The mechanism is known to consist of a spring-suspended weight, the tension of which may be adjusted by a regulating knob;

an electromagnet; a spring-loaded arming contact lever; and a spring-loaded actuating contact lever. Two electric leads project from the base of the fuze.

b. EMPLOYMENT. The fuze is normally used in mining railroads and is usually laid with a chemical delay or clockwork delay fuze connected to the circuit as shown in figure 47. The fuze is normally buried about 3 feet below the railroad bed.

c. FUNCTIONING. Vibrations from a train running over the railroad bed in which the fuze is laid cause the spring-suspended weight to move downward, forcing down the actuating contact lever, closing the contact, and completing the circuit. The circuit remains closed until broken by explosion of the charge or by breaking or cutting the electric wires, when all parts of the fuze returned to their original



FUZE WIRED IN TO A CIRCUIT

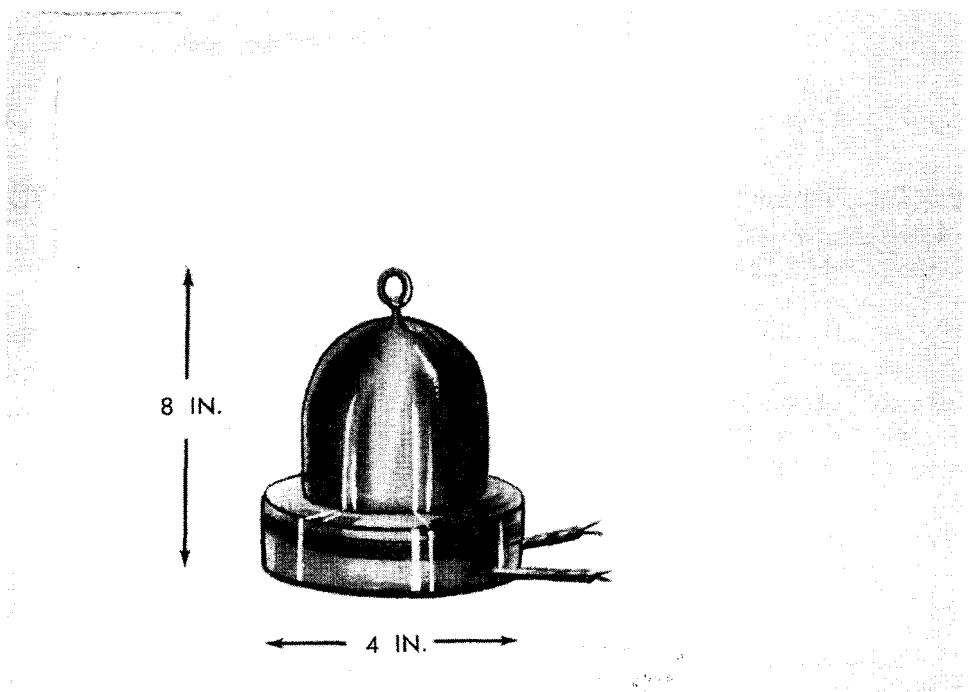


Figure 47. IZER 2 vibration-inertia fuze.

position. Since the fuze is usually laid at a distance from the charge, it may be reused.

d. INSTALLING AND ARMING. Connect the fuze to an electric detonating circuit. When the fuze is connected to the circuit, the current from the battery magnetizes the electromagnet and closes the arming contact. The fuze is now armed.

e. NEUTRALIZING. Cut the wire leads from the fuze, one at a time.

40. Radio-Controlled Fuzes

a. DESCRIPTION. Soviet radio detonating devices are electrical fuzes specifically designed to explode mines or large charges upon induction of radio signals from a remote control station. It is possible to detonate them at any chosen time up to 60 days after an area is abandoned to an opposing force. The primary difference between these radio detonating devices and clockwork or chemical delay fuzes is that the radio fuzes are controlled devices and can be set off at any time, rather than be depended on to detonate after a preset time delay or on actuation by the opposing force. During World War II the Soviet Army had three radio detonating devices—the F.10, F.40, and the F-TD. The F.10 is discussed in detail in paragraph 41. The F.40 is an improved version of the F.10 with the cases and batteries cylindrical rather than rectangular. The F-TD is a less expensive model of the F.40

b. EMPLOYMENT. The Soviets used these devices in important railway and highway junctions, principal buildings, and evacuated towns.

c. COUNTERMEASURES. Standard mine detectors will locate these devices. Jamming all known frequencies on which these devices operate is the only known way to prevent detonation before they are located. Jamming, however, is only a temporary safeguard. The Germans spent considerable time and effort in

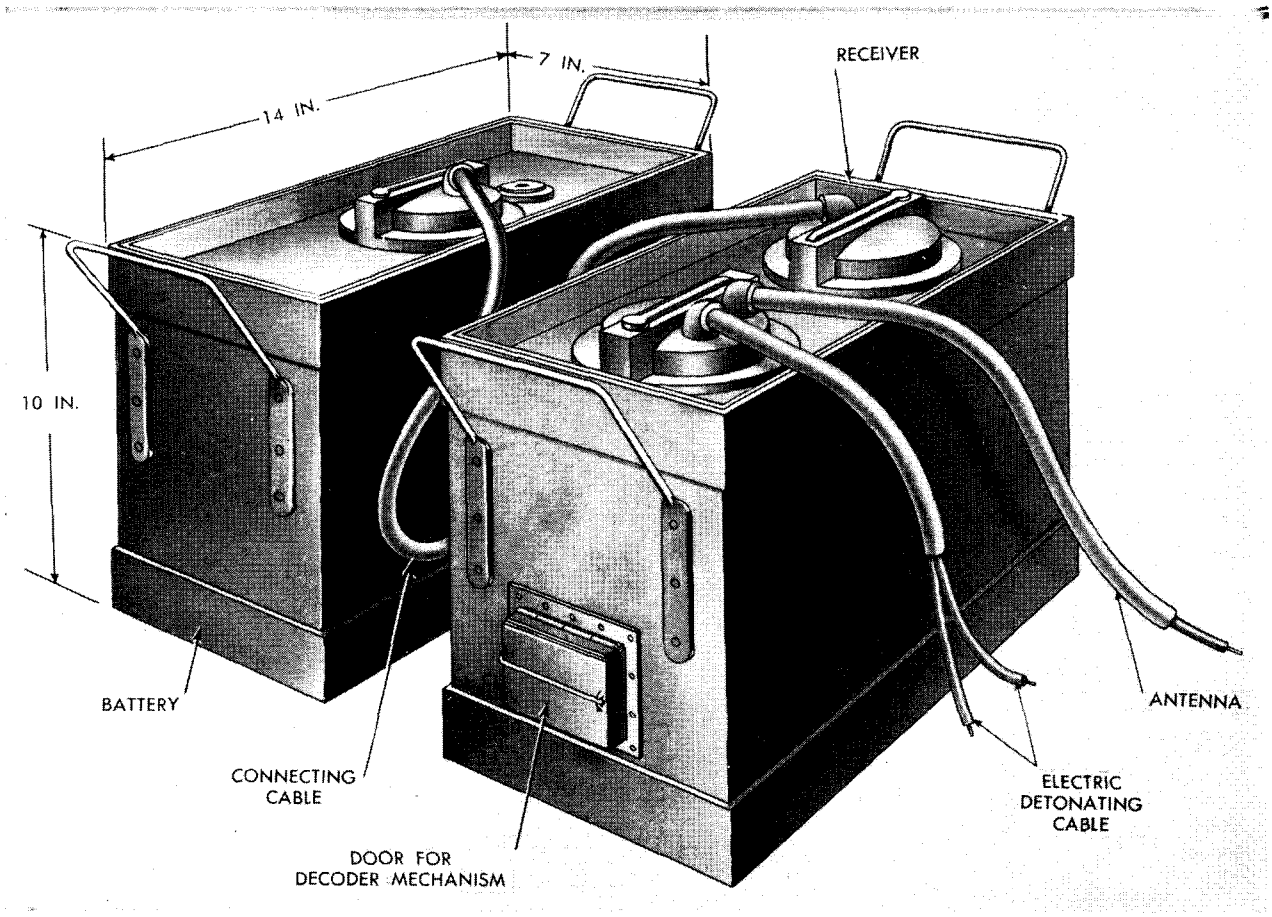


Figure 48. F.10 radio-controlled fuze.

devising techniques and equipment to counteract the effectiveness of these Soviet devices and developed a special fuze-detonating set and the Mine Searching Set 42. These Soviet devices were so effective that late in 1942 the Germans organized a new type of engineer unit, the Engineer Listening Platoon. Its primary mission was to detect radio-controlled, acoustic, and clockwork mines.

41. F.10 Radio-Controlled Fuze

a. DESCRIPTION. The F.10 radio-controlled fuze consists of a rectangular receiver case and a rectangular battery case (fig. 48), each 14 inches long, 7 inches wide, and 10 inches high. The two are connected by an electric cable and are usually placed in a rubber bag when installed. The receiver unit consists of a receiver, amplifier, decoding device, clockwork mechanism, antenna socket, and circuit-closer switch.

(1) *Antenna.* The antenna may be either a straight or spiral wire; the wiring in a building or even telephone wires may be used. The straight-wire antenna is about 100 feet long and is laid either under ground, under water, or under the foundations of a building. The F.10 may receive at a much greater range with a straight antenna than with a spiral antenna (fig. 49).

(2) *Battery.* The battery life is about 4 days if the set operates continuously. Its life can be lengthened up to 60 days by incorporating a clockwork time switch in the receiver. This switch turns the set on for a 12-to 15-second period every $2\frac{1}{2}$ to 5 minutes.

(3) *Transmitter.* A standard Soviet Army or commercial type transmitter is used for sending the detonating

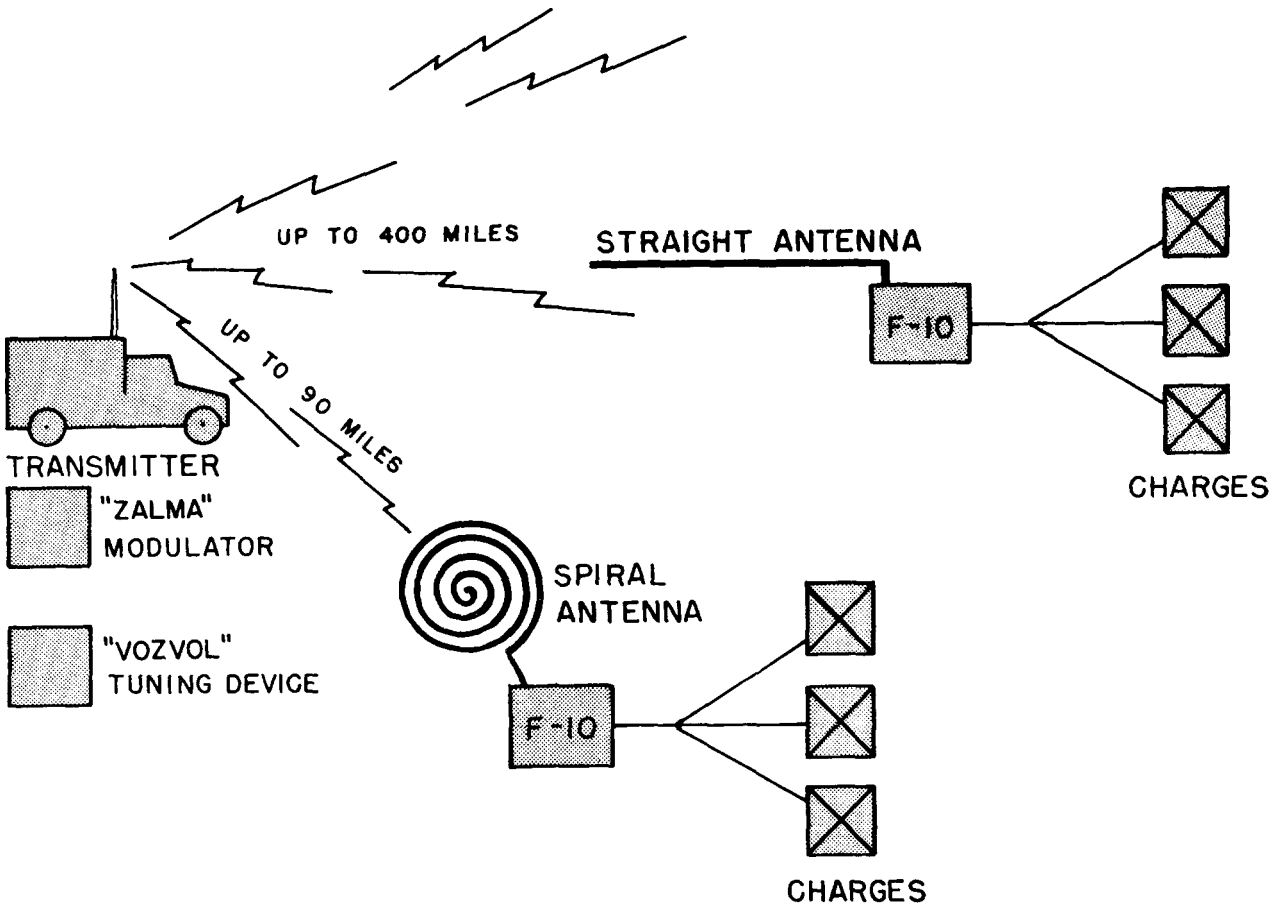


Figure 49. Layout of the F.10 receiver and transmitter.

signals. A modulator "Zalma" and a tuning device "Vozvol" are used in conjunction with the transmitter to tune it accurately. Figure 49 shows a schematic layout of F.10 receiver and transmitter equipment.

b. FUNCTIONING. Coded radio signals are transmitted at a specific wave length by a controlling transmitter. Each set has a code number painted on its case, indicating the radio frequency to which that set has been tuned. Table I lists the code numbers, frequencies, and wave lengths. The antenna of the F.10 picks up the coded signal, which is amplified by the receiver unit and then transmitted to the decoding device. When the received signals correspond to the prearranged code, the circuit of a mine-firing relay closes, detonating the charge or charges attached.

c. INSTALLING AND ARMING. The F.10 may be buried or unburied, but is usually laid in a rubber waterproof case. It is laid directly on the charge or may be wired to as many as three separate charges up to a distance of 160 feet. In place of the separate charges a device may be inserted which permits the F.10 to detonate as many as 36 separate charges as each device may detonate up to 12 charges. Another supplementary apparatus called the "Beredo" with a vibration fuze in it may be attached between the F.10 and the charge. It will detonate the charge by vibration caused by passing trains, tanks, or vehicles, when the F.10 is receiving the coded signals. The straight-wire antenna may be buried at the following depths: under ground, from 39 to 47 inches; under water, from 12 to 20 inches; under building foundations, from 2 to 4 inches.

d. NEUTRALIZING. German experience revealed that almost all of the F.10 fuzes were booby-trapped so steps (1), (2), and (3) below should be done with caution.

(1) Cut off the antenna as close to the F.10 case as possible.

(2) Cut the wires connecting the F.10 with the charge.

(3) The F.10 may also be neutralized by jamming if its frequency is known, or it may be detonated prematurely by other than the parent transmitter. This requires an exact knowledge of the frequency and code signals to which the F.10 is tuned.

Table I. Frequencies and Wave Lengths Used with the F. 10 Radio-Controlled Fuze.

Code No. on F. 10	Frequency number*	Wave length (in meters) corresponding to code No.	Type of transmitter
XV		2308	Commercial long wave**
XVI		1745	" " "
XVII		1182	" " "
XVIII		1120	" " "
XIX	11–12	1094.1–1000	1 W (Waggon), RAF
XX	12–13	1000–922.8	"
XXI	13–13.5	922.8–887.7	"
XXII	14–15	857.5–800	"
III	15–16	800–750	1 W.RAF, RUB, ZA, 4D
XXIV	16–17	750–706.7	"
XIV	17–18	706–667	"
XXVI	18–19	667–631.3	"
XXVII	19–20	631–600	"
XXVIII	21–22	568–545	"
XXIX	22–23	545–521.8	"
XXX	23–24	521.8–500	"
XII	24–25	500–480	"
XXXII	25–26	480–462.1	"
X	27–28	444.4–428.6	"
XXXIV	28–29	428.6–413.8	"

*These figures represent the frequency in kilocycles divided by 25. This system of denoting radio frequencies was devised by the Russians who use it almost exclusively, although the present tendencies are for neighboring countries to use the same method.

**For purposes of comparison, commercial medium-wave broadcasting is transmitted on 200-500 meters, and long-wave on 1000-2000 meters, approximately.

CHAPTER 6

MINES

Section I. GENERAL

42. Soviet Classification of Mines

According to published official Soviet Army doctrine, explosive mines are classified three different ways: according to the element (land, air, sea, or river) in which the mine is to be employed, according to the destructive mission and according to the method of detonating.

43. Types of Mines Used

The outstanding characteristics of Soviet mines are their simplicity of construction and wide variety of models, shapes, sizes, and methods of fuzing. During World War II the Soviets used about 15 models of standard metallic and nonmetallic antitank mines, at least 15 models of antivehicular and antitransport mines, about 10 standard dual-purpose mines, and about 12 standard models of antipersonnel mines, as well as numerous improvised types and vast numbers of captured mines. Of the standard Soviet mines used in World War II, the following have been used in Korea: the TM 38, TM 41, YaM 5, and TMD B antitank mines; the PMZ 40 dual-purpose mine; the POMZ 2 shrapnel mine; and the PMD 6, 7, and 7ts wooden antipersonnel mines. The KhF bounding gas mine, although not used in World War II, was produced in quantity.

44. Trends

It is believed that Soviet mine design will remain of simple manufacture with a variety of shapes, sizes, and materials.

Section II. ANTITANK MINES

45. TM-35 Antitank Mine

a. DESCRIPTION. The TM 35 antitank mine (figs. 50 and 51) is one of the earliest Soviet metallic land mines. It consists of a sheet-metal case 9 inches long, 8⅝ inches wide, and 3⅜ inches high, with a hinged, sheet-metal lid, and a pressure lid on top of the hinged lid. It contains six 400-gram blocks and two 200-gram blocks of trotyl explosive (TNT) for a total of 6.2 pounds (fig. 51). Total weight of the mine is about 11.4 pounds. A flat, metal shield plate is attached to the top of the pressure lid by the pressure bolt which projects through the lid. The lower end of the lid is positioned just above the lever (fig. 51) which actuates the MUV pull fuze (par. 22). A wire handle is located at the hinge end of the mine. Access to the fuze is also provided for at this end by a hole closed with a pivoted fuze-well cover. Projecting upward from each side (except the hinge side) of the mine body is a pair of metal locking lugs. When the lid is closed, the lugs project through holes in the lid and are bent over to keep the lid closed.

b. EMPLOYMENT. The mine is most frequently either laid on the ground and then camouflaged or laid in the ground with just a metal shield plate above ground level.

c. FUNCTIONING.

(1) Pressure of about 500 pounds on the metal shield plate crushes the pressure lid, forcing the pressure bold down on the fuze-actuating lever which has been kept stationary by a safety-pin type spring.

(2) The depressed fuze-actuating lever pulls the striker-retaining pin out of the MUV pull fuze and fires the mine.

d. INSTALLING AND ARMING.

(1) Screw an MD 2 detonator assembly to the base of an MUV pull fuze.

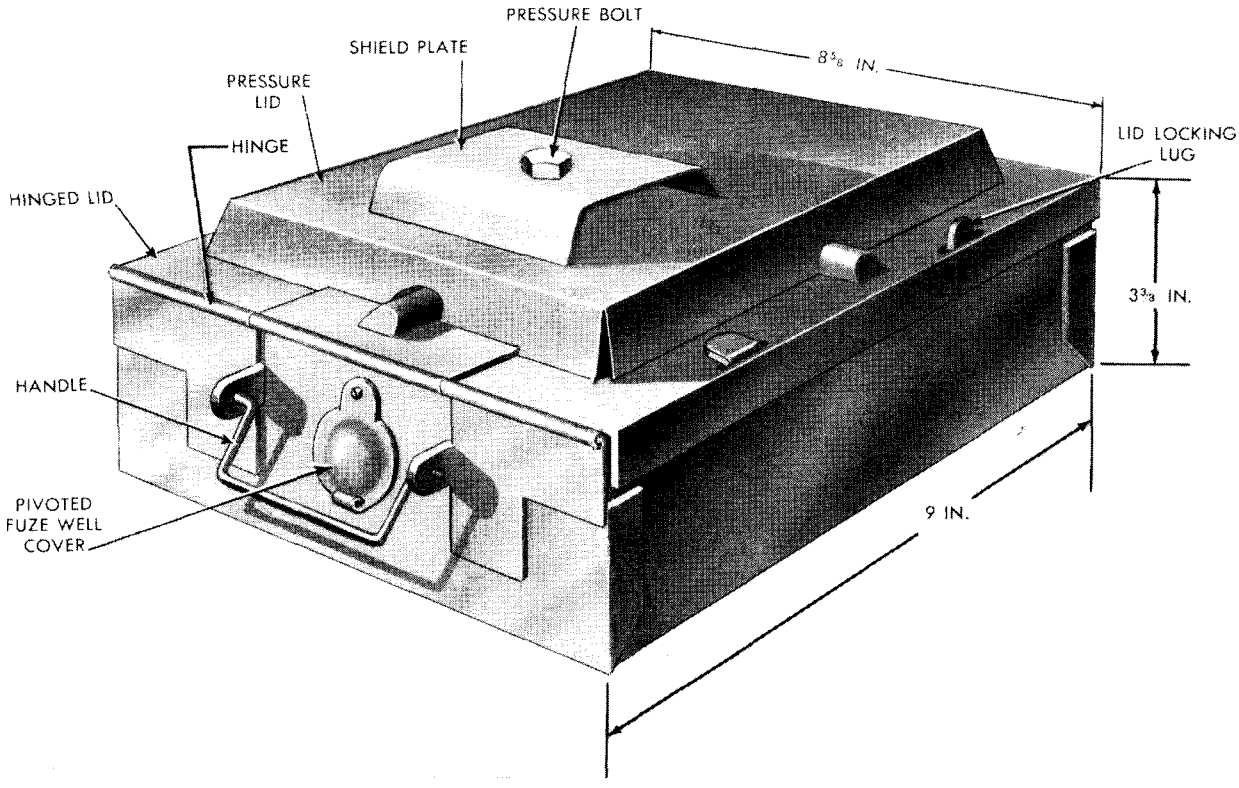


Figure 50. TM 35 antitank mine.

(2) Install the fuze by sliding it into the hollow fuze well through the opening under the handle; it does not screw in. Keep the loop of the striker-retaining pin upward so it engages in the narrow end of the fuze actuating lever (fig. 51).

(3) Close the pivoted fuze-well cover.

e. NEUTRALIZING.

(1) Carefully uncover and inspect the mine for antilifting devices. The recommended practice is to blow the mine in place with a prepared charge or, from defilade, pull the mine out with at least a 50-yard rope or wire.

(2) If any antilifting devices are found and a silent lift is required, neutralize them carefully. Uncover the fuze well and pull the fuze out of the well, being very careful that the loop of the striker-retaining pin slides easily off the end of the fuze-actuating lever, without pulling the striker-retaining pin loose.

46. TM-38 Antitank Mine

a. DESCRIPTION. The TM-38 antitank mine (fig. 52) is a later model of the TM-35 antitank mine (par. 45) and is similar to it in appearance. The TM 38 antitank mine is 8⅝ inches square and 3⅛ inches high. It weighs about 10.5 pounds and has 6.2 pounds of TNT. The pressure lid has four raised ridges to add rigidity and lacks the shield plate of the TM-35 mine. The TM 38 mine is painted field gray or olive drab. The lid is stamped with one of various manufacturing plant symbols, the month and year of manufacture, and the Russian symbol Ж.

b. EMPLOYMENT. This mine was employed as an antitank or antitransport mine in mine fields and road blocks. Occasionally the Germans, during World War II, found this mine laid on a supplementary charge containing an MUV pull fuze (par. 22), with a cord running from the striker-retaining pin of the fuze to the handle of the mine.

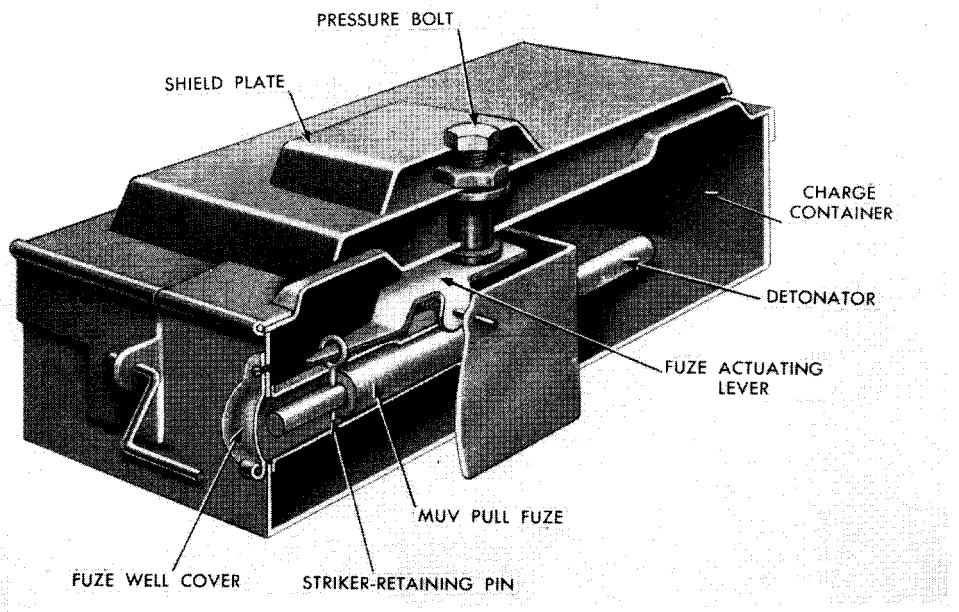


Figure 51. TM–35. antitank mine shown in cutaway and view with lid removed and explosives in place.

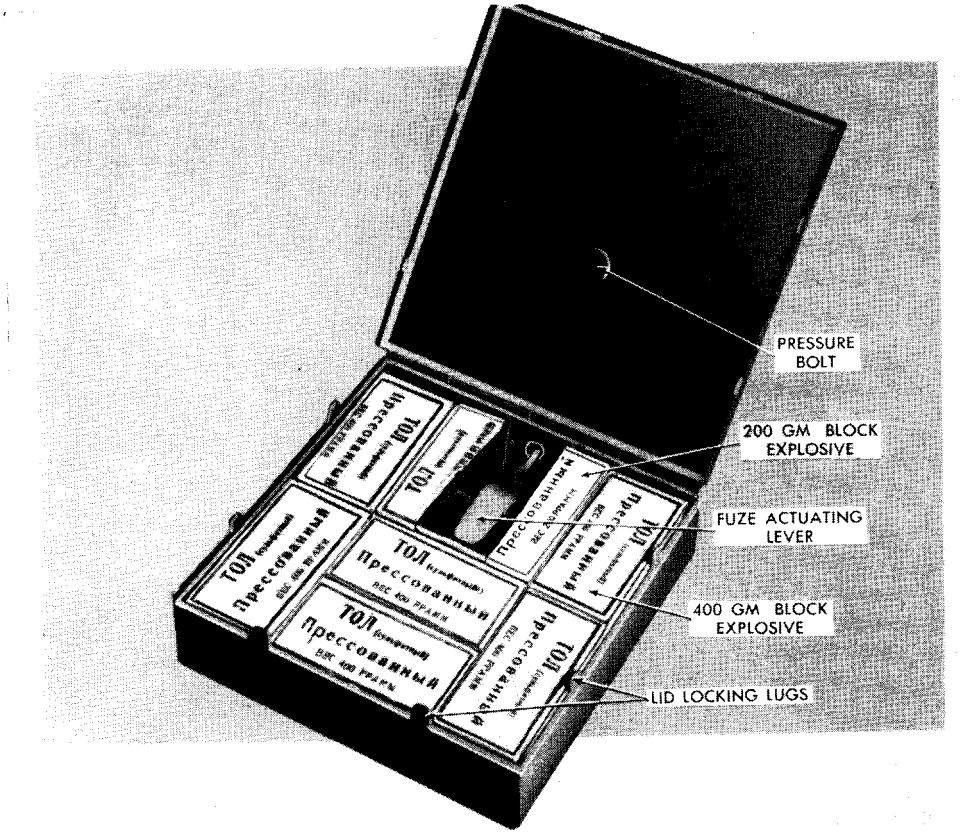


Figure 51.—Continued.

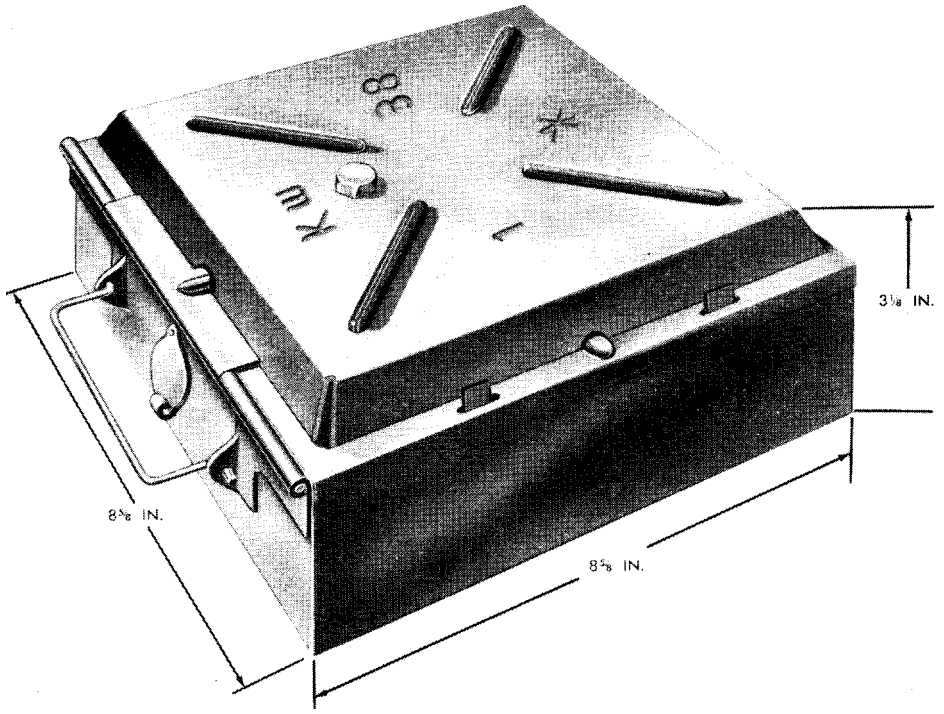


Figure 52. TM 38 antitank mine.

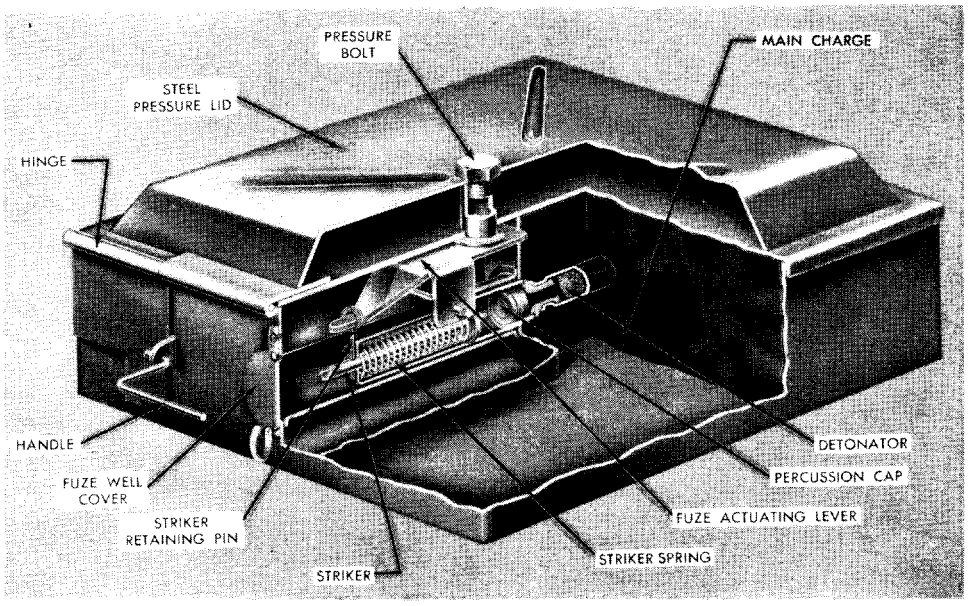


Figure 52.—Continued.

c. FUNCTIONING.

(1) Pressure of about 500 pounds on the steel pressure lid crushes the lid, forcing the pressure bolt down on the fuze-actuating lever which has been kept stationary by a safety-pin type spring.

(2) The depressed fuze-actuating lever pulls the striker-retaining pin out of the MUV pull fuze and fires the mine.

d. INSTALLING AND ARMING.

(1) Screw an MD 2 detonator assembly to the base of an MUV pull fuze.

(2) Install the fuze by sliding it into the hollow fuze well through the opening under the handle; it does not screw in. Keep the loop of the striker-retaining pin upward so that it engages in the narrow end of the fuze-actuating lever (fig. 52).

(3) Close the pivoted fuze-well cover.

e. NEUTRALIZING. Do not attempt to hand neutralize this mine. Blow the mine in place or, from defilade, pull it out with a long rope or wire.

Note. Some models of this mine had two built-in antilifting devices: one is a spring-actuated plunger in the bottom of the mine which fires the mine when it is lifted and the other is a spring-loaded striker held back by a projection on the pivoted fuze-well cover. Any attempt to rotate the fuze-well cover to get at the fuze releases the spring-loaded striker against a supplementary detonator and explodes the mine.

47. T-IV Antitank Mine

The T IV antitank mine (fig. 53) is merely another modification of the TM 35 and TM-38 antitank mines (pars. 45 and 46). The T IV mine differs from the TM 35 and TM-38 only in the lid and pressure piece. The interior view is the same as shown in figure 51. The pressure lid of the T-IV mine is a flat, wooden board secured to the steel hinged lid by four bolts, one at each corner. A round wooden pressure piece is attached to the underside of the wooden lid by a screw and projects through a hole in the top of the metal lid into the mine case where it is positioned just above the fuze-actuating lever. (Some models contain a round wooden shear pin projecting through the pressure piece flush with the top of the metal lid.) The total weight of the mine is about 9.2 pounds, including 6.2 pounds of explosive. The employment, functioning, installing, arming, and neutralizing are the same as for the TM 38 (par. 46).

Note. Some models of the T IV antitank mine have been found made entirely of wood. These mines operate in the same manner as the metal-bodied mines but are a little heavier and larger in dimensions because of the increased thickness of the mine body. The explosive content is the same.

48. TM-39 Antitank Mine

The TM 39 antitank mine (fig. 54) is very similar to the TM 38 (par. 46) but much longer and narrower. The mine is 23½ inches long, 5½ inches wide, and 4 inches high. Instead of a pivoted fuze-well cover, as in the TM 38, a sliding door provides access to the fuze well of the TM 39. The mine weighs a total of 11.4 pounds, including 7.1 pounds of explosive. A pressure of over 600 pounds is necessary to set off the mine. The interior view of this mine is the same as shown for the TMD 40 (fig. 61) except that the TM 39 has only one fuze. The employment, functioning, arming, and neutralizing are the same as for the TM 38 (par. 46).

49. TM-35 (M) Antitank Mine

This mine (fig. 55) is a 1941 modification of the TM-35 (par. 45) and resembles an elongated TM 38 antitank mine (par. 46). It is about 9 inches long, 8⅝ inches wide, and 4½ inches high. The pressure lid contains two pressure bolts, one at each end of the lid, each positioned over a fuze-actuating lever. The mine contains ten 400-gram blocks of TNT, or a total of 8.8 pounds of explosive, and employs two MUV pull fuzes (par. 22), one at each end of the mine. A sliding door at each end of the mine provides access to the fuze wells. This mine functions and is employed, armed, and neutralized the same as the TM-38, except that in arming or neutralizing, the sliding doors in the TM 35(M) are lifted to expose the fuze. It does not have pivoted fuze-well covers as does the TM-38.

Note. The Soviets produced an elongated plywood version of the TM-35(M) which is 19¾ inches long, 6 inches wide, and 4⅛ inches high. The mine weighs a total of between 16 and 18 pounds, depending upon the wood used, and contains 11.4 pounds of powdered explosives or TNT blocks, usually thirteen 400-gram

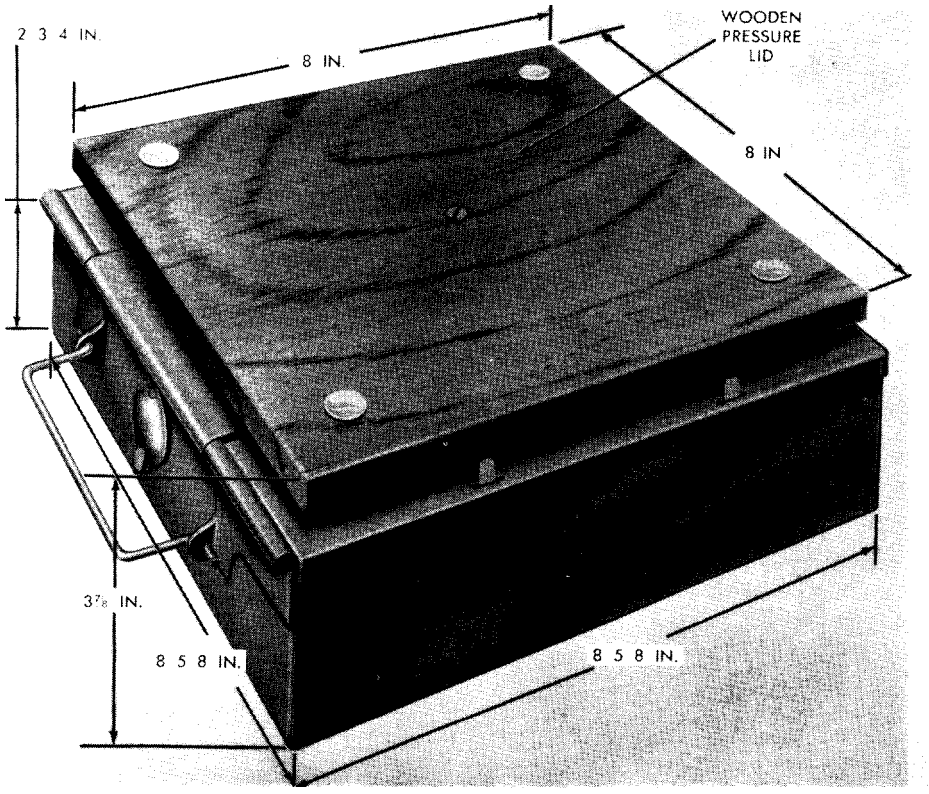
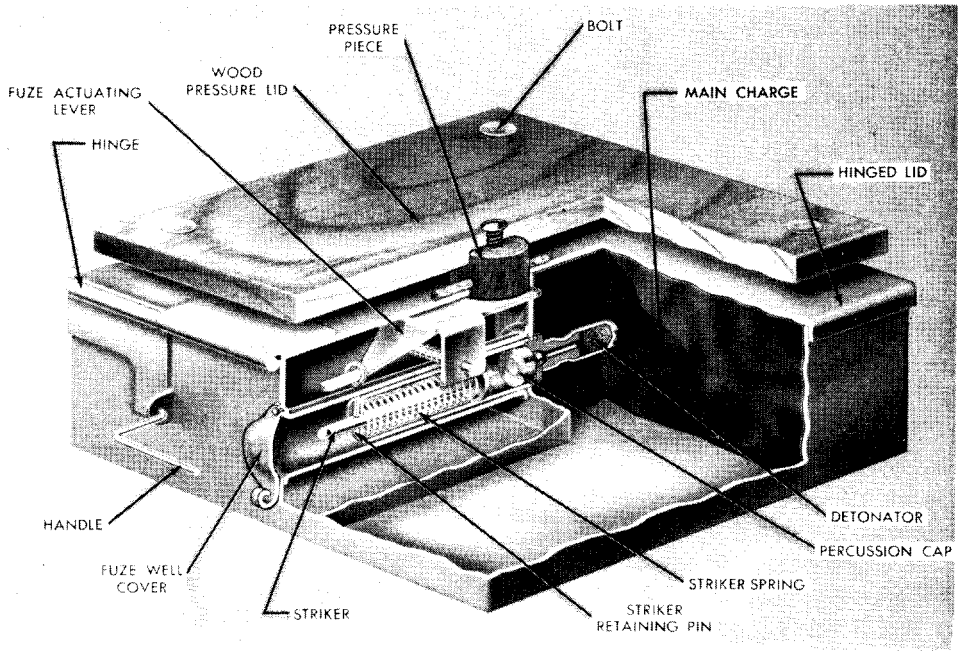


Figure 53. T–IV antitank mine.



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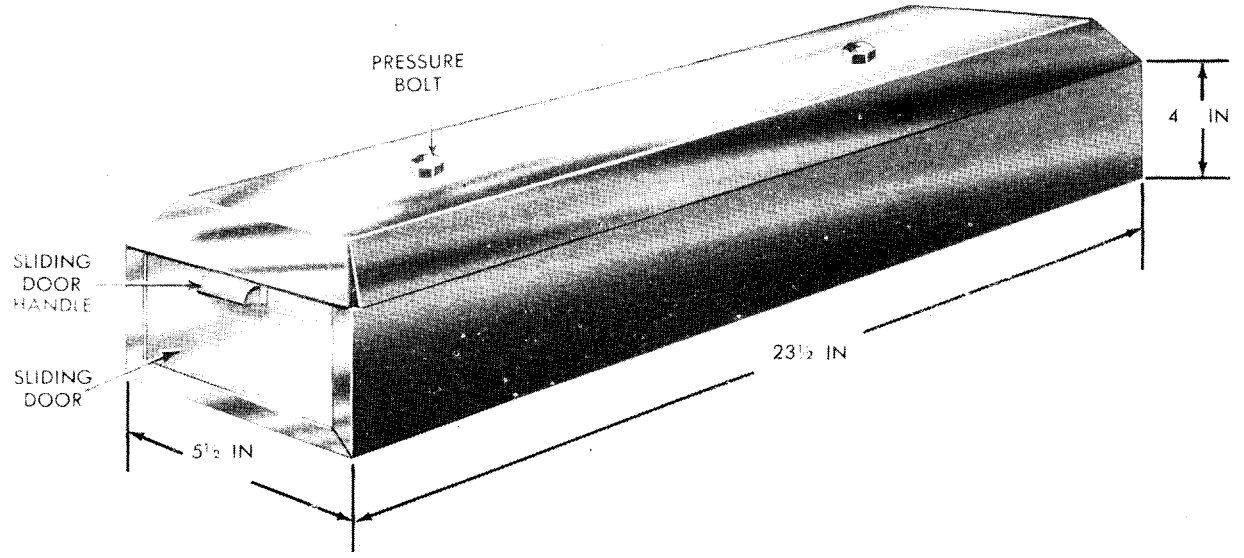


Figure 54. TM 39 antitank mine.

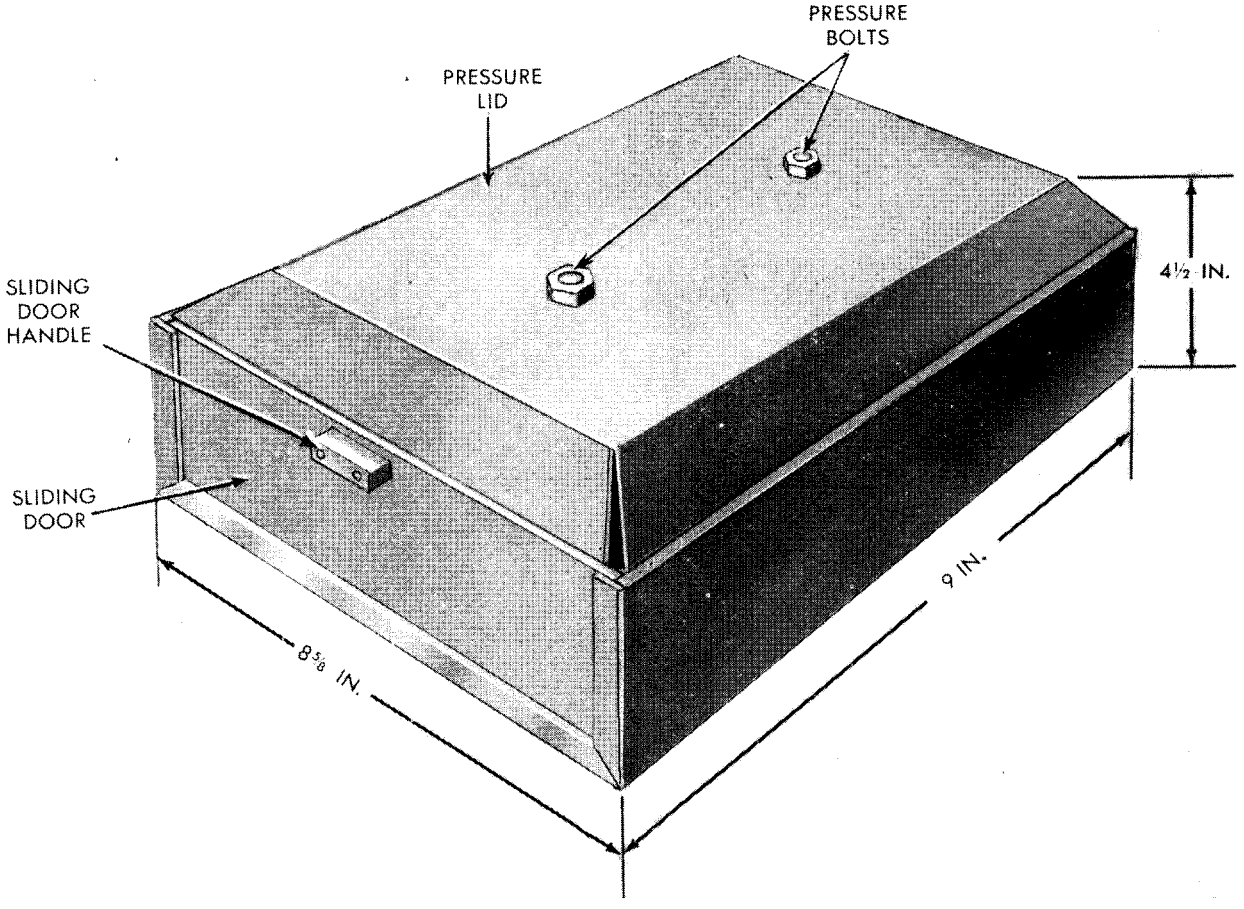


Figure 55. TM 35 (M) antitank mine.

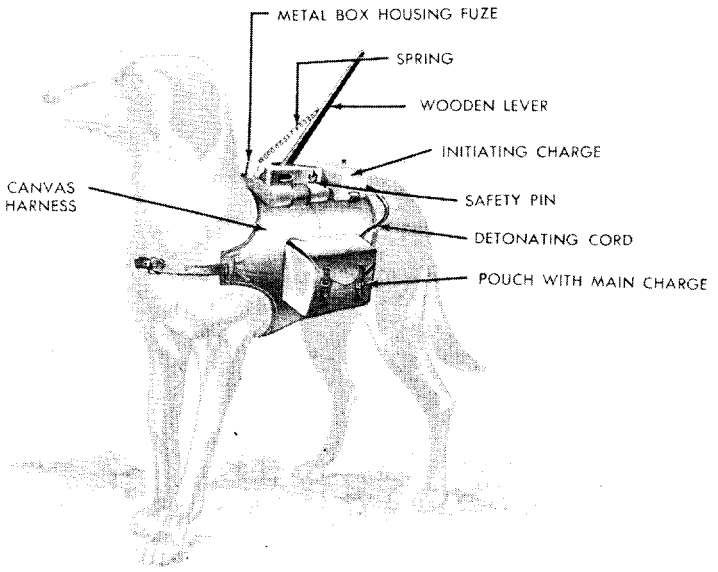


Figure 56. Antitank dog mine.

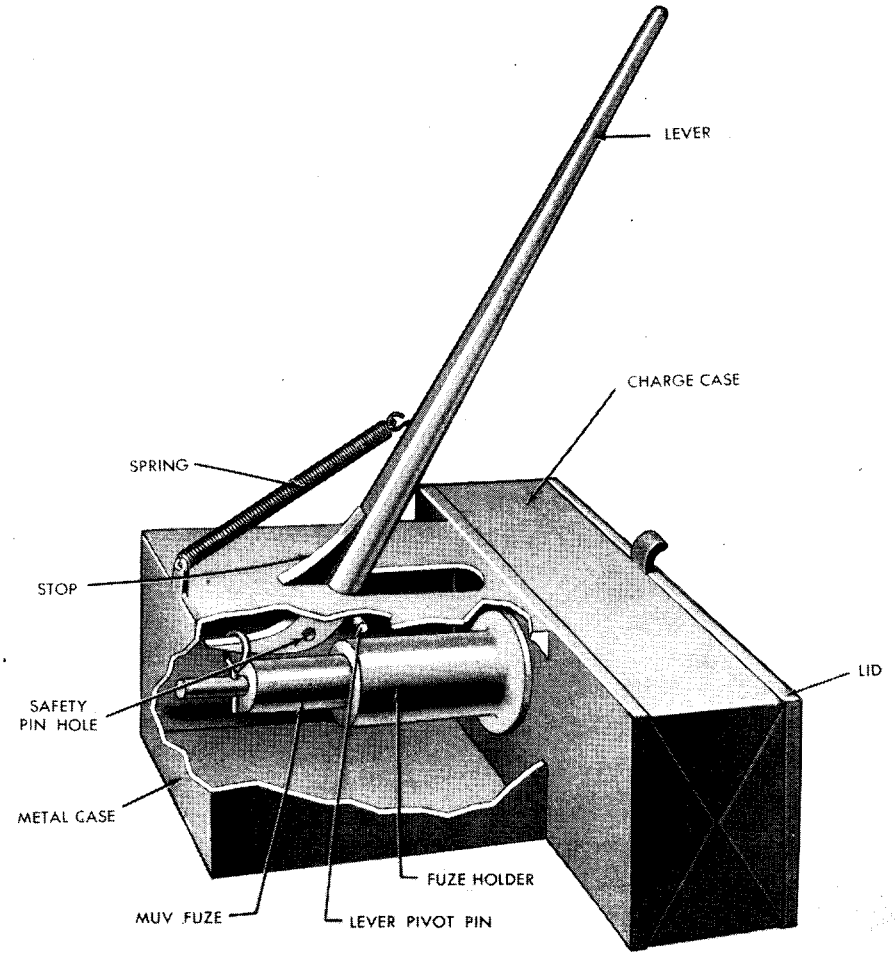


Figure 56.—Continued.

TNT blocks. A wooden pressure board, 16¾ inches long, 3⅞ inches wide, and ⅞ inches thick is nailed on the lid.

50. Antitank Dog Mine

a. DESCRIPTION. The antitank dog mine (fig. 56) consists of about 26 pounds of explosive carried in two canvas pouches, one strapped on each side of a dog. The ignition device consists of a metal box containing a standard MUV pull fuze (par. 22) inserted in a 200-gram block of explosive and wired with detonating cord to the main charge. A wooden lever, held by a spring to the top of the box (fig. 56) and by a pivot pin through the box, acts as the initiating mechanism. A safety pin projects through the lever arm just below the pivot pin and holds the lever fast before the mine is armed. A metal ring is attached to one end of this safety pin. This ignition device is attached to the harness on the dog's back.

b. FUNCTIONING. The dog is trained to run under a tank. As he crawls under the tank, the low part of the tank chassis strikes the lever and pushes it backward. This action pulls the striker-retaining pin out of the MUV fuze and explodes the charge.

c. NEUTRALIZING. The best method of neutralizing this mine is to shoot the dog before it reaches the tank.

51. TM-41 Antitank Mine

a. DESCRIPTION. The TM-41 antitank mine (fig. 57) is a round, steel-shelled mine, 10½ inches wide and about 5¾ inches high. It weighs about 12 pounds, including 8.8 pounds of amatol or about 9 pounds of flaked TNT explosive. It has a cylindrical 75-gram picric acid booster charge. The mine has a centrally located fuze well with a pressure cap in the lid, closing the fuze well. To add rigidity, the lid has ridges which radicate from the pressure cap. The lid also has a fluted circumference which permits it to collapse more easily under load. A wire carrying handle is located on the side of the mine. A circular plug in the bottom can be removed for filling the charge cavity. The fuze used with this mine is the MV-5 pressure fuze (par. 19). This mine was designed to replace the PMZ-40 (par. 83), which was considered too dangerous to handle. The manufacturer's symbols and dates are stenciled in black on the lid. The inscription TM-41, the abbreviation for the type of explosive used in the mine, and other manufacturer's symbols are stenciled on the side of the mine.

b. EMPLOYMENT. This mine is employed as an antitank or antitransport mine in mine fields and road blocks.

c. FUNCTIONING.

(1) Pressure of at least 350 pounds on the lid crushes the fluted circumference of the lid.

(2) The crushed lid depresses the pressure cap of the fuze, actuating the fuze and exploding the mine.

d. INSTALLING AND ARMING.

(1) Rotate the pressure cap in the lid until it comes off.

(2) Insert a 75-gram cylindrical booster charge into the fuze well.

(3) Insert an MV-5 fuze, with an MD-2 detonator assembly attached, into the fuze well so that the detonator is inserted into the hole in the booster charge.

(4) Replace the pressure cap of the mine.

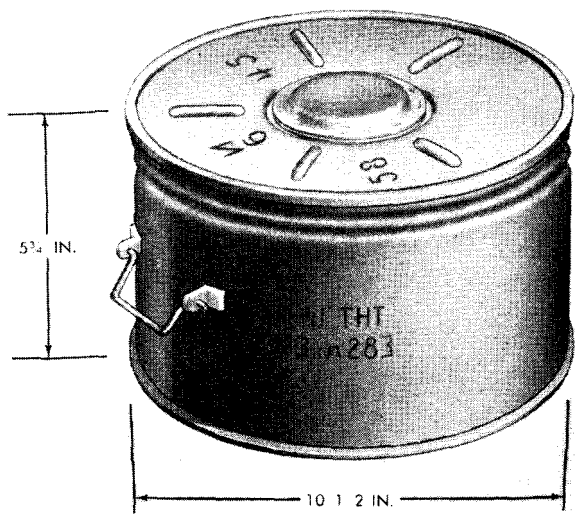
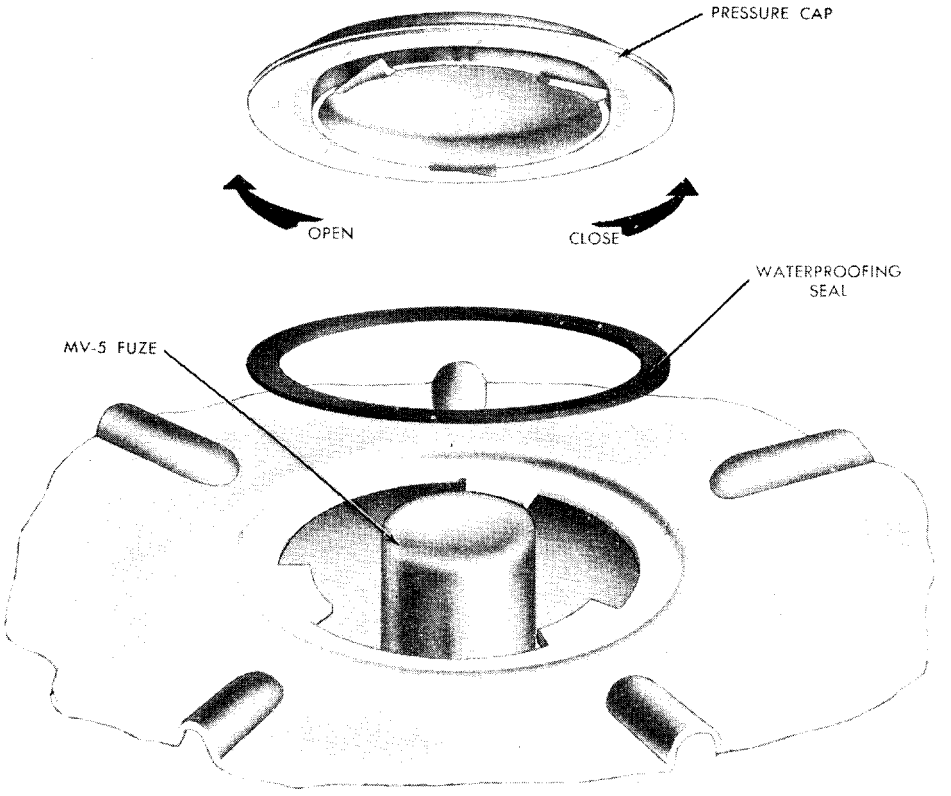


Figure 57. TM-41 antitank mine.



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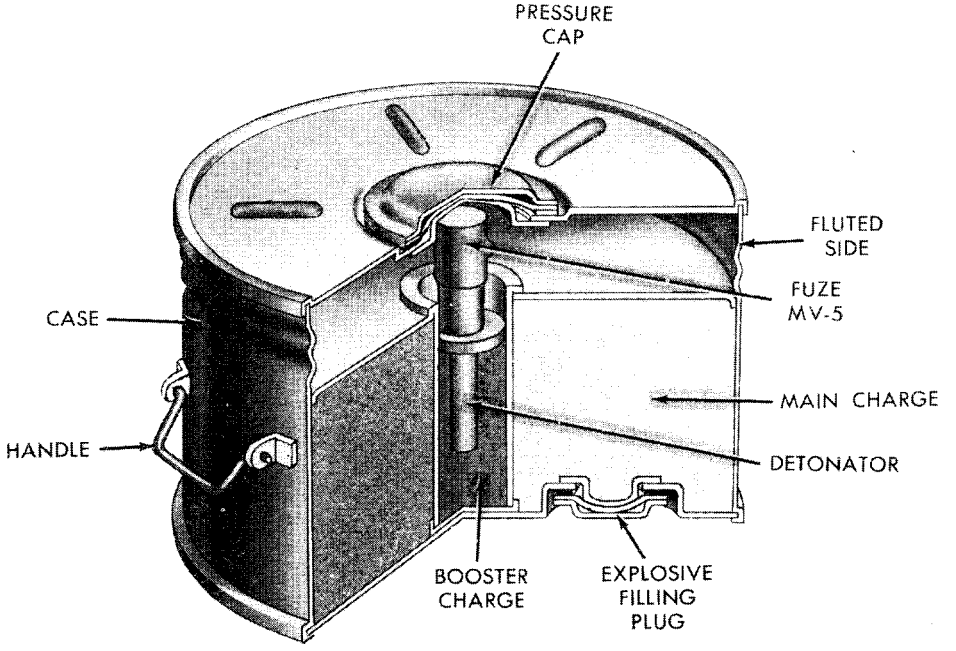


Figure 57.—Continued.

Note. When waterproofed with rubber washers and laid under water, this mine reportedly remains operative for up to 2 months.

c. NEUTRALIZING.

(1) Rotate the pressure cap in the lid until it can be lifted off. (If the pressure cap cannot be removed, blow the mine in place or pull it out with a long rope or wire to a safe place and destroy.)

(2) Pull out the fuze and the detonator assembly.

52. TM-44 Antitank Mine

This mine is a modification of the TM 41 (par. 51). It is similar in appearance and functioning, but it is larger and heavier. It weighs about 16 pounds, including about 12 pounds of explosive.

53. Asbestos Antitank Mine

a. DESCRIPTION. The asbestos antitank mine (fig. 58) consists of a waterproofed asbestos case containing 7 pounds of powdered ammonium nitrate with a 200-gram TNT block booster charge, a wood pressure piece, and a fuze-actuating lever which actuates an MUV pull fuze (par. 22). The case is $9\frac{3}{4}$ inches square and $4\frac{3}{4}$ inches high. Total weight of the mine is 12.5 pounds. The joints and openings of the mine are closed with sealing wax and the entire mine has a water repellent coating. The wooden handle is tied by rope to the pressure piece and fuze-supporting plug. A cord is tied to the fuze-well plug and to the wooden handle to prevent loss of the plug during transport.

b. EMPLOYMENT. This mine is used in antitank mine fields and road blocks. It may be actuated by a running man.

c. FUNCTIONING. Pressure of less than 200 pounds on the pressure piece or on the lid depresses the cover and rotates the fuze-actuating lever, pulling the striker-retaining pin from the fuze and firing the mine.

d. INSTALLING AND ARMING.

(1) Remove the wood fuze-well plug from the side of the mine.

(2) Screw an MD 2 detonator assembly to the base of an MUV fuze.

(3) Insert the fuze in the mine so the loop of the striker-retaining pin slides over the end of the fuze-actuating lever.

(4) Replace the wood fuze-well plug.

e. NEUTRALIZING.

(1) Remove the wooden fuze-well plug.

(2) Remove the fuze.

(3) Unscrew the detonator assembly from the fuze.

Note. The only metal in this mine is the fuze. If it is buried more than a few inches under the ground the mine cannot be detected by the SCR 625 detector.

54. TMB-1 Paper Antitank Mine

a. DESCRIPTION. This paper-bodied antitank mine (fig. 59) consists of a round asphalt-impregnated cardboard container in two halves, flat on the top and bottom. It weighs about 14.5 pounds, including 11 pounds of explosive. The mine measures $10\frac{5}{8}$ inches in diameter and $5\frac{1}{4}$ inches in height. The joint between the two halves of the mine is sealed with tape and asphalt. The mine body is coated with asphalt for waterproofing. On the inside wall of the mine are five wooden slats used to reinforce the cardboard body. In the centrally located fuze well is a MV 5 pressure fuze (par. 19). This fuze fits into a 50-gram cylindrical booster charge cemented with asphalt to the bottom of the well. The fuze well is closed at the top with a threaded glass pressure plug and a rubber washer.

b. EMPLOYMENT. This mine is laid either alone or with metal and wooden mines. Metallic-mine detectors will detect the metal mines, leaving the paper mines undetected in a supposedly cleared field.

c. FUNCTIONING. Pressure of about 26 pounds on the glass pressure plug or the top of the case causes the case to cave in, actuating the fuze and firing the mine.

d. INSTALLING AND ARMING.

(1) Unscrew the glass plug.

(2) Screw an MD 2 detonator assembly to the base of an MV 5 fuze and place in the fuze well of the booster charge.

(3) Replace the glass plug.

Caution: There is no safety device on this mine.

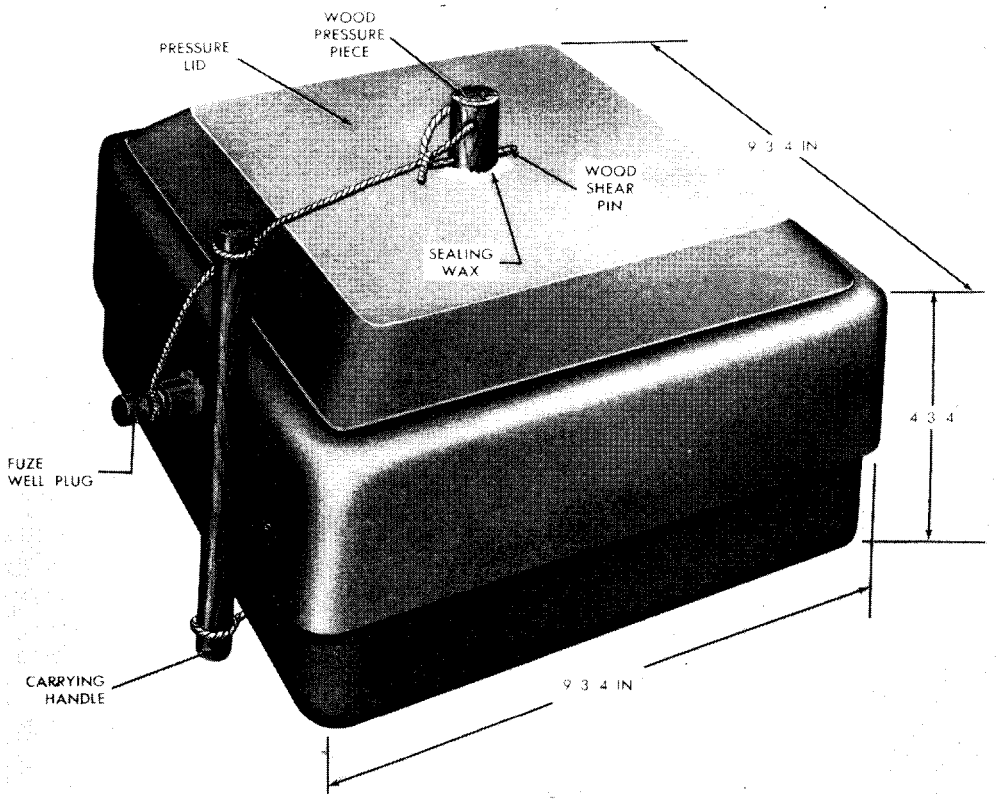


Figure 58. Asbestos antitank mine.

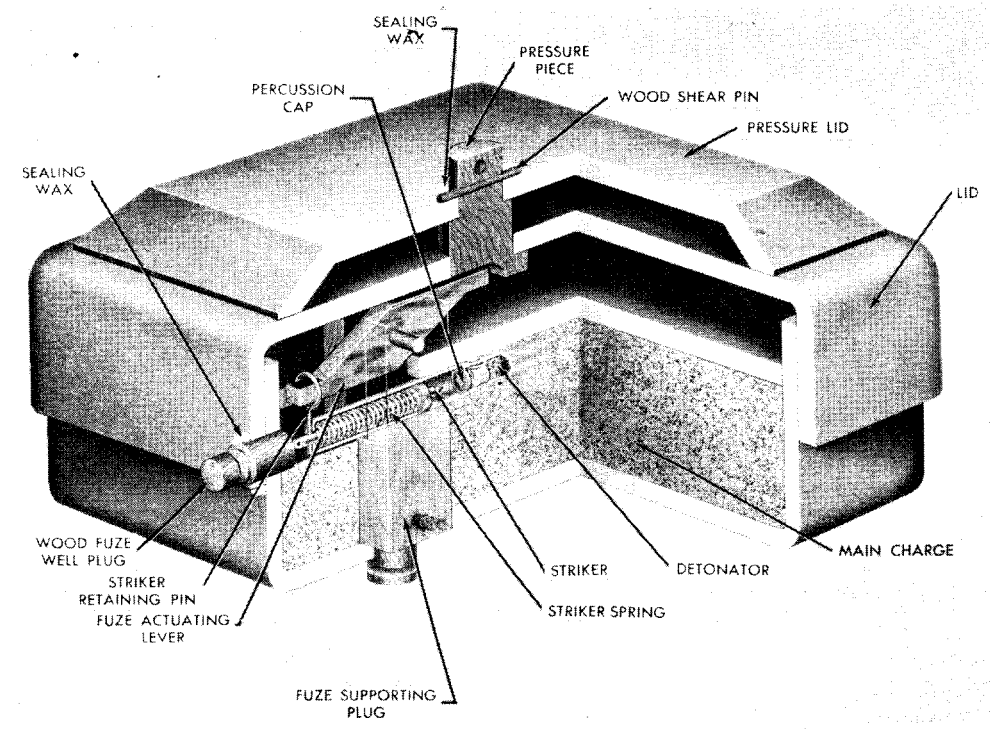


Figure 58.—Continued.

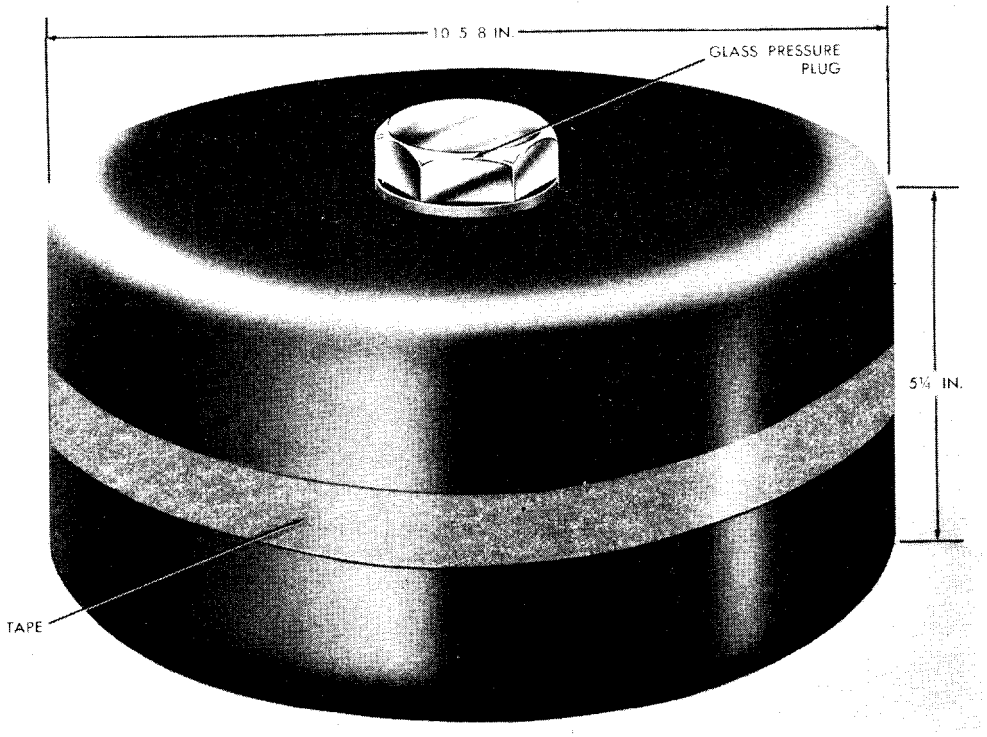


Figure 59. TMB-1 paper antitank mine.

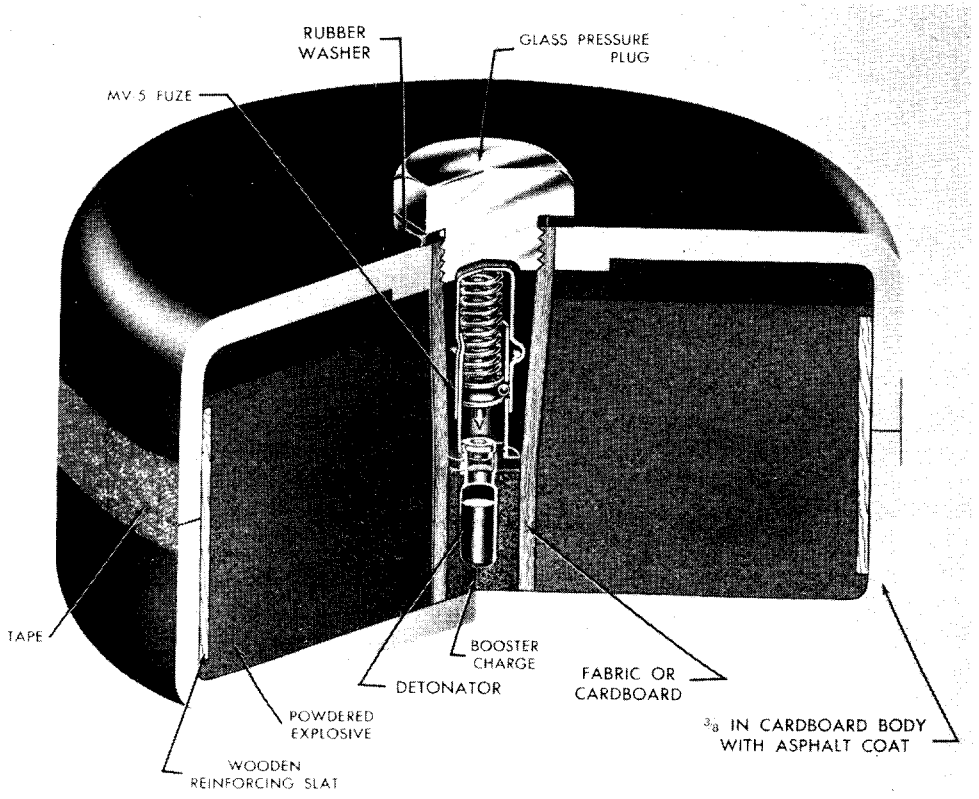


Figure 59.—Continued.

c. NEUTRALIZING.

(1) Unscrew the glass plug.

(2) Remove the fuze and detonator.

55. TMB-2 Paper Antitank Mine

The TMB 2 antitank mine (fig. 60) is identical in appearance to the TMB 1 (par. 54) except that it is larger and heavier. It is $10\frac{3}{4}$ inches wide and 6 inches high. It weighs a total of 15.4 pounds of which 11 pounds is explosive (usually powdered amatol, 80 20). The TMB 2 uses a 75-gram cylindrical charge for a booster instead of a 50-gram charge as in the TMB 1. Internally, however, there is some difference between the two mines. Compare figures 59 and 60. Otherwise, the two mines are identical in functioning, employment, arming, and neutralizing.

56. TMSB Tarpaper Antitank Mine

The TMSB tarpaper antitank mine is identical to the TMB 2 (par. 55) except that it is larger and heavier. It is $11\frac{3}{8}$ inches wide and $6\frac{5}{8}$ inches high. It weighs a total of 17.6 pounds, including about 13 pounds of explosive. The TMSB is a modification of the TMB 2. Its employment, functioning, arming, and neutralizing are the same as for the TMB 2.

57. TMD-40 Wooden Antitank Mine

a. DESCRIPTION. The TMD 40 mine (fig. 61) is similar to the wooden version of the TM 35 (M) described in paragraph 49 but it is not so heavy and contains a little less explosive. The TMD 40 is about $23\frac{1}{2}$ inches long, $5\frac{1}{2}$ inches wide, and 4 inches high. It

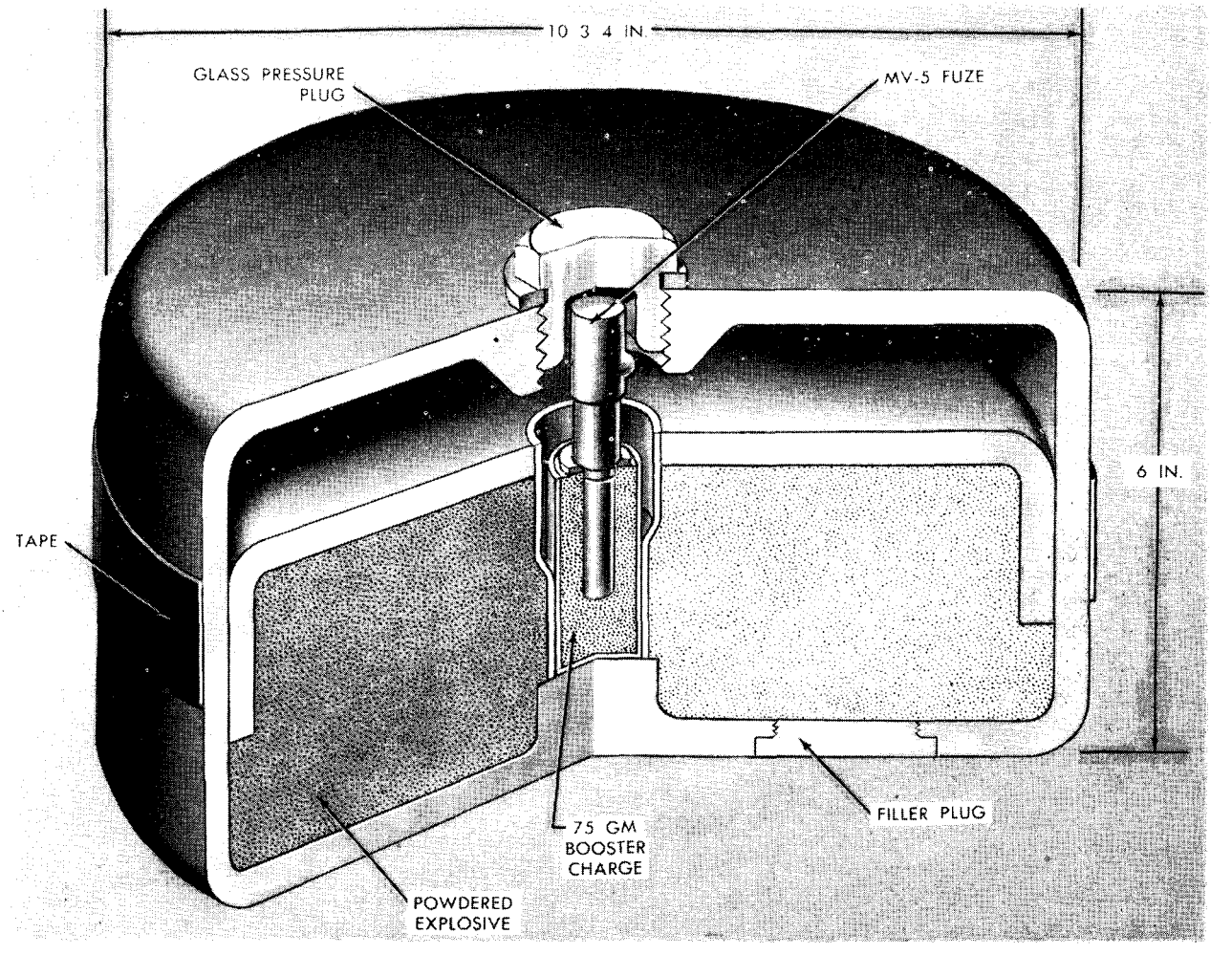


Figure 60. TMB-2 paper antitank mine.

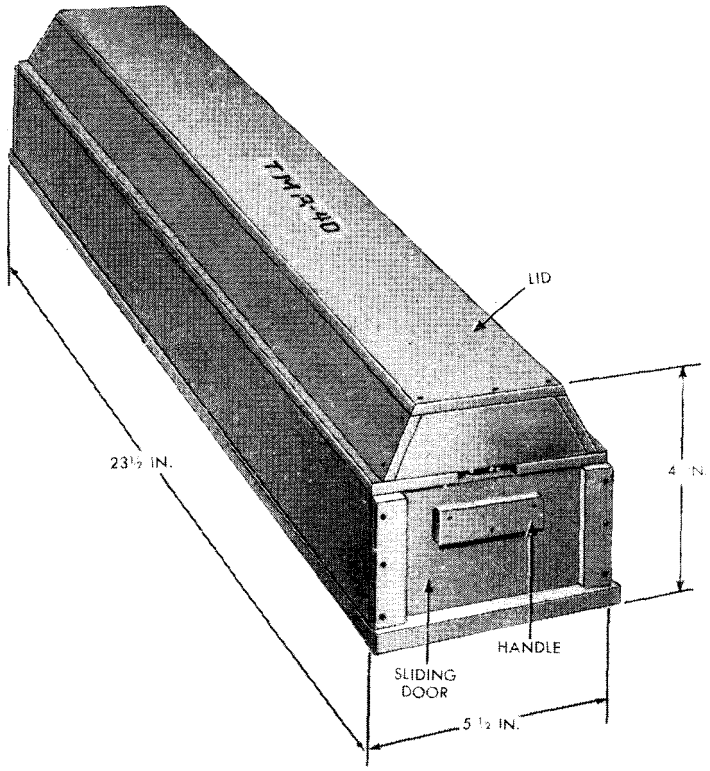


Figure 61. TMD 40 wooden antitank mine.

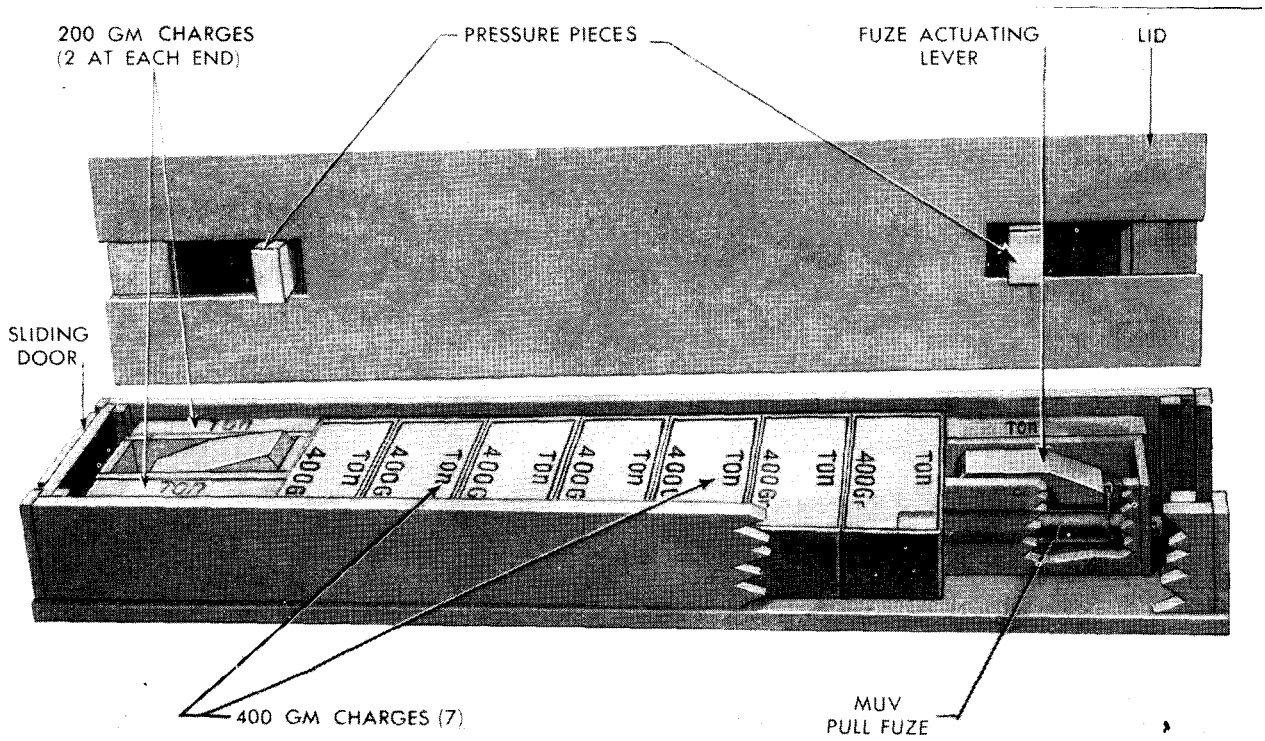


Figure 61.—Continued.

contains seven 400-gram and four 100-gram blocks of TNT (7.1 pounds). It weighs a total of 11 to 12 pounds. The mine is painted field gray except in winter when it is painted white. The abbreviation TMD 40 in Russian letters is stenciled in black on top of the lid.

b. EMPLOYMENT. These mines are laid in rows, with distances of about 2 feet between mines. They are used against vehicles and light and medium tanks.

c. FUNCTIONING. A pressure of at least 550 pounds on the lid crushes the top of the lid, forcing one or both of the wooden pressure pieces down onto the wooden fuze-actuating levers. This action pulls the striker-retaining pin from the MUV pull fuzes and explodes the mine.

d. INSTALLING AND ARMING.

(1) Lift the lid and insert the MUV pull fuzes, with detonator assemblies attached, into their respective holes. The nail in the end of the wooden fuze-activating lever is carefully inserted through the loop of the striker-retaining pin. The fuze rests on a wooden block in the bottom of the fuze housing.

(2) Replace the lid.

e. NEUTRALIZING.

(1) Lift up the sliding doors at each end of the mine to expose the fuzes.

(2) Pull out the fuzes and unscrew the MD 2 detonator assemblies from the fuzes.

58. YaM-5 Box Mine

a. DESCRIPTION. The YaM 5 (fig. 62) antitank mine (box mine, 5 kilograms) is a long, wooden-box type mine. It is about 19 inches long, 7 inches wide, and 3½ inches high. It weighs about 14.5 pounds, including about 11 pounds of explosive. The dimensions and weights may vary depending on the wood used. The lid of the mine overlaps on one long side and is recessed in the center of this overlap to fit over the end of the striker of the MUV pull fuze (par. 22). A pressure block is nailed to the top of the lid over the overlapping edge in some models. The inside of the mine is divided in half by the centrally located fuze compartment. This compartment contains a 400-gram booster charge held in place by a wooden wedge at the rear and the wooden fuze-holder block at the front. The fuze-holder block has a hole drilled through it for insertion of the MUV pull fuze. The MD 2 detonator assembly screwed to the fuze extends into the booster charge, while the striker projects out the side of the mine so that the striker-retaining pin is located immediately below the recess in the overlapping lid. Two staples are nailed in the bottom of this overlap, one on each side of the recess. A wooden peg or nail is passed through the staples and the eye of the striker-retaining pin when the mine is laid. The mine is normally painted olive green or slate gray. It is painted white in winter.

Note. Other models of this mine differing from the YaM 5 only in size and explosive content, are shown in table II.

b. EMPLOYMENT. The YaM 5 is employed in the same manner as any antitank mine. It is normally buried under an inch or two of soil.

c. FUNCTIONING. Pressure of at least 300 pounds crushes the lid and forces down the overlapping edge of the lid. This action causes the wooden peg or nail to pull out the striker-

Table II. Characteristics of Models of YaM-5 Box Mine

Model	Dimensions (inches)*			Weight (pounds)*		Remarks
	Length	Width	Height	Total	Explosive	
YaM-5	19½	7¾	3½	14	11	No pressure piece on lid.
YaM-5K	23 5/8	6 7/8	6 3/8	16	11	Long pressure piece.
YaM-5M	19½	7 5/8	6 3/8	16	11	Short pressure piece.
YaM-5U	19¾	7 5/8	6 3/8	14	11	Long pressure piece.

*Dimensions and total weights vary according to the wood used.

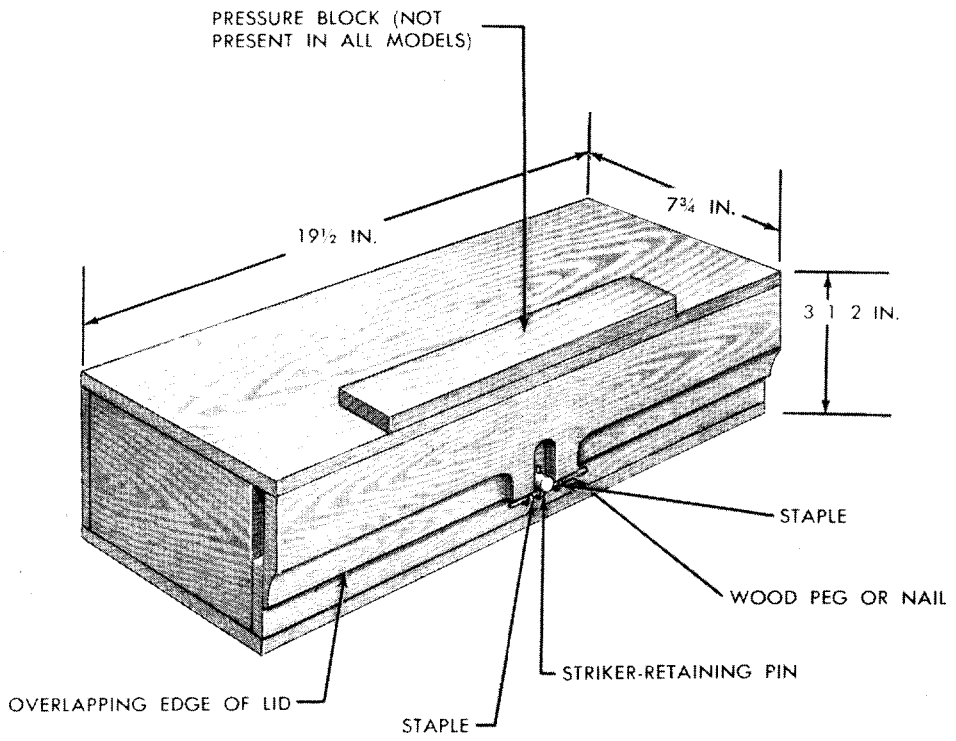


Figure 62. YaM box mine.

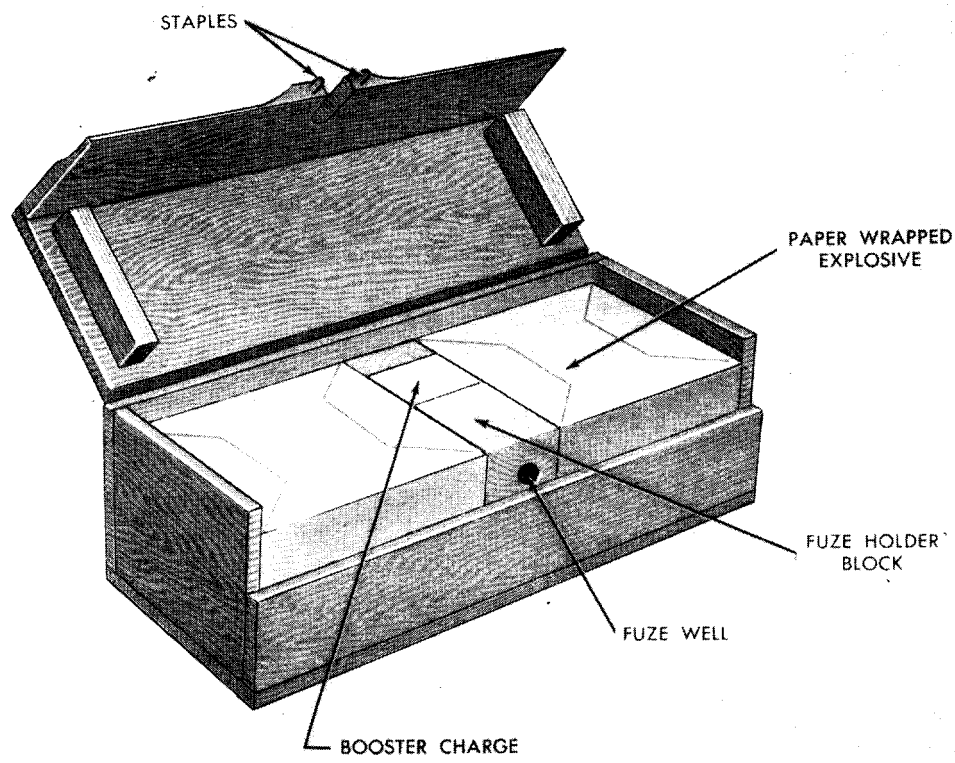


Figure 62.—Continued.

retaining pin in the MUV pull fuze which explodes the mine.

d. INSTALLING AND ARMING.

(1) Screw the MD 2 detonator assembly to the base of an MUV pull fuze.

(2) Lift the lid of the mine.

(3) Insert the assembled fuze into the hole in the fuze-holder block so the eye of the striker-retaining pin is down and positioned in line with the staples on either side of the recess in the lid.

(4) Close the lid.

(5) Insert a wooden peg or a nail through the staples and the eye of the striker-retaining pin.

e. NEUTRALIZING.

(1) Remove the wooden peg or nail from the striker-retaining pin.

(2) Lift the lid.

(3) Remove the fuze and unscrew the MD 2 detonator assembly.

Note. This mine has been found laid with various antiremoval devices, such as wire tied to the striker-retaining pin and anchored to the ground so that an attempt to lift the mine would explode it.

59. TMD-B Wooden Antitank Mine

a. DESCRIPTION. The Soviet TMD B antitank mine (fig. 63) is 12¼ inches long, 11 inches wide, and 6¼ inches high. It consists of a wooden box weighing about 14 pounds, including two 5.5 pound blocks of waterproofed paper-wrapped explosive and a 200-gram booster charge. The dimensions and weight may vary according to the wood used. A centrally located fuze well is accessible through a square or round hole cut in the top of the box. Some mines have a booby-trapping fuze well in one corner of the top of the mine. A square or cylindrical pressure block is nailed to the bottom of the hinged pressure board and fits into the fuze hole in the top of the mine when the pressure board is closed. Two other boards of similar size are nailed to the top of the box and act to hold the hinged pressure board in place. These boards are grooved at one end to receive a wooden shear strip, which may or may not be used depending upon the force desired to function the mine. The mine, which is normally olive drab or grey in color, is painted white in winter. A carrying handle of leather or rope is located at one end of the mine.

b. EMPLOYMENT. This mine is normally laid as an antitank mine in mine fields and in roads. It may be set to function under the weight of a man by placing a thicker wood block under the booster charge to raise the height of the fuze, when emplaced. In this case, the hinged pressure board rests on top of the pressure cap of the fuze and the weight of a man will easily detonate the mine.

c. FUNCTIONING.

(1) *With shear strip in place.* Pressure of about 300 pounds on the pressure board breaks the board and the shear strip, forcing the pressure block down on the MV 5 fuze (par. 19), actuating it and exploding the mine.

(2) *Without shear strip.* Pressure of less than 50 pounds on the pressure board depresses the fuze cap and fires the mine.

d. INSTALLING AND ARMING.

(1) Swing out the shear strip and lift the pressure board.

(2) Screw an MD 2 detonator assembly into the base of an MV 5 pressure fuze and place the fuze in the booster charge.

(3) For antitank use, close the pressure board and replace the shear strip so it fits in the grooves in the ends of the three pressure boards. For antipersonnel use, leave off the shear strip, insert a thicker block under the booster charge, and close the pressure board gently to rest on the fuze.

e. NEUTRALIZING. Reverse the order of procedure outlined in *d* above and perform the opposite steps.

Note. The nails holding the mine together and the fuze are the only metal parts of this mine. If set for fine tuning, the SCR-625 can detect this mine.

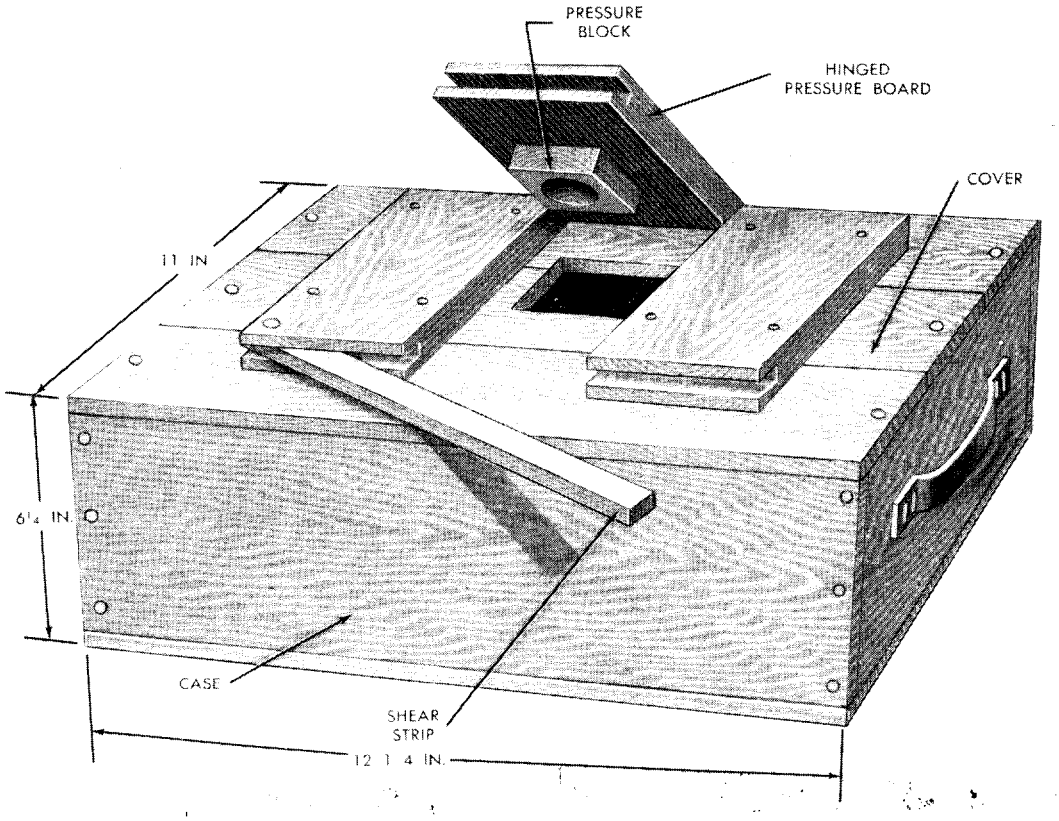


Figure 63. TMD-B wooden antitank mine.

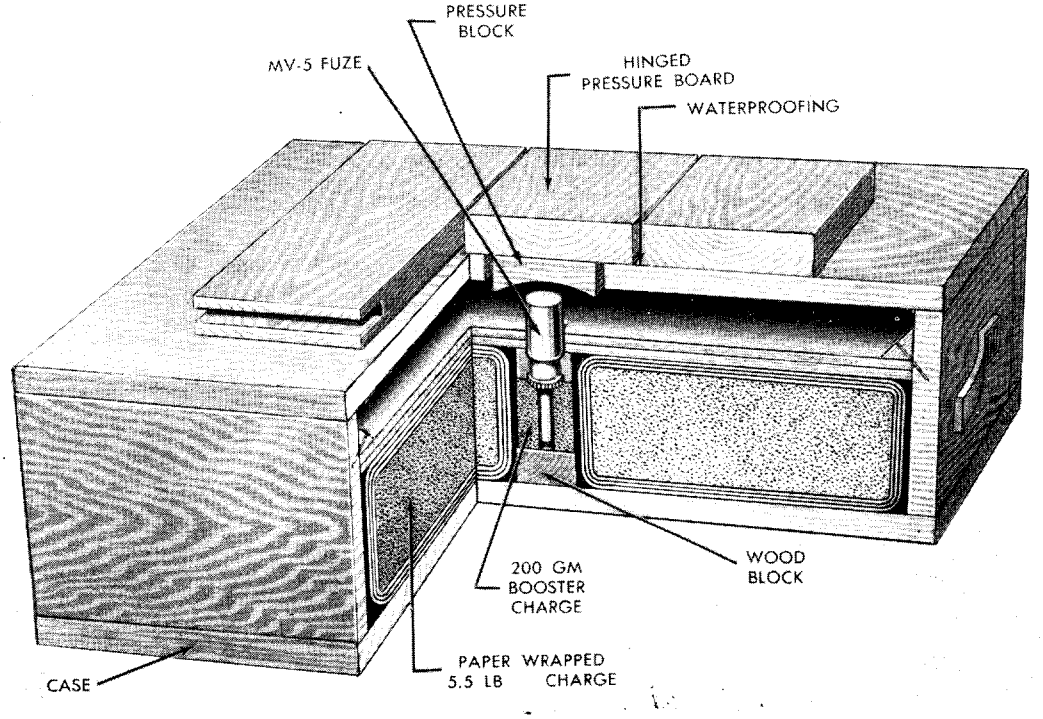


Figure 63.—Continued.

Section III. IMPROVISED ANTITANK MINES

60. General

Since the Soviets used so many types of improvised antitank mines during World War II, only those improvisations which became more or less standard and which were frequently encountered are included in this section.

61. LMG Rocket Mine

a. GENERAL. Soviet rocket mines are of several varieties. They all function in the same manner and have similar characteristics. The rockets may vary in shape, type, and manner of being attached to the launching platform. The LMG rocket mine is typical and is discussed below.

b. DESCRIPTION. The LMG rocket mine (fig. 64) consists of a rocket, a rocket-support rod, a launching platform, an ignition-and-propellant charge, an MUV pull fuze (par. 22), and a pull wire. The hollow shaft of the rocket slides over the rocket-support rod which has been screwed to a metal brace. The brace is bolted to the wooden launching platform. The ignition-and-propellant charge is contained in the rocket-support rod. The MUV pull fuze, with the pull wire tied to the striker-retaining pin, acts as the initiating fuze.

c. EMPLOYMENT. The LMG rocket mine is employed primarily as an antitank mine and may be installed to be detonated by a trip wire or a concealed observer pulling on a pull wire attached to the fuze of the mine.

d. FUNCTIONING. A tank or vehicle running over the tight pull wire, stretched to a distance of about 90 feet from the rocket, depresses the wire which pulls the pin out of the MUV fuze. The fuze sets off the ignition-and-propellant charge which launches the rocket into the air. Some rockets are guided in their flight along a guide wire by means of metal eyes attached to the rocket body. When the rocket strikes the tank or vehicle, the impact sets off the percussion fuze which explodes the rocket. The pull wire may also be led to a concealed observation post where the mine is set off by an observer.

e. INSTALLING AND ARMING.

(1) Place the rocket platform in a hole in the ground about 10 to 12 inches

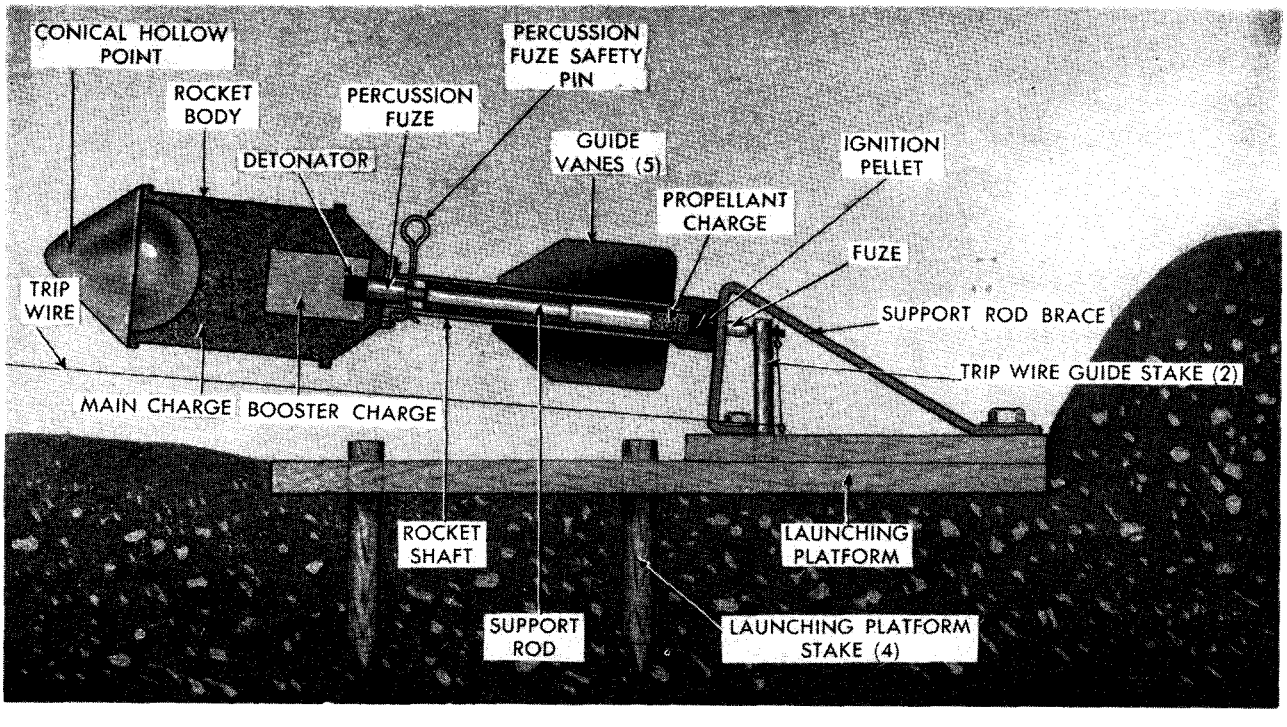


Figure 64. LMG rocket mine.

deep, 8 inches wide, and 30 inches long. Slope the wall gradually at the front so as not to hinder the rocket's flight.

(2) Insert an ignition-and-propellant charge into the hollow rocket-support rod.

(3) Insert an MUV pull fuze, with MD 2 detonator assembly attached, into the ignition charge through the hole in the fuze-support piece and the metal brace.

(4) Slide the hollow shaft end of a rocket over the rocket-support rod.

(5) Attach the pull wire, either for controlled or for noncontrolled detonation, as described in (*a*) or (*b*) below.

(*a*) For *controlled detonation*, run a pull wire from a concealed observation post to the mine and tie it to the striker-retaining pin of the MUV fuze.

(*b*) For *noncontrolled detonation*, drive into the ground three or four grooved support stakes for the pull wire, spacing them about 4 feet apart on a line with the rocket's flight. Tie one end of the pull wire to the last stake away from the mine, lay the wire in the groove in the top of each succeeding stake, and tie the other end to the eye of the striker-retaining pin of the MUV fuze.

(6) Withdraw the safety pin from the percussion fuze in the rocket.

f. NEUTRALIZING.

(1) Carefully cut the pull wire near the rocket.

(2) Insert a nail or wire into the safety-pin hole in the rocket.

(3) Remove the rocket from the rocket-support rod.

62. Rolling Beam Mine and Outrigger Mine

a. DESCRIPTION. There are several variations of these improvised antitank mines, but they all function in the same manner. Figures 65 and 66 show the types most commonly encountered in World War II. The rolling beam mine shown in figure 65 consists of a board about 2 by 8 inches in cross section. At each end of this board or rolling beam is an arm at right angles to the beam. On the end of each arm is a platform for supporting the charge. The outrigger mine shown in figure 66 consists of a wooden beam with two arms or outriggers of angle iron fastened to the center. These arms support the wooden charge container between them. The bend in the angle iron near the wooden beam acts as a fulcrum. Either the MUV pull fuze (par. 22), as is used in the two mines shown in figures 65 and 66, or the MV 5 pressure fuze (par. 19) may be used. Other mines of these types will vary in details, but the basic principle of operation will be the same.

b. EMPLOYMENT. These mines are best employed in high grass and are effective under 12 to 14 inches of snow.

c. FUNCTIONING. The operation of these mines is the same as that of a rake or hoe lying on the ground in such a way that the handle will spring up when the end is stepped on. A tank or vehicle running over the beam lying edgewise on the ground rotates the beam so the charge platforms are slammed up under the body of the vehicle with enough force to actuate the fuze and detonate the charge. The mines will also function if a tank runs over the charge.

d. INSTALLING AND ARMING.

(1) Place the mines on the road or the ground so that a tank or vehicle running over the beam will rotate the beam.

(2) Insert an MUV pull fuze or an MV-5 pressure fuze in each charge. If an MUV pull fuze is employed having a wing and loop type striker-retaining pin the wing and loop are positioned below the striker shaft with the tongues of the pressure lid resting thereon. If, however, the MUV pull fuze is provided with a loop type striker-retaining pin only, a nail must be provided as a rest for the pressure lid.

e. NEUTRALIZING. Remove the fuze from each charge.

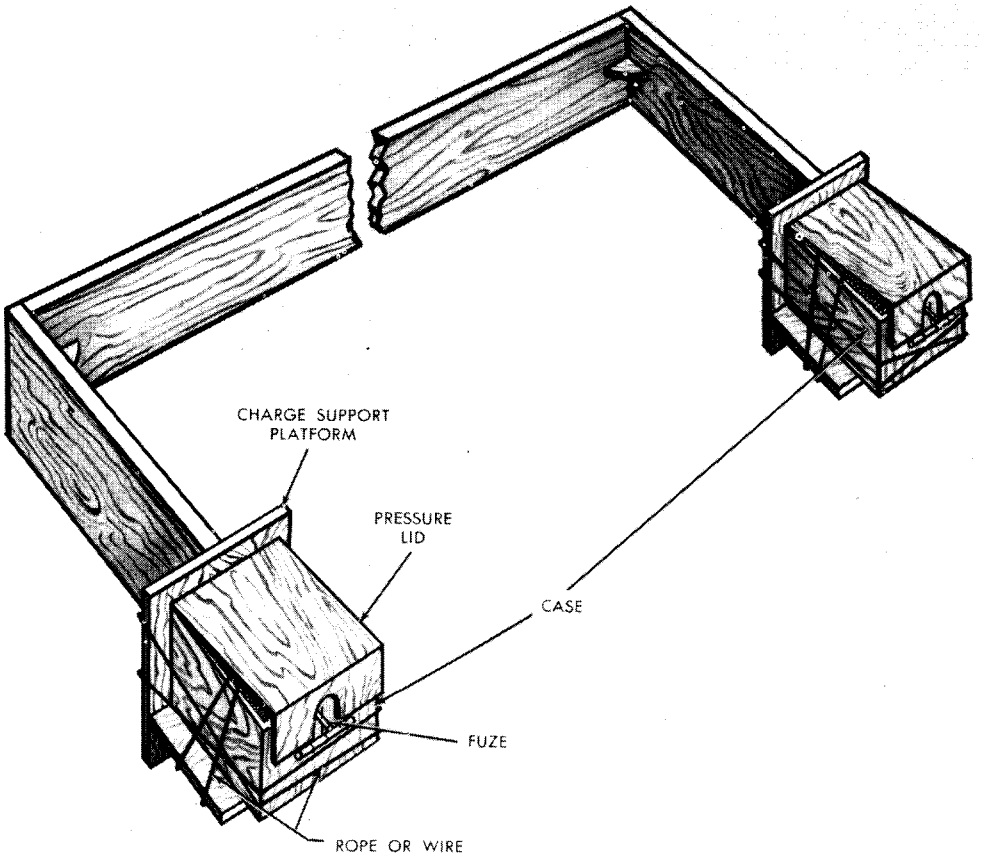


Figure 65. Rolling beam antitank mine.

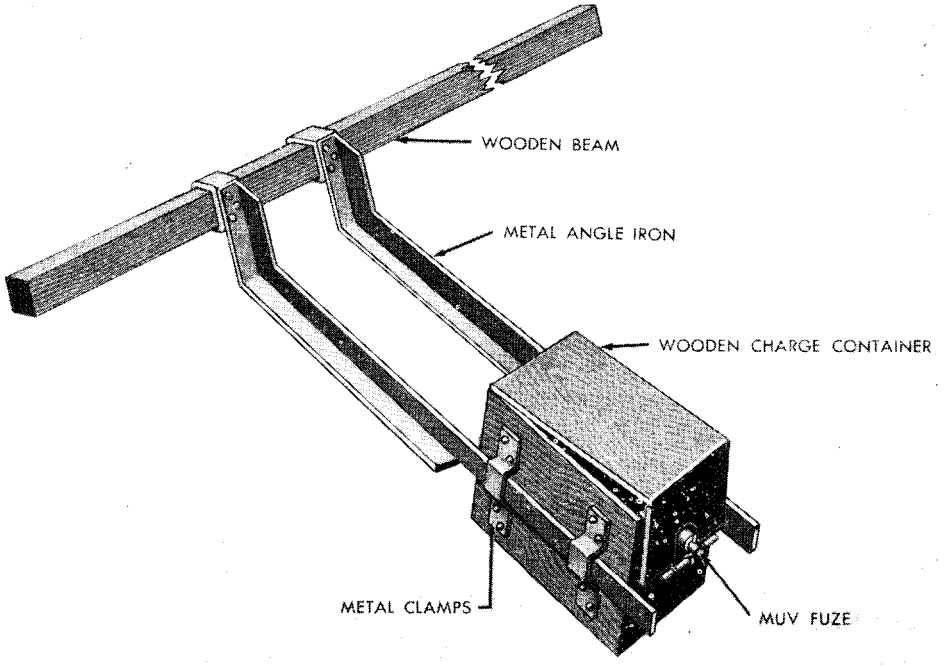


Figure 66. Outrigger antitank mine.

Section IV. ANTITRANSPORT MINES

63. General

In World War II the Soviet Army had a variety of mines with small explosive content for the sole mission of destroying sections of roadway, bridges, and railroads while being traversed by vehicles or trains. These mines are easy to improvise. An antitransport mine, consisting of a wooden box containing a few pounds of explosive is generally used to detonate a large supplementary explosive charge. Most of these mines, except the vibration-contact and delayed-action types, have built-in detonating assemblies which may be mechanical, chemical, or electrical. Most of them function by pressure, but those with trip wires attached function by pull or release of the trip wire. When no wire, lever, plunger, or button is visible outside the mine, it is undoubtedly a vibration-contact or delayed-action mine and usually not safe to neutralize. This section discusses only those antitransport mines which are considered representative of standard types.

64. Mechanical Pressure Mines

a. GENERAL. These antitransport mines have built-in mechanical pressure-operated detonating assemblies and may be identified by a pressure piece of some type projecting through the top of the mine. This type of mine is generally safe to hand neutralize. A typical mechanical pressure antitransport mine is described in *b* below.

b. PDM 1 PARTISAN RAILROAD MINE.

(1) *Description.* This wooden box mine (fig. 67) is about 5 inches square and 3 inches high. It is partitioned inside into two compartments. One compartment contains a 400-gram block of TNT and an MD 2 detonator assembly which projects through the partition into the charge. The other compartment contains a built-in detonating mechanism. It consists of a mousetrap type striker held open in a vertical position by a cup on the lower end of a pressure plunger, the top of which projects through the lid, and a restraining wire looped around a lead strip fixed to the partition. A striker needle is fixed to the U-shaped arm of the striker and so positioned that, when the striker is released, the needle strikes the percussion cap of the MD 2 detonator assembly. The end of the mine by the striker mechanism is removable and held in place by two clamps.

(2) *Employment.* This mine is always laid on an additional explosive charge of at least 10 pounds. It is placed in railroad beds with the plunger just under a rail or tie.

(3) *Functioning.* Passage of the first train depresses the plunger releasing the spring-loaded striker from the striker-retaining cup so that the striker is restrained only by the wire. Pressure of the striker spring causes the wire to slowly cut through the lead strip. From 3 to 5 minutes are required to cut through the strip. If the train passes before the wire has cut through the strip, lack of pressure allows the plunger and striker-retaining cup to rise under action of the plunger spring and thus prevent the striker from further movement. Passage of a second train again starts the process. This is repeated until the wire cuts completely through the lead strip. The striker is thus released against the percussion cap, exploding the mine.

(4) *Installing and arming.*

(*a*) Dig a hole in the railroad bed under a tie or rail and place in it an explosive charge.

(*b*) Lay the mine on the charge so the projecting plunger rests flush with the under side of the rail or tie.

(*c*) Remove the end of the mine and insert an MD 2 detonator assembly into the hole in the partition leading into the charge.

(*d*) Cover the mine and charge and remove the safety pin from the plunger.

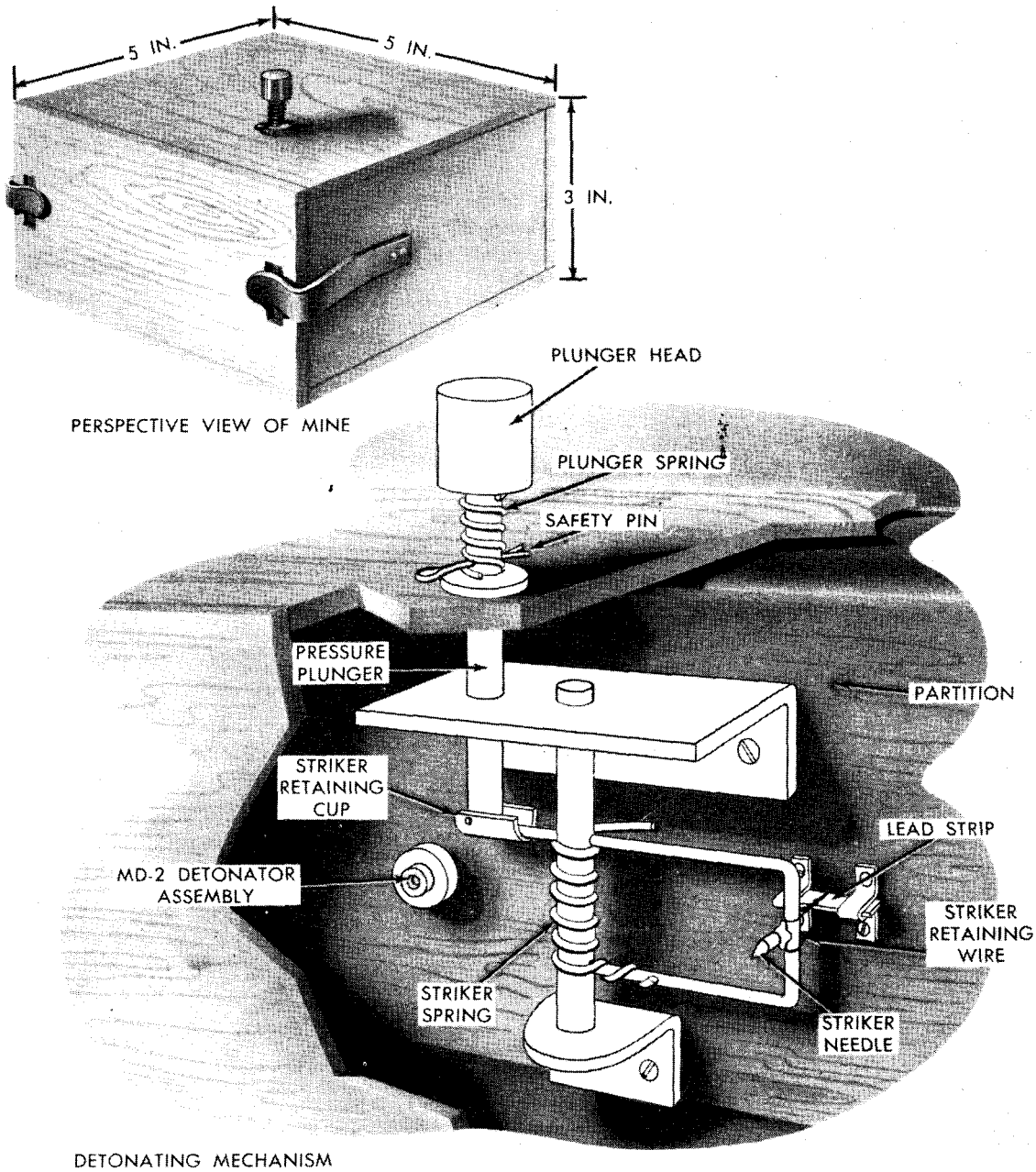


Figure 67. PDM–1 partisan railroad mine.

(5) *Neutralizing.* If the safety pin can be easily replaced in the plunger, the mine may be lifted by hand; otherwise, it must be pulled out with a rope or wire from defilade.

65. Chemical Pressure Mines

a. GENERAL. These antitransport mines are very similar in appearance to the mechanical pressure mines (par. 64), but they have a chemical ampoule inside as the detonating medium. A typical chemical pressure antitransport mine is described in *b* below.

b. CHEMICAL FUZE (AMPOULE) MINE.

(1) *Description.* This rectangular wooden box mine (fig. 68) has a chemical fuze, a hinged lid, and a wire handle at one end. It is 7 inches long, 4½ inches wide, and 2½ inches high. The mine contains slightly more than 2 pounds of explosive surrounding a central ignition chamber. A hole in the center of the lid is for insertion of a glass ampoule filled with acid. The ampoule is contained in a zinc case and is separated from the case at the top by a sponge-rubber washer. On the bottom of the ignition chamber a recessed wooden block holds a brass disk. On top of the brass disk is a hollow glass disk containing a black and white powder, separated by a glass partition. A paper disk fills the free space between the brass and glass disks. The disks are held in the recess of the wooden block by two spring clamps. The recesses between the disks and the wooden block are filled with tar or other waterproofing substances. Two detonators project into the charge through opposite holes in the wooden walls of the ignition chamber.

(2) *Employment.* This mine was employed as an initiating mine for large charges buried in railroad beds. It can be used alone as an antipersonnel mine.

(3) *Functioning.* Pressure on the zinc case surrounding the acid ampoule presses down and crushes both the ampoule and the glass disk containing the powdered chemicals. The resulting chemical reaction creates a flash which sets off the two detonators and explodes the charge.

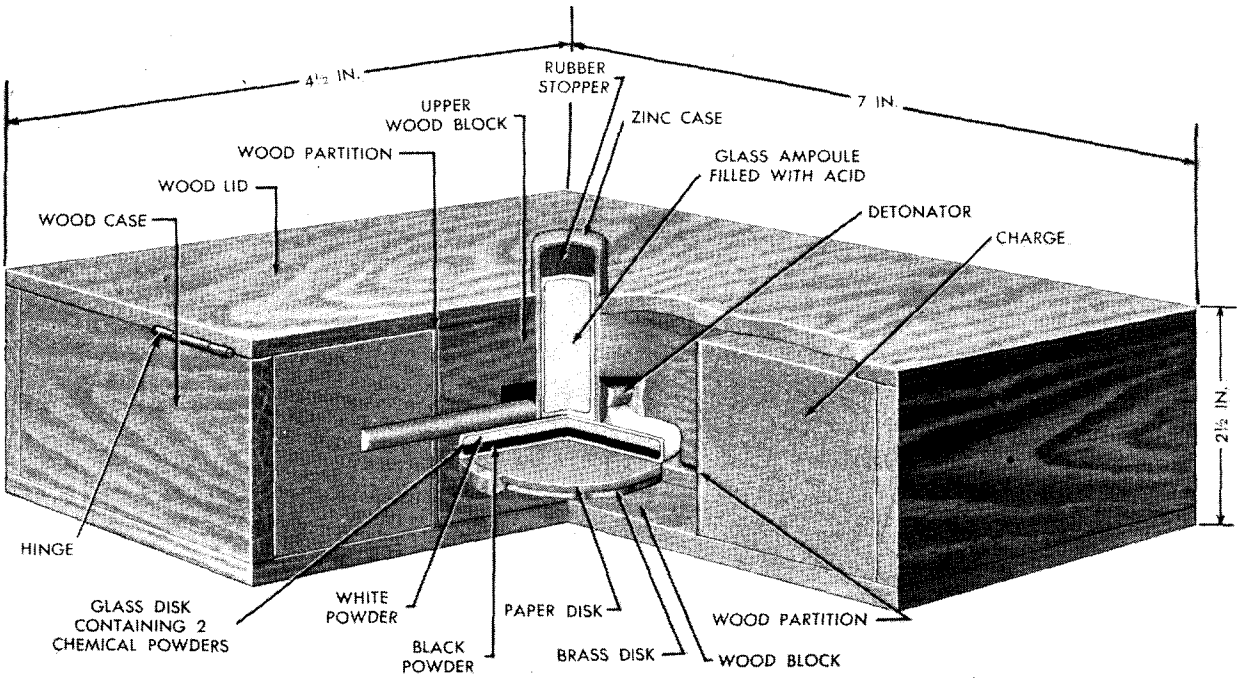


Figure 68. Chemical fuze (ampoule) mine.

(4) *Installing and arming.*

(*a*) Lift the lid and remove the upper wood block.

(*b*) Place a brass and a paper disk in the recess in the lower wood block.

(*c*) Insert a glass disk containing chemicals on top of the paper disk.

(*d*) Insert two detonators into the charge through the holes provided in the walls of the ignition chamber.

(*e*) Install the upper wood block so the two grooves in its base fit over the two detonators.

(*f*) Close the lid.

(*g*) Insert the acid ampoule into the hole in the lid.

(5) *Neutralizing.* Pull out the acid ampoule. If the ampoule is stuck, the mine must be destroyed in place. Disassemble the ignition assembly by reversing the steps outlined in (4) above.

66. Electrical Pressure Mines

a. DESCRIPTION. These antitransport mines have a built-in electrical detonating circuit, consisting of one or more flashlight batteries, an electric detonator inserted into the charge, and a pressure type contact fixed to the top of the mine or separate from, but wired to, the mine. A typical electrical pressure antitransport mine (fig. 69) is a plywood box, $5\frac{1}{2}$ to 6 inches long, $4\frac{1}{2}$ to 5 inches wide, and 2 to 3 inches high. In the box is an explosive charge, usually from 300 to 500 grams in 100-, 200-, or 400-gram blocks.

b. EMPLOYMENT. This mine is normally used against trains and is laid on a large charge buried in a railroad bed so the push-button contact is just below the rail or tie. The mine may also be used as a road mine.

c. FUNCTIONING. This type of mine functions only by pressure on the push-button contact which closes the circuit.

d. INSTALLING AND ARMING. The electric detonator is placed in the charge and wired into the circuit only after the mine has been laid. The push-button contact is placed just under the rail or tie so that a train passing over the spot depresses the rail or tie enough to close the contact.

e. NEUTRALIZING. Although hand neutralizing is a safe procedure for most models of this type mine, it should be attempted only by trained experts. Since this mine is so similar in appearance to those which have built-in antiremoval contacts (par. 68), it is best to uncover the mine carefully and then, from defilade, pull it out with a rope or wire.

67. Electrical Pull-Wire Mines

a. GENERAL. These antitransport mines have built-in electrical detonating circuits. The circuit is closed by pulling on a wire or cord tied to a mousetrap type contact or by cutting or breaking a taut wire attached to the contact. This type of mine may be identified by a wire, usually taut, emerging from a hole in the mine and anchored to a tree, stake, or other support. It is usually possible to neutralize this type of mine but great care must be used in releasing the wire. Generally, if the wire or cord is taut, it must not be cut or broken until the lid is raised and a stone or piece of wood placed between the contacts. Then the detonator may be removed. A typical electrical pull-wire mine is described in *b* below.

b. AMS STARINOV AUTOMOBILE MINE.

(1) *Description.* The automobile mine designed by Colonel Starinov (fig. 70) consists of a rectangular wooden box about $6\frac{3}{4}$ inches long, $4\frac{3}{4}$ inches wide, and 3 inches high. The box contains a 400-gram block of explosive at one end. The ignition element consists of a small battery, an electric detonator, an arming contact, and a detonating contact. A hinged lid on top of the mine is provided for assembling the mine. A pivoted wooden door on one side of the mine covers the hole through which the arming cord extends.

(2) *Employment.* The mine is designed for use against vehicles and is placed in the surface of paved or unpaved roads on a supplementary charge. It is also used as a booby trap.

(3) *Functioning.* Pulling or breaking the pull wire attached to the detonating contact closes the circuit and explodes the mine.

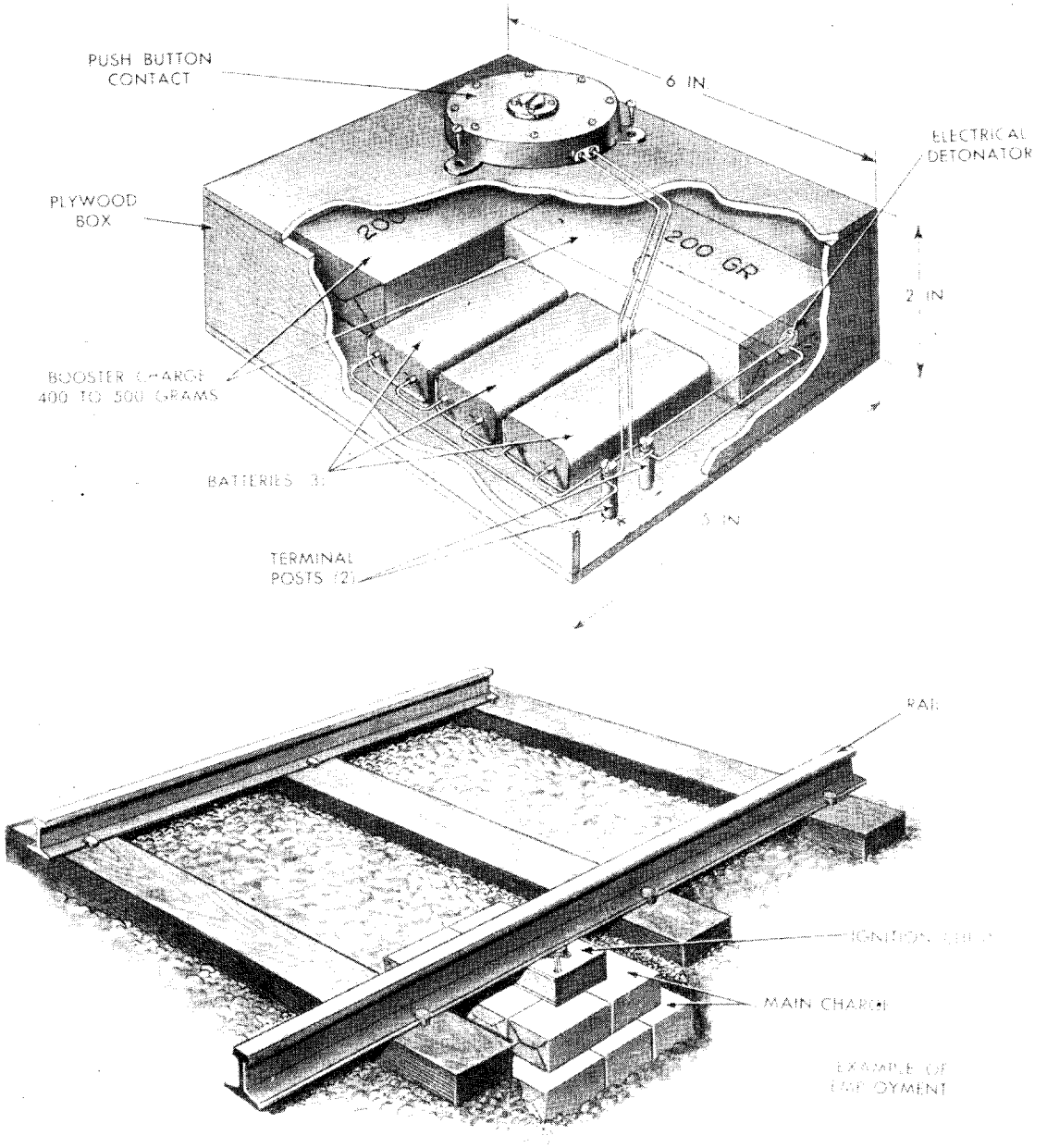


Figure 69. Electrical pressure type of antitransport mines.

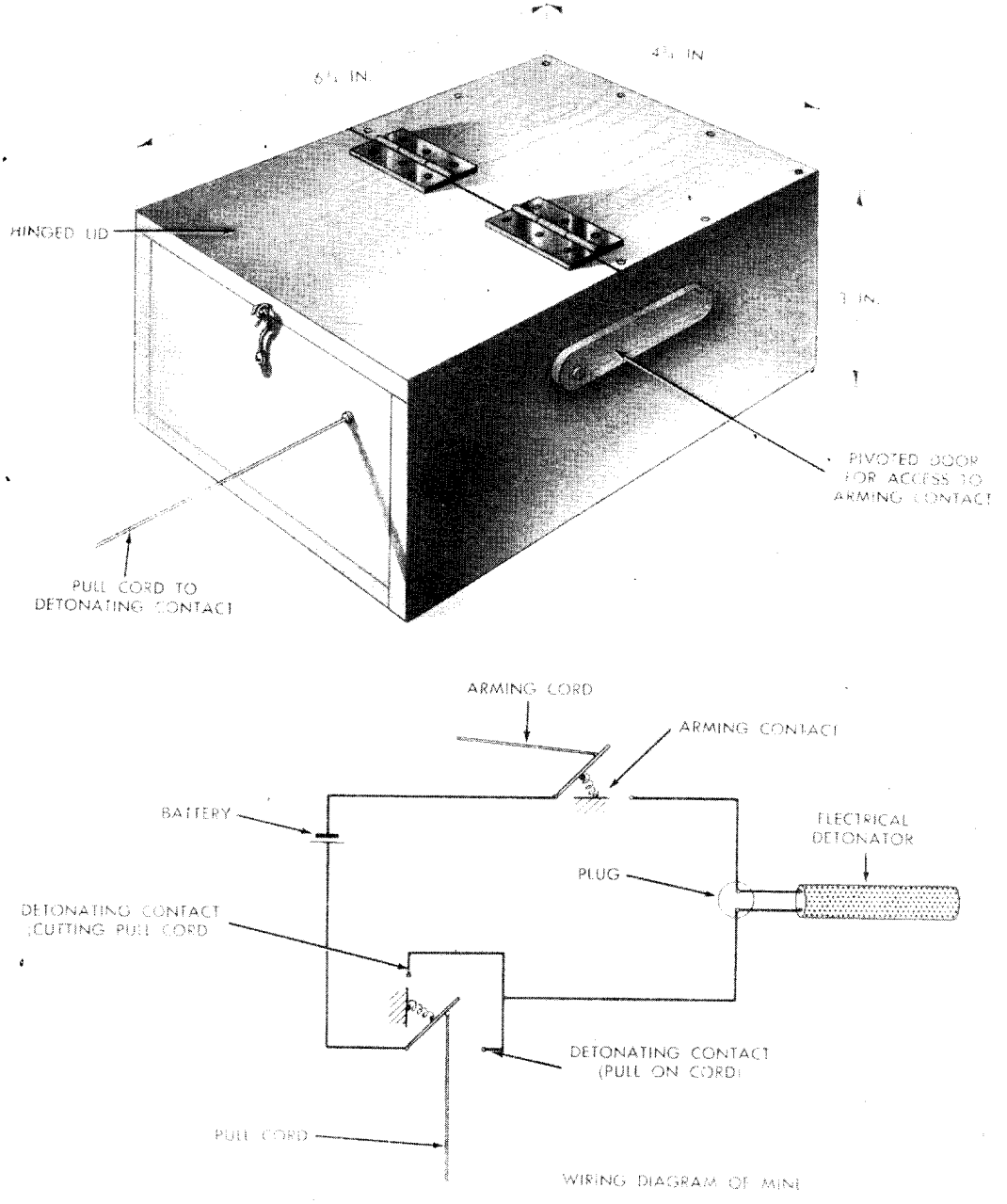


Figure 70. AMS Starinov automobile mine.

(4) *Installing and arming.*

(*a*) Test the battery and contacts by inserting a bulb in the plug socket for the leads of the electric detonator. The bulb should light when both contacts are closed.

(*b*) Place the mine on an additional charge so the top of the mine is flush with the surface of the road.

(*c*) Stretch the cord or wire attached to the detonating contact over the road at a height of about 4 inches. Tie it fast to a tree, post, or other anchor in such a way that the detonating contact lever is midway between the contacts.

(*d*) Open the arming contact by leading the arming cord through the hole in the side of the mine closed by the pivoted door and tie fast to an anchor so that the contact remains open.

(*e*) Insert an electric detonator into the charge and plug the electric leads into the terminal socket.

(*f*) Release the arming contact by cutting the arming cord. The mine is now armed.

(5) *Neutralizing.* Do not attempt to hand neutralize this mine. It should be pulled out with a grapnel or blown in place.

68. Electrical Antiremoval Mines

a. GENERAL. Electrical antiremoval mines closely resemble either the electrical pressure type (par. 66) of mine or the electrical pull-wire type mine (par. 67). An electrical antiremoval mine is described in *b* below.

b. PMS RAILROAD MINE.

(1) *Description.* This mine (fig. 71) has a visible knob on its top. The knob houses a spring-loaded antiremoval contact which is held open by a weight, such as a rock, when the mine is laid. The mine is about 6½ inches long, 5½ inches wide, and 2½ inches high. It contains about 1 pound of explosive. A safety arming contact is also provided and is held open by a cord led through a hole in the top of the mine and tied to a nail in the side of the mine.

(2) *Employment.* This mine is used as an initiating mine for large charges and also as a booby trap.

(3) *Functioning.* In addition to functioning like the electrical pressure mine (par. 66), this mine also functions if the weight is lifted from the antiremoval contact. This action allows the spring-loaded contact to rise until the circuit is closed, detonating the mine.

(4) *Installing and arming.*

(*a*) The mine is laid on a supplementary charge buried under a railroad bed so that the antiremoval contact is depressed (opened) by the weight of a rock or other object and the arming safety contact is held open as described in (1) above.

(*b*) Lift the lid and connect the electric detonator into the detonating circuit.

(*c*) Close the lid and place the push-button contact on a support just under a rail or tie.

(*d*) From the nail in the side of the mine, untie the cord holding the arming safety contact open.

(5) *Neutralizing.* This mine cannot be hand neutralized. It must be pulled out from defilade or blown in place.

69. Magnetic Mines

Two distinct types of magnetic mines were employed by the Soviet Army in World War II. One type consists of a magnet mounted on the end of a pivoted lever which closed a circuit when the metal body of a tank or vehicle passing over the mine caused the magnet to rise. The other type of magnetic mine has a magnet fixed in its base and is hand-placed on a railroad rail or vehicle. It is fitted with a lead-break delay fuze. Examples of these mines are described in paragraphs 70, 71, and 72.

70. MDM Magnetic Road Mine

a. DESCRIPTION. The MDM magnetic road mine (fig. 72) consists of a bronze box 12 inches long, 8 inches wide, and 4 inches high.

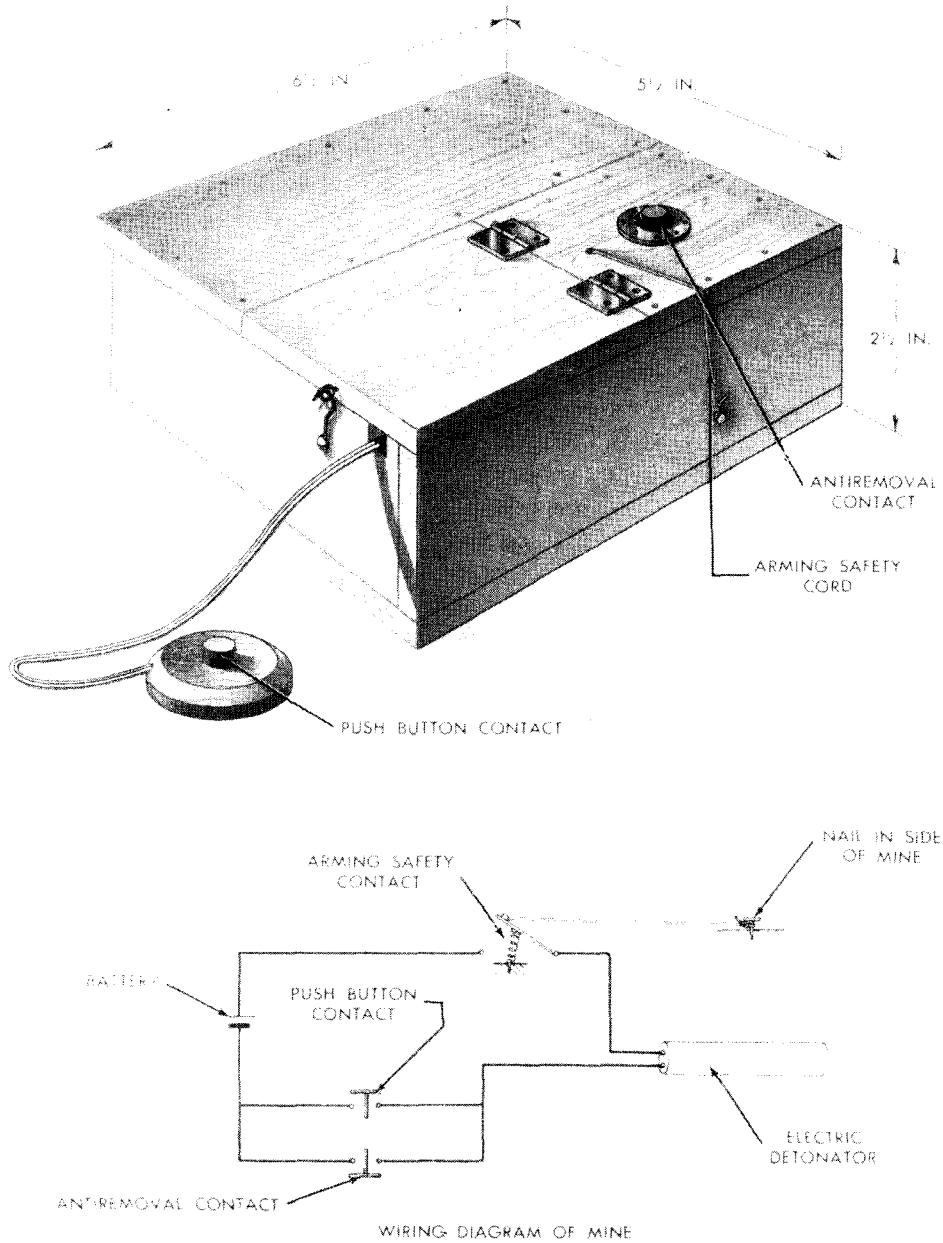


Figure 71. PMS electrical antiremoval railroad mine.

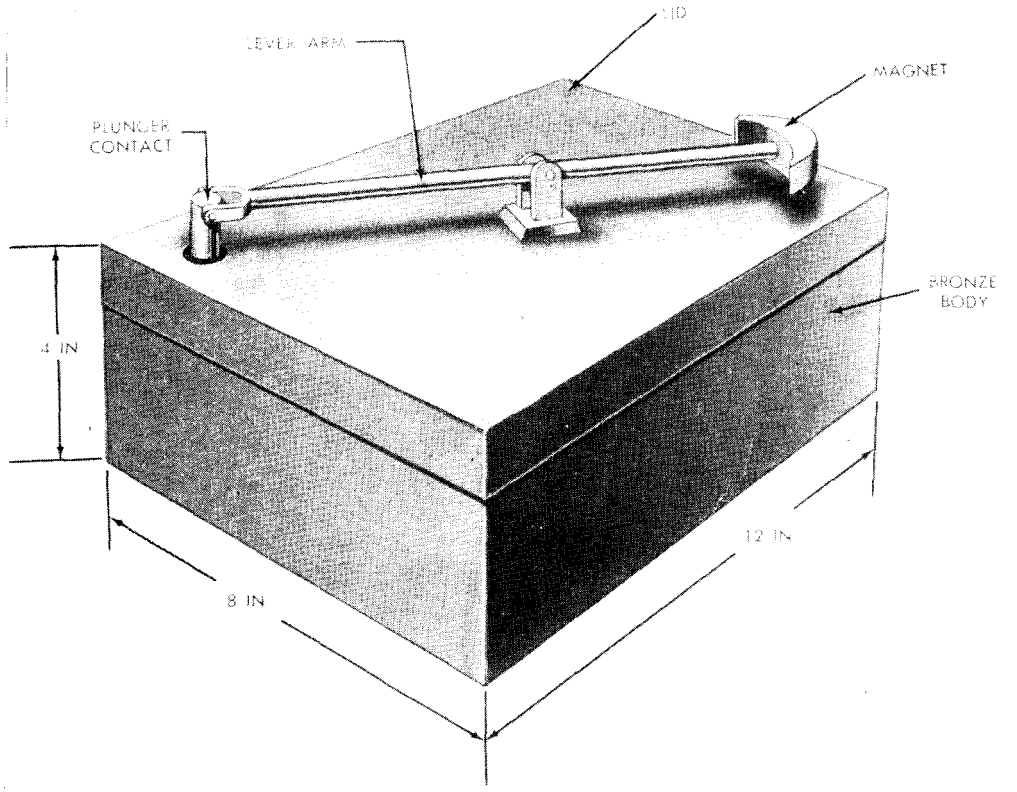


Figure 72. MDM magnetic road mine.

The box contains about 2 pounds of explosive. The explosive is housed in a zinc container in the center of the mine. Surrounding the explosive charge are two 3-volt dry cell batteries, three induction coils, and a relay. A contact is attached to the inner end of a plunger which projects through one corner of the lid. The outer end of the plunger is attached to a lever arm, pivoted in the center of the box. A magnet is attached to the other end of the lever arm. A short length of time fuze connects the contact with the charge.

b. EMPLOYMENT. This mine is employed as an antitransport mine laid in roads or railroad beds on a supplementary charge.

c. FUNCTIONING.

(1) When a large metal object, such as a tank, railway car, or truck, passes over the mine, the magnet on the end of the lever rises.

(2) As the magnet rises, the lever arm pivots and depresses the plunger at its other end.

(3) The plunger closes the contact and fires the mine.

d. INSTALLING AND ARMING.

(1) Hold the magnet end of the lever arm down firmly when laying the mine so the contacts are open.

(2) Bury the mine flush with the ground or lay it on the ground so the lever arm is exposed.

(3) Keep it in a perfectly horizontal position.

e. NEUTRALIZING.

(1) Hold the magnet end of lever arm down and lift the lid.

(2) Cut the fuse connecting the contact with the charge.

(3) Pull the detonator out of the charge.

71. Magnetic Mine 158

a. DESCRIPTION. The magnetic mine 158 (fig. 73) consists of a $5\frac{3}{4}$ by $2\frac{3}{4}$ by $1\frac{1}{2}$-inch case containing 1 pound of explosive and two bar magnets, one at each end of the mine case. It has a total weight of 3 pounds. The fuze used in this mine is similar to the British lead-break delay fuze in design and function-

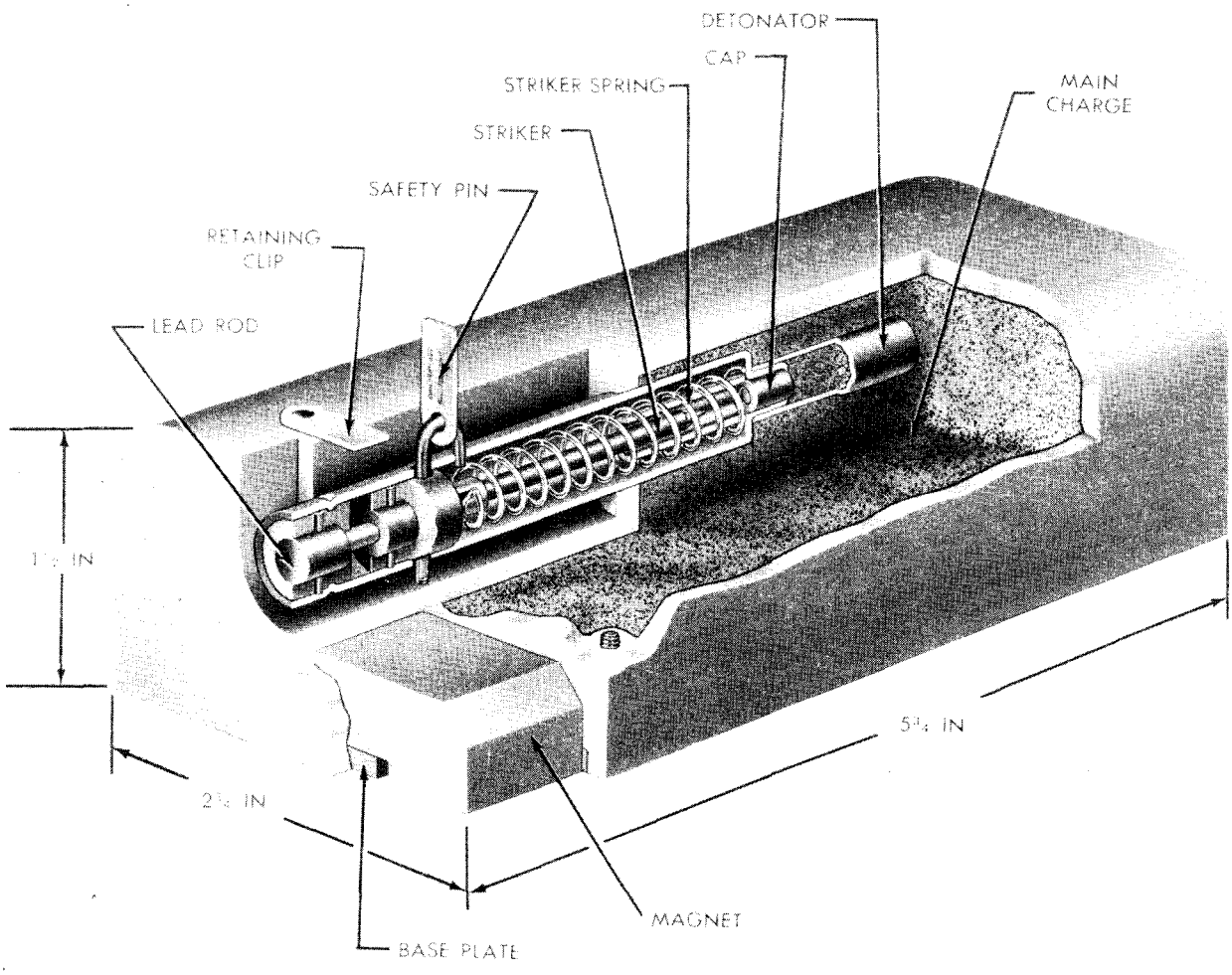


Figure 73. Magnetic mine 158.

ing. The striker spring is held in expanded position. One end of the spring is attached to the upper end of the striker and the other end of the spring is attached to the base of the fuze.

b. EMPLOYMENT. This mine was designed for use by underground forces to cut railroad tracks and sabotage tanks and vehicles of the opposing force. Figure 74 illustrates one method of placing the mine for the destruction of railroad tracks. The safety pin is withdrawn and the mine pushed down the trough from a flatcar. When the mine hits the rail, it is held there by the magnets. The mine explodes after a brief time, which allows the flatcar to travel to a safe position.

c. FUNCTIONING. The striker is restrained by a safety pin and a lead rod. When the safety pin is pulled, the entire force of the expanded striker spring is transferred to the lead rod. The rod breaks after a time lapse determined by the size of the rod and the air temperature. When the rod breaks, it completely releases the striker which fires the mine.

d. INSTALLING AND ARMING.

(1) Insert the detonator and fuze in the hole in the mine and tape them in place.

(2) Place the mine against the object to be destroyed. If the object is constructed of ferrous metal, the magnets hold the mine in place.

(3) Remove the safety pin.

e. NEUTRALIZING. The safety pin cannot be put back into the mine. The only way to hand neutralize the mine is to pull out the

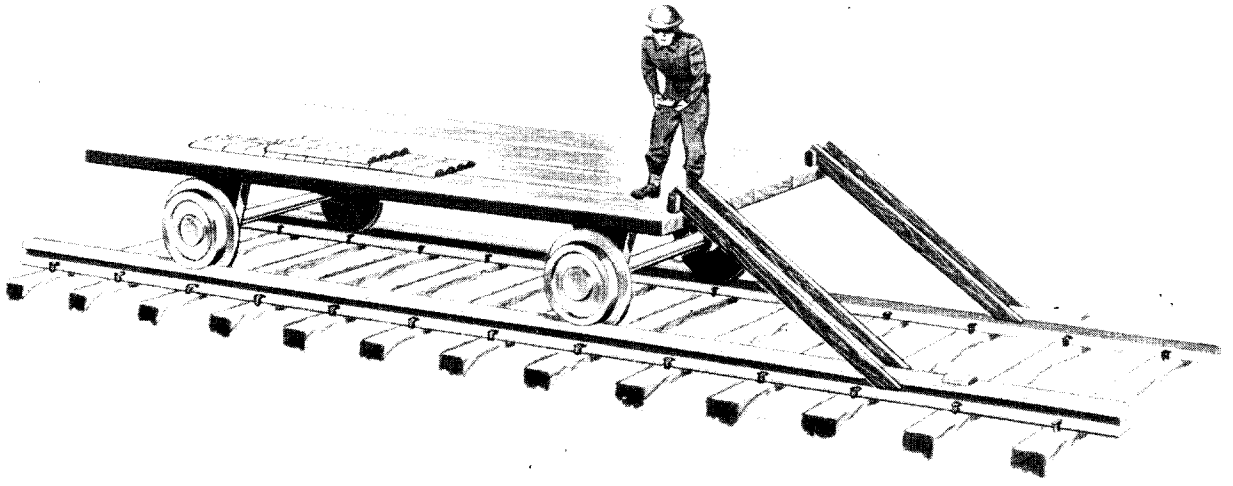


Figure 74. Method of employing magnetic mine 158 for destroying railroad tracks.

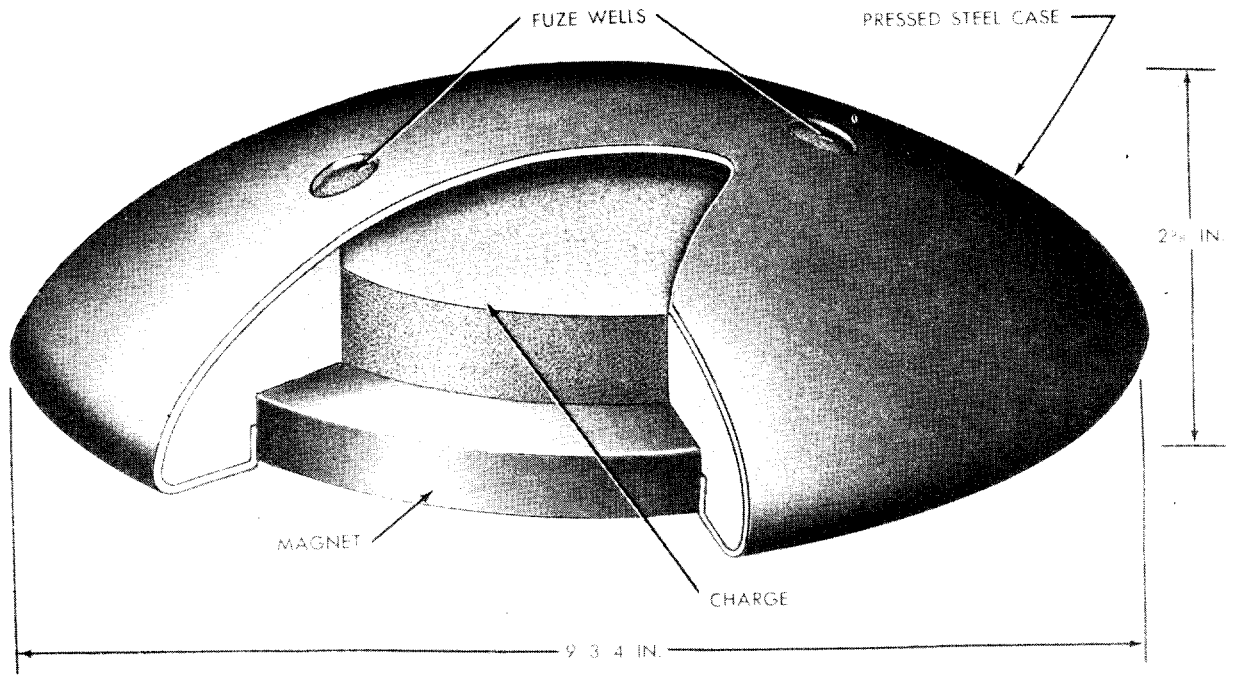


Figure 75. BMZ-1 magnetic mine.

fuze. The fuze must be destroyed. It cannot be hand neutralized.

72. BMZ-1 Magnetic Mine

The BMZ 1 magnetic mine (fig. 75) is similar to the magnetic mine 158 (par. 71) in operation and employment. The BMZ 1, however, is a circular, dome-topped mine, $9\frac{3}{4}$ inches in diameter and about $2\frac{5}{8}$ inches in height. The magnet is doughnut-shaped and is located in the bottom of the mine. Two fuze wells are located in the top of the mine and the fuze is identical to that described in paragraph 71*a* and shown in figure 73. This mine was used in World War II, chiefly by Soviet guerillas, to sabotage vehicles and tanks behind the lines of the opposing forces.

73. Vibration-Contact Mines

a. DESCRIPTION. This type of mine generally consists of a wooden box divided into an upper and a lower compartment. The lower compartment contains the main charge and the upper compartment a vibration-contact type fuze wired to an electric detonator inserted into the charge. Vibration-contact mines, as well as delayed-action mines (pars. 74 through 81), are generally recognized by the lack of pull wires or protruding pressure pieces on the mine body. A typical vibration-contact mine is described in *b* below.

b. DM VIBRATION ROAD MINE.

(1) *Description.* This mine (fig. 76) consists of a rectangular wooden box, painted gray, and divided into two compartments by a horizontal partition. The lower compartment holds about 2.7 pounds of explosive (six standard 200-gram blocks, or two 400-gram blocks and two 200-gram blocks). The upper compartment contains an electrical fuze with a ChVZ vibration delay fuze (par. 38). A hole in the partition is for the short electric leads from the fuze to connect with the leads of an electric detonator in the charge compartment. Another hole in the top of the mine is for leading out the long arming wire leads from the fuze.

Note. German reports describe two other models of this mine, the DM 3 and the DM 4, as being $6\frac{1}{8}$ inches square and $5\frac{1}{8}$ inches high. Both these mines use the VZ-1 vibration fuze (par. 37). The DM 3 uses two fuzes, one set horizontally and the other vertically; the DM 4 uses only one. Both mines use a clockwork fuze for actual detonation of the mine, probably the ChMV 10 or 16 delay clock (par. 25) or the ChZ 10 delay clock (par. 29).

(2) *Employment.* This mine is designed for mining truck routes, and railroad and highway bridges. It is buried about 20 inches under railroad beds or 10 inches under roads and is often laid on a supplementary charge.

(3) *Functioning.* Vibrations in the ground or structure where the mine is placed cause the spiral-spring contacts in the fuze to vibrate until one touches its metal housing, completing the circuit and exploding the detonator and mine.

(4) *Installing and arming.* These instructions are taken from Soviet directions.

(*a*) Lift the cover off the wooden box.

(*b*) Lift the fuze from the box. Make sure that the fuze is still usable in accordance with date printed thereon.

(*c*) With the standard small pocket ohmmeter OK, test the lead wires projecting from the fuze. The ohmmeter reading should be infinity for the short leads and zero for the longer leads.

(*d*) Lay the charge on the bottom of the box. Install the electric detonator in a hole in a 200-gram or 400-gram demolition block. Pack the hollow space between the charge and the wall of the box with paper or other suitable material.

(*e*) Join the wires of the electric detonator and the short wires from the fuze. Carefully insulate the joints.

(*f*) Lay the wooden partition on the charge. Insert the lead wires connecting the fuze with the electric detonator in the cutout of the partition.

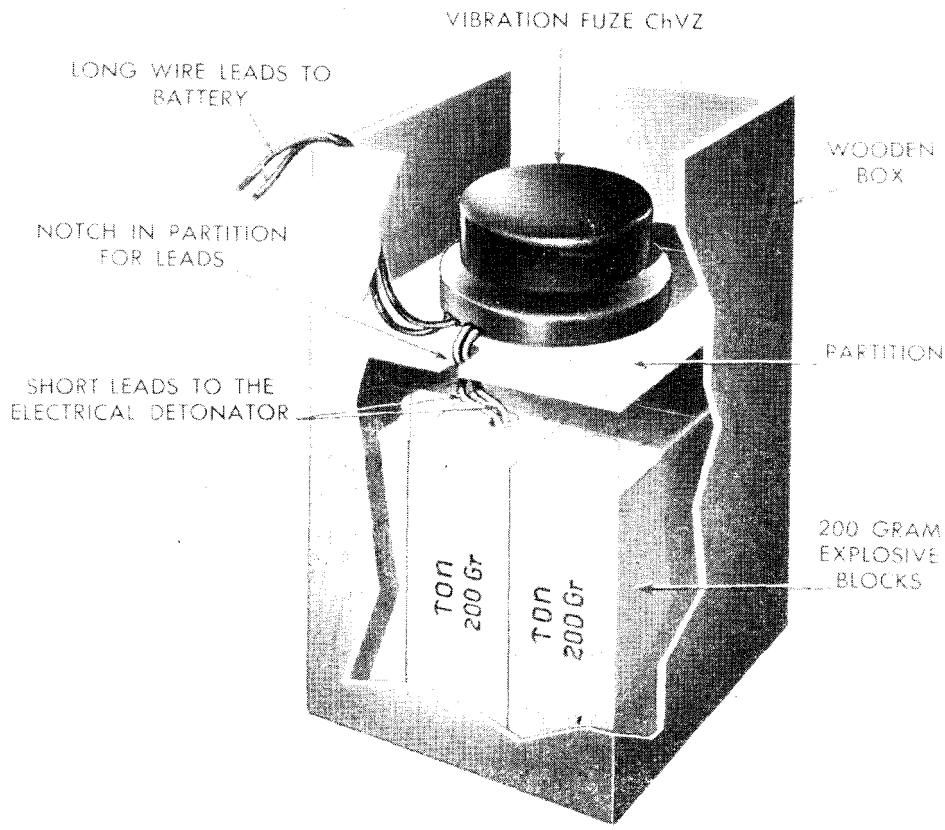


Figure 76. DM vibration road mine.

(*g*) Set the fuze on the partition with the fuze lid downward. The long wire leads are to be led out of the top of the box.

(*h*) Close the mine cover.

(*i*) Bury the mine in a previously prepared hole not deeper than 20 inches. Supplementary charges may be installed under the mine before laying. Bring the long lead wires to the surface.

(*j*) To activate the mine, connect the clean ends of the long wire leads to the poles of a 16-volt battery for 5 to 10 seconds. This melts a small wire which had restrained the wound-up clockwork in the fuze. The released clockwork runs down (time of functioning, about 4 minutes) until a metal pointer strikes against a contact screw. The circuit is now interrupted only by the two spiral-spring vibrator contacts, which are connected in parallel. The mine is now armed.

(5) *Neutralizing.* Mines once installed cannot be removed. If located with a mine detector they should be blown in place.

74. Delayed-Action Mines

Delayed-action mines are designed primarily for the delayed detonation of large explosive charges hidden in strategic places in areas abandoned to an opposing force. They are frequently used as railroad mines. These mines may be used alone but are normally used with additional charges. They are similar to the vibration-contact mines but have delay fuzes added. A typical delayed-action mine is a wooden box about 8 inches square and 5 inches high with two partitions. One partition is for the fuze and the other is for the charge. The fuze may be either a mechanical delay fuze in-

serted directly into the charge (par. 75) or may be an electrical delay fuze wired to an electric detonating circuit. The electric detonating circuit normally consists of a clockwork, electrochemical, or vibration type fuze, a battery, and an electric detonator. Some mines have both a vibration type fuze and a delay type fuze wired into the circuit. Since it cannot always be determined from looking at the mines whether they have a vibration contact, it is safest to treat all such mines as if they all had vibration contacts and to destroy them in place by placing a prepared charge against them.

75. MZD-1 Mine

a. DESCRIPTION. The MZD 1 relayed-action mine (fig. 77) is 9½ inches long, 7½ inches wide, and 5½ inches high. It may contain up to about 10 pounds of explosive. It is fused with an EKhV fuze (par. 26) and with an MD-2 detonator assembly. The fuze is adjusted to the proper delay period at the place of use only. This is done by inserting the resistance tube in the fuze and then inserting the fuze in the mine.

b. EMPLOYMENT. This mine is used primarily for the delayed, uncontrolled detonation of large charges concealed in important buildings and installations. In the winter, the mine is laid below the frost line. In wet earth, it is waterproofed with tar or paraffin. The mine explodes at the time set, without external influence.

c. FUNCTIONING. The time of the explosion depends on the electrical resistance in the resistance tube of the fuze.

d. INSTALLING AND ARMING.

(1) Test the voltage between the terminals; it should be a minimum of 1.25 volts. Test the voltage between one terminal and the striker; it should be at least 1.4 volts.

(2) Insert the fuze into an explosive charge or mine (or into an electric detonating circuit).

(3) Insert a resistance coil between the two arming contacts. One of 10 different resistances may be used depending upon the length of delay desired.

e. NEUTRALIZING. Neutralizing is not recommended, as the fuze has no safety device. However, if gently handled, the detonator assembly (or electric contact base) may be unscrewed from the fuze.

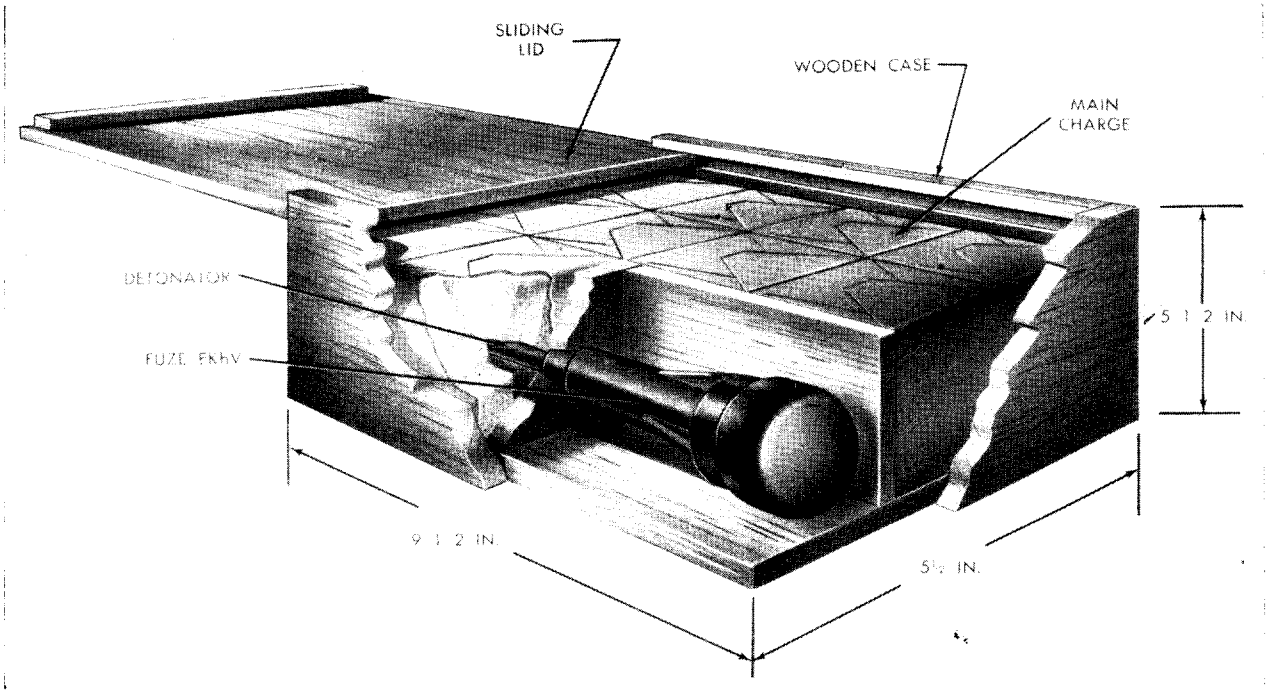


Figure 77. MZD–1 delayed-action mine.

76. MZD-2 Mine

a. DESCRIPTION. This mine (fig. 78) is a wooden box which has two compartments. About 1.75 pounds of explosive is in one compartment and an electrical detonating circuit in the other. The detonating circuit consists of an EKhV fuze (par. 26), three batteries, a vibration contact fuze, and an electric detonator. It is 8½ inches long, 8½ inches wide, and 4½ inches high. The mine has a sliding lid. It is waterproofed with tar, and the batteries and the vibration contact fuze are imbedded in paraffin. The EKhV fuze is fitted with an electric-contact base instead of the MD 2 detonator assembly as in the MZD 1 mine (par. 75). The EKhV fuze is inserted in the detonating circuit to provide a delay period before the mine is armed.

b. EMPLOYMENT. This mine was used primarily to detonate large charges in railroad beds. It is normally buried 2 to 3 feet underground, but only 15 to 20 inches in freezing weather.

c. FUNCTIONING. The EKhV fuze is connected into the detonating circuit and, after the fuze functions, the circuit is closed except for the vibration contact fuze. Any subsequent vibration or movement of the mine causes the vibration contact fuze to close the circuit, firing the electric detonator.

d. INSTALLING AND ARMING. See paragraph 26*d* on installing and arming the EKhV chemical-electrical delay fuze. Connect the batteries in series. Connect the EKhV fuze in series with the batteries, and test the circuit with a galvanometer. There should be no reading. If there is any deflection of the pointer on the meter, the EKhV fuze is not good. After tests show the fuze to be good, connect a vibration contact fuze in series with the batteries and the EKhV fuze. Connect the leads to the electric detonator. The mine is now armed (fig. 78).

e. NEUTRALIZING. This mine should not be hand neutralized.

77. MZD-3 Mine

This mine differs from the MZD 2 (par. 76) only in that the vibration contact fuze is separate from the mine. The EKhV fuze, batteries, electric detonator, and charge are contained in the mine. However, the vibration contact fuze is outside the mine (about 1½ feet away), but wired to it. This mine is used primarily to detonate large charges under highways and railroad beds. It is buried about 3 feet deep under highways with the vibration fuze about 8 inches below ground. In railroad beds, it is buried from 3 to 4½ feet deep with the vibration contact fuze about 2 feet deep. On hard-surfaced roads, only medium and heavy tanks cause enough vibration to explode the mine.

78. MZD-4 Mine

This mine is about 7 inches long, 5½ inches wide, and 4 inches high. It is partitioned and holds a 400-gram block of TNT, an electric detonating circuit with a flashlight battery, an EKhP electro-chemical safety-delay fuze (par. 35), and a VZ 1 vibration contact fuze wired to an electric detonator. The VZ 1 fuze (par. 37) is fastened under the lid of the mine. In functioning and employment this mine is similar to the MZD 2 mine (par. 76).

79. MZD-5 Mine

The MZD 5 is similar to the MZD 4 (par. 78) in all respects except that an EKhV electrochemical fuze is used instead of the EKhP safety delay fuze. It is buried about 20 inches under railroad beds and 10 inches under roads.

80. MZD-10 Mine

The MZD 10 mine measures 7¼ by 8 by 4½ inches. It contains a 400-gram explosive block fitted with an electric detonator which is wired to a battery, a VZ 1 vibration contact fuze, and a ChZ 10 electrical delay fuze, all in one compartment of this mine. The mine is employed with large charges under railroad beds or roads.

81. MZD-35 Mine

This mine is basically the same as the MZD-10 (par. 80) but larger, measuring 10⅜ by 2¾ by 4¾ inches. It has a ChZ 35 electrical delay fuze (pars. 30 and 31), instead of the ChZ 10, wired into the circuit.

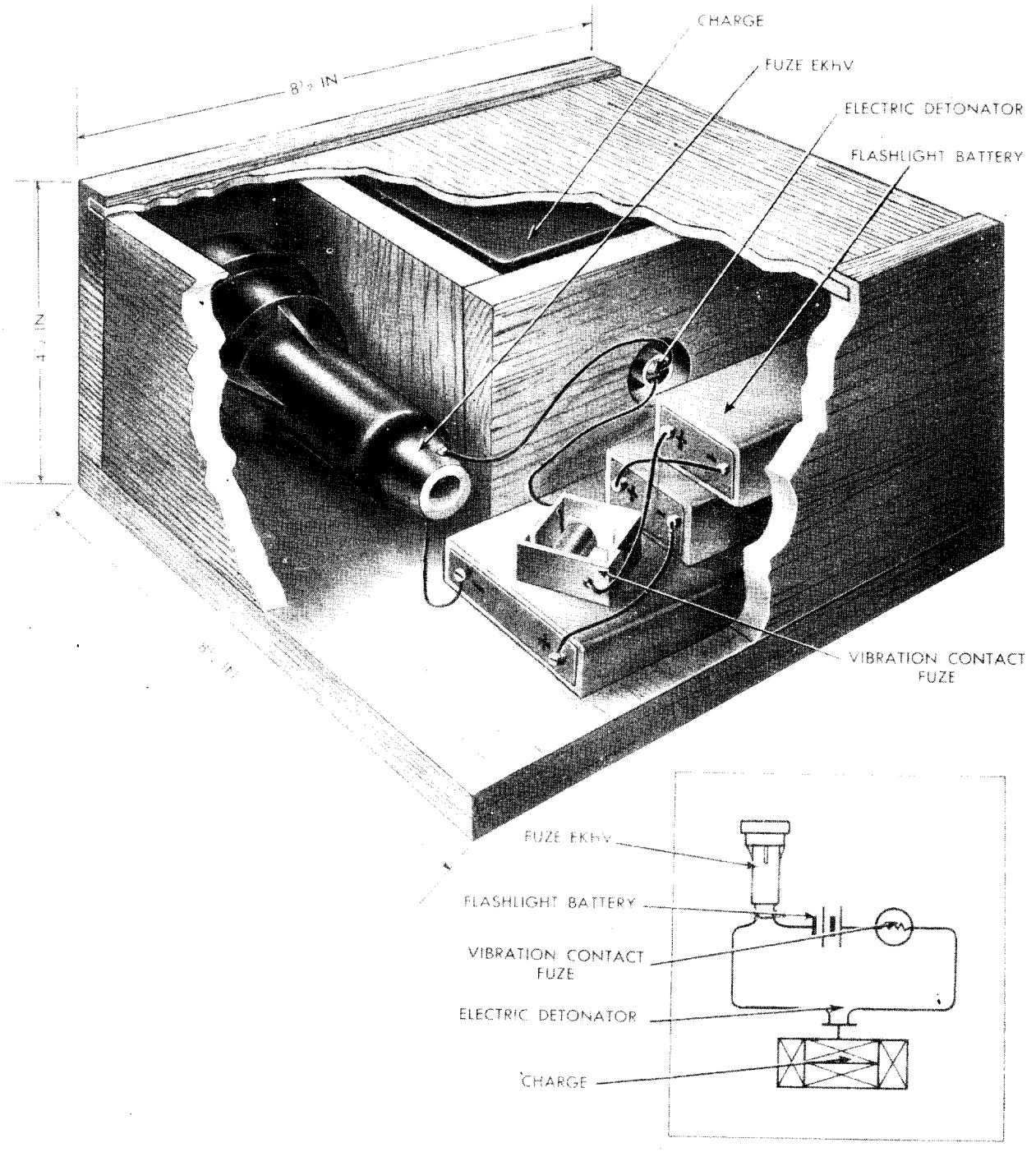


Figure 78. MZD 2 delayed-action mine.

Section V. DUAL-PURPOSE MINES

82. General

Dual-purpose mines are specifically designed for more than one destructive mission. They are usually employed against either personnel or vehicles or both, depending on the setting and fuzing of the mine. The explosive content is generally not more than 10 pounds. Most dual-purpose mines are of the pressure type and will detonate under a pressure of as little as 20 pounds.

83. PMZ-40 Obstacle Mine

a. DESCRIPTION. The PMZ-40 obstacle mine (fig. 79) is a dual-purpose mine made of pressed steel and is 11 inches in diameter. It is 4¾ inches high when set for antitank use and 4 inches high when set for antipersonnel use. It weighs 20 pounds, including about 8 pounds of explosive. The mine consists of three parts: the charge container with a flanged base, a central fuze well, and a charge filling hole in the bottom closed by a steel plug; a pressed-steel band, held to the charge container by four lug-and-groove locks, and flanged on the top; a pressure plate, grooved to add rigidity, with four shear studs equally spaced about its edge. When resting on top of the rim (fig. 79), these studs make the mine antitank; when turned to drop into the four notches in the rim, they make the mine antipersonnel. The pressure cap closes the central fuze well. It is held in place by a retaining spring under the pressure plate (fig. 79). The MV-3 fuze (par. 18) was specially designed for this mine. It is a round ball-release type fuze, has no safety, and has a percussion cap, detonator, and metal-cased booster charge screwed to the base. This mine was issued in Korea with the MV-5 (par. 19), instead of the MV 3 fuze.

b. EMPLOYMENT. Set for antitank use, the PMZ-40 obstacle mine is used in road blocks. When laying an antitank mine field, a number of these mines can be set for antipersonnel use, which will harass mine clearing and breaching parties.

c. FUNCTIONING.

(1) *When set for antitank use.* Pressure of about 500 pounds shears the four shear studs on the side of the pressure plate, depressing the fuze and detonating the mine.

(2) *When set for antipersonnel use.* The pressure plate is rotated so the shear studs drop into the corresponding notches in the rim of the band. Therefore, there is no shearing action and pressure is transmitted directly to the head of the fuze.

d. INSTALLING AND ARMING. (WITH THE MV-3 FUZE).

(1) Set the pressure plate for either antitank or antipersonnel use.

Note. It is doubtful whether the mine can be set for antipersonnel use with the MV-5 pressure fuze, as the weight of the pressure plate alone may cause premature functioning of the fuze.

(2) Remove the pressure cap and separate the two arms of the pressure-cap-retaining spring by inserting a U-shaped wire key in the two small holes in the pressure plate (fig. 80).

(3) Install the fuze.

(4) Replace the pressure cap so the square plunger bolt which projects above the fuze fits through the square hole in the pressure cap.

(5) Remove the U-shaped key. This action allows the two arms of the pressure-cap-retaining spring to close, holding the pressure cap in place.

e. NEUTRALIZING. When the mine is used with the MV 3 fuze, two special keys (fig. 80) are needed for hand neutralizing. These are an L-shaped and a U-shaped key.

Note. No attempt should be made to turn the pressure cap as the square bolt on the MV-3 fuze will turn with the pressure cap allowing the striker-retaining balls to escape into a recess, and thus release the spring-loaded striker and fire the mine.

(1) Insert the L-shaped key into the large hole in the pressure plate and turn the key until one arm of the pressure-cap-retaining spring is seen to pass one of the smaller holes.

(2) Insert one leg of the U-shaped key in the small hole just cleared.

(3) Turn the L-shaped key in the opposite direction until the other leg of the

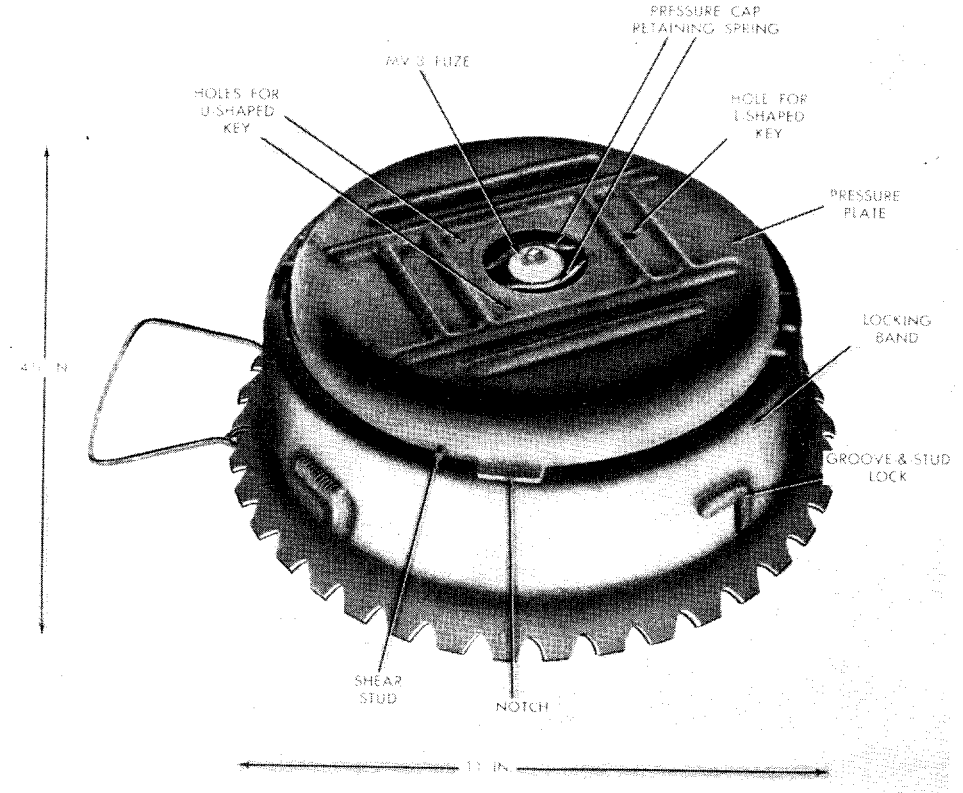


Figure 79. PMZ–40 obstacle mine.

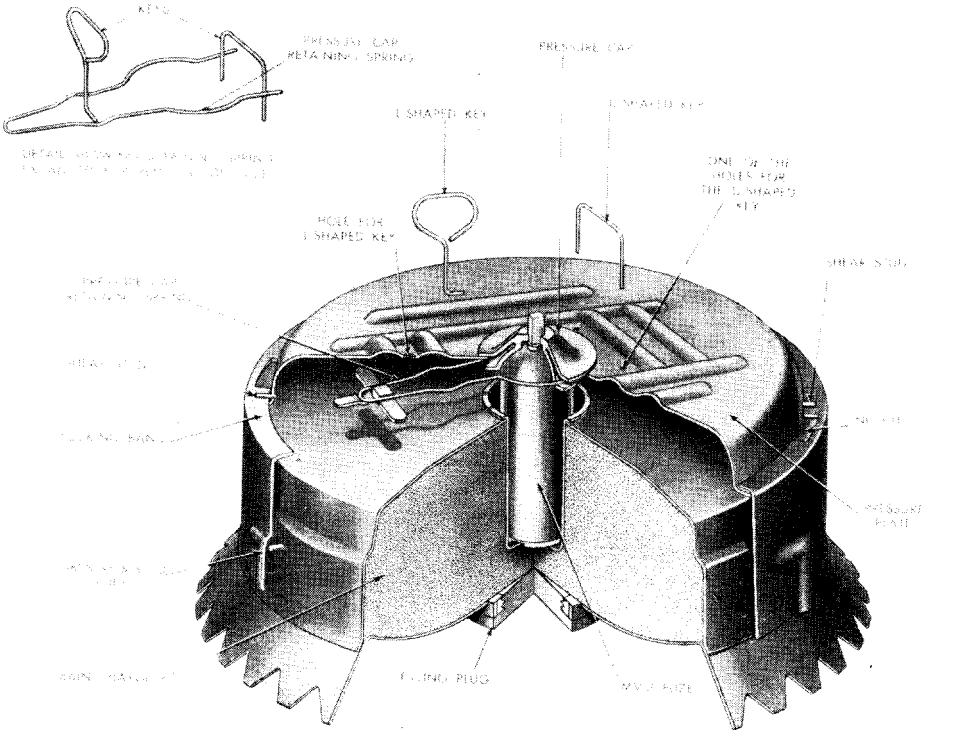


Figure 79.—Continued.

spring passes the remaining small hole. Insert the other end of the U-shaped key in this hole.

(4) Remove the pressure cap and withdraw the fuze.

Note. In 1944 the PMZ-40 mine was replaced by the TM-41 mine, as the PMZ-40 was considered too dangerous to handle with the MV-3 fuze.

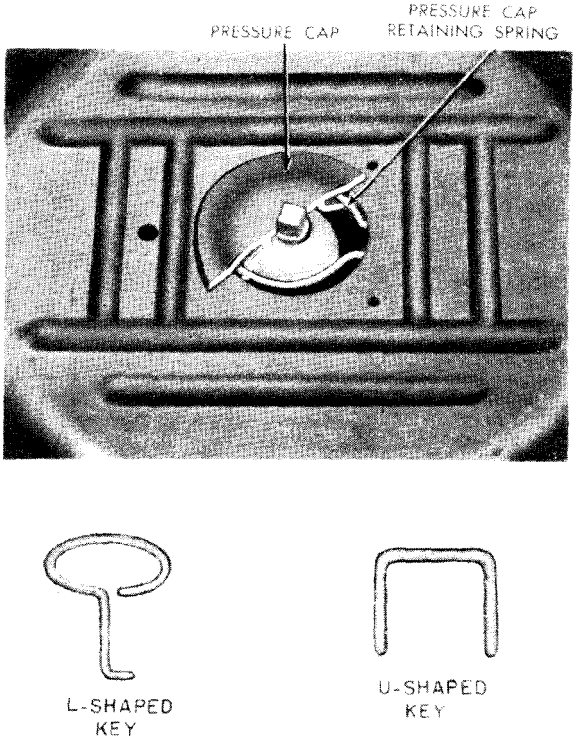


Figure 80. Neutralizing keys for PMZ-40 mine.

84. Horseshoe Mine

a. DESCRIPTION. The horseshoe mine (fig. 81) consists of a metallic horseshoe-shaped case containing about 2 pounds of explosive. It is 4 inches high, 4 inches wide and 4 inches long. Two MV 5 pressure fuzes (fig. 19) with MD 2 detonator assemblies are inserted into wells in the top of the mine and these are covered with a pressure box and a pressure plate. An iron bolt holds the pressure box more firmly to the mine. The bolt is not screwed in but merely projected into a cavity in the mine. This allows the box to move downward under pressure. To prevent the pressure box from being depressed and actuating the fuzes prematurely, an elaborate safety assembly is provided. A release lever which is welded to a release rod is hinged to a U-shaped pivot bracket which is welded to the top of the mine. The release lever is depressed until its tip rests under the edge of the pressure box. The lower end of the release rod is hook-shaped. The release lever is prevented from pivoting by a U-shaped retaining wire in the hooked end of the release rod. The ends of the retaining wire are hinged under the top of the mine. A spring-actuated bolt, held in place by a safety pin, is clamped to the lower end of the release rod and holds the retaining wire in place.

b. EMPLOYMENT. The horseshoe mine is employed as an antipersonnel mine when used alone and as an antitransport mine when used with a supplementary charge. This mine is usually buried in the ground on a board or plank with an additional charge (fig. 82). The open end of the horseshoe-shaped mine faces the charge. A hole is provided in the plank to fit the hooked end of the release rod and to allow it to move outward when pressure is applied to the mine. A pressure board is normally laid over the pressure plate with one end on the supplementary charge.

c. FUNCTIONING. This mine will not function under pressure until the safety pin has been removed from the release rod and safety bolt. Pressure on the pressure box rotates the freed lever-and-rod assembly and moves its lower end outward. This allows further pressure to depress the pressure box, eventually actuating the fuzes.

d. INSTALLING AND ARMING.

(1) Dig a hole for the mine and place a wooden plank with a hole bored through it in the bottom of the hole (fig. 82).

(2) Place the mine on the plank so the hooked end of the release rod extends into the hole in the plank.

(3) Emplace any additional charges desired on top and on either end of the board or plank.

(4) Insert two pressure fuzes with MD-2 detonator assemblies and cover with the pressure box.

(5) Remove the safety pin. This causes the spring-actuated safety bolt to rise, permitting the U-shaped retaining

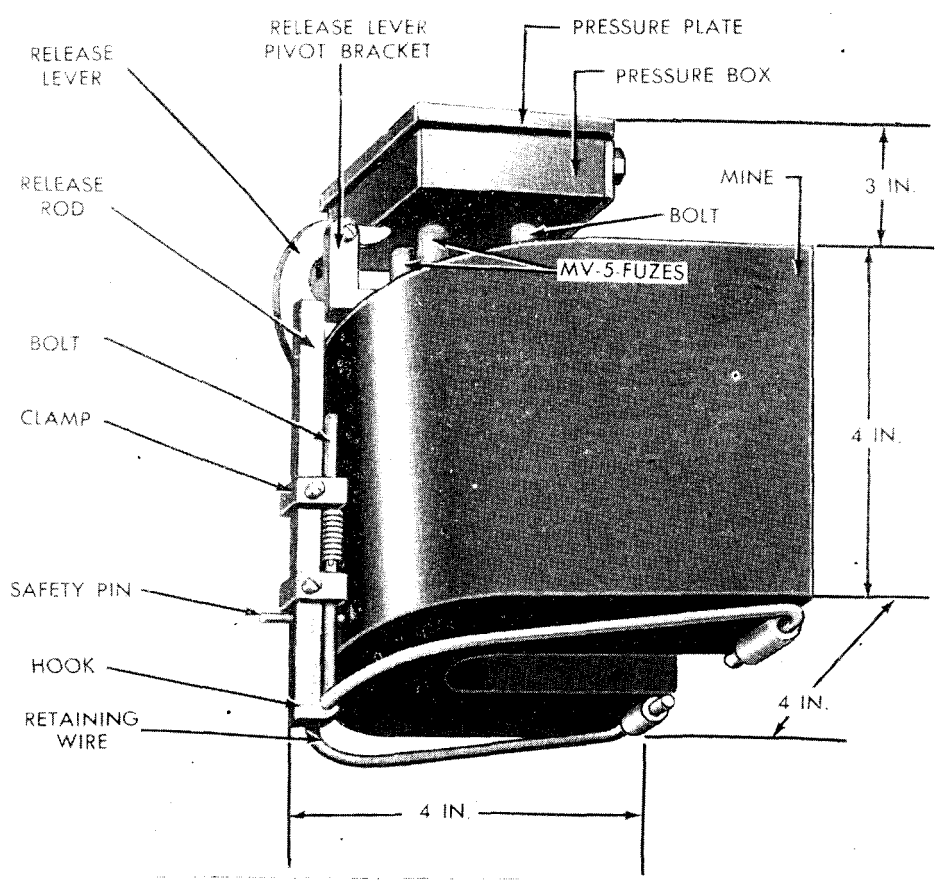


Figure 81. Horseshoe mine.

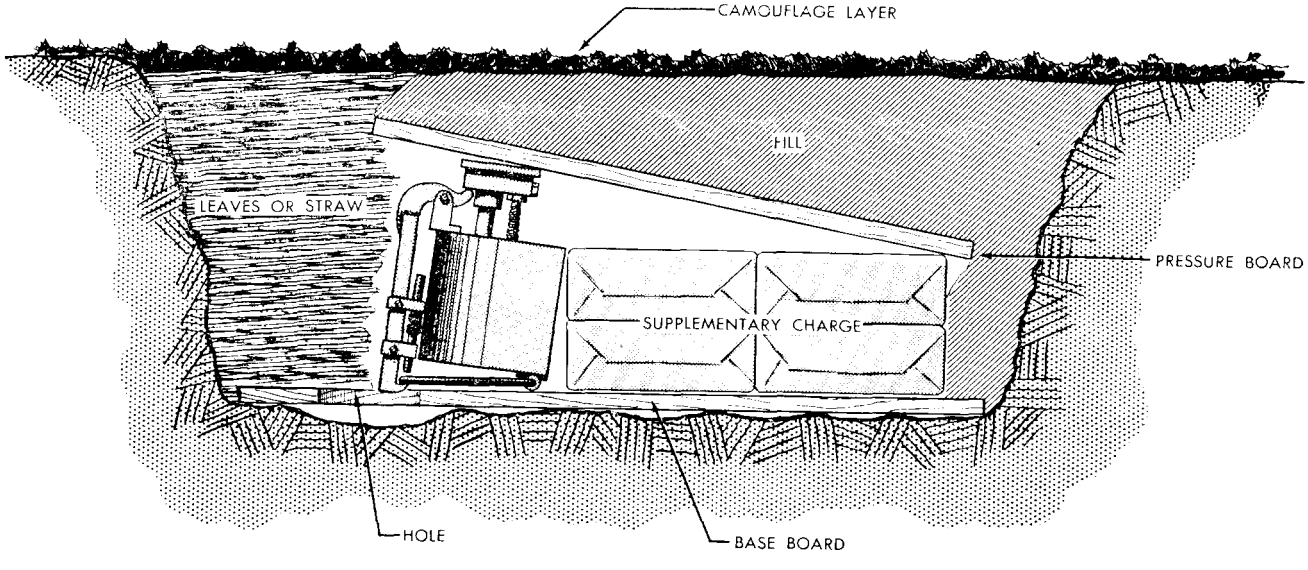


Figure 82. Installing the horseshoe mine.

wire to disengage itself from the hooked end of the release rod.

(6) Cover the mine and place a pressure board over the pressure plate.

c. NEUTRALIZING.

(1) Uncover the pressure board and lift it from the mine.

(2) Lift off the pressure plate and the box.

(3) Remove the two pressure fuzes.

(4) Without exerting any pressure on the pressure cap, unscrew the MD 2 detonator assembly from each of the fuzes.

85. MZ Mine

a. DESCRIPTION. The MZ mine (fig. 83) is a cylindrical sheet-steel container, 5 inches in diameter and 10 inches high. It weighs 22 pounds, including 4 pounds of explosive. The mine is similar to the British No. 5 antipersonnel mine, Mark I. The centrally located pressure fuze is welded to the top of the container. This fuze has a shear pin holding back a spring-loaded striker. If the mine is to be actuated by pull, a trip wire can be attached to the eye in one end of the shear pin. The lid has a slot in one side for insertion of the trip wire. A spring type safety clip fits around the plunger of the fuze and prevents the plunger from depressing until the clip is removed.

b. EMPLOYMENT. The MZ mine is normally laid in clusters of two or three mines, each mine placed in the ground with only the lid above ground. This mine is primarily used against personnel but is also effective against vehicles.

c. FUNCTIONING.

(1) *Set for pressure.* Pressure on the lid shears the shear pin and releases the spring-loaded striker against the percussion cap which fires the mine. The container is shattered into many small fragments.

(2) *Set for pull.* A trip wire is attached to the eye at one end of the shear pin

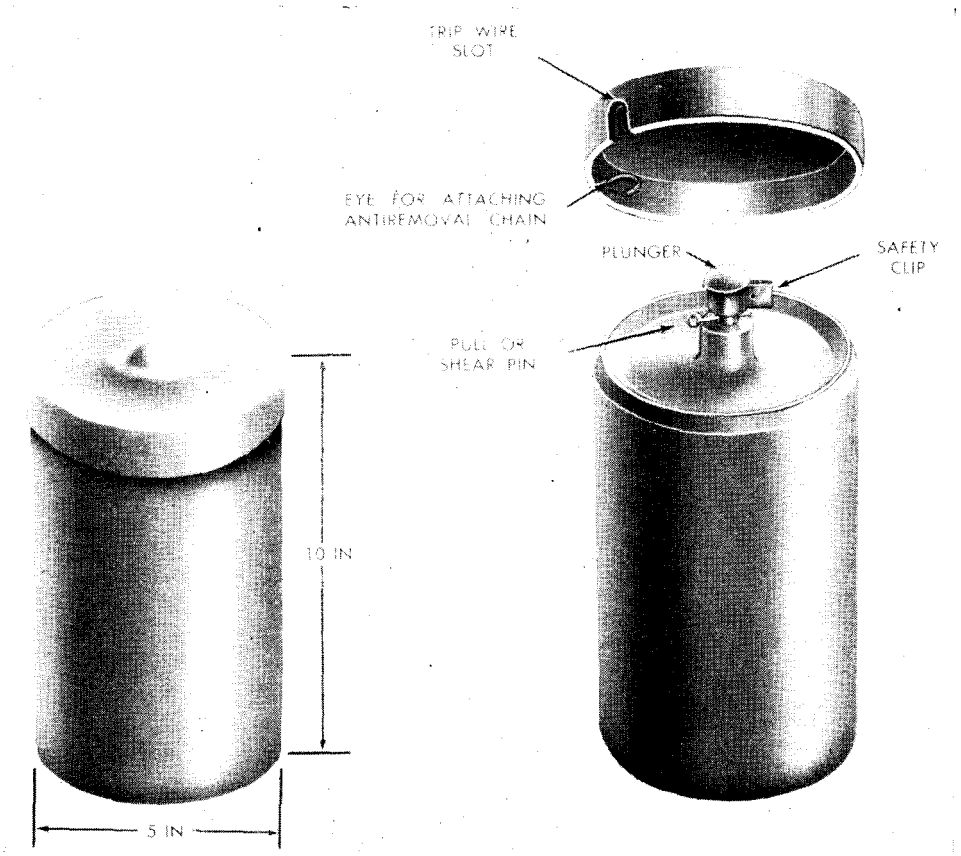


Figure 83. MZ mine.

and runs out through the hole in the lid to an anchor. A pull on the wire pulls out the shear pin, releasing the spring-loaded striker.

(3) *Set for antiremoval.* A chain with a snap hook may be attached to the lid and the eye in the shear pin. When the lid is raised, the chain pulls the shear pin out of the fuze.

d. INSTALLING AND ARMING.

(1) Dig a hole and place the mine therein.

(2) Remove the lid and take off the safety clip. If desired, attach an anchored pull wire to the eye of the shear pin or attach a chain to the under side of the lid and to the eye of the shear pin.

e. NEUTRALIZING.

(1) Cut any pull wires attached to the mine and gently lift the lid enough to be able to feel or see if there is an antiremoval chain attached to the shear pin. If not, remove the lid. If the chain is present, cut it with pliers and remove the lid.

(2) Wrap or clip a safety device around the plunger of the fuze.

86. NV-41 Mine

a. DESCRIPTION. The NV-41 mine (fig. 84) is a wooden box-shaped mine with a flat lid and sloping sides. The mine is 9¾ inches long, 7¾ inches wide, and 7¼ inches high. It weighs about 17.5 pounds, including about 13 pounds of TNT. The mine has a built-in pressure plunger, a release lever and spring, a spring-loaded striker, and a booster charge. A vertical hollow tube in the bottom leads into the chamber between the striker and the detonator. This tube is used for insertion of an electric blasting cap so the mine may be fired electrically. If the mine is to be set for antilifting, the tube permits a wire or string to be tied to the end of the plunger. A wooden plug closes the access tube to the percussion cap and detonator well.

b. EMPLOYMENT. This mine was employed as an antitransport mine, as an antipersonnel mine, or for both uses at the same time.

c. FUNCTIONING.

(1) *By pressure.*

(*a*) Pressure of several hundred pounds on the lid crushes the lid and depresses the plunger and spring.

(*b*) The plunger, moving down, rotates the striker-release lever which releases the spring-loaded striker.

(2) *By lifting.* If the mine is laid with a string or wire attached to the hole in the lower end of the plunger, the string runs down the tube in the bottom of the mine and is anchored in the ground. Any attempt to lift the mine causes the anchored string to pull down on the plunger, which rotates the lever arm and releases the spring-loaded striker.

(3) *By electrical detonation.* If an electric blasting cap is inserted in the tube in the bottom of the mine, the mine is fired electrically from a remote-control post.

d. INSTALLING AND ARMING.

(1) Dig a hole deep enough so that just the sloping lid remains above ground.

(2) Insert the cap-and-detonator assembly in the horizontal tube and close the tube with a wooden plug.

(3) Arm the mine for pressure, antilifting, or electrical functioning (*c* above).

e. NEUTRALIZING.

(1) Uncover the mine.

(2) Carefully search around the mine and under it for antilifting wires or electrical leads. Cut any wires that are found.

(3) Carefully lift the mine and remove the wooden plug.

(4) Tip the mine gently so the cap-and-detonator assembly slides out.

87. Ovtsinnikov Mine

a. DESCRIPTION. This wooden box mine (fig. 85) is 9½ inches long, 8¼ inches wide, and 4⅞ inches high. It consists of a box-shaped charge container and a lid which fits down over the charge container. The mine weighs 9.25 pounds, including 4.4 pounds of explosive. Four wooden shear pegs hold the lid to the charge container and are kept from being lost by a cord tied to each peg and to a nail in the lid.

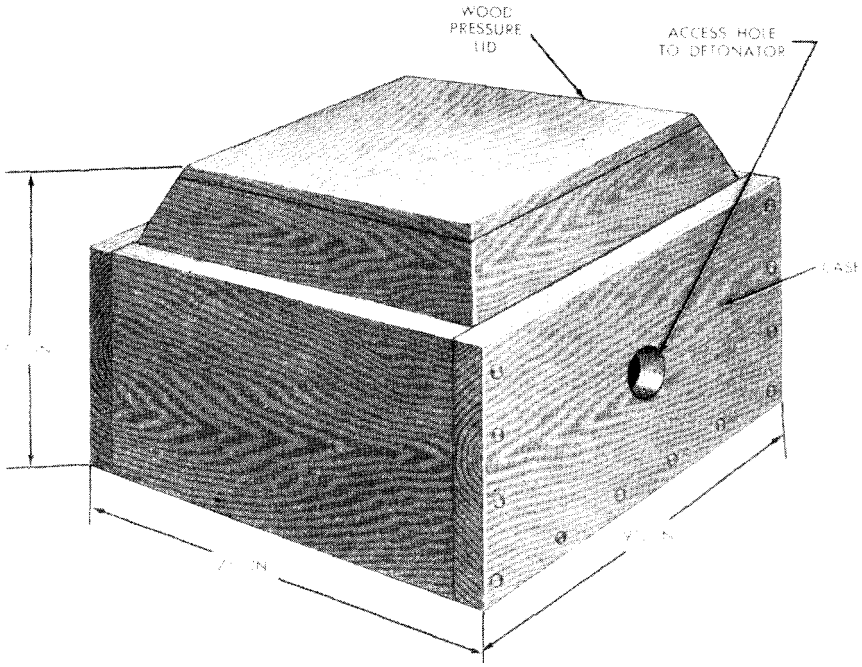


Figure 84. NV–41 mine.

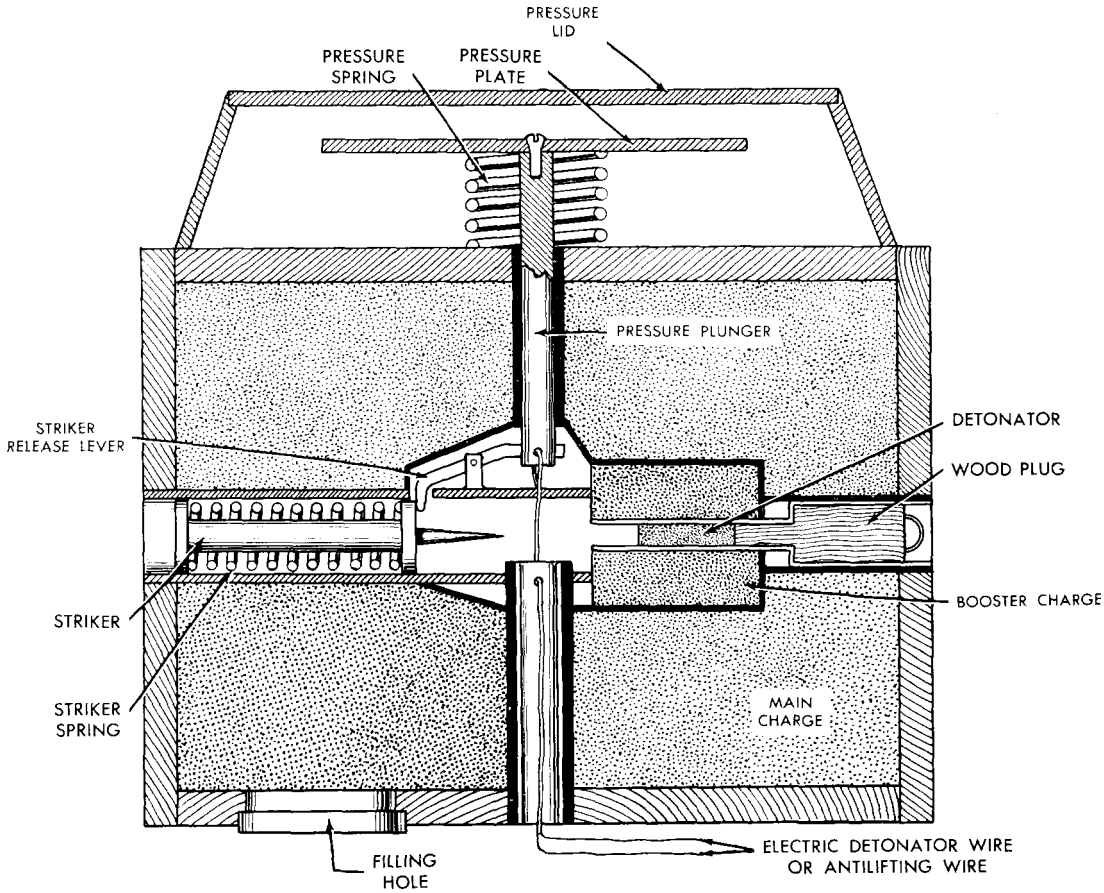


Figure 84.—Continued.

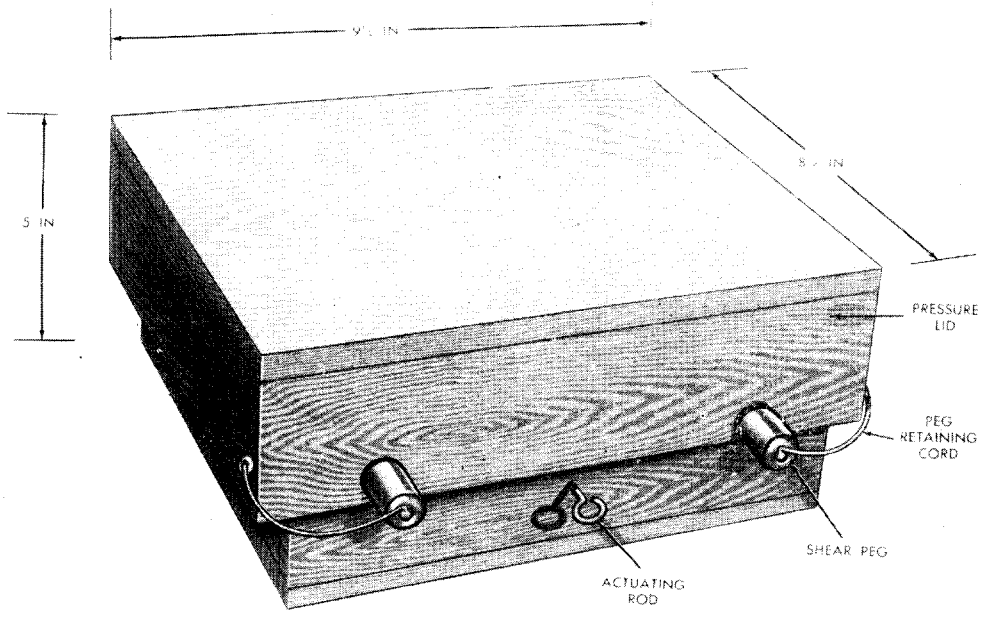


Figure 85. Ovtsinnikov mine.

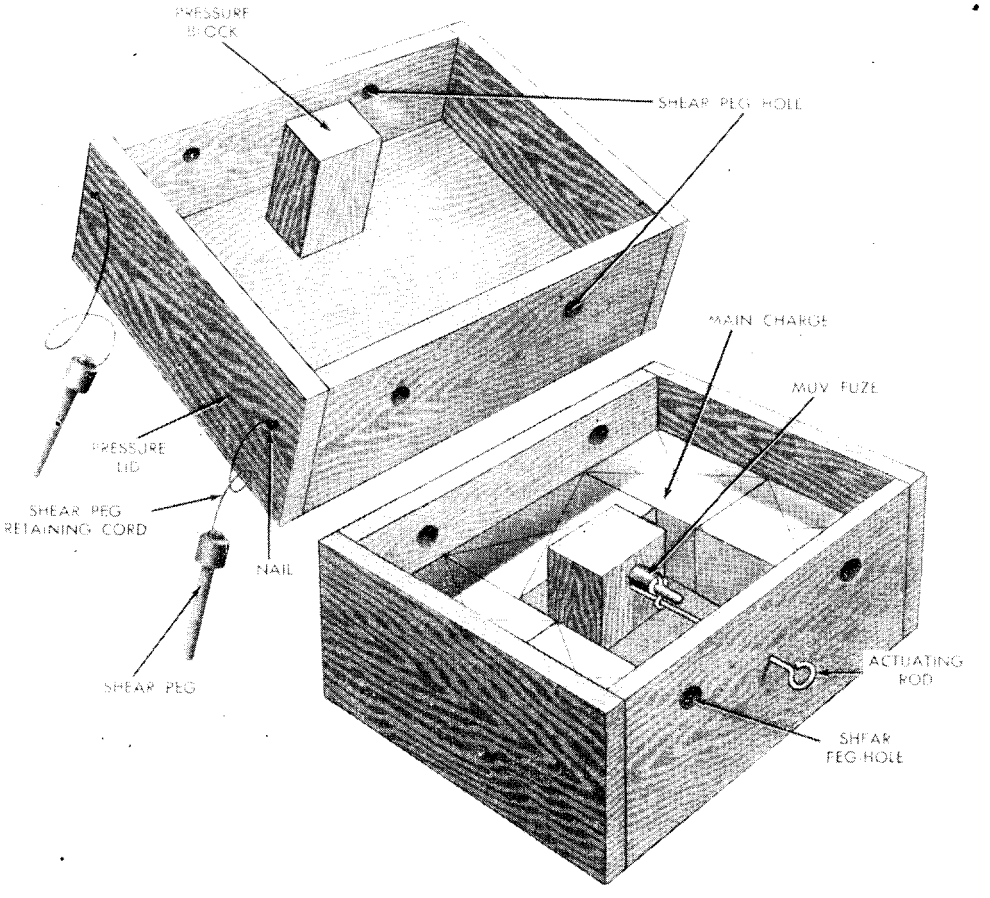


Figure 85.—Continued.

A wooden pressure block nailed to the under side of the lid is positioned over a metal actuating rod which projects through one side of the container. The outer end of the rod is fashioned into an eye or loop. The inner end engages in the loop of the striker-retaining pin of the MUV pull fuze (par. 22). A block of wood in the bottom of the charge container is recessed to hold the fuze. The mine can be detected with the SCR 625 detector.

b. EMPLOYMENT. This mine may be employed either as an antitank or as an antipersonnel mine. For antitank use, the charge container is fitted with explosive blocks. For antipersonnel use, only one or two blocks of explosive are used, and the remaining space is filled with nails or shrapnel.

c. FUNCTIONING. Pressure on the lid shears the wooden pegs and depresses the lid. The pressure required to shear the pegs and actuate the fuze depends on the type of wood and the diameter of the shear pegs. The pressure block forces down on the metal actuating rod which pulls the pin out of the MUV pull fuze, releasing the spring-loaded striker.

Note. A modification of this mine has a wooden or metal pressure bolt attached to the center of the lid, directly over a pivoted lever which is engaged in the loop of the striker-retaining pin of the fuze. It functions as described in paragraph 46.

d. INSTALLING AND ARMING.

(1) Dig a hole for the mine.

(2) Remove the lid and place an MUV pull fuze fitted with an MD 2 detonator assembly through the hole in the fuze-support block and into the explosive block, after the fuze has been fitted with an MD 2 detonator assembly.

(3) Carefully engage the end of the metal actuating rod in the loop of the striker-retaining pin of the fuze.

(4) Carefully replace the lid and cover the mine.

e. NEUTRALIZING.

(1) Withdraw the metal actuating rod from the mine.

(2) Remove the shear pegs.

(3) Lift the lid.

(4) Slide the fuze out and unscrew the detonator assembly from the fuze.

88. Lever Mine

a. DESCRIPTION. The lever mine (fig. 86) consists of a rectangular wooden box, 19½ inches long, 7¾ inches wide, and 4¾ inches high. It weighs about 14 pounds, including 10 pounds of explosive. The MUV pull fuze (par. 22) is used with this mine. It is inserted into a hole in the middle of one long side. The fuze rests in a hole through a wooden block nailed inside the mine and projects into a booster charge. A block of wood, 14 inches long, 3 inches wide, and 1 inch thick, is nailed to the lid of the mine over the side in which the fuze is inserted. This wooden block acts as a fulcrum for a wooden actuating lever which is nailed with one nail to the block (fig. 86). One end of the lever is tied to the loop in the striker-retaining pin in the fuze.

b. EMPLOYMENT. This mine was designed primarily for use as an antitank mine. However, since so little pressure is required to set it off, the mine is also effective against personnel.

c. FUNCTIONING. Pressure on the long arm of the actuating lever pulls the pin out of the fuze, releasing the spring-loaded striker. The mine will operate under the weight of a person or vehicles of all types.

d. INSTALLING AND ARMING.

(1) Dig a hole so the top of the mine will be flush with the ground.

(2) Tie a wire to the short end of the actuating lever and to the loop of the striker-retaining pin in the fuze.

e. NEUTRALIZING. In lifting or removing this mine, use great caution in uncovering the lever. No pressure should be exerted on the lever.

(1) Carefully cut the wire attached to the fuze.

(2) Pull out the fuze and the attached MD-2 detonator assembly.

(3) Unscrew the detonator assembly from the fuze.

89. VMG Seesaw Winter Mine

a. DESCRIPTION. This rectangular plywood box mine (fig. 87) is 18¾ inches long, 4¾ inches wide, and 9 inches high. It weighs about 22 pounds, including about 17 pounds of ex-

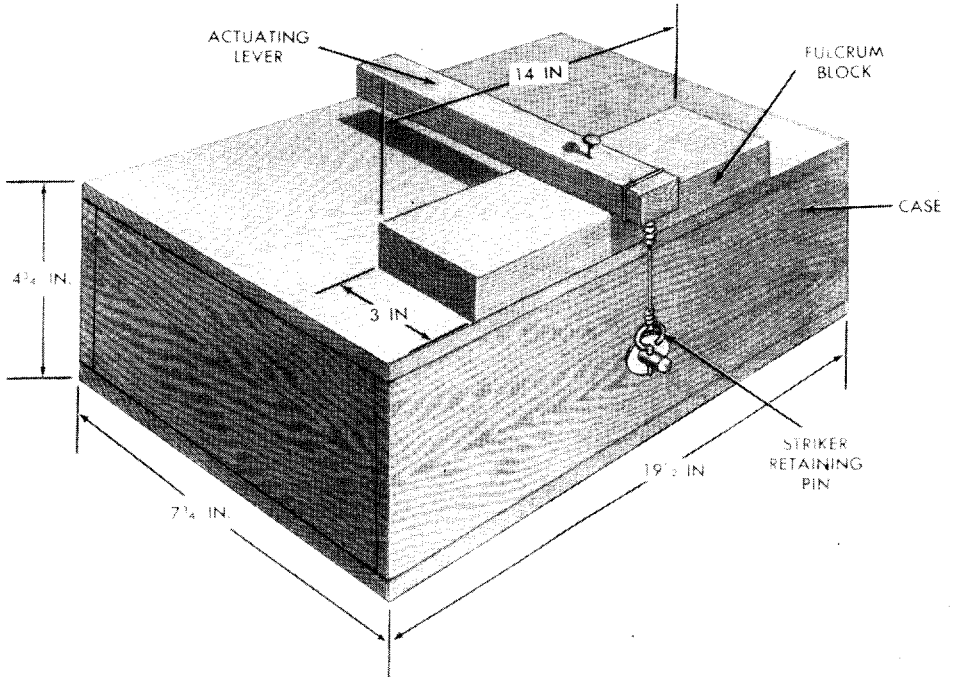


Figure 86. Lever mine.

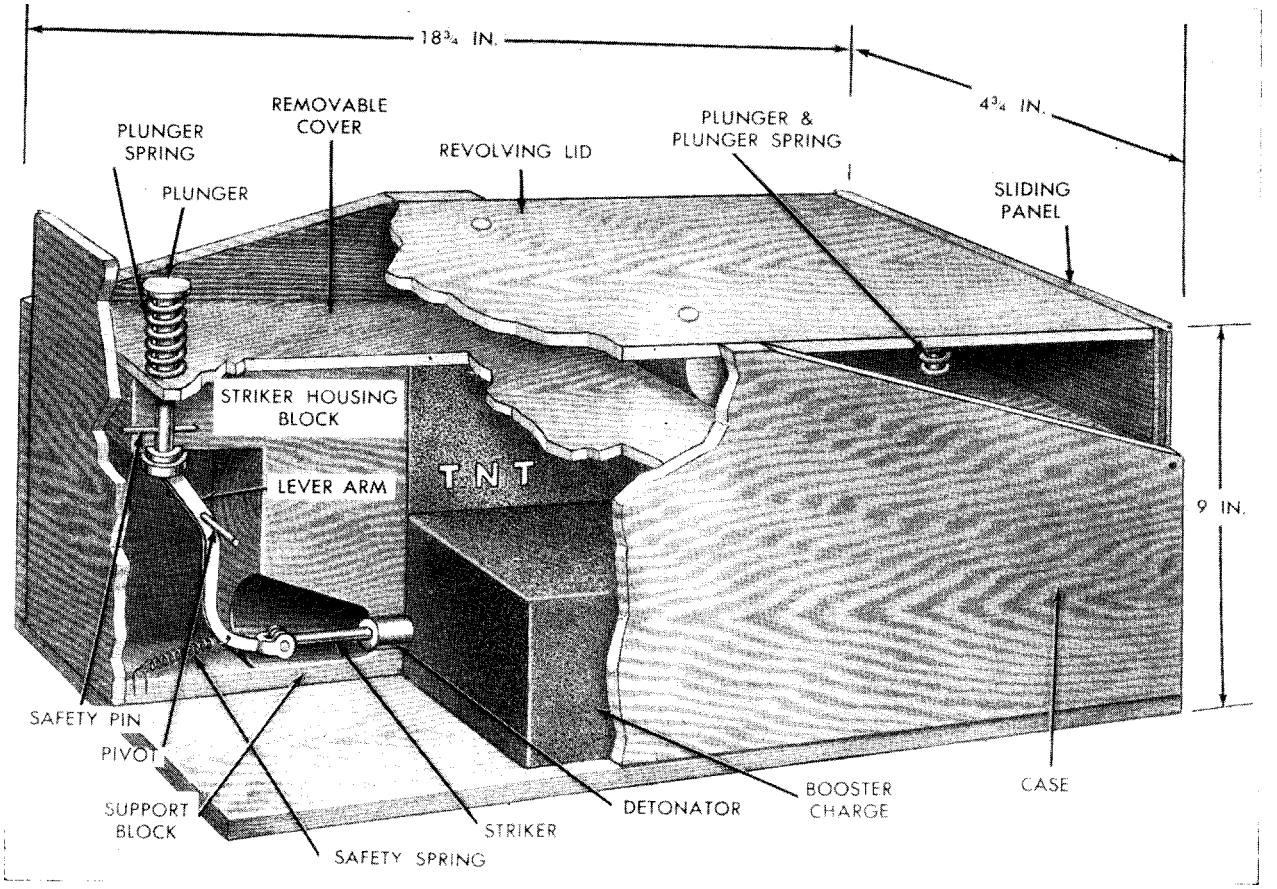


Figure 87. VMG seesaw winter mine.

plosive when laid for antitank use. If laid for antipersonnel use, only 6 to 8 pounds of explosive are placed in the mine with the remaining space filled with shrapnel. The two end panels are removed by sliding them upward, exposing the actuating assembly at each end. Each actuating assembly consists of a plunger, a plunger spring, and a lever arm which is hinged at the bottom to a striker. The hinged lever arm is prevented from moving by a spring attached to the end of the support block and the lever arm. A safety pin passing through the support block and the plunger prevents the plunger from moving. The top of the mine contains a removable cover through which the two plungers project so that they rest flush with the under side of the revolving lid. The revolving lid acts as a pressure plate and rotates on a wooden axle which is seated on the top of the mine. The mine has enough metal to be detected by an SCR 625 detector.

b. EMPLOYMENT. This mine was designed primarily for use in winter as an antitank mine. However, since so little pressure is required to set it off, the mine is also effective against personnel.

c. FUNCTIONING.

(1) Pressure on either end of the revolving lid forces the lid down on the plunger. This compresses the plunger spring.

(2) Downward pressure is transmitted through the plunger to the hinged lever arm. The arm rotates, extending the safety spring and forcing the striker against the percussion cap inside the detonator.

d. INSTALLING AND ARMING.

(1) Remove the ends of the mine by sliding the panels upward, and remove the safety pin revolving lid cover, and the striker-housing blocks containing the striker mechanism.

(2) Insert the detonators into the hole in each explosive block.

(3) Carefully replace the striker-housing blocks in the mine; replace the cover and the revolving lid.

(4) Lay the mine.

(5) Push the sliding panels down.

e. NEUTRALIZING.

(1) Uncover the mine and remove the sliding end panels. If these panels stick, blow the mine in place.

(2) Remove the revolving lid and the cover.

(3) Pull out the striker-housing blocks and remove the detonators.

f. VARIATION OF SEESAW MINE. A variation of the VMG seesaw winter mine is shown in cross section in figure 88. The dimensions and weight are about the same, but this mine is simpler in design in that it employs two MUV pull fuzes (par. 22). Each of these is attached

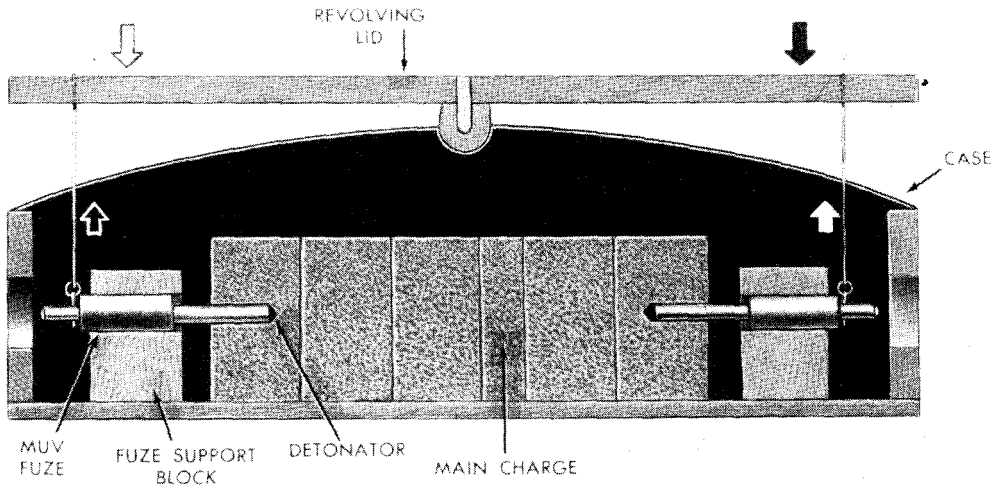


Figure 88. Variation of VMG seesaw winter mine.

to the revolving lid by a wire fastened to the fuze striker-retaining pin. Access to the fuzes is provided through a hole at each end of the mine. The mine functions in the same manner as the VMG, except that pressure on one end of the revolving lid actuates the fuze at the opposite end. This mine may be neutralized by cutting the wires connecting the fuzes to the revolving lid and then pulling out the fuzes.

90. Tilt-Rod Mine

a. DESCRIPTION. The tilt-rod mine (fig. 89) adapts the principles of the antitank dog mine (par. 50) to a stationary mine. The interior of the mine is similar to the TM 38 (par. 46). The metal case is about 8½ inches long, 8½ inches wide and 4½ inches high. The mine weighs about 16 pounds, including about 12.3 pounds of explosive in fourteen 400-gram blocks. The tilt rod is about 25 inches high. One side of the mine has a sliding door to provide access to the fuze. A safety pin is inserted through the base of the tilt rod to prevent it from moving.

b. EMPLOYMENT. The tilt-rod mine was designed for use in deep snow where other types of mines would not always function. It is effective against tanks and infantry. The tilt rod is camouflaged to resemble a small seedling or bush.

c. FUNCTIONING. Pressure against the tilt rod rotates a hinged disk, depressing the actuating lever. The lever lifts the striker-retaining pin out of the MUV pull fuze, firing the mine.

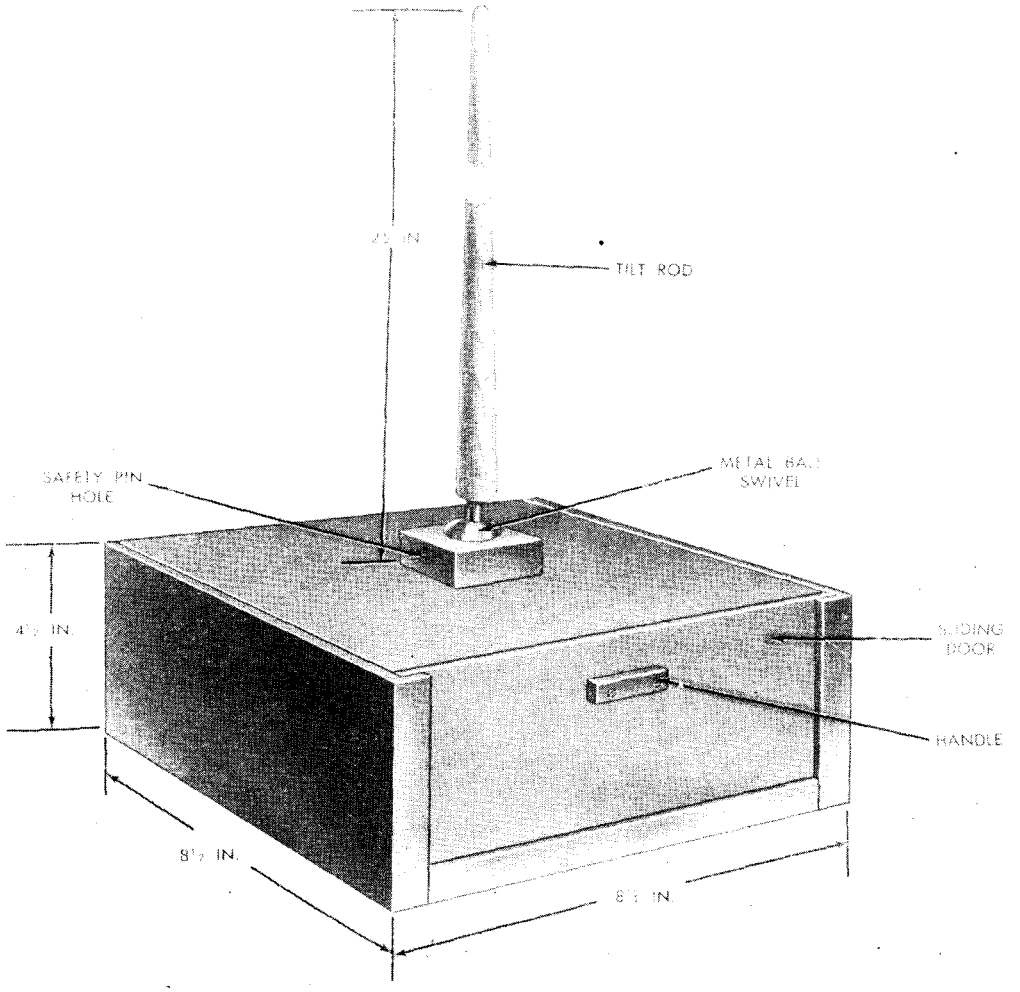


Figure 89. Tilt-rod mine.

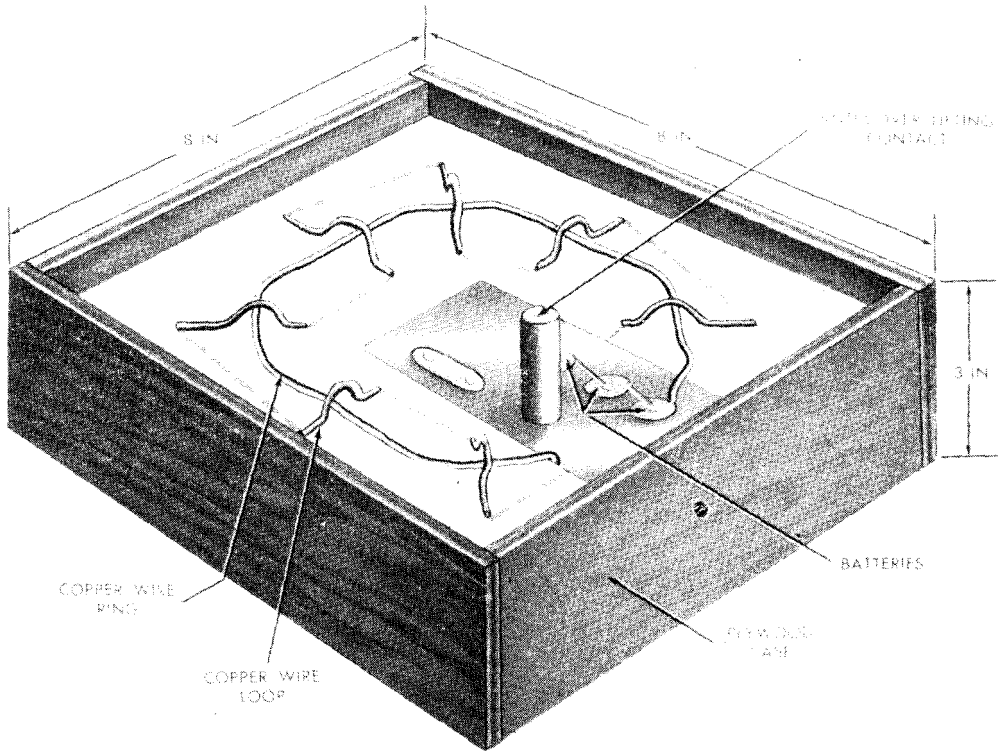


Figure 90. Electrical dual-purpose mine.

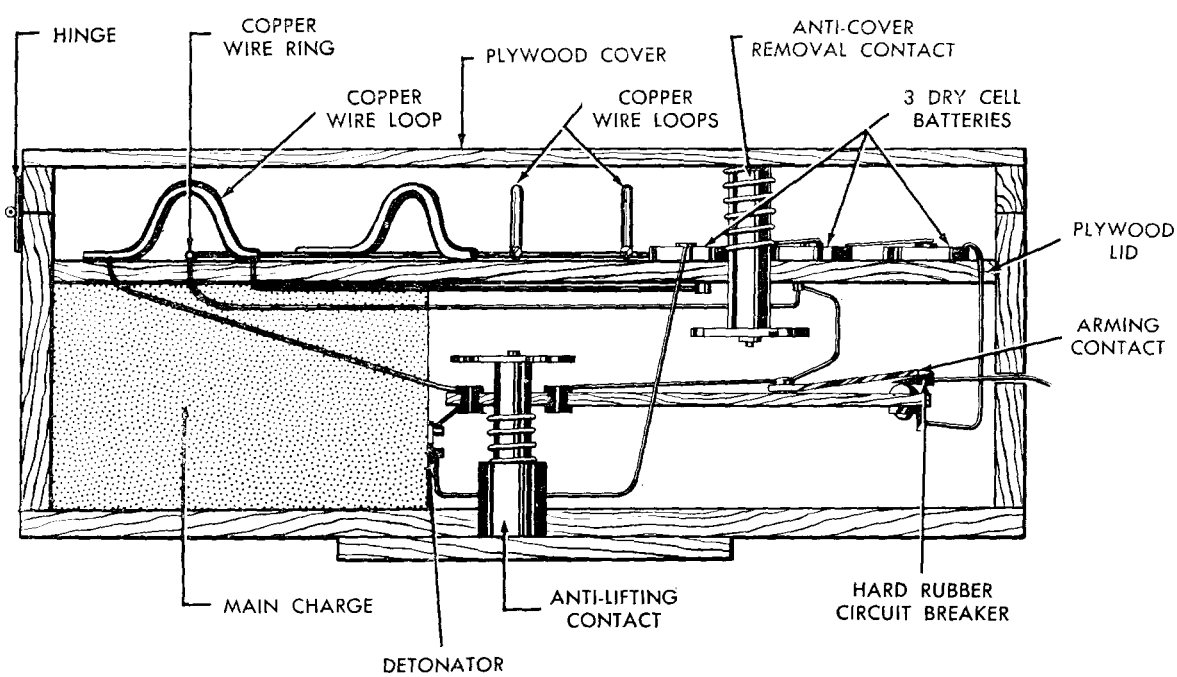


Figure 91. Cross-section view of electrical dual-purpose mine.

d. INSTALLING AND ARMING.

(1) Slide off the removable side and proceed as described in paragraph 46*d*.

(2) Remove the safety pin.

e. NEUTRALIZING. Extreme caution must be used to prevent touching the tilt rod.

(1) Insert a nail or wire through the safety-pin hole.

(2) Uncover the removable side and slide it off. Proceed as described in paragraph 46*e*.

Note. Any tilt-rod mine may have a two-stage tilt action. The first time the tilt rod is moved the fuze is armed; the second time it is moved the mine is fired.

91. Electrical Dual-Purpose Mine

a. DESCRIPTION. This electrical mine (figs. 90 and 91) consists of a plywood box, usually painted white to resemble a Soviet first-aid kit. It is 8 inches long, 8 inches wide, and 3 inches high. It weighs about 6.5 pounds, including 3.5 pounds of explosive. The mine contains an electrical ignition system wired to three dry-cell batteries and containing three different contacts, any one of which may complete the circuit and fire the electric detonator. Under the main hinged cover is a removable plywood lid which fits over the explosive charge and ignition system. Wired to the plywood lid is an octagonal copper-wire ring connected to the batteries (par. 92). Seven copper-wire loops are regularly spaced over the wire ring and are connected to it. Two arming contacts are connected to the wiring system; one closes the circuit if the mine is lifted, the other if the cover is raised.

b. EMPLOYMENT. The electrical dual-purpose mine is used both as an antipersonnel and antitransport mine. When camouflaged as a Soviet first-aid kit it is dispersed in former bivouac areas.

c. FUNCTIONING. This mine will detonate in one of three ways:

(1) *Under pressure.* Pressure on the cover of the mine crushes it, forcing the copper-wire loops to contact the wire ring. The contact closes the circuit and fires the mine.

(2) *Lifting the cover.* When an attempt to lift or remove the cover is made, the contact post attached to the cover slides up until it closes the circuit and fires the mine.

(3) *Lifting the mine.* When an attempt to lift the entire mine is made, the contact post in the bottom of the mine slides out of the hole until it closes the circuit and fires the mine.

d. INSTALLING AND ARMING. A hard-rubber circuit breaker is placed between the poles of the arming contact to assure safe arming of the mine. A hole in the bottom of the mine is for insertion of the antilifting contact post. A board is laid under the mine so the bottom of the contact post will not sink into soft ground and actuate the mine prematurely. After the mine has been laid, the rubber circuit breaker is removed from the arming contact by pulling an attached cord running through a hole in the end of the mine.

e. NEUTRALIZING. Once this mine has been armed there is no safe way to hand neutralize it. It must be destroyed in place.

92. Electrochemical Mine

a. DESCRIPTION. This mine (fig. 93) is contained in a plywood box 5 inches long, 4 inches wide, and 2⅜ inches high. This box contains 0.5 pound of explosive and an electrical circuit, consisting of a dry-cell battery, two electrical contacts, and a chemical contact. One end of the box and part of the lid are hinged to the remainder of the lid which is fixed. The hinged lid is employed as a pressure piece. It rests on the pointed end of the glass ampoule of acid which acts as the chemical ignition device. The ampoule rests on a copper and a zinc strip wired into the circuit. To the rear of the ampoule is the main circuit breaker which is held open, while the mine is being laid, by a wire leading out through a hole in the fixed lid. Attached to the under side of the fixed lid is a spring-loaded antiremoval contact with the contact post projecting through the lid and held down (open), when the mine is laid, by a rock or other weight. A push-button contact is also wired into the circuit. The circuit diagram for this mine is shown in figure 94.

b. EMPLOYMENT. Because of its low explosive content, this mine is intended primarily for antipersonnel use.

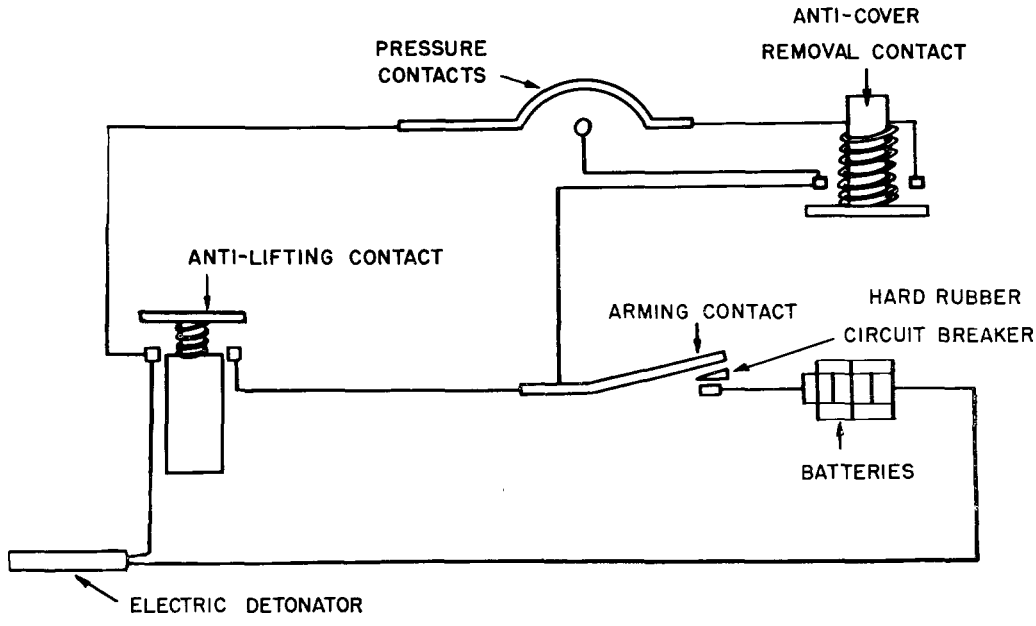


Figure 92. Circuit diagram of the electrical dual-purpose mine.

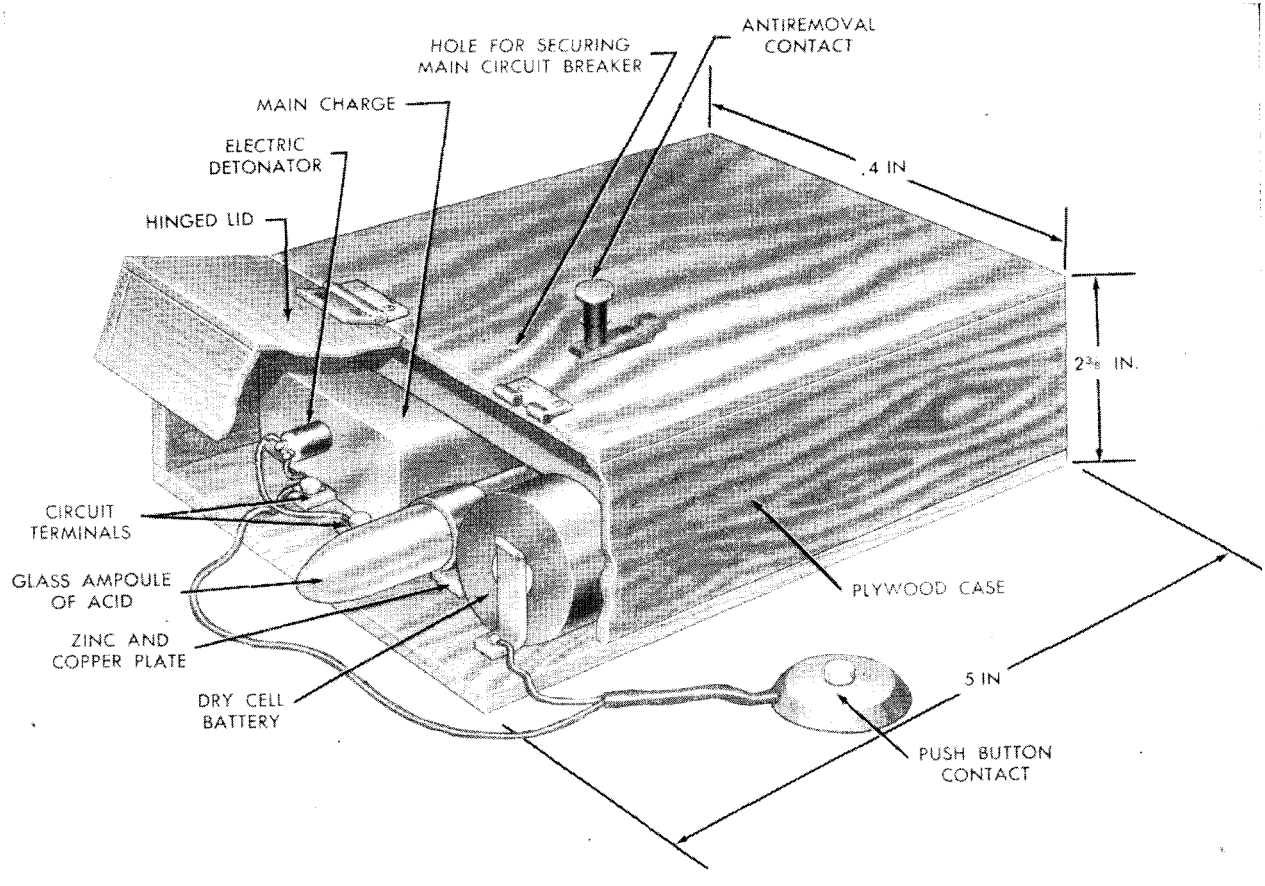


Figure 93. Electrochemical mine.

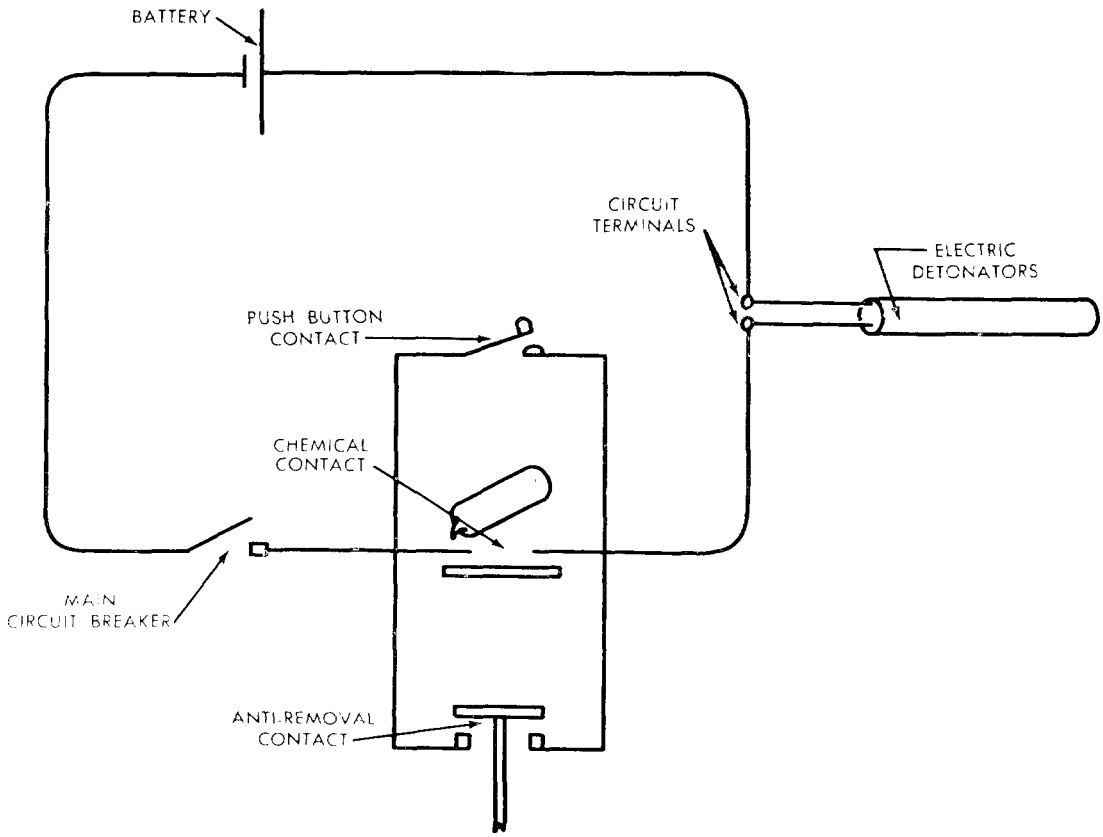


Figure 94. Circuit diagram of the electrochemical mine.

c. FUNCTIONING.

(1) Pressure on the push-button contact completes the circuit and fires the mine, or

(2) Pressure on the hinged lid crushes the glass ampoule of acid which, when it seeps onto the copper and zinc plate, creates an electrical impulse, completes the circuit, and fires the mine, or

(3) Releasing the rock or weight resting on the lid on the antiremoval contact permits the spring-loaded contact post to rise until it closes the contact, completing the circuit and detonating the mine.

d. INSTALLING AND ARMING.

(1) Lay the mine.

(2) Pull the main circuit breaker open with a wire or cord passing through the hole in the lid and secure it.

(3) Raise the hinged lid and insert the glass ampoule in its holder on the copper and zinc plate.

(4) Insert an electric detonator into the charge and connect the wire leads from the detonator to the two circuit terminals.

(5) Place the push-button contact under a pressure board but in such a manner that the board does *not* rest on the push button.

(6) Place a rock or weight on the antiremoval contact post projecting through the fixed lid so that this contact is open.

(7) Lower the hinged lid gently so it rests on the pointed end of the glass ampoule.

(8) Gently release the safety cord attached to the circuit breaker, thus closing this contact. The mine is now armed and will function in any of the three ways described in *c* above.

e. NEUTRALIZING. Because jarring or tipping the mine may remove the weight from the antiremoval contact in the lid, great caution

must be taken when hand neutralizing this mine. Gently lift the hinged lid and disconnect the wire leads from the electric detonator to the circuit terminals. Remove the detonator.

Note. If the lid does not open easily or if the detonator cannot be removed, the mine must be destroyed in place.

Section VI. IMPROVISED DUAL-PURPOSE MINES

93. General

Soviet field-improvised dual-purpose mines have a variety of forms. Soviet mine warfare doctrine emphasizes field improvisation and teaches that any container, including artillery and mortar shells, when filled with explosive makes a land mine just as effective as those which are factory-made. The following paragraphs in this section discuss the types of improvised dual-purpose mines emphasized in Soviet mine doctrine.

94. Fougasses

a. DESCRIPTION. A fougasse is a mine covered with rocks or other missiles so placed that upon detonation the missiles are hurled in a desired direction. This type of improvised mine was frequently employed by the Soviets against the Germans in World War II. A fougasse (fig. 95) generally consists of a 20- to 60-pound charge of ammonium-nitrate explosive laid in the bottom of a hole 4½ feet deep or less. The side of the hole toward the opposing force is sloped at an angle of about 45°. A wooden board, resting against the charge and placed perpendicular to the slope of the hole, is used as a support for the rock. Rocks about 4 to 6 inches in diameter are placed in the hole on top of the board at a ratio of about ½ cubic yard for every 15 pounds of explosive. The charge is detonated electrically from a remote-control post.

b. EMPLOYMENT. Fougasses are generally placed in groups of 5 to 10 staggered in 2 to 3 rows with 30 to 45 feet between each fougasse and 75 to 90 feet between rows. They are placed to help defend narrow defiles and to reinforce obstacles and field fortifications. Fougasses may also be placed under water to impede the movement of enemy vessels, to hinder assault landings, and to deny likely fording sites.

c. FUNCTIONING. One or more fougasses are detonated electrically upon the approach of foot troops or tanks of the opposing forces. The detonation of the charge hurls the rocks out of the hole to a distance of 600 to 900 feet with a lateral dispersal of 150 to 180 feet.

d. NEUTRALIZING. Locate and cut the electric firing cable.

95. Barrel Mines

Barrel mines consist of an ordinary wooden barrel or a metal oil drum, filled with stone,

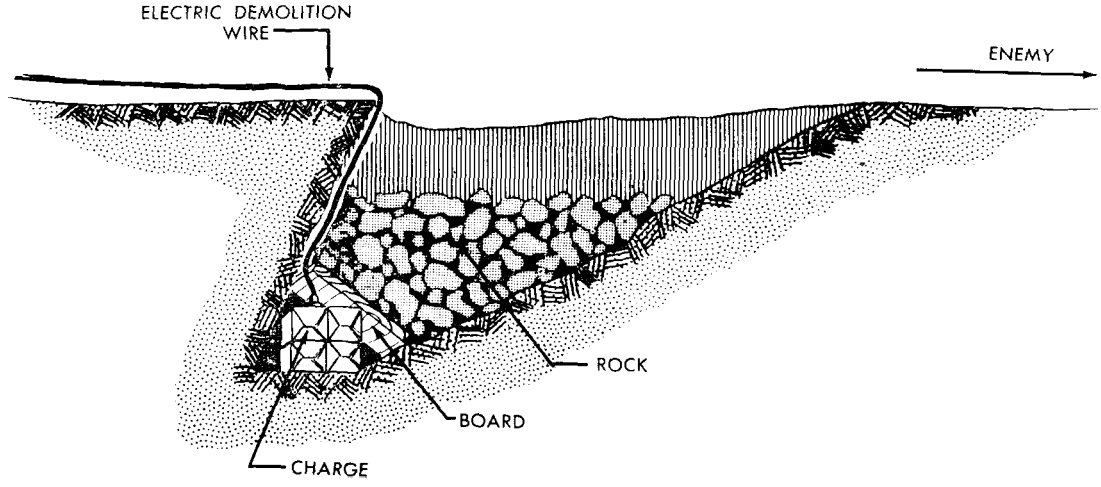


Figure 95. A typical Soviet fougasse.

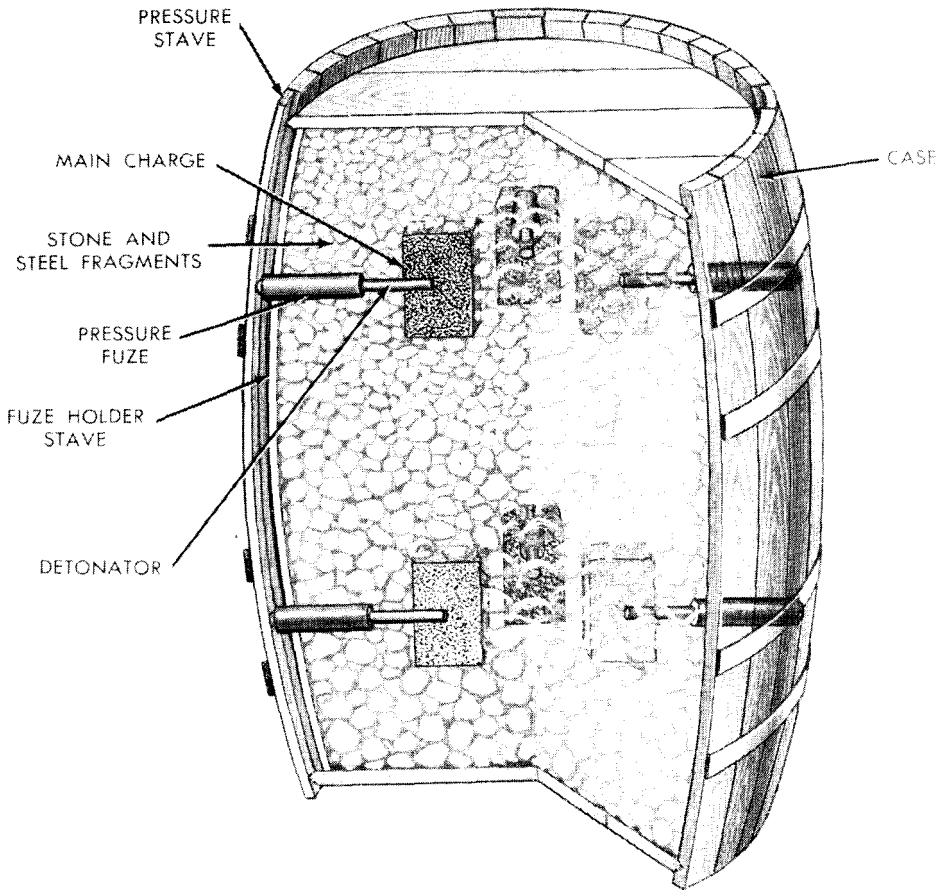


Figure 96. Improvised wooden barrel mine.

steel fragments, and explosive. The mines may be fuzed to fire electrically or by pressure. There were two general types of barrel mines employed by the Soviets in World War II.

a. WOODEN BARREL MINE (fig. 96).

(1) *Description.* This mine usually employs eight MV 5 pressure fuzes (par. 19), four in the upper half and four in the lower half of the mine. Four of the barrel's staves are removed and replaced with thin, flexible pressure staves and fuze-holder staves. Two MV-5 fuzes are placed in a horizontal position in each fuze-holder stave. Changes in the barrel's appearance are not noticeable from the outside. To distinguish it from ordinary barrels, the barrel mine is marked with chalk.

(2) *Employment.* The wooden barrel mine is normally placed on roads and trails to create the impression that the barrel was lost or forgotten. Any attempt to tip the barrel over or to roll it pushes in one of the pressure staves which actuates a fuze and explodes the mine.

Note. This type of mine has also been found floating in ship channels of rivers and harbors where it detonates when struck by a ship. The mine has also been found buried in the ground and attached by detonating cord to a pressure type fuze under a pressure board buried flush with the ground.

(3) *Neutralizing.* In neutralizing this mine, the barrel must not be moved, whether in a standing or lying position. The hoop nearest the top or bottom of the barrel must be removed without exerting pressure on the staves. The lid or base is taken off and the contents carefully removed. There is no safety device of any kind on the mine.

b. OIL-DRUM MINE (fig. 97).

(1) The oil-drum mine was usually found buried in the ground and wired to one or more EKhZ chemical-electrical fuzes (par. 33) as shown in figure 97.

(2) In neutralizing this mine, cut the wires connecting the fuzes and detonator in the mine.

96. Shell Mines

a. GENERAL. Artillery and mortar shells, bombs, and rockets make ideal improvised mines and can be fuzed and laid in any number of ways, both for antitank and antipersonnel use. The Soviets used all types of bombs and shells as improvised mines during World War II. Normally, shell mines are buried in the

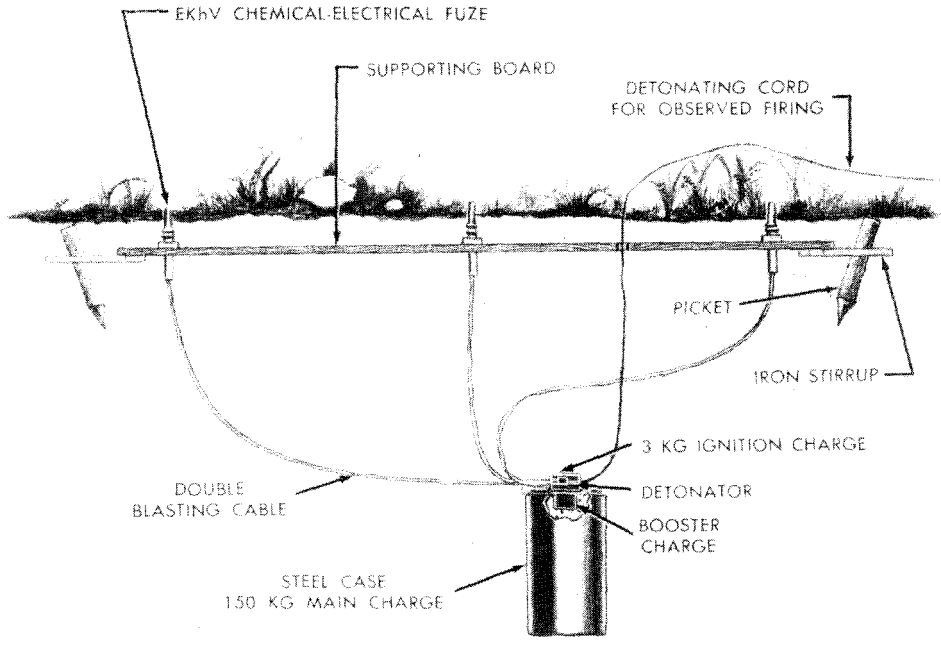


Figure 97. Improvised oil-drum mine.

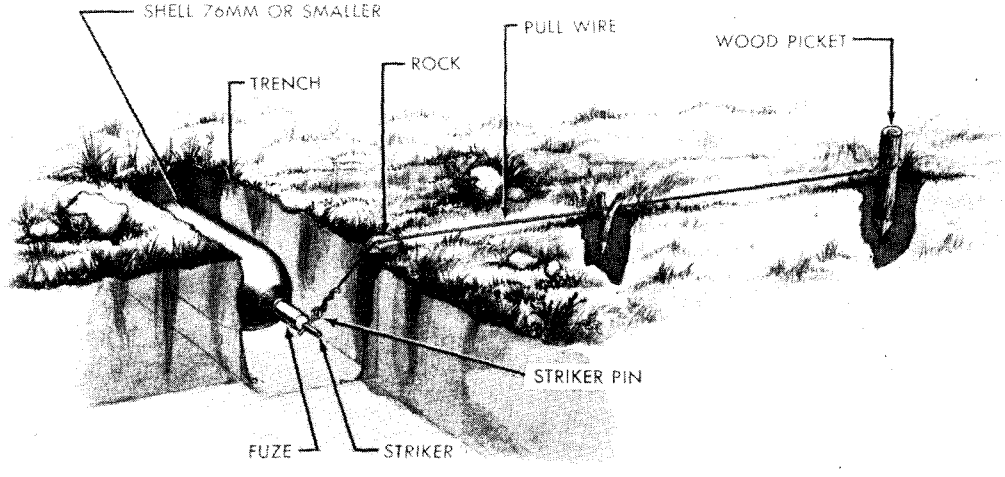


Figure 98. Improvised shell mine fuzed to detonate by pull on a wire.

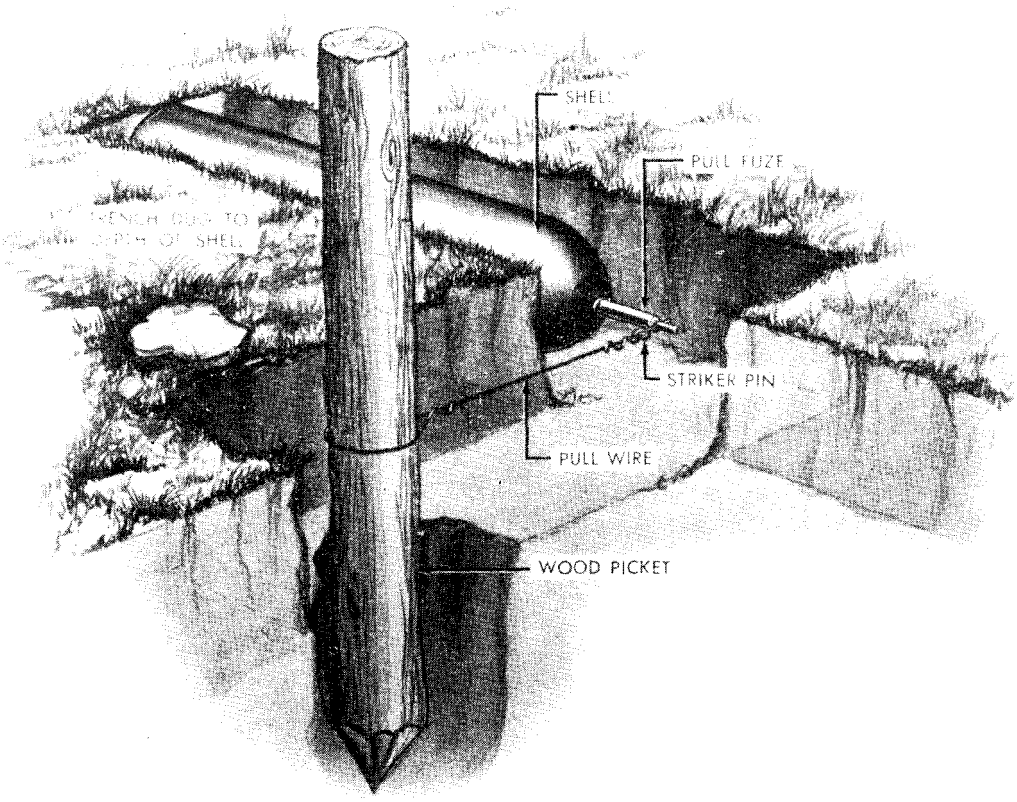


Figure 99. Improvised shell mine fuzed to detonate by pressure or pull on a picket.

ground and fused to fire either electrically, or by pressure with a pressure board, or by trip wires attached to a pull fuze in the nose of the shell. Some of the more common ways in which shells were employed as mines are shown in figures 98 to 101. The OZM 152 shell mine (152-mm fragmentation shell) shown in figure 101 is of the bounding type. A steel pull wire about 5 feet long is fastened to the base of the shell. On ignition, the propellant charge throws the mine up to the full length of the pull wire which actuates a pull fuze in the mine and explodes it above ground.

b. NEUTRALIZING. Depending upon the way in which the mine is fuzed and laid, neutralizing this type of mine usually involves one of the following procedures:

(1) Cutting the trip wire and removing the fuze.

(2) Cutting the electric leads and removing the fuze.

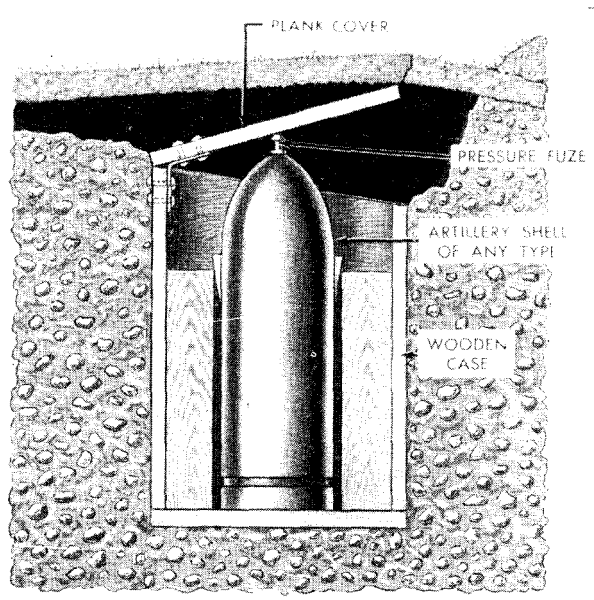


Figure 100. Improvised shell mine fuzed to detonate by pressure.

(3) Removing the pressure board or lid and removing the fuze.

97. Incendiary Mines

a. DESCRIPTION. The incendiary mine shown in figure 102 consists of a wooden box containing 24 bottles of incendiary liquid and a wooden antipersonnel mine containing 3 pounds of TNT. Incendiary mines inflict casualties to infantry accompanying tanks and will temporarily blind the tanks. They may vary in size and in the number of bottles.

b. EMPLOYMENT. These mines are installed in front of unit positions to retard armor-supported attacks. These mines are laid in checkerboard pattern with about a 10-yard space between mines.

c. FUNCTIONING.

(1) Pressure applied on the pressure board shears the wooden shear pin and depresses the pressure plug of the wooden antipersonnel mine.

(2) The antipersonnel mine detonates, destroying the case and breaking the incendiary bottles.

(3) Phosphorus from the bottles ignites on contact with the air.

d. INSTALLING AND ARMING.

(1) Lift the mine lid and remove two bottles from the section of case which

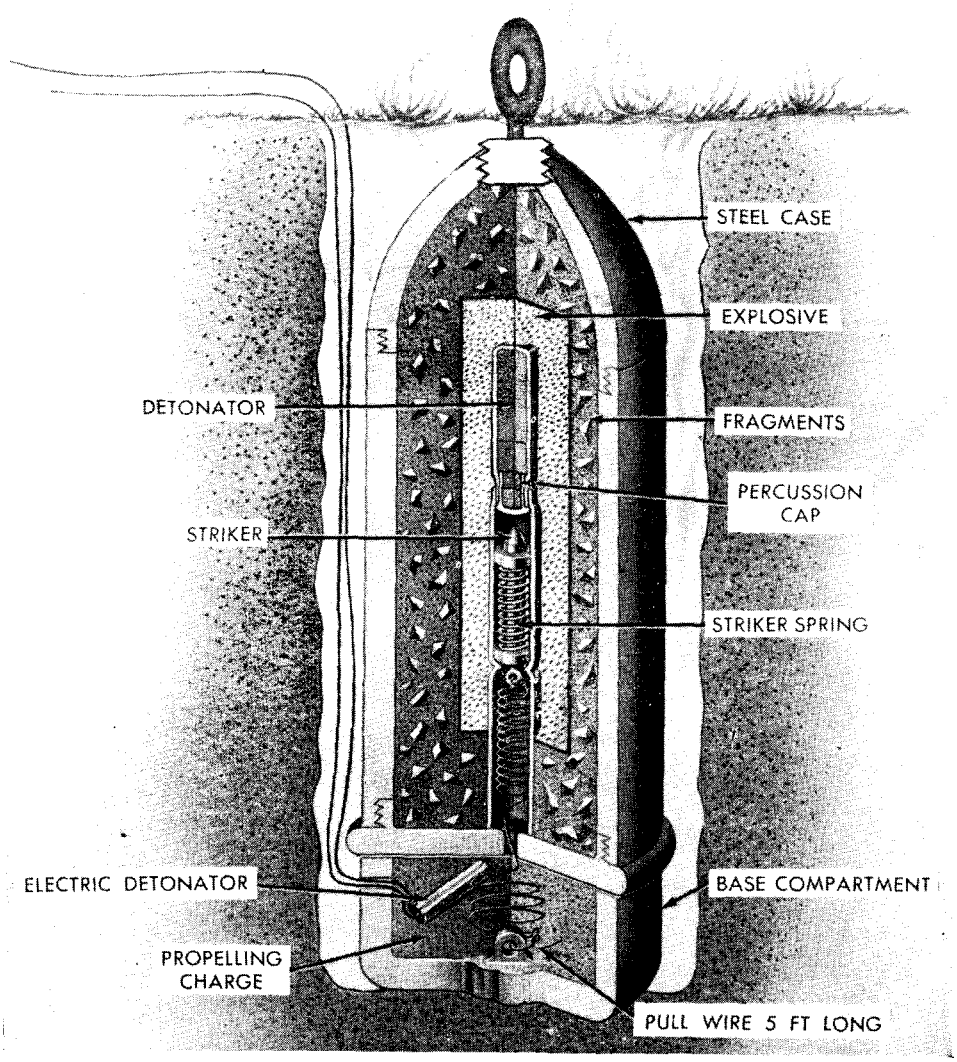


Figure 101. Remotely controlled improvised shell mine.

is directly beneath the pressure-board opening.

(2) Place the two bottles in the brackets on the sides of the case.

(3) Install the antipersonnel mine and the pressure board.

(4) Bury the mine with only the pressure board above the ground.

e. NEUTRALIZING.

(1) Care must be taken not to break any of the bottles as they will ignite upon contact with the air.

(2) Raise the lid.

(3) Remove and neutralize the antipersonnel mine.

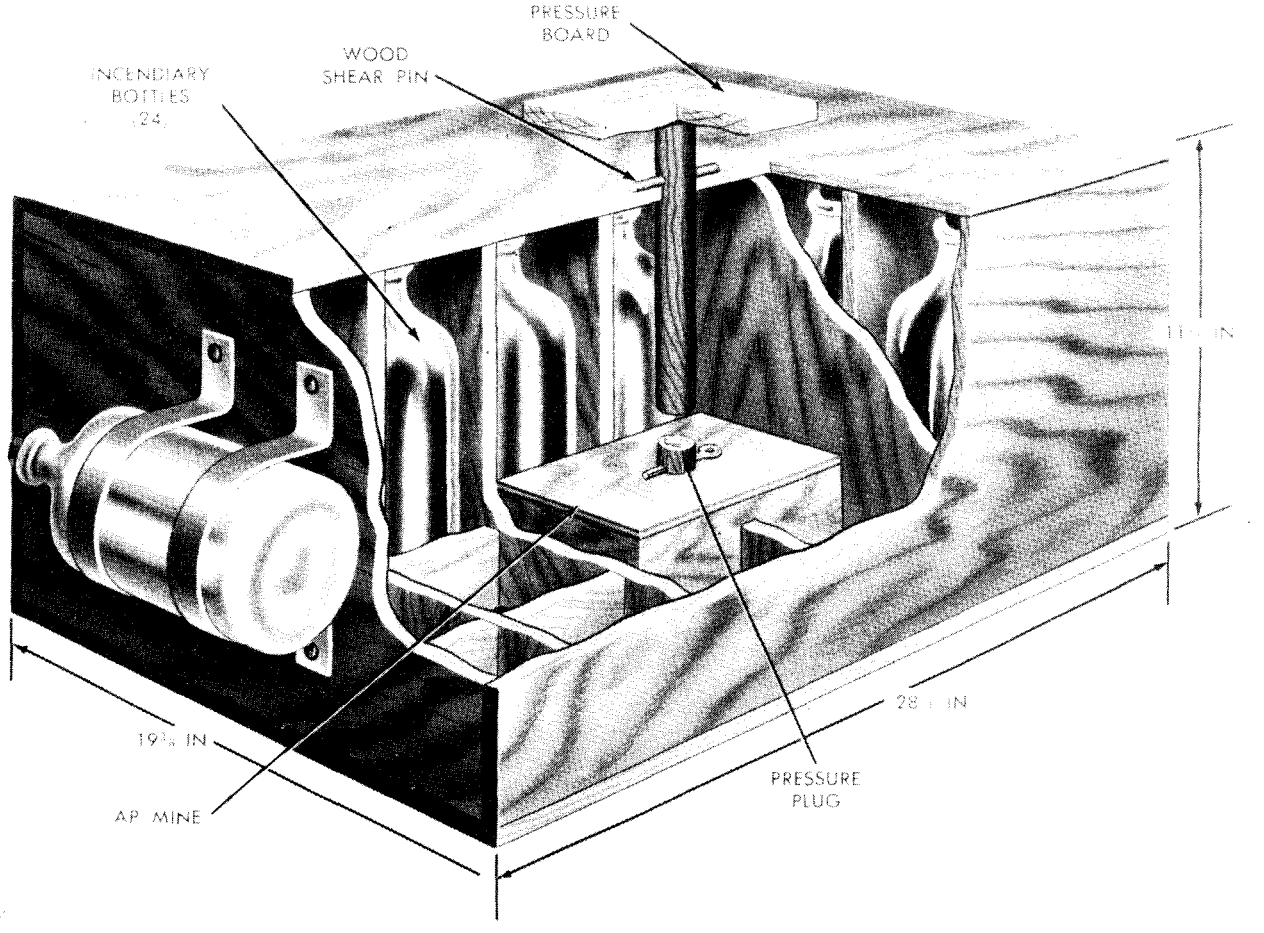


Figure 102. Improvised incendiary mine.

Section VII. ANTIPERSONNEL MINES

98. General

Soviet standard antipersonnel mines are chiefly of conventional pressure and pull types but they also have several types which are used as controlled mines, set off electrically by a concealed observer.

99. POMZ-2 Shrapnel Mine

a. DESCRIPTION. This antipersonnel mine (fig. 103) consists of a serrated, cylindrical cast-iron body 2½ inches in diameter and 5 inches in length, a 50- or 75-gram cylindrical charge, an MUV pull fuze (par. 22) or a VPF

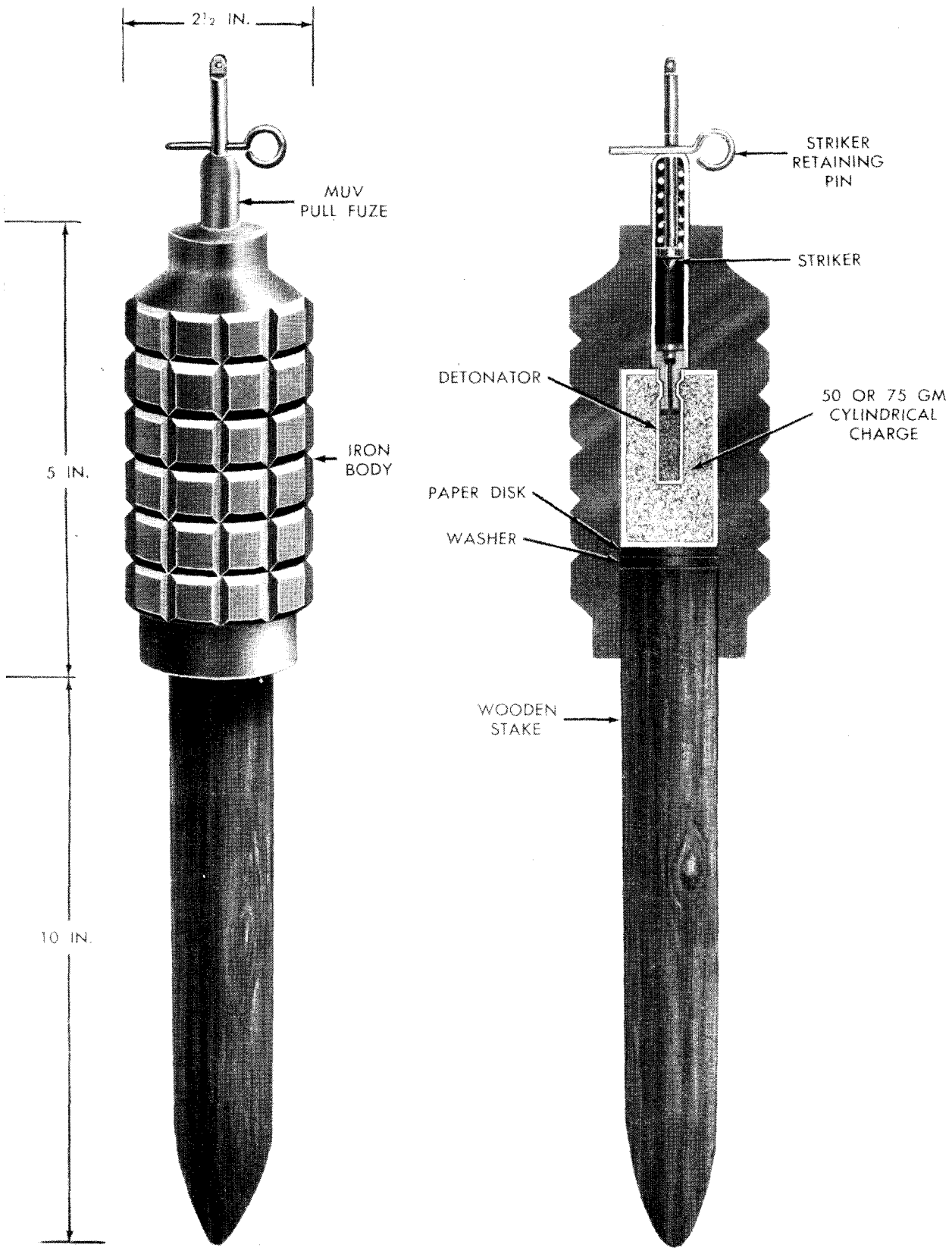


Figure 103. POMZ-2 shrapnel mine.

pull fuze (par. 24), and a wooden stake 10 inches long. The mine is similar to the German concrete stake mine and the Italian picket mine.

b. EMPLOYMENT. This mine is normally laid in high grass or bushes, the stake driven into the ground so the top of the mine is about 1 foot above the ground. Two or more mines may be connected by trip wires to the striker-retaining pins as shown in figure 104.

c. FUNCTIONING. A pull on the trip wire attached to the striker-retaining pin or ring of the pull fuze releases the spring-loaded striker, detonating the mine and splintering the cast-iron shell.

d. INSTALLING AND ARMING.

(1) Place the explosive charge into the base of the iron body.

(2) Place the mine on a wooden stake driven into the ground.

(3) Insert the MUV pull fuze, with MD 2 detonator assembly attached, into the top of the mine.

(4) Attach trip wires.

e. NEUTRALIZING.

(1) Cut all trip wires attached to the mine.

(2) Carefully pull out the fuze and the attached detonator assembly.

100. PMM-3 Mine

a. DESCRIPTION. This pressed-steel anti-personnel mine (fig. 105) is about 4 inches in diameter and 1½ inches high. It consists of a charge container and a lid. Hinged to the top of the lid is an oval, wire carrying handle. A safety pin projects through a hole in the side of the lid and the charge container into the percussion-cap detonator which is screwed into

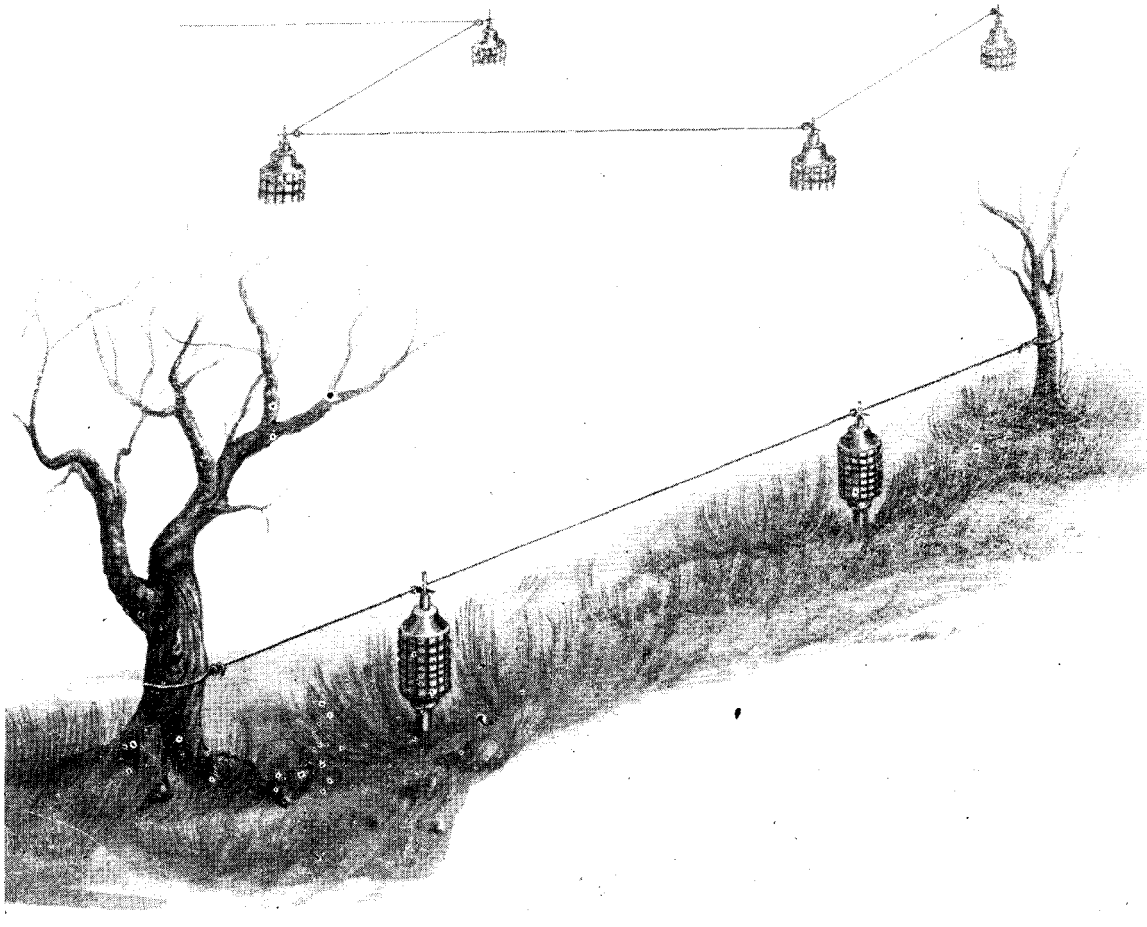


Figure 104. Methods of laying the POMZ-2 shrapnel mine.

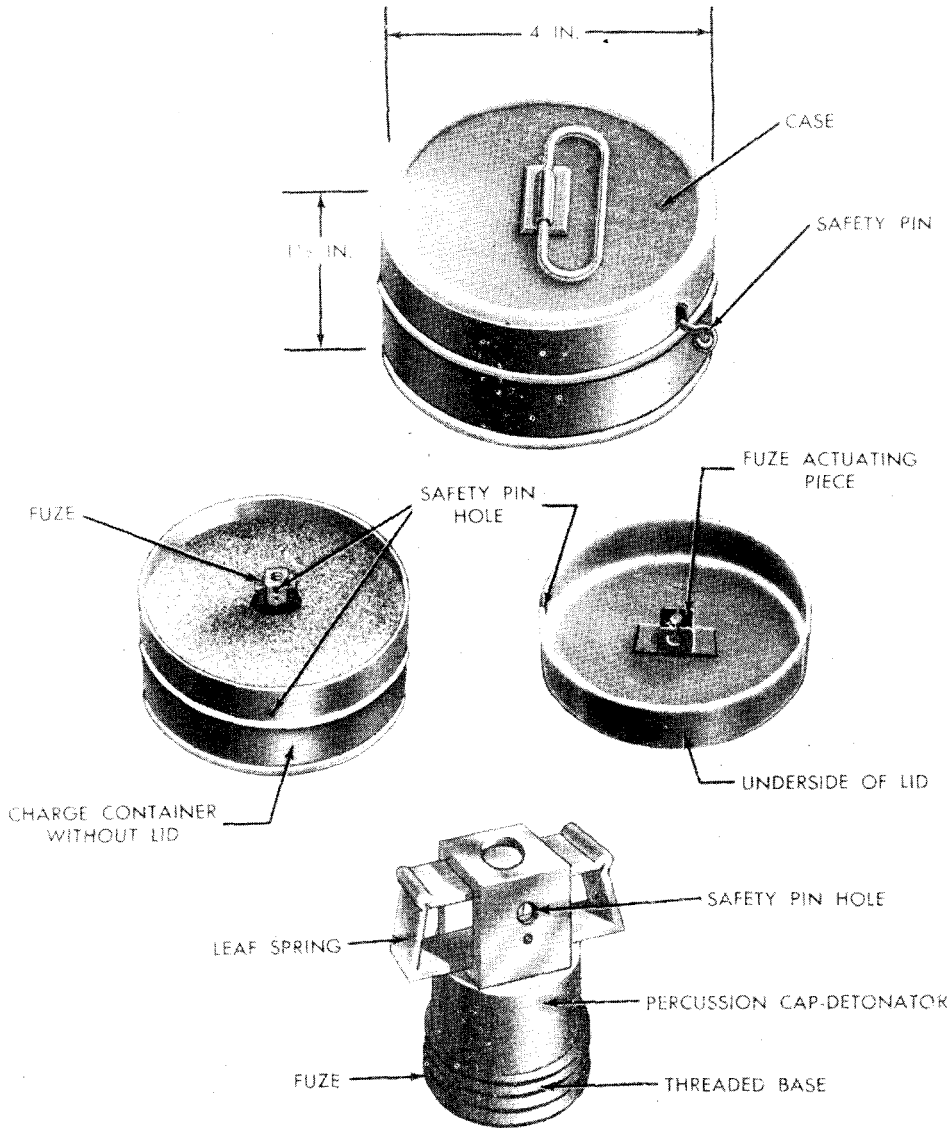


Figure 105. PMM 3 mine and fuze.

the bottom of the charge container. Attached to the under side of the lid is a pronged fuze-actuating piece which actuates the leaf spring of the percussion type fuze when under pressure. The fuze consists of an inverted U-shaped metal leaf spring, a striker, and a built-in percussion-cap detonator.

b. EMPLOYMENT. This mine is scattered in grassy areas or along trails and road shoulders to hinder foot troops.

c. FUNCTIONING. Pressure on the lid depresses the leaf spring until it snaps over forcing the striker against the percussion cap which fires the detonator and the main charge.

d. INSTALLING AND ARMING. Lay the mine and remove the safety pin.

e. NEUTRALIZING. Gently remove the lid and unscrew the fuze from the charge container.

101. PMM-5 Antiskier Mine

a. DESCRIPTION. This antipersonnel mine (fig. 106) consists of a rectangular metal box about 6 inches long, 2½ inches wide, and 2

inches high. It is divided into two compartments by a partition. One compartment contains a built-in spring-loaded striker, and the other compartment contains a 200-gram block charge. The charge is housed in a lidless metal box which slides out of the open end of the mine to allow the charge and the MD 2 detonator assembly to be inserted. A piece of angle iron is welded to the sliding charge container to provide support and a stable bearing surface when the mine is laid. A serrated fragmentation jacket surrounds the charge container. The spring-loaded striker is held back by a projection on a striker-release axle, the ends of which project through each side of the mine. A U-shaped metal actuating lever is firmly fixed to the ends of the axle and is prevented from moving by a safety bar which is inserted through holes in the legs of the lever and sides of the mine. The safety bar is held in place by a pin.

b. EMPLOYMENT. This mine is designed for use against ski troops. It is laid in ski trails and then covered with snow.

c. FUNCTIONING. Pressure on the actuating lever revolves the striker-release axle and moves the projection away from the spring-loaded striker, releasing it against the percussion cap.

d. INSTALLING AND ARMING.

(1) Slide out the charge container and place in it a 200-gram explosive block fitted with an MD 2 detonator assembly; slide the container back into the mine.

(2) Bury the mine.

(3) From a prone position or from defilade, pull out the safety bar, using a long cord or wire.

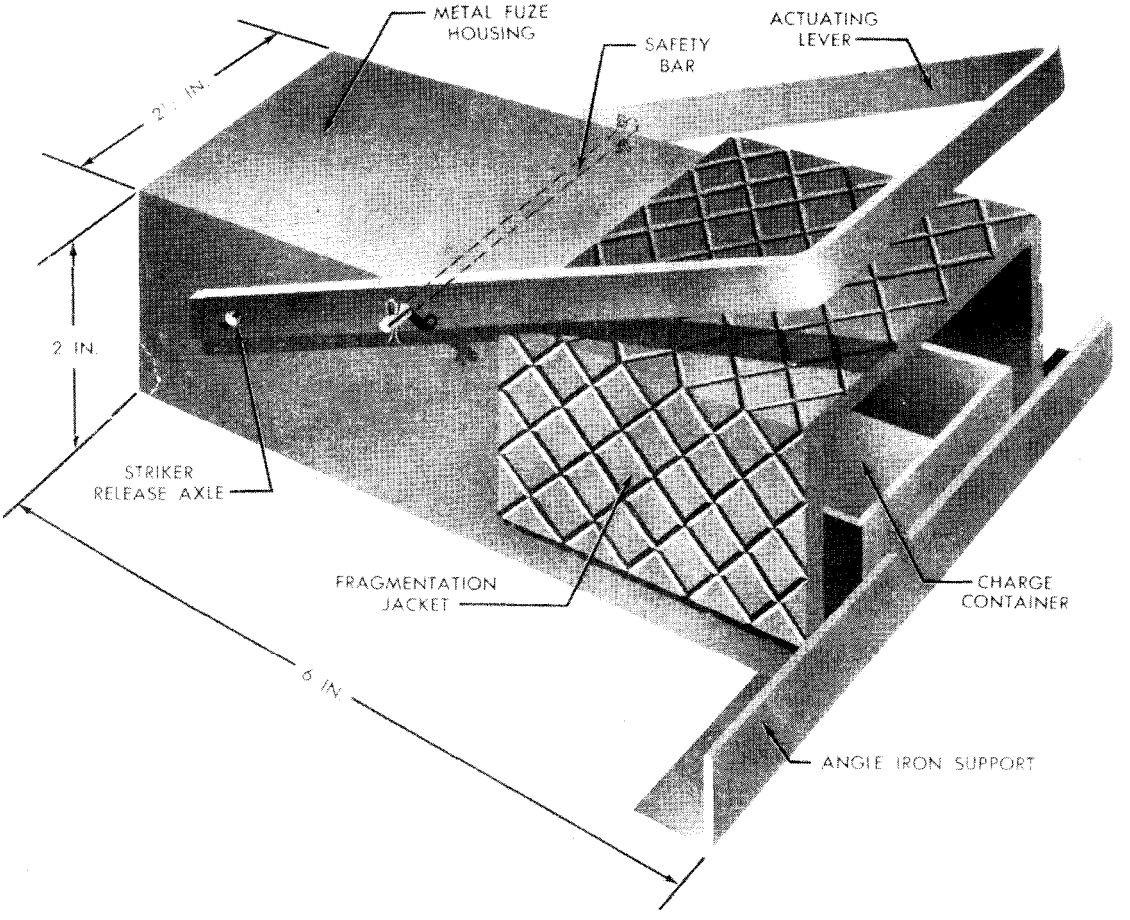


Figure 106. PMM–5 antiskier mine.

e. NEUTRALIZING.

(1) Carefully uncover the mine.

(2) Insert a nail or wire into the safety-bar hole.

(3) Gently lift the mine, slide the charge countainer out, remove the charge, and unscrew the MD 2 detonator assembly.

102. Vise Mine

a. DESCRIPTION. This antipersonnel mine (fig. 107) is an antipersonnel mine consisting of a flat, round sheet-metal case, about 12 inches in diameter and 2½ inches high, containing 2.5 pounds of explosive. The mine is held between the hinged legs (wooden bars) of a wooden vise. The top leg (the longer wooden bar) lies on a leaf spring fixed to the top of the mine. The MUV pull fuze (par. 22) is inserted through a slot in a metal slide on the side of the top half of the mine. The bottom of this slide is pointed and bent out and engages in the eye of the fuze striker-retaining pin.

b. EMPLOYMENT. The vise mine is employed as an antipersonnel mine.

c. FUNCTIONING. Pressure on the top leg of the vise depresses the leaf spring and the metal slide. This forces the striker-retaining pin out of the MUV pull fuze, and the mine explodes.

d. INSTALLING AND ARMING.

(1) Insert an MD 2 detonator assembly into an MUV pull fuze. Insert the fuze into the mine through the slot in the metal slide, so the end of the slide engages in the eye of the striker-retaining pin.

(2) Place the vise so that the longer wooden bar rests on the leaf spring on the top of the mine.

e. NEUTRALIZING. Uncover the mine and carefully pull out the fuze.

103. Fragmentation Tread Mine

a. DESCRIPTION. This antipersonnel mine (fig. 108) is a sheet-metal (sometimes wooden)

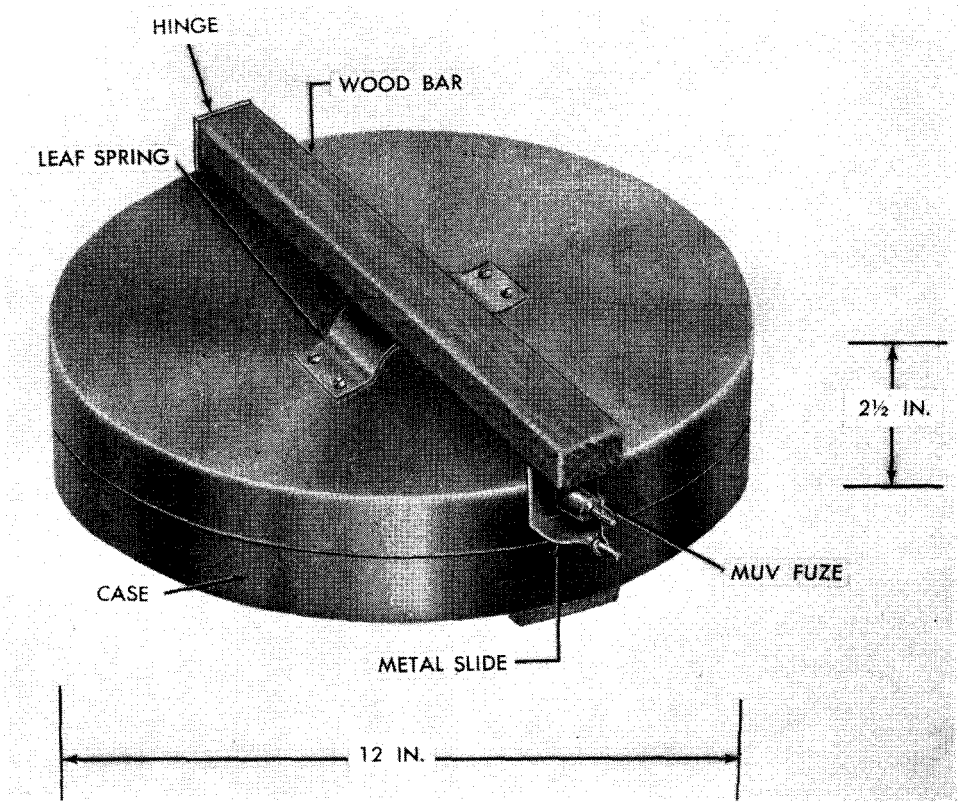


Figure 107. Vise mine.

box about 3¼ inches square and about 7¾ inches high. The mine is filled with explosive and steel fragments. On one side is a carrying handle, and in the top are two metal tubes projecting down into the explosive. One tube holds the MUV pull fuze (par. 22), the percussion cap, and the detonator; the other holds a wooden or metal pressure rod, grooved at the bottom. This rod acts as a pressure piece. A cord or wire is fastened to the eye in the striker-retaining pin of the fuze and is looped around the groove in the bottom of the rod.

b. EMPLOYMENT. This mine is used as an antipersonnel mine and is placed in the ground with only the pressure rod extending above the ground.

c. FUNCTIONING. Treading on the rod depresses it and causes the cord or wire to pull the pin out of the fuze, exploding the mine.

d. INSTALLING AND ARMING.

(1) Dig a hole deep enough for the mine.

(2) Loop a cord or wire in the groove at the base of the metal or wooden rod. Gently push the rod into the tube nearest the handle until the slack in the cord or wire is taken up.

(3) Screw a cap-and-detonator assembly into an MUV pull fuze and insert it in the other tube.

(4) Carefully tie the loose end of the cord or wire to the eye of the striker-retaining pin.

e. NEUTRALIZING.

(1) Uncover the mine.

(2) Cut the cord or wire connecting the rod and the fuze.

(3) Pull out the rod and the fuze.

104. Beer-Stein Mine

a. DESCRIPTION. This antipersonnel mine (fig. 109) has a cylindrical cast-iron case in

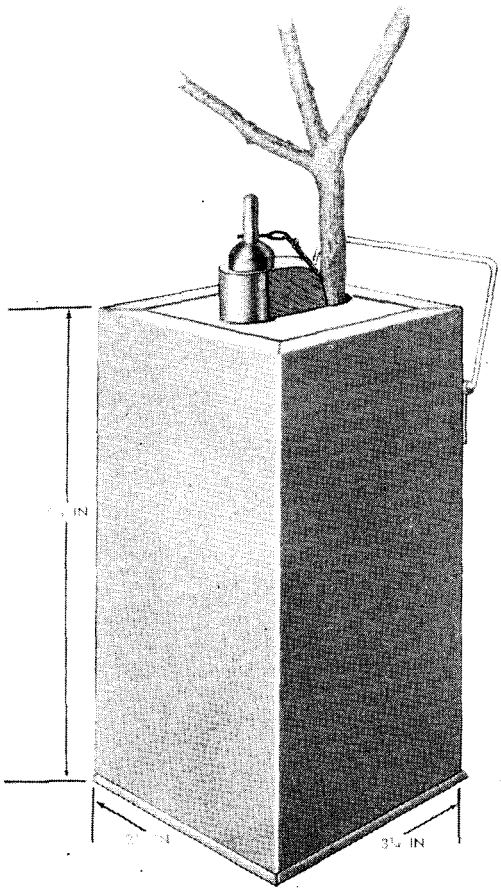


Figure 108. Fragmentation tread mine.

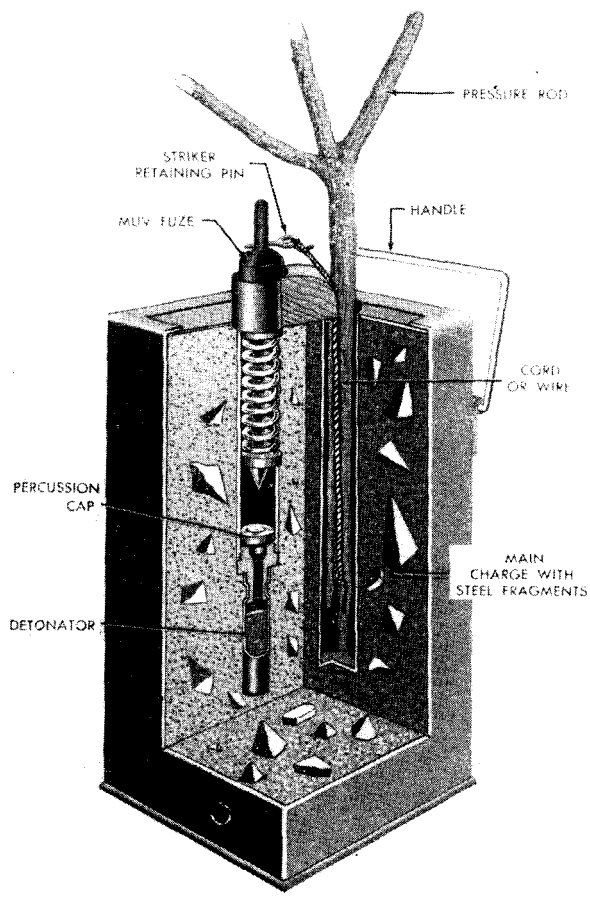


Figure 108.—Continued.

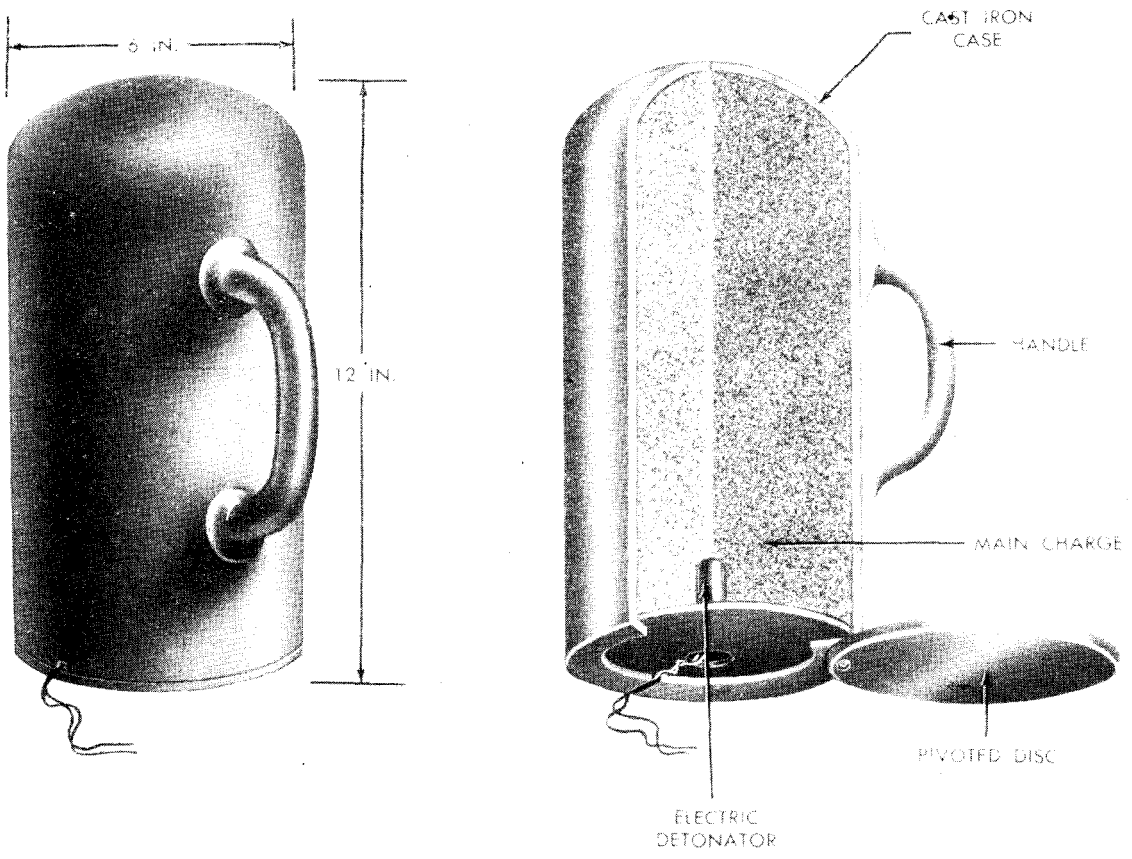


Figure 109. Beer-stein mine.

the shape of a beer stein with handle. It weighs 4.5 pounds and is 6 inches in diameter and 12 inches high. The open end of the mine is closed by a pivoted metal disk. This mine is fired either electrically or by pull or pressure.

b. EMPLOYMENT. The mine is normally laid as a controlled mine, detonated by a concealed observer. Usually two or more mines are connected with electrical wire and placed at 3-foot intervals. The mines are laid with the open end down and can be ignited simultaneously from one observation post. A current of 120 volts is required for detonation. If laid with a pull or pressure fuze, the mine is laid with the open end up.

c. FUNCTIONING. Ignition of the fuze explodes the detonator and the main charge, shattering the iron shell.

d. INSTALLING AND ARMING.

(1) Rotate the metal disk.

(2) Insert an electric detonator (or a pull or pressure fuze).

(3) Lay the mine.

e. NEUTRALIZING. Cut the wires attached to the mine. Remove the detonator (or the fuze).

105. Pot Mine

a. DESCRIPTION. This antipersonnel mine (fig. 110) is 6 inches in diameter and 7 inches high. It contains 0.5 pound of TNT explosive surrounded by shrapnel. The lid of the mine extends all the way to the base of the charge container. The top of the charge container is closed with a plywood disk. The disk has a hole in the center for insertion of a detenator into the main charge. An MUV pull fuze (par. 22) is inserted horizontally through a hole in the side of the lid. Its inserted detonator rests on a small sack of powdered explosive, which acts as a booster charge to ignite the second detonator and the main charge. (The fuze, the powder sack, and the detonator are

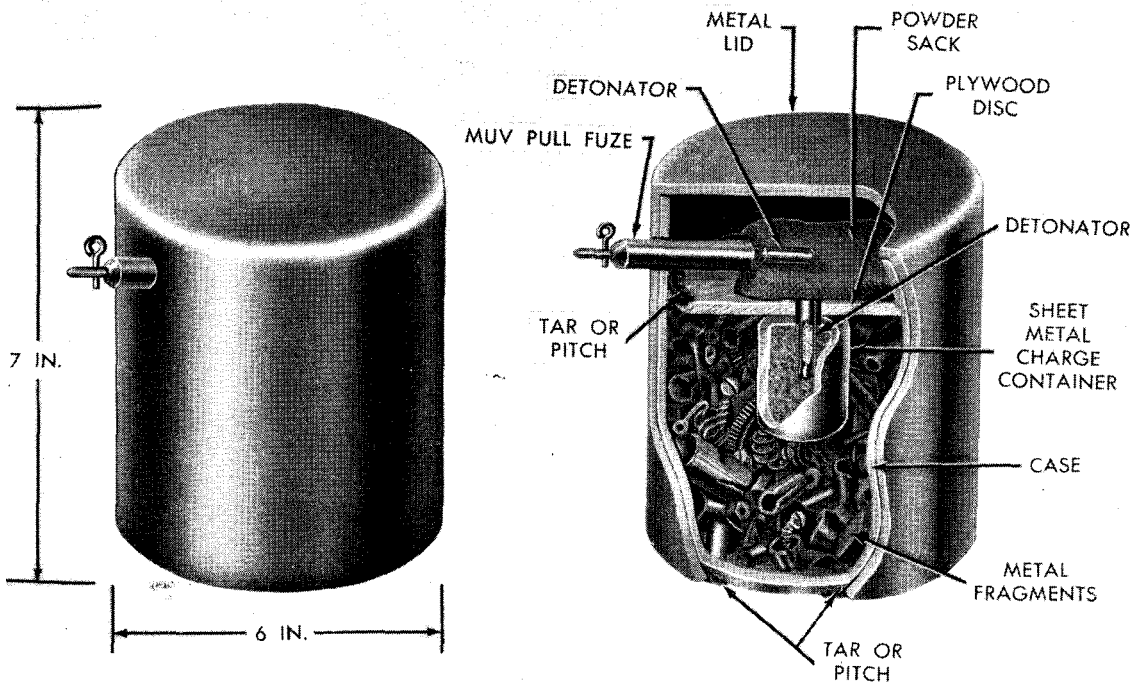


Figure 110. Pot mine.

inserted only when the mine is laid.) This mine is waterproofed with tar or pitch.

b. EMPLOYMENT. The Soviet pot mine is used as a controlled mine, detonated by a concealed observer, or as a trip-wire mine in mine fields.

c. FUNCTIONING. The mine functions either by a pull wire attached to the striker-retaining pin of the fuze or by electrical ignition, an electric detonator being used in place of the pull fuze. Ignition of the electric detonator (or of the fuze) sets off the powder sack, the second detonator, and the main charge, scattering the shrapnel and metal fragments.

Note. It is believed that this mine is of the bounding type and that the MUV fuze is used to set off the propellant powder in the sack. This intermediate explosion forces the mine into the air out of its outer case, where it explodes a few feet above the ground like the German S-mines 35 and 44.

d. INSTALLING AND ARMING.

(1) Remove the lid.

(2) Insert the detonator into the charge.

(3) Place the powder sack over the detonator hole in the plywood disk.

(4) Replace the lid.

(5) Screw a detonator assembly onto the base of an MUV pull fuze and insert it through the hole in the lid or insert an electric detonator through the hole.

e. NEUTRALIZING.

(1) If laid with a pull fuze, cut the wire attached to the fuze and carefully pull out the fuze. Remove the lid and the powder sack. Tip the mine so the second detonator slides out.

(2) If laid with an electric detonator, cut the lead wires *one at a time* and remove the detonator. Proceed as in (1) above.

106. Bounding Shrapnel Mine

a. DESCRIPTION. This antipersonnel mine (fig. 111) consists of a cylindrical metal container 5 inches in diameter and 11 inches high. It contains 2.5 pounds of explosive and 9 pounds of metal fragments or shrapnel. A propellant charge and an electrical detonating system is built into the base of the mine.

b. EMPLOYMENT. The mine is generally laid in groups of two or more and is connected electrically by wires to a central detonating

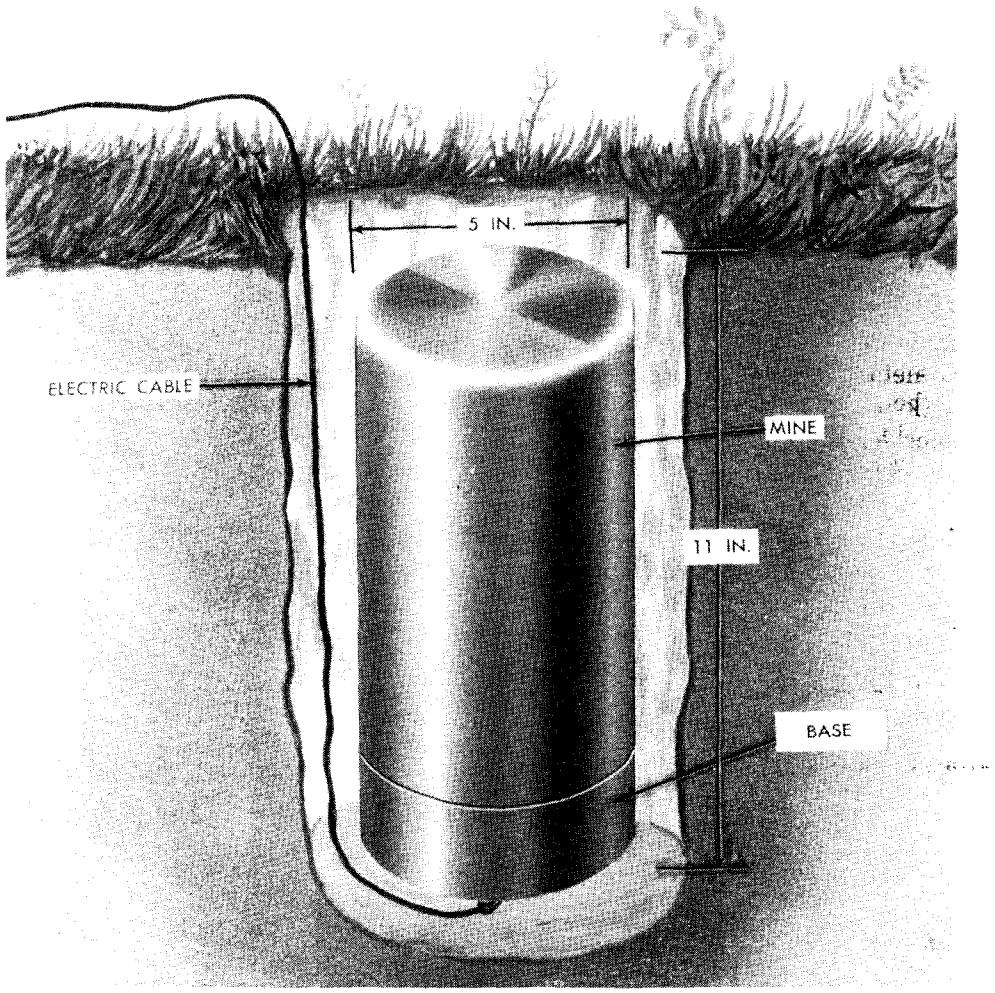


Figure 111. Bounding shrapnel mine.

point. It is employed in much the same way as the German S-mines 35 and 44. This Soviet mine may also be laid to fire by trip wire.

c. FUNCTIONING. Upon closing of the circuit, the propellant charge is detonated, forcing the mine into the air where it explodes about 3 feet above the ground and scatters shrapnel to a danger radius of about 60 yards.

d. INSTALLING AND ARMING.

(1) Prepare a hole in the ground for the mine.

(2) When connected electrically, insert the electric detonator and connect the wires to a remote detonating station.

(3) When using trip wire, insert an MUV pull fuze (par. 22) into the base of the mine and attach the trip wire to a stake above ground and to the fuze.

e. NEUTRALIZING. The Soviets do not recommend neutralizing this mine unless the remote detonating station is found and the electric leads disconnected. There is no safety device in the mine.

107. KhF Bounding Gas Mines

a. DESCRIPTION. The two types of this chemical antipersonnel mine differ only in dimensions. The KhF–1 mine (fig. 112) is 6 inches in diameter and about 14 inches high; the KhF–2 mine is 7½ inches in diameter and 11 inches high. Externally, the mine closely resembles the bounding shrapnel mine (par. 106). The KhF–1 bounding gas mine consists of a cylindrical sheet-steel container and a hollow, cylindrical sheet-metal mine unit which fits inside the container. The container is fitted

with a carrying handle in the top and a vertical groove inside to hold the detonating cable. The mine unit is filled with 1.2 gallons (4.5 liters) of liquid contaminant and has a central well containing 10 grams of TNT (toluol) or picric-acid (melinite) explosive. A threaded metal plug closes the contaminant filling hole on the top of the mine unit. A cork stopper with a ½-inch length of safety fuze is fitted into the well opening in the mine unit. The mine unit rests on two disks, one cardboard and the other metal. Both these disks rest on a 10-gram black powder propellant charge enclosed in a sheet-metal container. Each disk has a hole in the center through which the cork stopper projects so that one end of the safety fuse contacts the propellant charge. An electric detonator is inserted into the propellant charge and is attached to the electric detonating cable leading to a detonating station.

b. EMPLOYMENT. The KhF bounding gas mines are normally laid in groups of 10 to 12 mines, connected by electric cables to a detonating station at least 350 yards from the nearest mine. Individual mines are placed so that there is a minimum distance of about 18 yards between individual mines. Each mine is usually buried under 1 or 2 inches of dirt.

c. FUNCTIONING.

(1) Electrical ignition sets off the propellant, boosting the mine unit into the air.

(2) At the same time, the time fuse ignites and burns through and ignites the nonelectric detonator which deto-

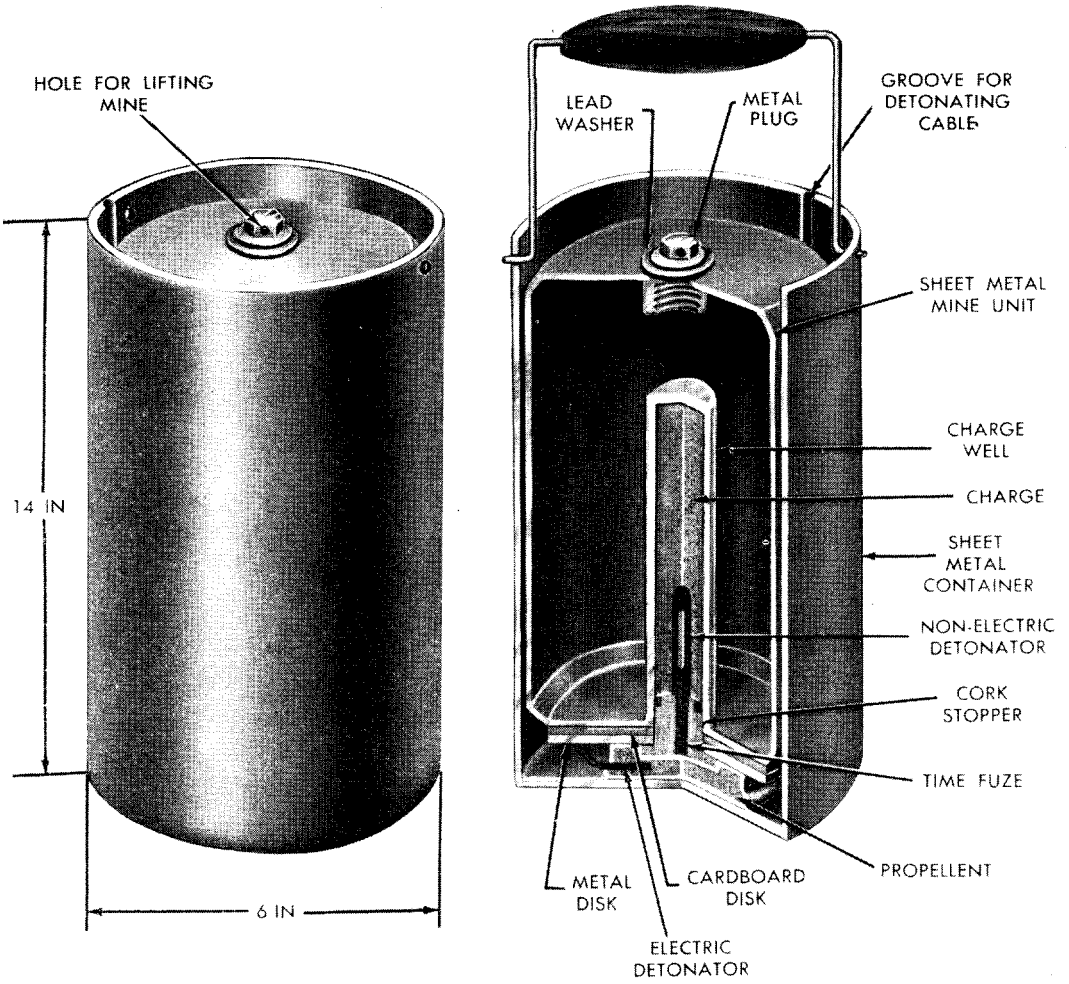


Figure 112. KhF 1 bounding gas mine.

nates the explosive and bursts the gas cylinder at a height of 13 to 25 feet above ground. The gas will contaminate an area of 300 to 350 square yards with an average concentration of 20 to 25 grams per square yard.

d. INSTALLING AND ARMING.

(1) Dig a hole for the container.

(2) Insert an electric detonator into the propellant charge and place on the bottom of the container.

(3) Insert a nonelectric detonator into the explosive charge in the mine unit and close the well with the cork stopper.

(4) Place the metal and cardboard disks on top of the propellant charge.

(5) Place the mine unit on top of the disks so that the cork stopper projects through the holes in the disks and contacts the propellant charge.

(6) Connect the wire leads to a detonating cable.

e. NEUTRALIZING. Neutralize this mine only while wearing a gas mask and gas-protective clothing. On individual mines work from the windward side.

(1) Remove the electric detonating cable.

(2) Lift the mine unit out of the container by inserting a wire (or one leg of the handle) through the hole in the metal plug on top of the mine unit.

(3) Remove the electric detonator and propellant charge.

(4) Remove the cork stopper, nonelectric detonator, and explosive charge.

g. VARIATION OF THE KhF MINE. A variation of the KhF bounding mine is shown in cross section in figure 113. This mine consists of a metal mine unit containing the chemical charge in the upper compartments and an explosive charge in the lower portion of the unit, and has a central spring-loaded striker bolt built into the mine. The end of the striker bolt is connected to a metal pressure plate. The bottom of the fuze well is open to receive the percussion cap and the detonator. This unit fits into a metal container. The mine is buried in the ground with the pressure plate flush with the ground. It functions by being stepped on.

108. PMD Wooden Box Mine

a. DESCRIPTION. The PMD wooden mines (figs. 114 to 118) are almost identical to the well-known German Schü-mines of World War II. The several types of PMD mines are described in (1) through (5) below. The PMD 6, PMD 7, and PMD–7ts mines were used against the Germans in World War II and were field-improvised as well as factory-made.

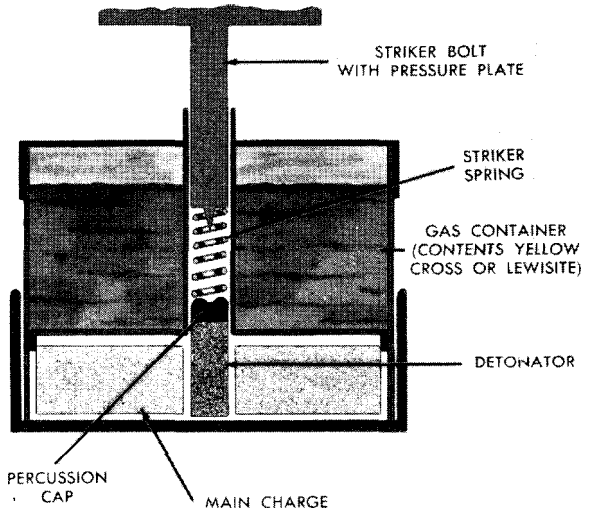


Figure 113. Variation of the KhF bounding gas mine.

(1) *PMD 6 mine.* This antipersonnel mine is a wooden box with a lid hinged at end (fig. 114). The lid fits part way down over the charge container. Overall, the mine is 7½ inches long, 3½ inches wide, and 2½ inches high. It weighs about 1.5 pounds. The mine is divided into two compartments by a wooden partition. The compartment nearest the hinge of the lid contains a 400-gram block charge; the other compartment contains the MUV pull fuze (par. 22) with a loop and wing type striker-retaining pin. The fuze is inserted into the charge through a hole in the end of the mine and the partition, detonator end first. The top of the fuze and the striker-retaining pin remain outside the end of the mine. A groove in the lid rests on the striker-retaining pin of the fuze. Some mines are provided with a thin metal rod

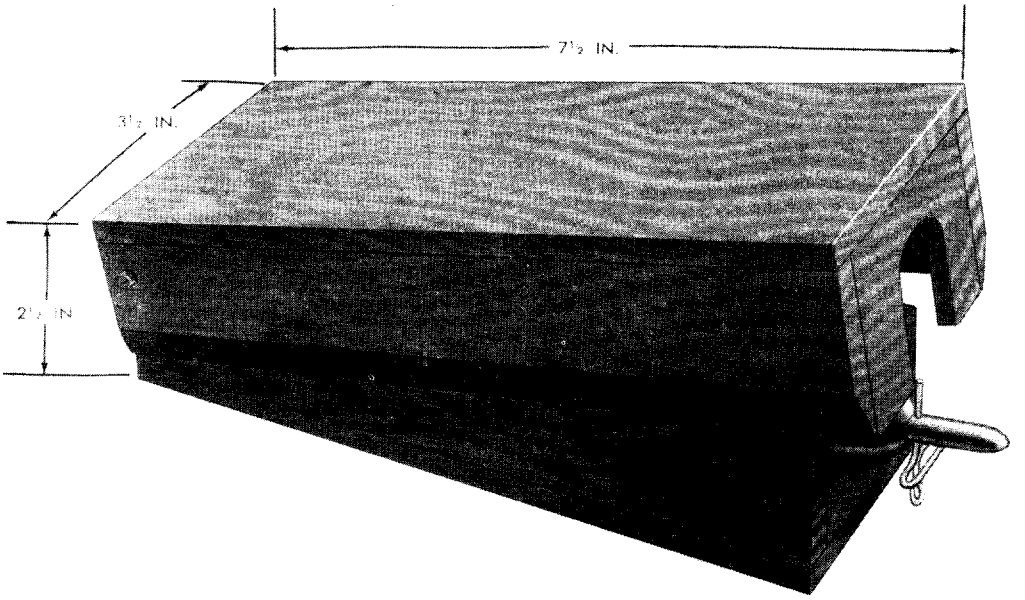


Figure 114. PMD–6 mine.

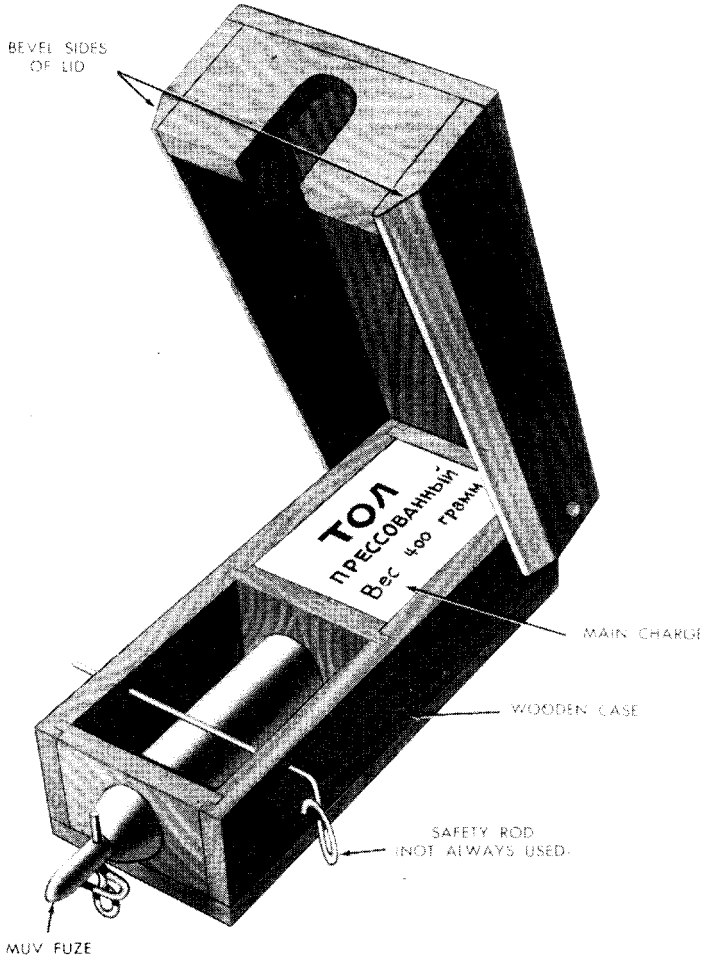


Figure 114.—Continued.

which is passed through holes in the sides of the mine near the front. This rod acts as a safety bar and prevents the lid from actuating the fuze prematurely.

(2) *PMD-7 mine.* This antipersonnel mine (fig. 115) is a later version of the PMD-6 wooden antipersonnel mine and differs from it by being slightly smaller and containing a 200-gram rather than a 400-gram charge. Like the PMD-6, the PMD-7 is an open box with a hinged lid and employs an MUV pull fuze.

(3) *PMD-7ts mine.* This is a more simple version of the PMD-7, in that the body of the mine (fig. 116) is merely a boredout block of wood. The "ts" after the 7 stands for *solid block*. The mine uses a 50- or 75-gram cy-

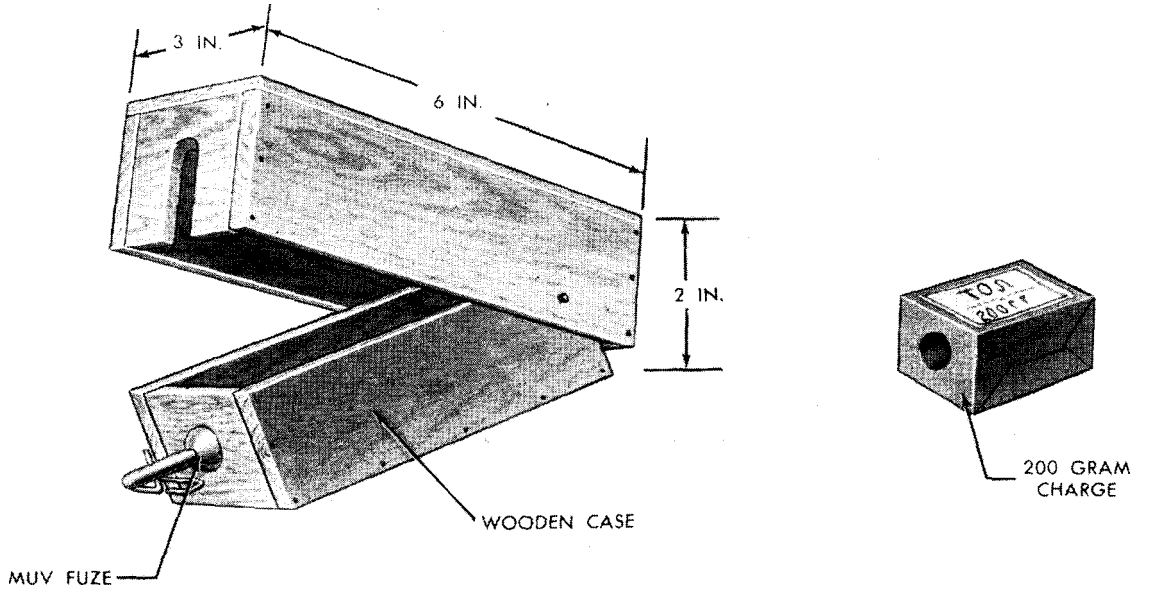


Figure 115. PMD-7 mine.

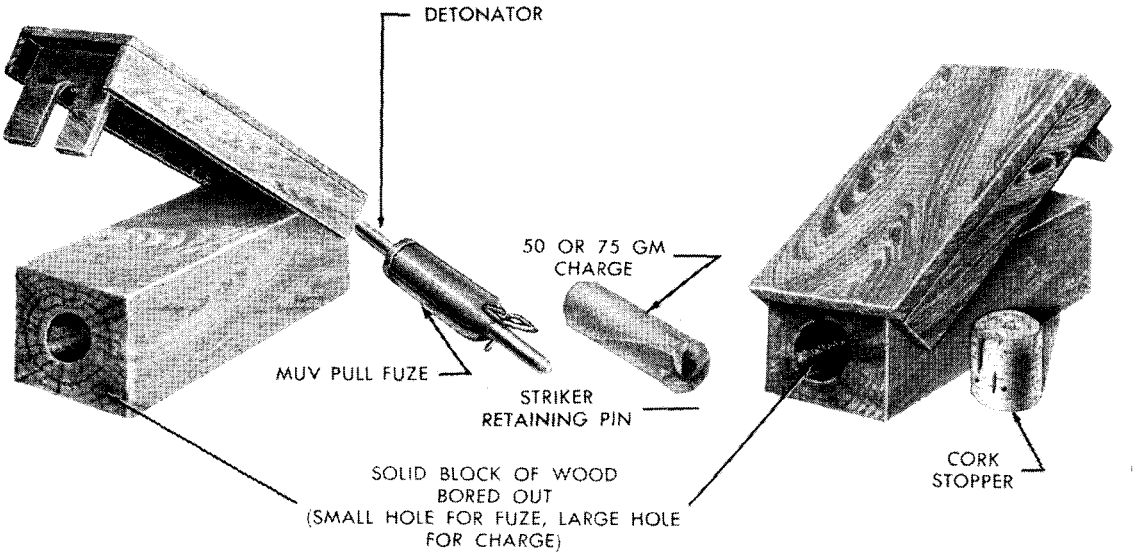


Figure 116. PMD-7ts mine.

lindrical charge instead of a heavier block charge.

(4) *PMD bottle mine.* This antipersonnel mine (fig. 117) consists of a glass bottle filled with powdered explosive placed in the body of a PMD 6 or PMD 7 mine. It is otherwise identical to the PMD 6 or PMD 7 and is also fitted with an MUV pull fuze.

(5) *PMD mortar mine.* This antipersonnel mine (fig. 118) is made from a Soviet mortar shell with the mortar fuze removed. The shell is placed in the body of a PMD 6 or PMD 7 mine and is fitted with an MUV pull fuze, as are the other PMD mines.

b. EMPLOYMENT. PMD mines are normally laid as security against opposing foot troops in mine fields, paths and trails, road shoulders, and grassy areas.

c. FUNCTIONING. All these PMD mines function in the same manner. Pressure on the lid forces the pin out of the MUV pull fuze, releasing the spring-loaded striker and firing the mine. These mines may be activated by connecting the eye of the striker-retaining pin with wire or cord to a stake driven into the ground under the projecting fuze.

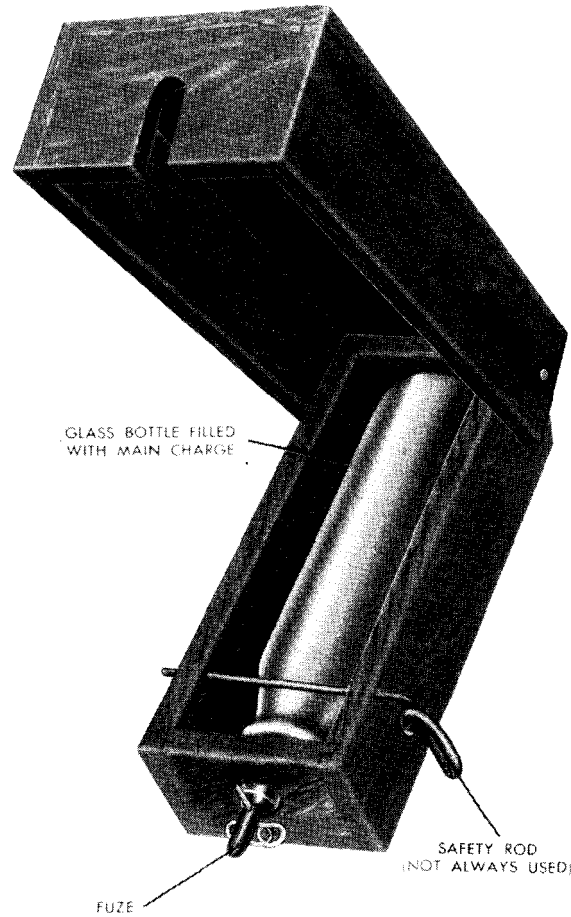


Figure 117. PMD bottle mine.

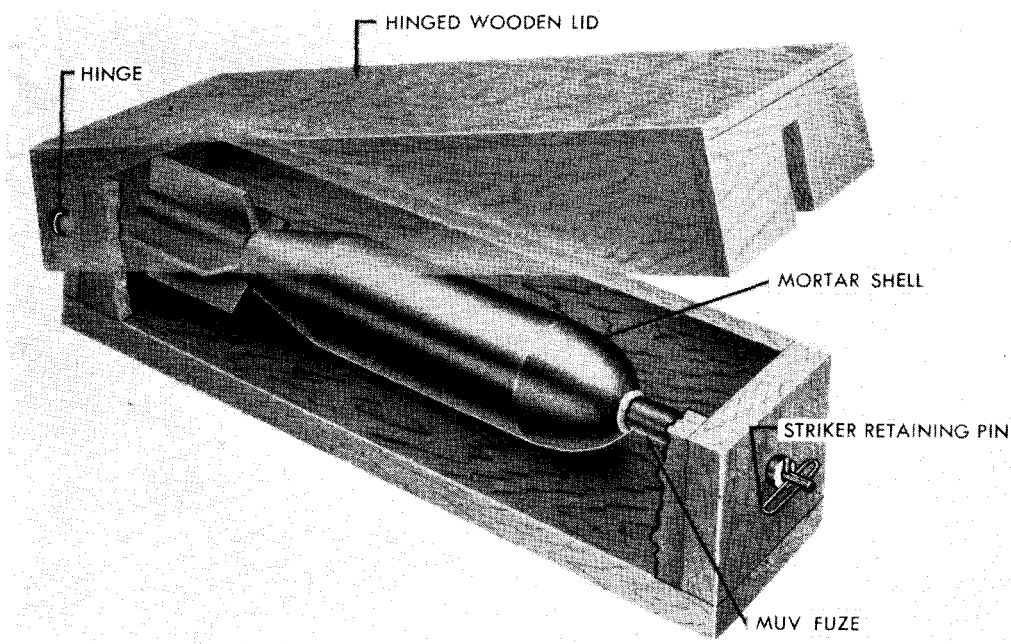


Figure 118. PMD mortar mine.

d. INSTALLING AND ARMING.

(1) Lay the mine.

(2) Lift the lid and insert the explosive charge.

(3) Insert a detonator assembly into an MUV pull fuze and insert the fuze into the charge, with the loop of the striker-retaining pin *down*.

(4) Close the lid and pull the safety bar, if present, from the mine with a cord or wire.

e. NEUTRALIZING.

(1) Search for and cut all wires connected to the fuze.

(2) Lift the lid carefully and slide the fuze out.

(3) Detach the detonator from the fuze.

109. PMK-40 Cardboard Mine

a. DESCRIPTION. The PMK 40 cardboard mine (figs. 119 and 120) is an antipersonnel mine resembling a shoe-polish can. It is about 2¾ inches in diameter and 1½ inches high. It weighs about 3.2 ounces. It contains 1.7 ounces of chipped TNT and a built-in spring-loaded striker. The spring-loaded striker is held in the cocked position by the hinged pressure pedal. The body and pressure lid of this mine are constructed of cardboard and are fastened together with glue and waterproofed with wax. A wood, cork, or rubber stopper closes the hole giving access to the detonator tube. A metal-bodied version of this mine was also produced.

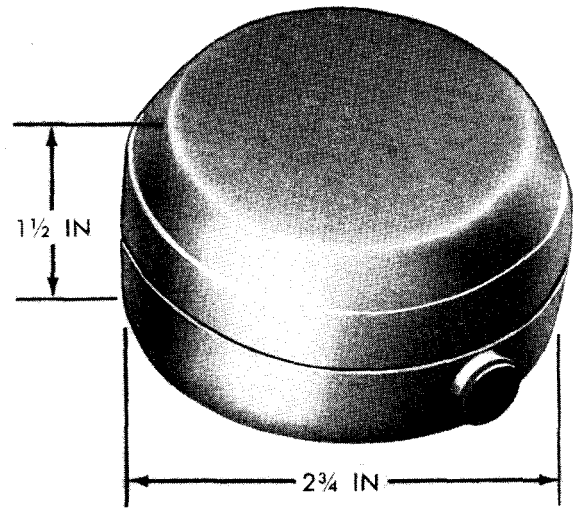


Figure 119. PMK-40 cardboard mine.

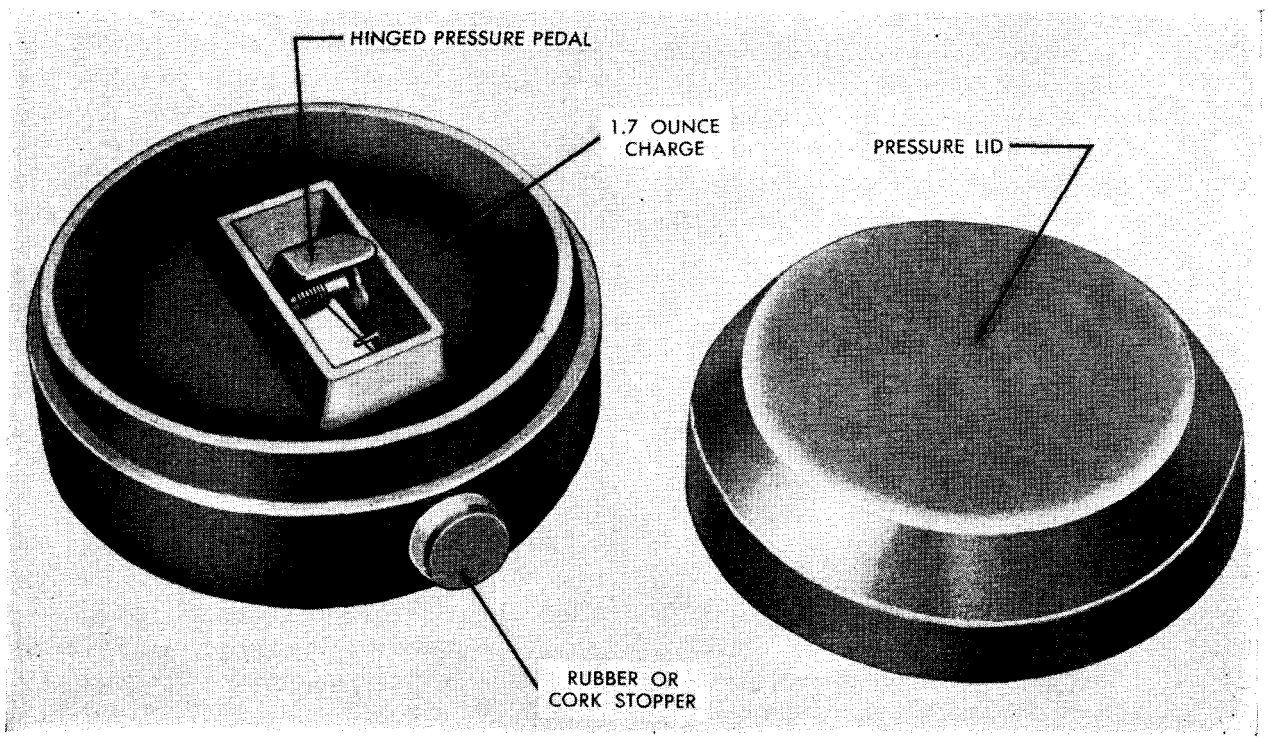


Figure 119.—Continued.

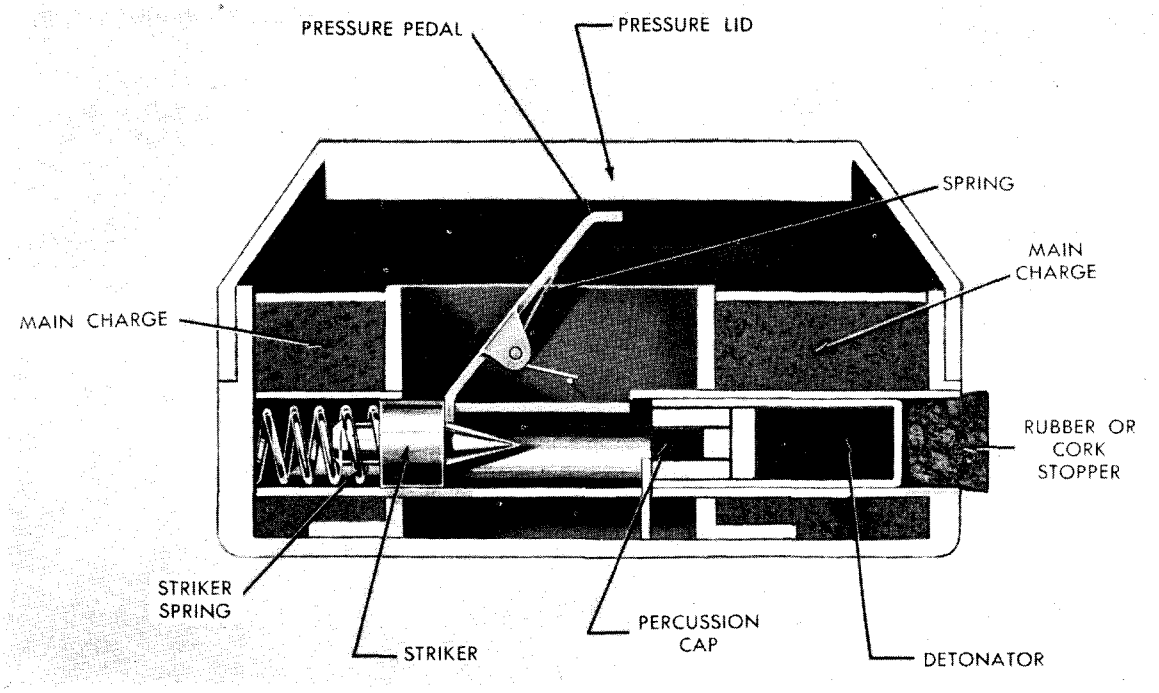


Figure 120. Interior of PMK-40 cardboard mine.

b. EMPLOYMENT. This mine is used to secure unit positions against infantry attacks. It is also employed in antitank mine fields and along ditches and trails.

c. FUNCTIONING.

(1) Pressure of 20 to 40 pounds on the pressure lid depresses the hinged pressure pedal which releases the spring-loaded striker. The metal-bodied model reportedly requires a pressure of only about 3 pounds to function.

(2) The striker fires the percussion cap.

d. INSTALLING AND ARMING.

(1) Remove the rubber or cork stopper.

(2) Insert the percussion cap and detonator assembly.

(3) Replace the stopper.

e. NEUTRALIZING.

(1) There is no safety device on this mine.

(2) Withdraw the stopper and carefully remove the percussion cap and the detonator.

110. Wooden Box Mine

a. DESCRIPTION. The wooden box antipersonnel mine (fig. 121) consists of a plywood box with a removable front. It is 6 11/16 inches long, 4½ inches wide, and 2½ inches high. These dimensions will vary with the wood used. The mine contains three 200-gram blocks of explosive at one end and an MUV pull fuze (par. 22) held to a wooden block in the middle of the mine by tape. A metal actuating lever is pivoted in a hole in a wooden support block which is nailed under the lid. One end of the lever is inserted through the lower end of a wooden pressure piece projecting through the center of the lid, and the other end of the lever engages in the eye of the striker-retaining pin of the fuze.

b. EMPLOYMENT. These mines are employed to secure unit positions against infantry attacks. They are also used in pairs with a supplementary charge for antivehicular use and were used as initiating mines in the improvised incendiary mines (par. 97).

c. FUNCTIONING. Pressure on the pressure piece pushes the lever down, withdrawing the striker-retaining pin from the fuze and firing the mine.

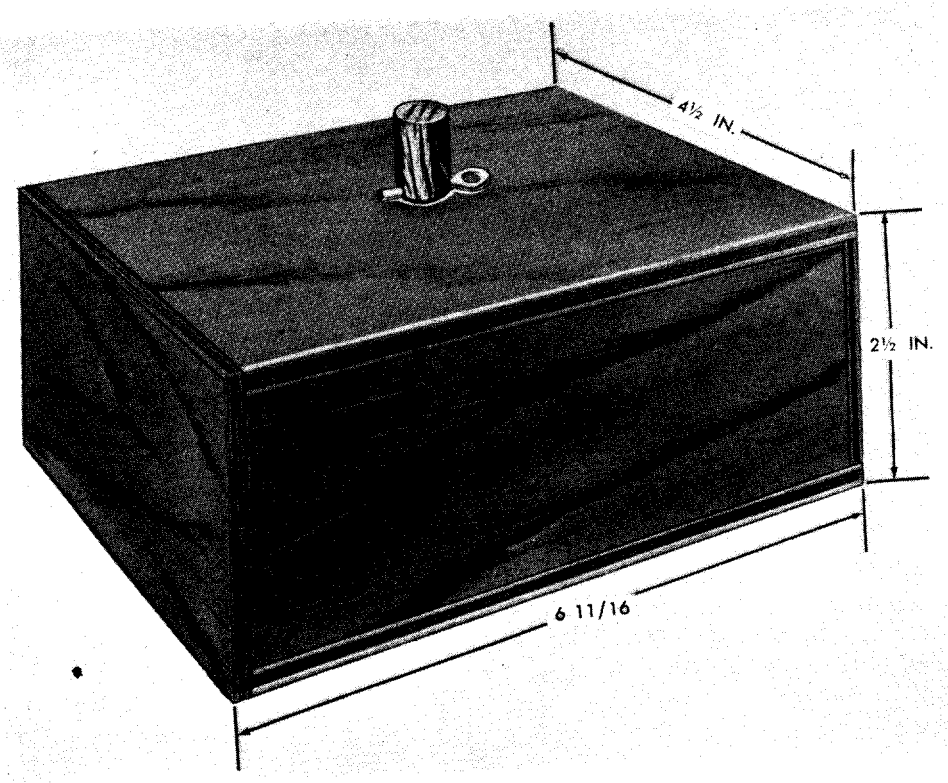


Figure 121. Wooden box mine.

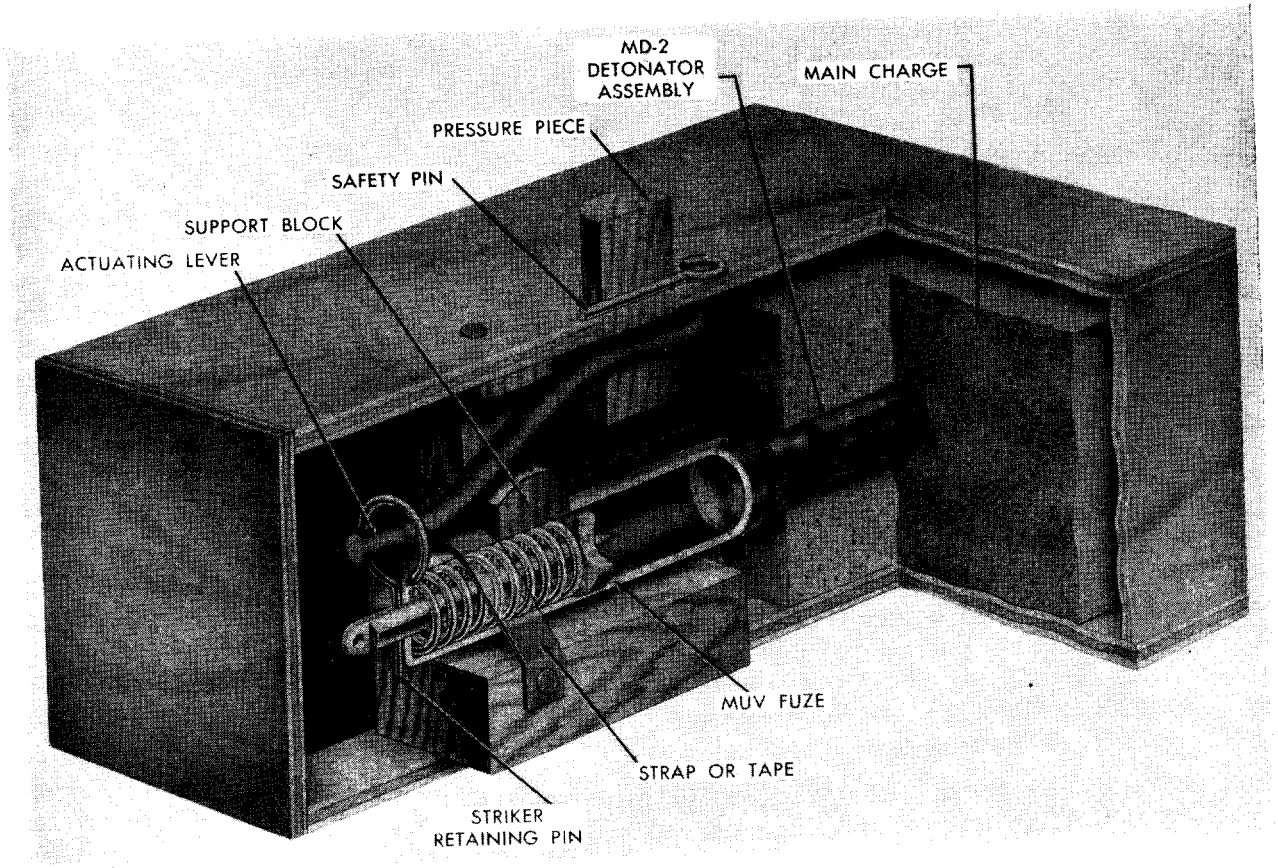


Figure 121.—Continued.

d. INSTALLING AND ARMING.

(1) Open the front side of the box and insert the fuze and the detonator.

(2) Tape the fuze to the wooden support block.

(3) Insert the end of the actuating lever through the eye of the striker-retaining pin.

(4) Close the front cover and bury the mine.

(5) Pull the safety pin from the pressure block.

e. NEUTRALIZING.

(1) Insert a pin or wire through the exposed hole in the pressure block.

(2) Open the front side of the box.

(3) Slide out the fuze and the detonator.

Section VIII. IMPROVISED ANTIPERSONNEL MINES

111. General

There were so many ways in which antipersonnel mines were improvised by the Soviets that only a few of the more commonly encountered improvisations are described in this section. Most improvised mines consist of an explosive charge fitted with a push fuze and a pressure board, or with a pull fuze and trip wires, or with an electrical detonator and a simple contact circuit. The charge may or may not be enclosed in a wooden or waterproofed container. A few examples of the more simple types of improvised mines which were laid by the Soviets in World War II are shown in figure 122.

112. Tread Mines

a. GENERAL Of the many varieties of Soviet improvised wooden tread mines the four examples given in *b* through *e* below were the ones most frequently encountered in World War II. All of them use the MUV pull fuze (par. 22) and function on the principle of pressure on a pressure board pulling the striker-retaining pin out of the fuze by a pull wire.

b. SEESAW TREAD MINE. This mine (fig. 123) consists of a baseboard to which is fastened a block of TNT, two wooden axle posts, two fuze-holder blocks of wood, and a tilt board nailed to the axle posts. A wire is attached to each striker-retaining pin in the pull fuzes and to the tilt board. Pressure on one end of the board rotates the board and pulls the pin out of the far fuze, firing the mine.

c. LEVER TREAD MINE. This tread mine (fig. 124) is a long, shallow wooden box filled with explosive. A tilt lid is nailed to a fulcrum located less than halfway from one end of the mine. The short arm of the lid is tilted down and lightly nailed to the end of the mine. An MUV pull fuze (par. 22) is inserted into the charge through a hole in this end of the mine. A pull wire is connected to the striker-retaining pin and to the end of the tilt lid. Pressure on the longer, upraised part of the lid rotates the lid and pulls the pin out of the fuze, firing the mine.

d. SHEAR TREAD MINE. This mine (fig. 125) is a Y-shaped wooden box with a lid which is cut in half at the center. The two halves of the lid are held together by two wooden shear pegs, each inserted through metal staples in both halves of the lid. An MUV pull fuze (par. 22) is attached to the under side of one half of the lid, and a pull wire tied to the striker-retaining pin is fastened to a nail under the opposite half of the lid. The fuze is connected with detonating cord to the explosive charge in the bottom of the mine. Pressure on the lid shears the wooden pegs and separates the halves of the lid, at the same time forcing the pull wire to pull the pin out of the fuze. This explodes the detonating cord and the mine.

e. ROLLER TREAD MINE. This improvised antipersonnel mine is shown in figure 126 lying on its side. It is a rectangular wooden box with a wooden roller attached near the top at each end of the mine. A wooden block in the bottom of the mine holds the MUV pull fuze (par. 22). A wire runs over the rollers and down to the striker-retaining pin of the fuze. A removable wooden lid rests at each end on two nails driven halfway into each roller. Pressure on the lid causes at least one roller to rotate, dropping the lid onto the pull wire and forcing it to pull

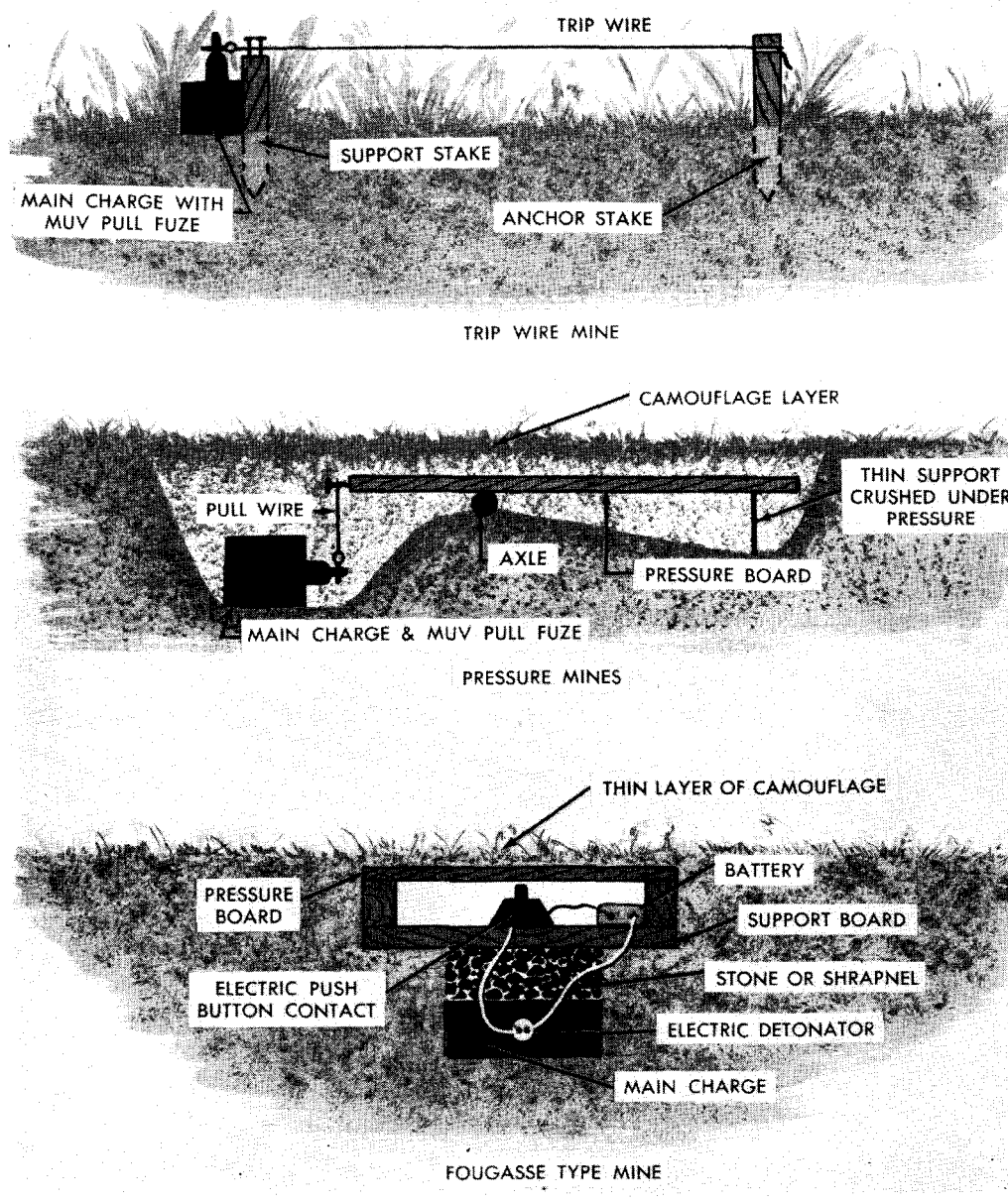


Figure 122. Examples of Soviet improvised antipersonnel mines.

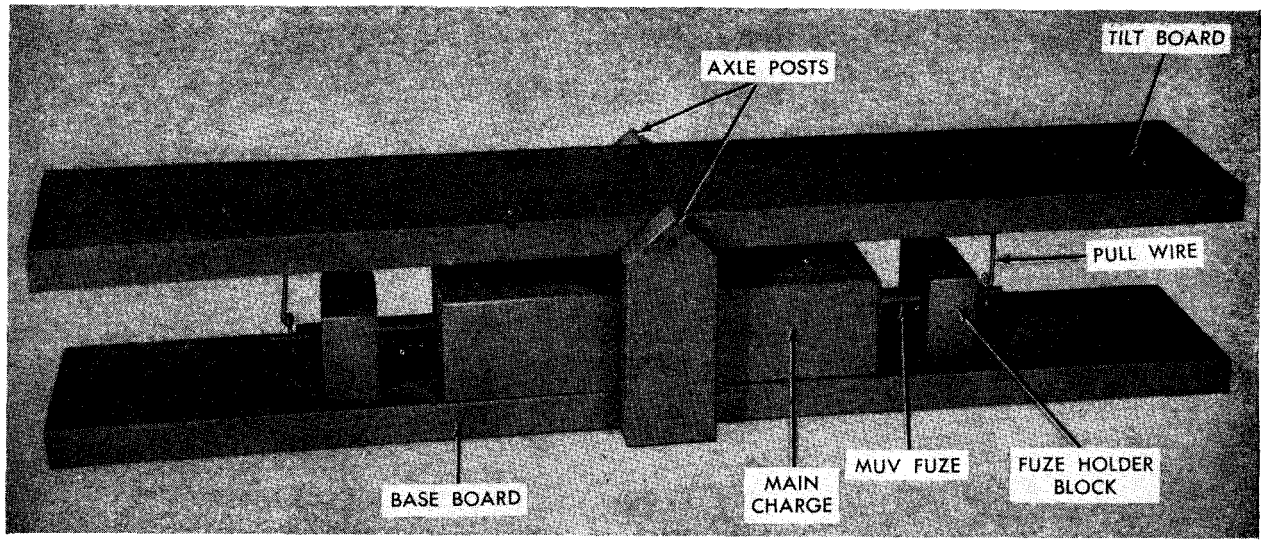


Figure 123. Seesaw tread mine.

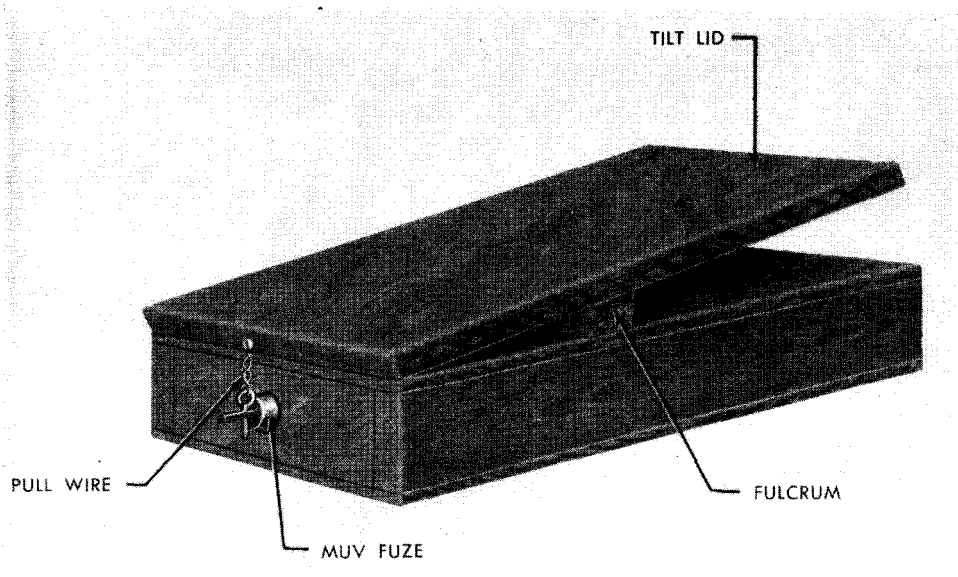


Figure 124. Lever tread mine.

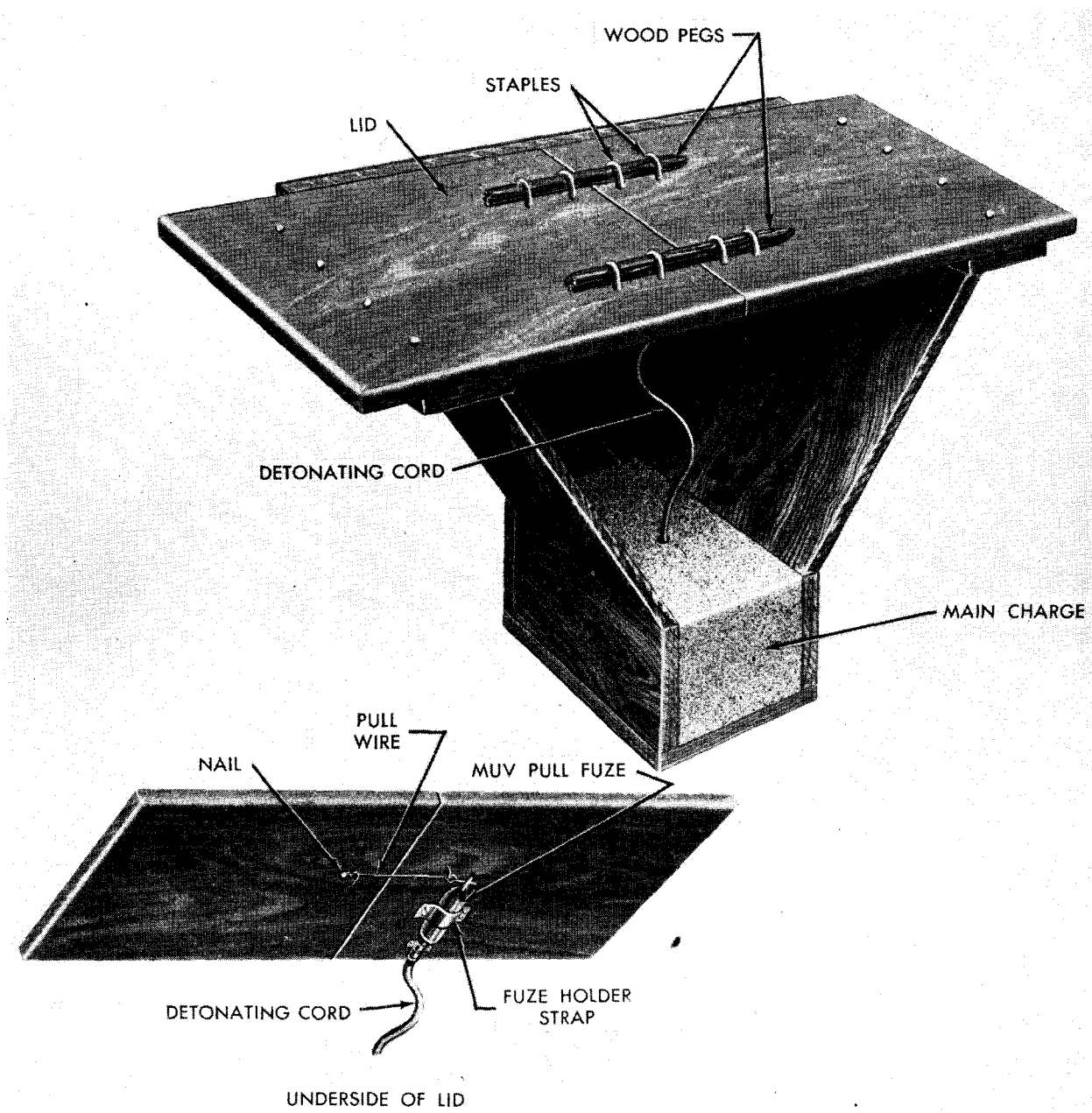


Figure 125. Shear tread mine.

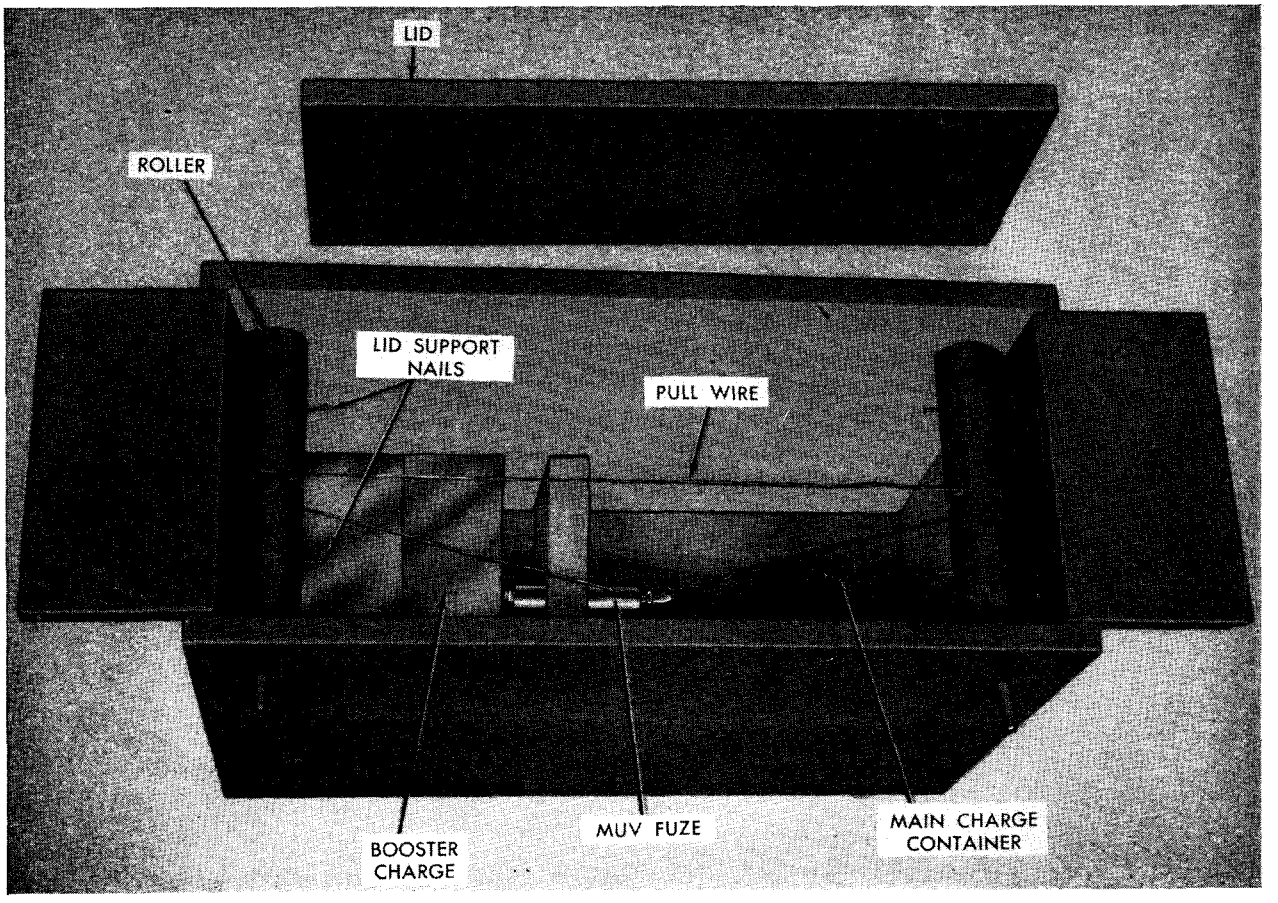


Figure 126. Roller tread mine.

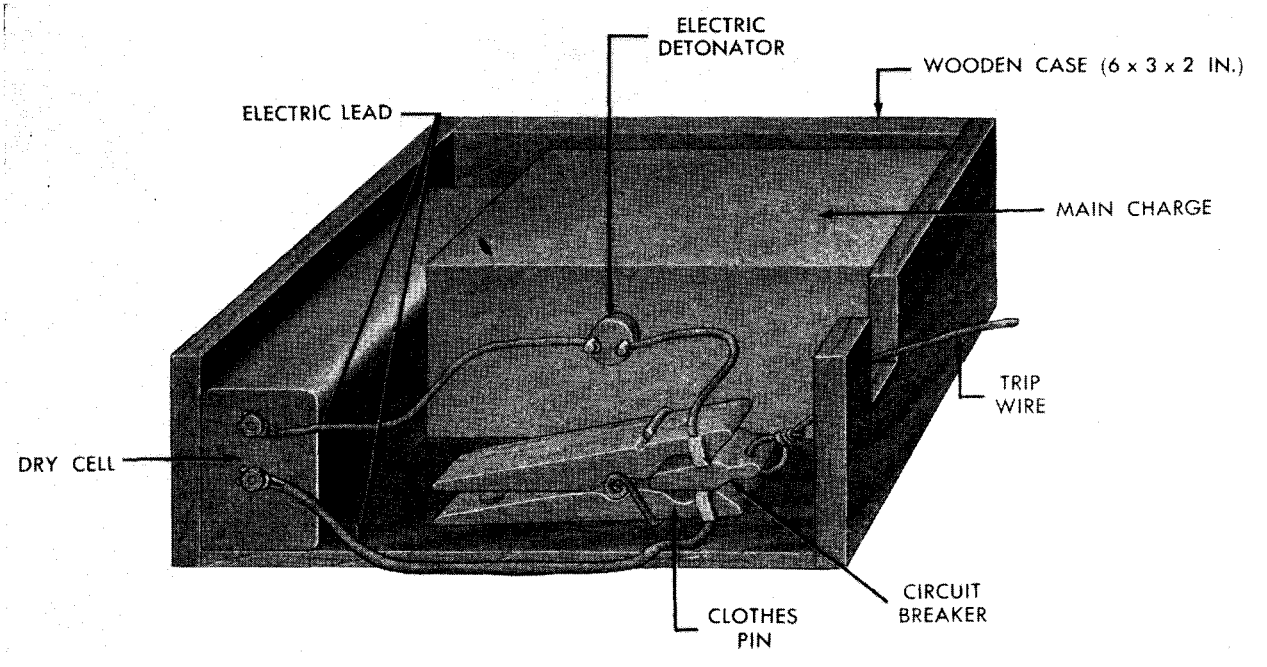


Figure 127. Clothespin electric mine (lid and side removed).

the pin out of the fuze. This fires the detonator and explodes the mine.

113. Clothespin Electric Mine

a. DESCRIPTION. This improvised antipersonnel mine (fig. 127) consists of a wooden box about 6 inches long, 3 inches wide, and 2 inches high. It contains about 0.5 pound of explosive, a small dry-cell battery connected by electrical leads to contacts on both jaws of a clothespin, and an electric detonator inserted into the charge. The clothespin is kept open by a small wooden wedge tied to a trip wire which runs through a hole in the end of the mine and is tied to an anchor stake about 3 feet from the mine.

b. EMPLOYMENT. The clothespin electric mine may be employed as either an antipersonnel mine or a booby trap.

c. FUNCTIONING. A pull on the trip wire pulls the wooden wedge from the jaws of the clothespin. The clothespin snaps shut, thus completing the circuit to the detonator. This explodes the charge.

d. INSTALLING AND ARMING.

(1) Place the charge and battery in the wooden box.

(2) Wire the clothespin to the posts of the battery and electric detonator making sure the clothespin is kept open by a small wooden wedge with a trip wire tied thereto.

(3) Tie the trip wire to an anchor stake about 3 feet from the mine.

e. NEUTRALIZING.

(1) Cut the trip wire attached to the wooden wedge and the wires connecting the battery with the electric detonator and the clothespin contact.

(2) Remove the detonator.

114. Grenade Mines

The Soviet Army teaches the employment of standard hand grenades as improvised antipersonnel mines or booby traps. Such improvised mines consist of a pull fuze and a grenade tied to a stake driven into the ground, to a tree, or to other support above ground. A trip wire is attached to the pull pin of the grenade or pull fuze and is anchored at the other end. This type of mine is employed and functions in the same manner as described for the POMZ 2 shrapnel mine (par. 99).

115. Fougasses

Small fougasses, previously described in detail in paragraph 94, were often used by the Soviets in World War II to impede the advance of opposing foot troops. Fougasses for antipersonnel use normally contained an explosive charge of about 20 pounds.

Section IX. BOOBY TRAPS

116. General

Soviet Army techniques in the employment of booby traps are similar to those of other armies. Booby traps are designed to harass and confuse opposing troops entering areas abandoned to them. In World War II, both the Soviets and the Germans employed booby traps to a much greater extent than did other armies. Therefore, the booby-trap doctrine of other armies is based to a great extent on Soviet and German practices during World War II.

117. Typical Soviet Booby Traps

German experiences with Soviet booby-trapping techniques showed that the Soviets are extremely ingenious in devising and placing booby traps. This paragraph covers some typical Soviet booby traps.

a. MINE BOOBY TRAPS. One of the most frequently employed methods of booby trapping is the rigging of individual mines so that they cannot be removed without detonating. This is usually done in one of the following ways:

(1) Placing the mine on a pressure-release type of antilifting device (par. 118).

(2) Tying a wire to the striker-retaining pin of the mine fuze and to a stake in the ground so that lifting the mine pulls out the pin.

(3) Inserting a pull type fuze in a supplementary fuze well (if any) in the mine and wiring it as explained in (2) above.

Note. The Germans devised a fuze for their Tellermines which, once armed in the mine, caused detonation of the mine when any attempt was made to deactivate the fuze. It is safe to assume that any Soviet pressure type mine in which the fuze is covered or concealed may be fitted with a similar type of antiremoval fuze.

b. RAIL-SPIKE BOOBY TRAP. This booby trap (fig. 128) is laid under a railroad tie to harass crews repairing railroad tracks or altering their gage. The trap consists of a very long spike driven through the tie and replacing one of the shorter normal spikes holding down the flange of the rail. The bottom of the long spike has a hole through it in which one end of a pull wire is attached. The charge is buried in the railroad bed and is fitted with an MUV pull type fuze (par. 22). The other end of the pull wire is attached to the eye of the striker-retaining pin. A wooden support block under the tie is employed as the fuze support. The Soviets normally indicated the presence of this booby trap by driving a spike into the outside end of the railroad tie. A groove cut into the long spike was also used to indicate the particular spike to which the pull wire was attached. To neutralize this device, check the ends of railroad ties for the presence of the indicator spike. Carefully uncover the roadbed around the charge until the fuze and pull wire are exposed. Cut the pull wire and pull out the fuze and attached detonator.

c. BOOK BOOBY TRAP. This device (fig. 129) consists of a hollow book containing two explosive charges (one 3.5 ounces and the other 1.8 ounces), a flashlight battery, a detonator, a wire-loop contact, and connecting wires. When the book is opened, the wire loops of the contact touch, closing the circuit and firing the charge. If a booby trap of this type is encountered, neutralization should not be attempted. The

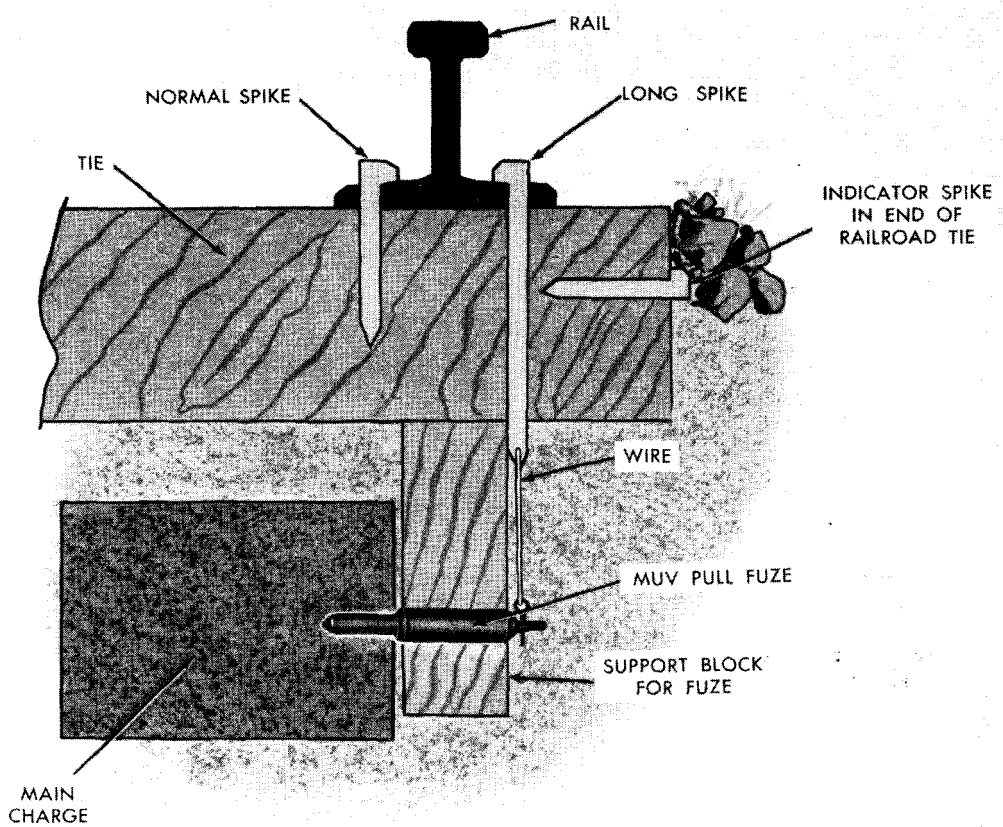


Figure 128. Rail-spike booby trap.

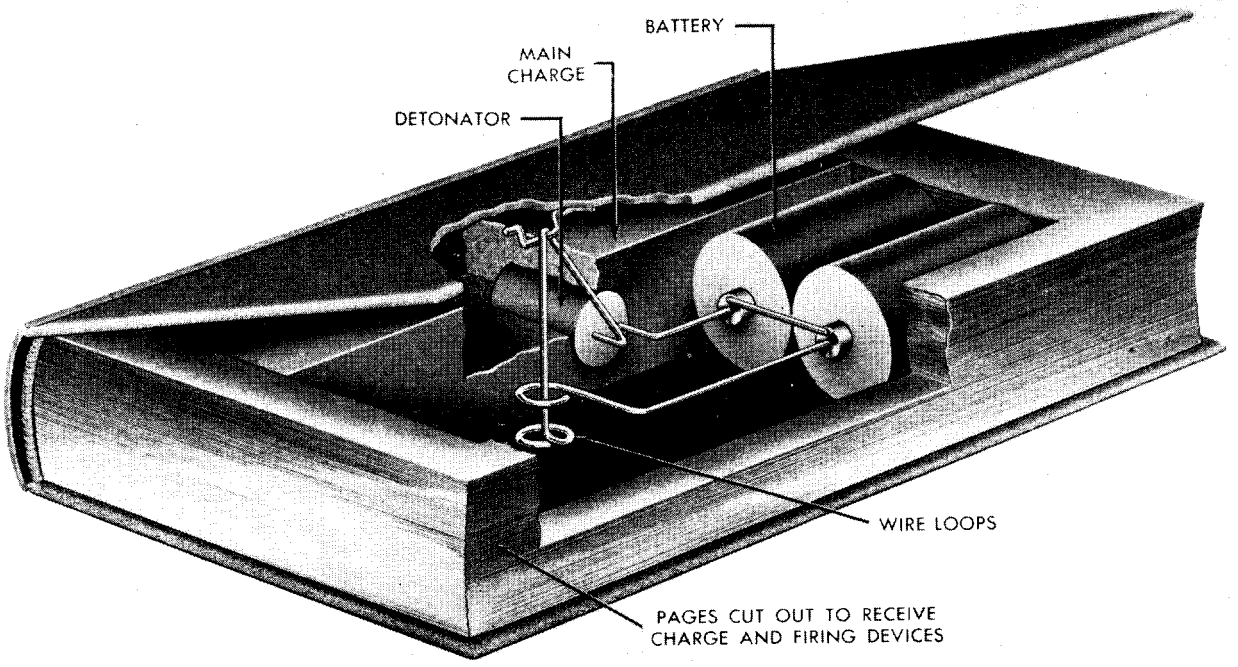


Figure 129. Book booby trap.

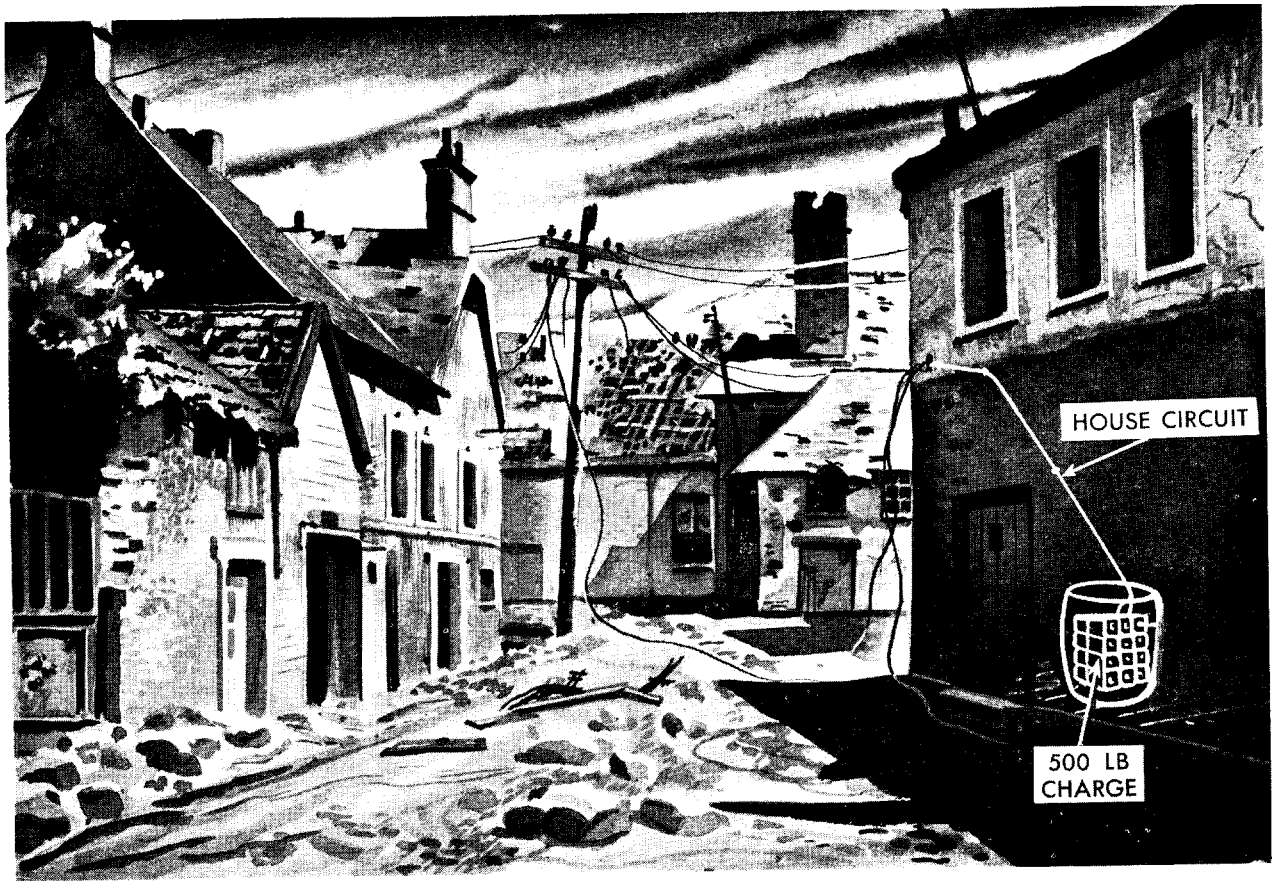


Figure 130. Power system booby trap.

proper procedure is to remove the device and destroy it in a safe place.

d. POWER SYSTEM BOOBY TRAPS. In towns and cities which have been under artillery fire or bombing, many wires are left loose and disconnected. It is a common Soviet practice to place large charges of explosives in prominent buildings (fig. 130). These charges are connected to the existing circuits. Then when the wires are repaired, the flow of power completes the circuit and detonates the charge.

e. MISCELLANEOUS BOOBY TRAPS. Several examples of fabricated booby traps encountered by the German Army in World War II are as follows:

(1) Cartridge boxes filled with what appeared to be German infantry ammunition, but the powder charge removed and the cartridges refilled with high explosives and detonators. Such a booby-trapped round is capable of destroying the weapon firing it.
(2) Bandage packets containing shrapnel and a detonator.
(3) Bandage cases with Red Cross insignia employed as mines.
(4) Rubber balls filled with explosive about twice the size of a fist used as explosive bombs.
(5) Silver-gray, light-metal flasks exploding when the lid was opened.
(6) Cognac bottles filled with an incendiary liquid.
(7) Small red flags marked with an "M" issued to Soviet engineer troops for marking individual mines connected to the mine. Upon removal of the flag, the mine detonated.
(8) Imitation frogs colored earthy-gray detonating when pressure was exerted on them.
(9) Flashlights containing a high explosive detonating when tampered with.
(10) Letter envelopes with explosive filler detonating when opened.
(11) Dead soldiers connected to mines or charges.
(12) Charges placed in the wreckage of blown bridges or other structures to delay repair.

118. Wooden Antilifting Device

a. DESCRIPTION. This device (fig. 131) consists of a wooden box, $8\frac{5}{8}$ inches long, $2\frac{3}{4}$ inches wide, and $1\frac{3}{8}$ inches high. It contains about 200 grams of explosive separated from the fuze chamber by a wooden partition. An MUV pull fuze (par. 22) is held in a wooden block in such a position that the attached detonator projects through a hole in the partition into the charge. A fuze-access hole in the fuze end of the mine, closed by a pivoted fuze-well cover, permits access to the fuze. A square movable lid, with a metal actuating hook screwed to the under side of the lid, rests on two springs positioned in the fuze-holder block. The hook engages in the eye of the striker-retaining pin of the fuze when the fuze is inserted.

b. EMPLOYMENT. This mine is used as a booby trap and as an antilifting device placed under antitank mines.

c. FUNCTIONING. This device is laid under a mine or other heavy object. When the object is removed, the two compressed springs push the lid up and the hook pulls the striker-retaining pin out of the fuze, firing the device.

d. INSTALLING AND ARMING.
(1) Prepare a hole or location for the device.
(2) Place the lid on the springs and weigh the lid down with a mine or other object heavy enough to compress the springs.
(3) Insert an MUV pull fuze with a percussion cap and a detonator attached through the hole in the end of the mine (exposed by rotating the fuze-well cover) and through the fuze block into the charge. In so doing, keep the eye of the striker-retaining pin up so it engages in the hook projecting below the lid.

e. NEUTRALIZING.
(1) Carefully *slide* the weight or object off to expose enough of the lid so that the lid may be pressed down with the hand.
(2) Carefully wrap a wire or cord around the lid and body of the device to insure its remaining in the compressed state.

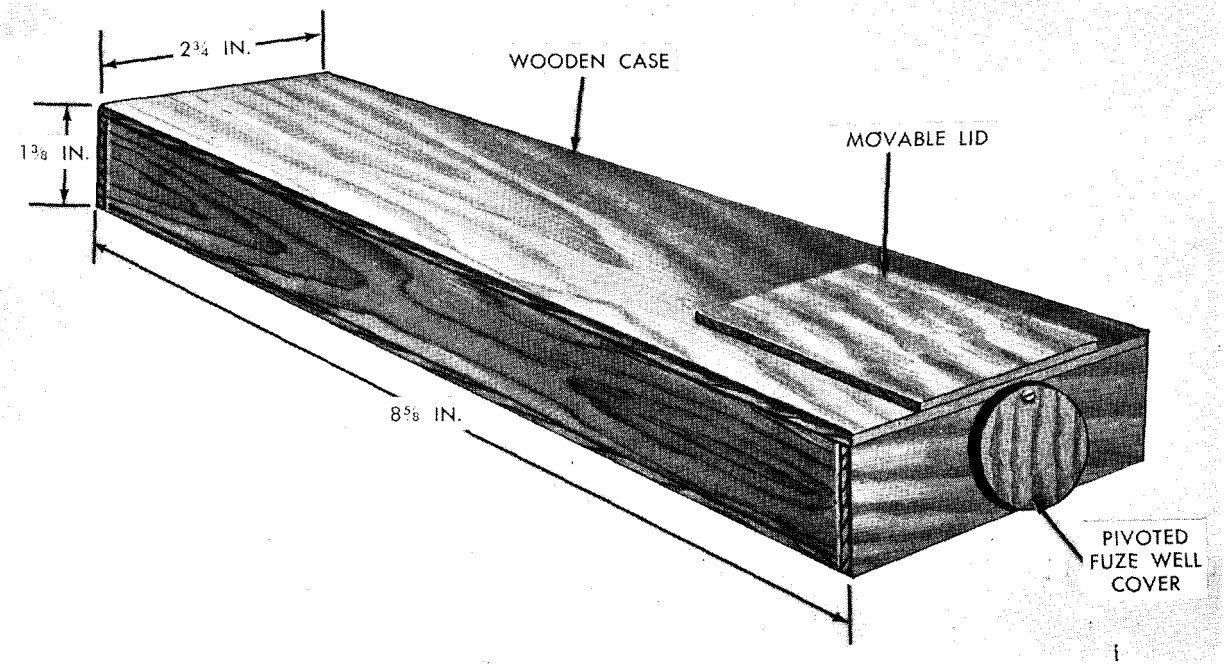


Figure 131. Wooden antilifting mine.

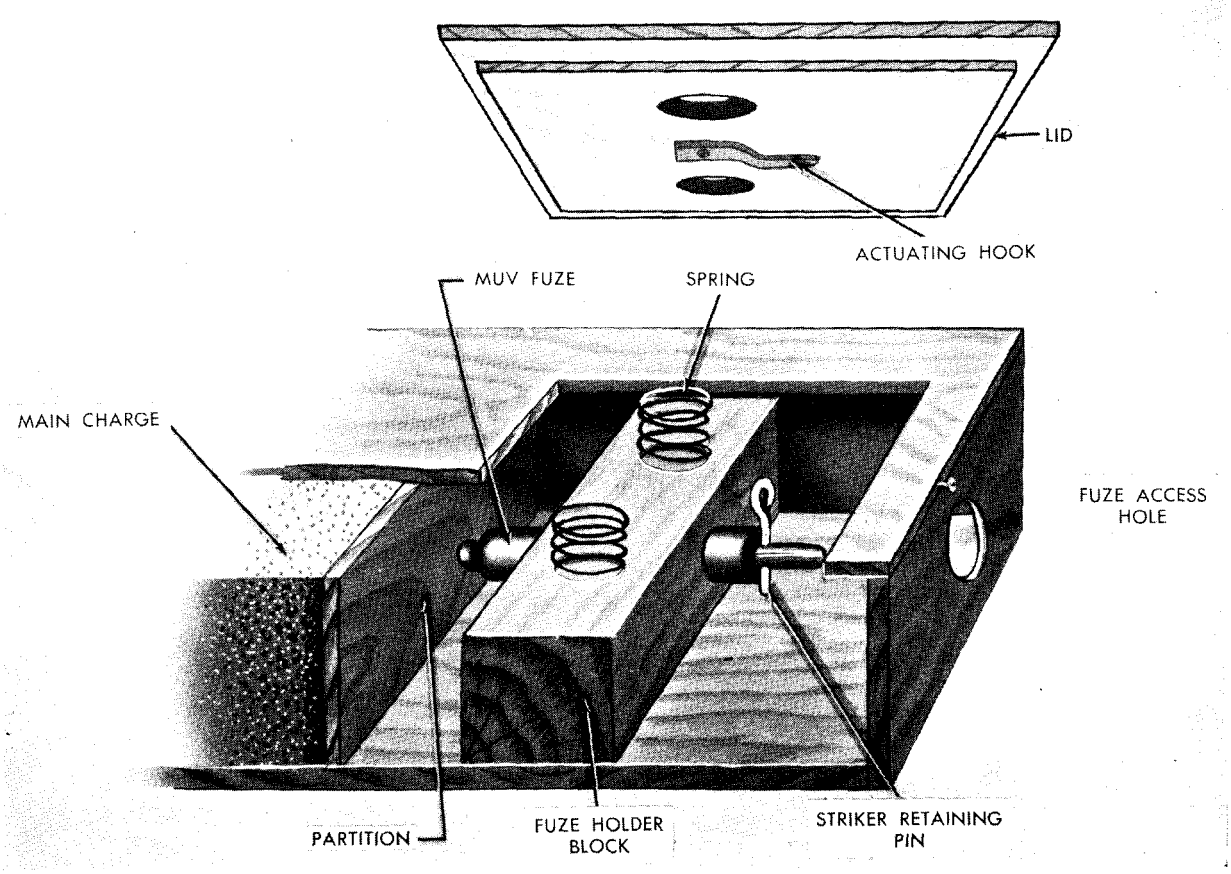


Figure 131.—Continued.

(3) Uncover the fuze well and pull out the fuze and attached detonator.

Note. Pressure must be applied to the lid at all times when neutralizing until the fuze has been removed.

Section X. RIVER MINES

119. General

All Soviet river mines used against the Germans in World War II were of improvised construction and generally consisted of a waterproofed box or barrel containing a 30- to 120-pound charge. The three types of river mines are floating, anchored, and bottom mines. They were placed on a raft or other buoyant object, or anchored to the river bottom. They used either pull, pressure or delay type fuzes. Some were detonated by trip wires and some had lever arms projecting out on all sides of the mine which, when moved by contact with an object, closed an electrical contact or pulled a striker-retaining pin out of a pull fuze. None of these mines are safe to neutralize unless discovered before immersion in water. After it has been set afloat, the chances are that the mine has become extremely sensitive from bumping objects in the water which may have partially pulled the fuze pins.

a. FLOATING MINES.

(1) *General construction.* The rafts or boxes used to float the explosive charge are made of dry lumber which is tarred inside and outside. If long immersion in water is contemplated, the box is a double one. The space between the walls is filled with a waterproofing compound consisting of liquid tar mixed with calcium, cinders, chalk, or other material. To insure level flotation, only about half of the charge container is filled with explosive. The remaining space is filled with sawdust or paper.

(2) *Employment.* Soviet doctrine indicates that free-floating mines are used to destroy crossings, bridges downstream, and floating mines laid by the opposing force. As a rule, the floating mines are prepared in advance and brought to the river banks at night. The launching site is as near to the front lines as possible after all approaches to the river and the character of the current have been studied. Meandering sections of the river are avoided since a mine touching the shore will explode too soon. In lowering the mine into water great care is taken to avoid a premature explosion.

(3) *Neutralizing.* Soviet doctrine also indicates that in order to stop floating mines, nets are laid across the river. The nets are made of such materials as timber or chains. The net is fastened on both sides of the river banks to special piles or trees. A demolished net system must be restored immediately with reserve materials available near the banks. Objects caught in the net should be removed at once. Mines and other suspicious objects should be pulled out of the net with grappling hooks attached to long ropes. Intercepted floating mines should not be pulled out on the banks, especially when the type of mine is unknown. These mines should be pulled upstream in the water for about 100 yards from the net and then blown up. When a floating mine is discovered before it reaches the net, a long piece of lumber, the ends of which are connected by a 150-foot rope, is lowered into the water and is used to pull the mine upstream. The mine should explode on contact. If the mine does not explode, it should be destroyed by an explosive charge of from 3 to 5 pounds. This charge should be placed on floats and allowed to float down behind the mine in such a way that the charge will get hooked to the mine. Detonating cord should be of such length that the charge should explode as close as possible to the mine. Do not approach a floating mine. The disassembly of a mine is not recommended even after the mine has been in the water for a long time. A river mine should be handled only by experts.

b. ANCHORED MINES. Anchored mines are used to deny likely river crossings to the oppos-

ing force and for interrupting river traffic. These mines are laid in a checkerboard pattern across the river in several rows, the distance between the rows being 350 to 500 feet and the distance between individual mines 50 to 80 feet. These mines are launched from a boat or raft according to a previously arranged plan and along previously laid markers. The best place for laying anchored or underwater mines is in a narrow section of the river. The method of their detonation can be either mechanical or electrical. For electrical detonation, an observation point and an electrical control station is set up near the bank at a strategic vantage point. These mines can be neutralized by cutting the anchor cable so the mine will float to the sur-

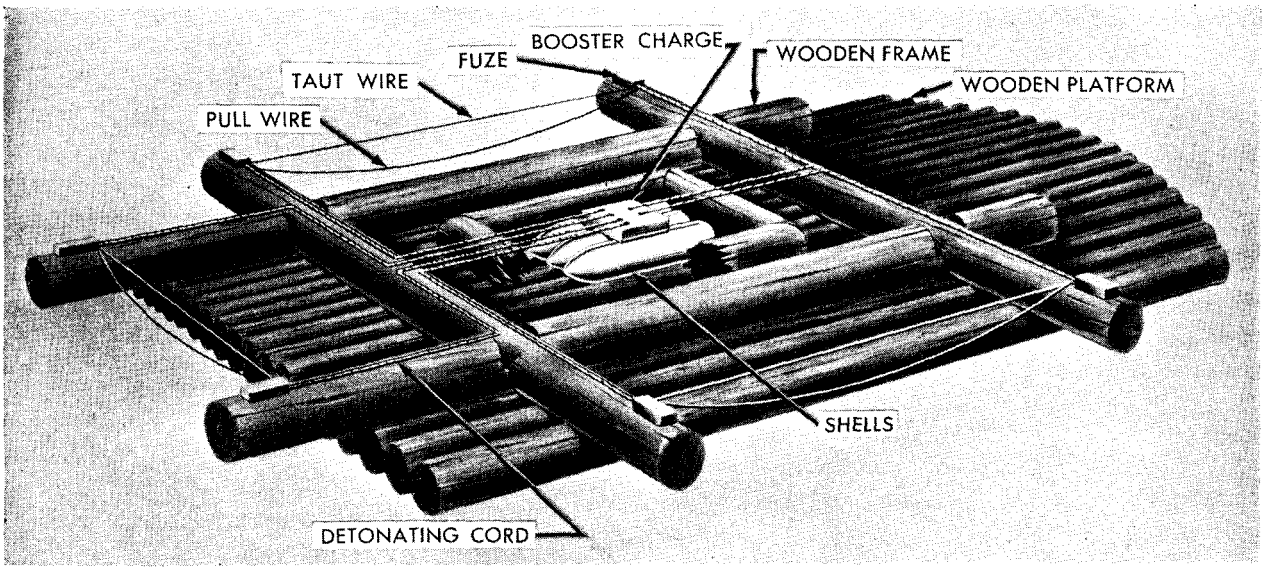


Figure 132. Raft mine.

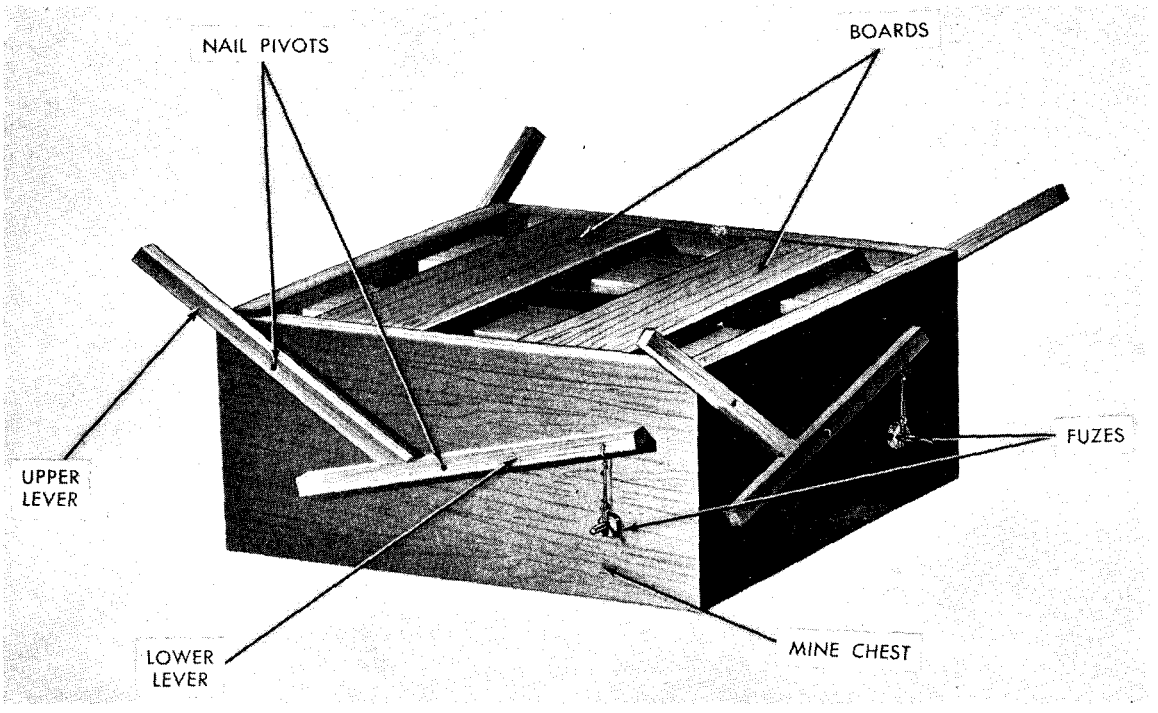


Figure 133. Floating lever mine.

face where it can be destroyed by rifle fire or towed to a safe place and destroyed.

c. BOTTOM MINES. Bottom mines are generally explosive charges encased in concrete, metal, or other waterproofed containers. They are laid just below the low-tide mark along beaches or on the river bottom at likely assault-crossing and fording sites. Bottom mines are usually electrically detonated by a concealed observer, but they may be fitted with pressure fuzes to detonate upon contact. Bottom mines may also be in the form of a fougasse. These mines may be neutralized by cutting the electric cable or by neutralizing the pressure fuze.

120. Raft Mine

a. DESCRIPTION. The floating raft mine (fig. 132) consists of a timber raft carrying three aerial bombs or other heavy charges, a booster charge, and six MUV pull fuzes (par. 22). The fuzes are installed on cross arms which extend beyond the edge of the raft. Detonating cord connects the fuzes to the booster charge. In turn, the fuzes are interconnected by taut and slack pull wires as shown in figure 132. The effect of the mine varies according to the size of the charge used and the contact made with the objective.

b. EMPLOYMENT. This mine was designed to destroy stream-crossing equipment of an opposing force. It floats downstream and detonates upon contact. It will destroy piers of fixed bridges as well as floating equipage.

c. FUNCTIONING. Pull on one of the pull wires or breaking one of the taut wires actuates the fuze.

d. INSTALLING AND ARMING.

(1) Place aerial bombs or other charges on the raft and fasten them securely.
(2) Install fuzes on the cross arms of the raft.
(3) Attach detonating cord to the booster charge and connect the cord to fuzes.
(4) Install pull wires and taut wires after the mine is in the water, as shown in figure 132.
(5) Set the raft adrift.

e. NEUTRALIZING. Do not attempt to hand neutralize this mine unless absolutely necessary. Detonate by small-arms fire or place charges or obstacles in the water to intercept it.

121. Floating Lever Mine

a. DESCRIPTION. This mine (fig. 133) consists of a waterproofed wooden box containing up to 120 pounds of explosive. A pair of actuating levers is nailed to each side of the box, the lower lever being tied to an MUV pull fuze (par. 22).

b. EMPLOYMENT. This mine is used to destroy fixed and floating bridges of an opposing force and can be used in swampy terrain against vehicles.

c. FUNCTIONING. When the upper lever strikes an object, the lever pivots. This depresses the lower level and causes it to revolve about its own pivot, pulling the striker-retaining pin from the MUV pull fuze.

d. NEUTRALIZING. This mine should be blown in place.

122. Anchored Barrel Mine

This improvised underwater mine (fig. 134) consists of a waterproofed barrel filled with explosive and wired electrically to a remote-control point. Such mines are laid as described in paragraph 119.

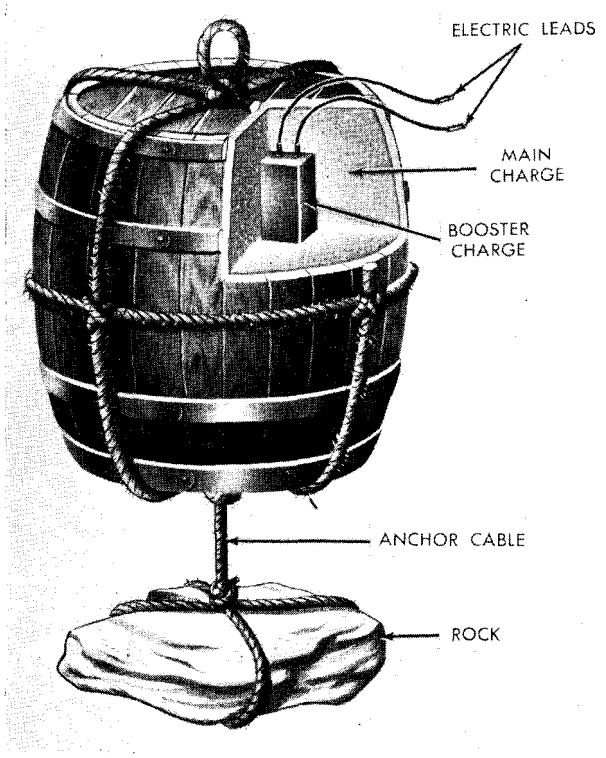


Figure 134. Anchored barrel mine.

CHAPTER 7

MINE LAYING, MARKING, AND RECORDING EQUIPMENT AND SUPPLIES

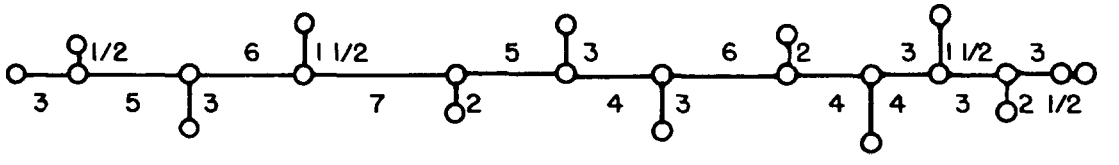
123. General

Soviet equipment for laying, marking, and recording mines is quite similar to German equipment. Like the Germans, the Soviets have a special cord for spacing mines within a mine field. Other than this mine spacing cord, the only special marking equipment is a small red flag marked with an "M" for indicating the location of detected, buried mines. The Soviets are not known to have any special mechanical mine laying equipment and their mine recording supplies are similar to those used by all armies to record mine fields.

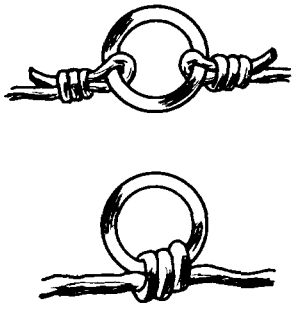
124. Mine Spacing Cord

a. DESCRIPTION. A typical Soviet mine spacing cord (fig. 135) consists of a piece of tracing tape or cord between 100 to 150 feet in length with metal rings tied at various intervals throughout its length. To each of these metal rings is tied a short piece of tracing tape or cord. On the ends of short cords are metal rings which determine the position of the mines. Short cords are not standardized and may vary in length in every spacing cord. However, they are of such lengths that the shortest distance between any two mines laid at the ends of these short cords is at least 12½ feet. The complete mine spacing cord is carried wound on a wooden reel or spindle. Metal hold-down pins or wooden stakes are provided to peg the cord to the ground when mines are being laid.

b. EMPLOYMENT. The Soviet mine spacing cord is used in placing a mine field and permits spacing mines quickly and accurately, yet in a varied and irregular pattern.

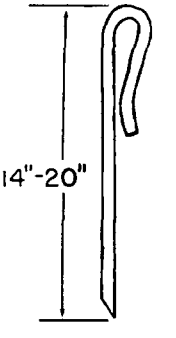


A TYPICAL RUSSIAN MINE-SPACING CORD
(NUMBERS INDICATE METERS; DIMENSIONS VARY)



METHODS OF TYING THE CORD TO THE METAL RINGS

WOODEN REEL



METAL HOLD-DOWN PIN

Figure 135. A typical Soviet mine spacing cord.

(1) *Mine laying.* The main cord is stretched and pinned at both ends with metal hold-down pins or wooden stakes. The short cords are stretched out perpendicular to the main cord. Mine laying starts at either end, and mines are placed at the rings tied to the ends of the short cords.

(2) *Mine removal.* The cord is placed according to the data on the mine field record card, and mines are found at the positions of the rings tied to the ends of the short cords.

CHAPTER 8

MINE DETECTING EQUIPMENT

Section I. PROBES

125. General

The probe is the primary Soviet means for the detection of land mines. It is used in preference to electronic mine detectors both at the front and in rear areas. The majority of Soviet probes are improvised and consist of stiff wires or thin metal rods wired, inserted, or otherwise fastened to a wooden or metal pole. Bayonets, long knives, and sharp wooden poles are also used. The variety of crude Soviet probes used in World War II resulted from different requirements for probing due to differences in soil characteristics at various fronts. The following information in this section is taken from a post-World War II Soviet manual on mine detecting tactics.

126. Normal Probe

The most common probe (fig. 136) consists of a sharpened metal rod wired to or inserted into one end of a wooden pole. Shorter probes are made for use in front lines where the operator must stay in a prone or kneeling position. Long probes are for use in rear areas where the prober works from a standing position. Probes with poles longer than 10 feet are rarely used.

127. All-Metal Probe

This probe is prepared in two lengths as shown in figure 136. It consists of a solid metal rod sharpened at one end and bent into a loop handle at the other.

128. Sectional Probe

The sectional probe has a steel point and a long handle in three sections of various lengths (fig. 136). The handle is the same as that used in the early models of the VIM-203 mine detector (par. 136). The handle sections are joined together with bayonet catches. This was the first probe to be included in the Soviet demining kit, KR, and was replaced by the folding probe.

129. Folding Probe

The folding probe (fig. 136) has a channel-iron-shaped probe point which is fastened to the end of the handle segment by bolt-and-groove latches which permit the point to be used either straight or at an angle to the axis of the handle. The handle segments are joined by latches. This probe is standard equipment in the Soviet demining kit, KR.

130. Double-Ended Probe

This improvised probe (fig. 136) is just like the longer normal probe (par. 126) but has a two-pronged metal fork wired to the opposite end of the handle. The double-pronged end of this probe is used for pulling up mines of the PMD type (par. 108) and to detect mines buried under snow.

131. Multipronged Probe

This probe (fig. 136) consists of four or five wires tied to the end of a 3½- to 4-foot wooden handle. It is intended for use in detecting wood-cased mines which may have rotted in the ground. It is assumed that this probe is not as likely to actuate the fuze, as would a probe with a tip of a larger diameter. This probe is only satisfactory when used in snow or marshy ground, because the tips bend easily.

132. Short Probe

This probe (fig. 136) has a detachable steel point about 8 inches long and a partially hollow wooden handle 17 inches long. The point is held to one end of the handle by two nuts. It

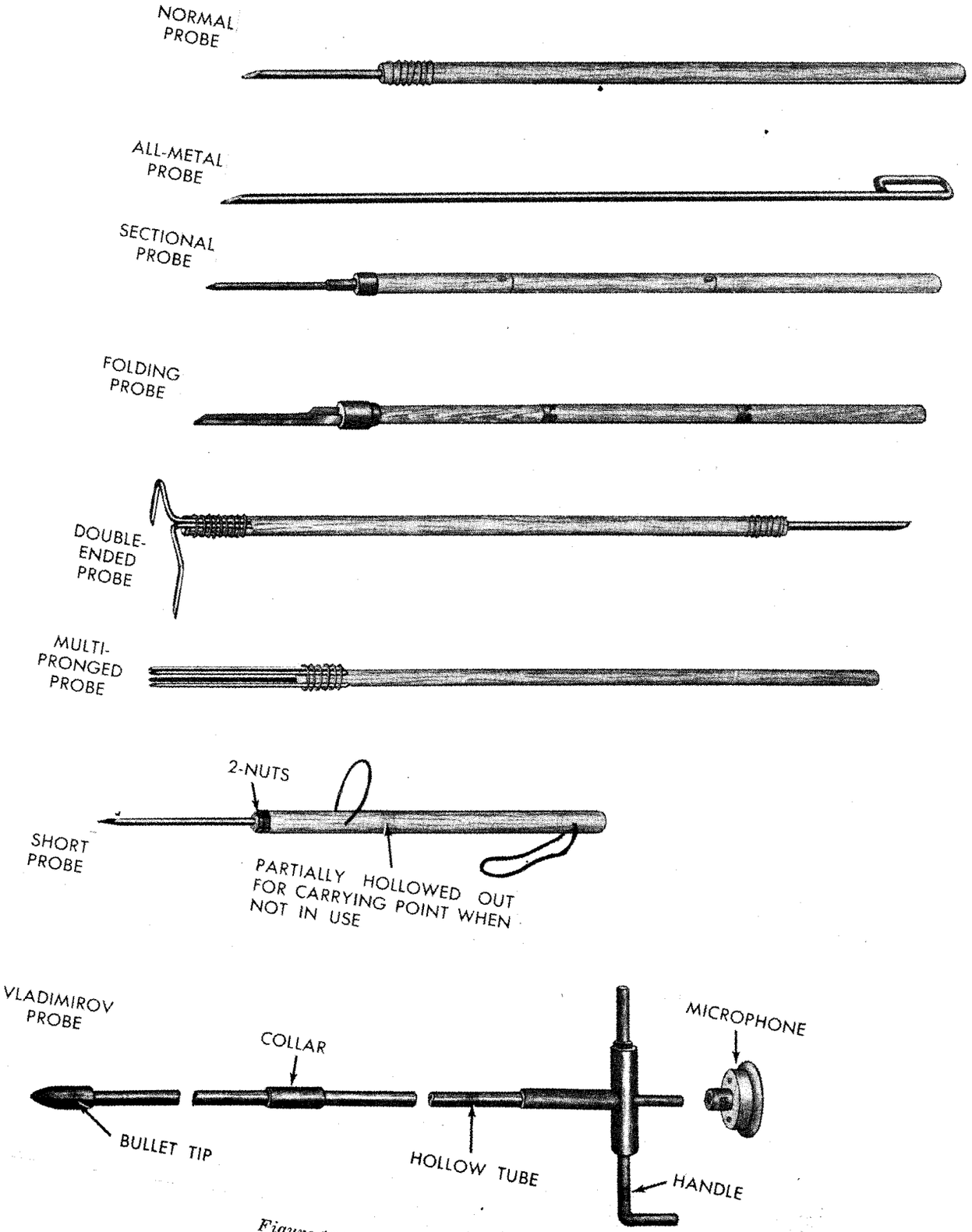


Figure 136. Soviet probes.

may be removed and inserted into the hollow end of the handle for carrying. At one end of the handle is a large loop or cord to be placed over the hand while probing. A small cord loop is for insertion of the thumb.

133. Vladimirov Probe

This probe (fig. 136) is designed for locating unexploded bombs and mines with clockwork delayed-action fuzes. It consists of six 5-foot sections of hollow tubing joined together with metal collars. The probe has a diameter of only ⅓ inch. The probe tip is a bullet-shaped piece of metal which screws onto the first section of the probe. A tubular metal handle is provided for thrusting the probe into soft ground, holes in the ground, or wells. The probe is not suitable for work in rubble or gravel. This probe works on the principal that upon contact with a mine or bomb the ticking of clockwork devices can be felt throughout the metal probe. Its great length gives the operator more safety in case of detonation of the mine. A microphone has been adapted for use with this probe. It is placed over the end of the probe and held to it by two bolts and a metal sleeve (fig. 136). Even with this microphone, clockwork fuzes can be heard only if the tip of the probe is in contact with the mine or bomb.

Section II. ELECTRONIC MINE DETECTORS

134. General

Soviet electronic mine detectors are generally of simple design and construction and are not as efficient as American, British, or German detectors. Most Soviet models are so constructed that the search coil may be detached from the search pole and attached to the muzzle of a rifle. Most detectors have either a circular or a rectangular search coil. Other differences between models are slight modifications of the search coil or power supply.

135. VIM-210 (IMVETA 210) Detector

a. DESCRIPTION. The VIM-210 (Imveta-210) mine detector (figs. 137 and 138) consist of a rectangular search coil with a tuning box, a three-section aluminum search pole, a battery case carried on the back of the operator, and a set of headphones. The tuning box contains two tubes and the tuning regulator. The search coil is about 17½ inches long by 10 inches wide, and the search pole is about 6½ feet long. A device on the search coil permits attachment to either the muzzle of a rifle or to the standard three-section aluminum search pole (fig. 137). If the operator must crawl or lie down while sweeping, the stoppers of the storage battery must be taped firmly to prevent leaking of the battery acid. This detector will detect large bodies of metal, such as a Tellermine or other large metallic mines, at about 18 inches, and small bodies of metal, such as an MUV pull fuze, at no more than 2½ inches. Two models of this detector exist. The 1939 model weighs about 17 pounds and the battery case weighs 9.5 pounds. The 1940 model weighs about 15 pounds and the battery case 11.5 pounds. The 1940 model is capable of 24 hours' continuous use.

b. FUNCTIONING.

(1) After the detector is assembled, the switch is turned to *connected* and the tubes are permitted to heat up for several seconds.

(2) The tuning regulator is turned until a continuous buzz is heard in the headphones.

(3) As the search coil approaches a metal object the buzzing sound diminishes, and when the coil is directly over the object the sound stops.

136. VIM-203 Detector

a. DESCRIPTION. The VIM-203 detector comes in two models, the 1941 and the 1942 model. Both models are very similar in appearance; however, the 1941 model (fig. 139) has only a circular search coil, while the 1942 model may have either a circular (figs. 139 and 143) or a rectangular (fig. 140) search coil. The search coil may be attached to either a wooden or a metal pole or it may be attached to a rifle muzzle. Both models have a power-supply box containing batteries and extra tubes

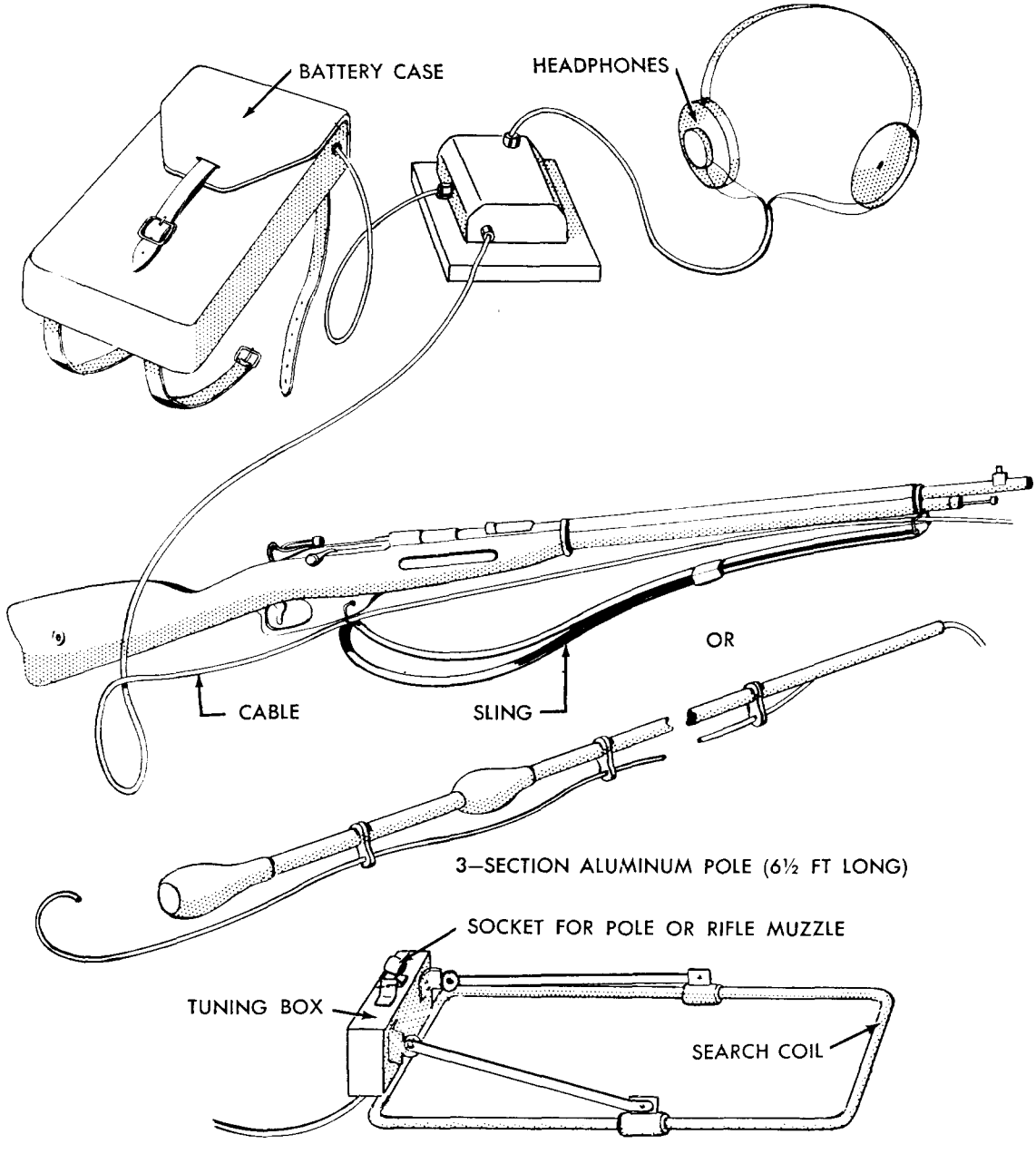


Figure 137. Components of VIM-210 detector.

Figure 138. VIM–210 detector in operation.

Figure 139. VIM–203 detector with circular search coil.

(fig. 141). The tuning box (figs. 142 and 143) is attached to the search handle and contains two tubes and a control knob. The detector is carried disassembled in a canvas carrying bag (fig. 144). The 1941 model weighs about 14 pounds and uses three 1.5-volt dry cells for filament power and one 60-volt dry cell battery for plate power. This model is capable of 30 hours' continuous operation. The circuit diagram for the VIM-203 detector (both models) is shown in figure 145.

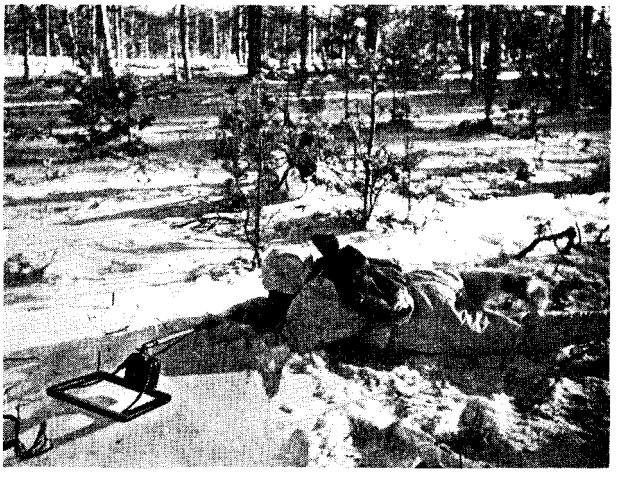


Figure 140. VIM-203 detector with rectangular search coil.

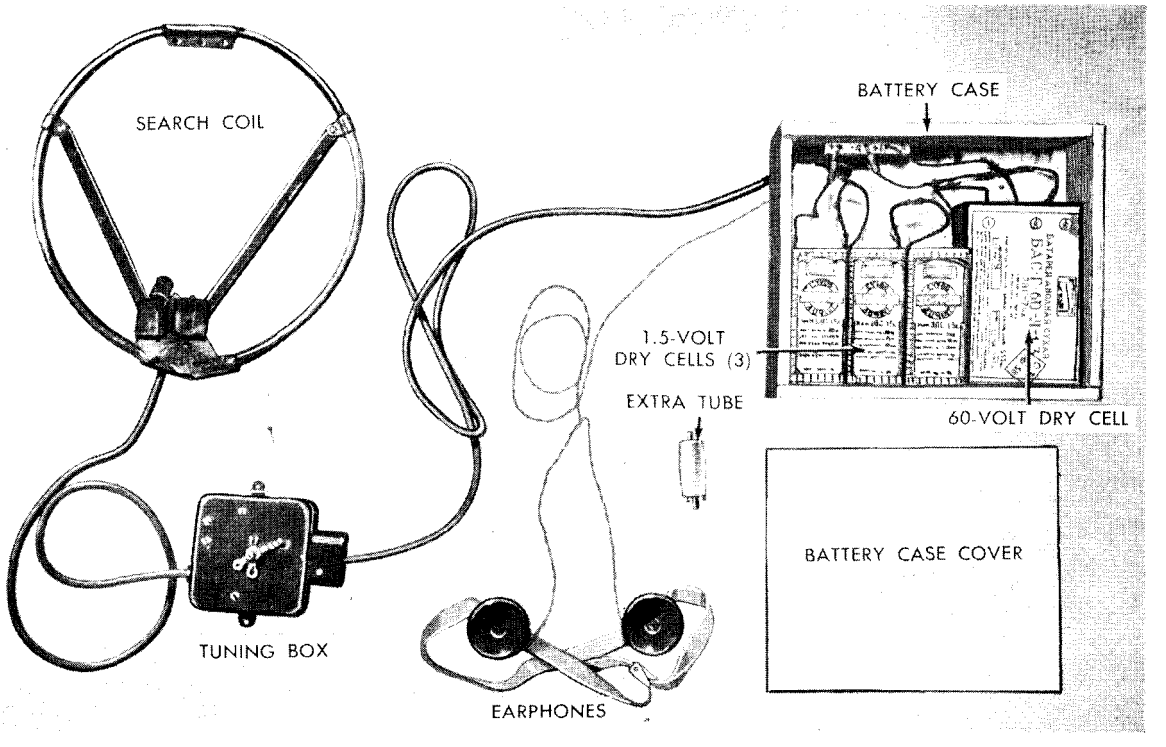


Figure 141. Components of the VIM-203 detector.

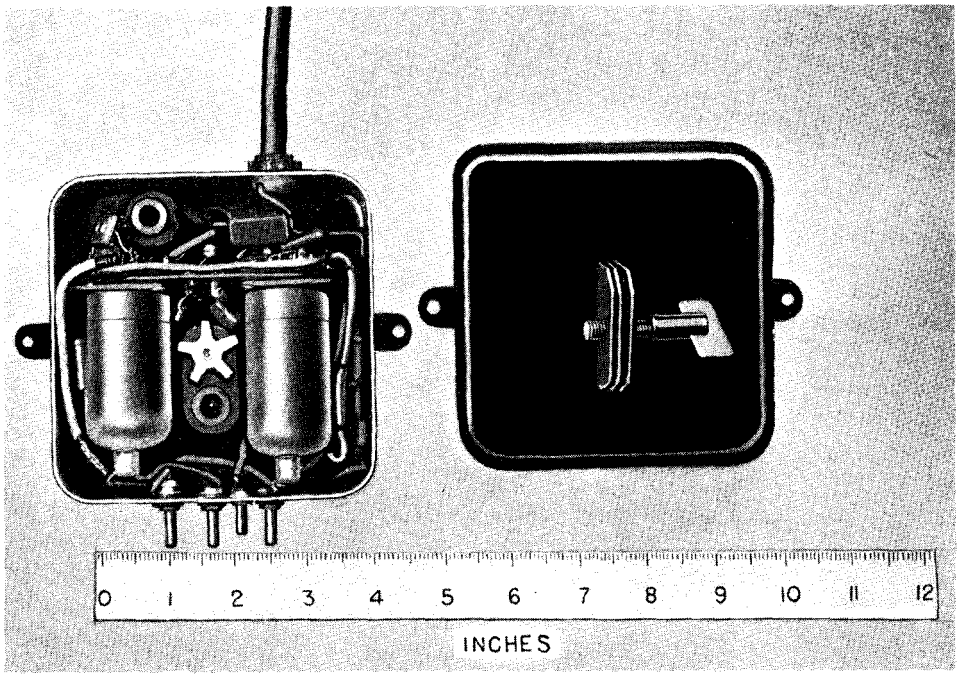


Figure 142. Tuning box for the VIM-203 detector.

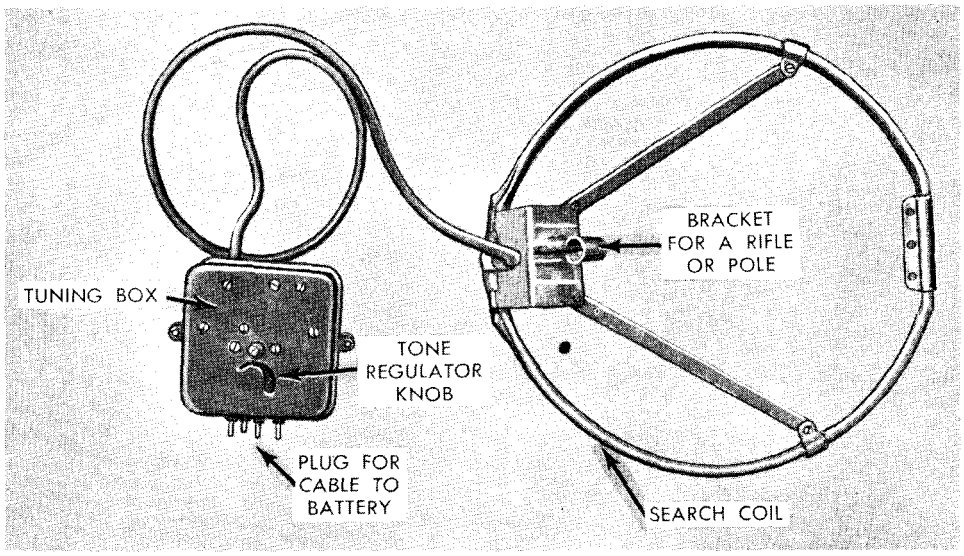


Figure 143. Search coil and tuning box for the VIM-203 detector.

b. FUNCTIONING. The VIM-203 functions in the same manner as the United States SCR-625 (TM 11 1122). Unlike the VIM 210 (par. 135) a buzzing sound in the earphones is heard only when the search coil is over a metallic object.

137. VIM-625 and VIM-695 Detectors

The VIM 625 and VIM 695 mine detectors (figs. 146 and 147), both 1942 models, appear to be identical, but details are not known. Operation and appearance are similar to those of the VIM-203 detectors (par. 136). Both the VIM 625 and VIM 695 detectors may have a circular or a rectangular rubber-insulated search coil with a one-tube tuning box attached to the search coil. Each detector weighs about 13 pounds and has a power supply weighing about 11 pounds. The power supply consists of a 60-volt dry cell battery and two wet cells each developing 1.4 volts. Each model is capable of 10 hours' continuous use.

138. Three-Search Coil Detector

This detector (fig. 148) is reported to have come into use in 1945. The search head consists of three rectangular search frames. The tuning box is separated from the search frame.

Figure 144. Canvas carrying bag for the VIM-203 detector.

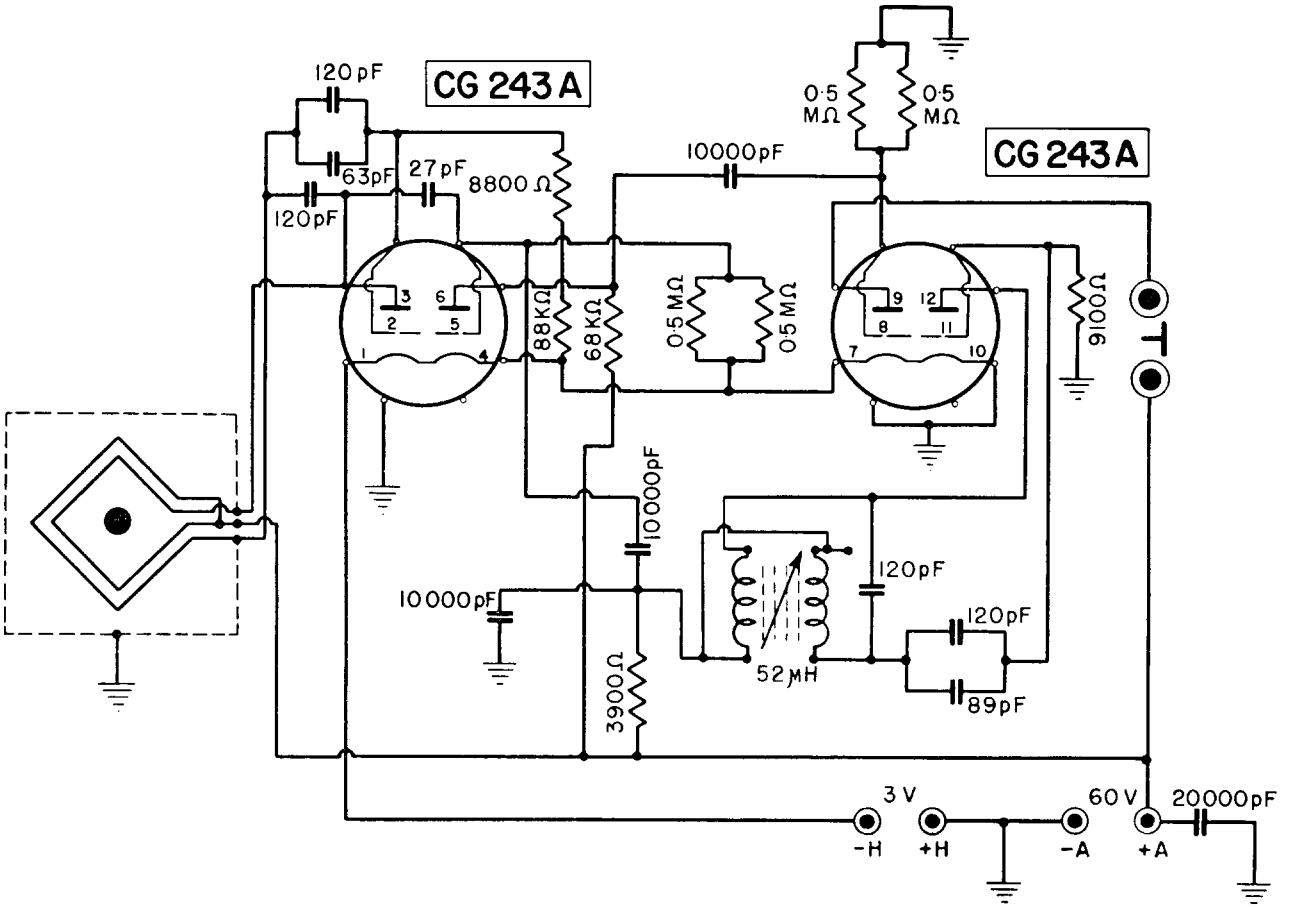


Figure 145. Circuit diagram for the VIM-203 detector.

Figure 146. VIM–625 or -695 detector mounted on a rifle.

Figure 147. VIM–625 or -695 detector mounted on a pole.

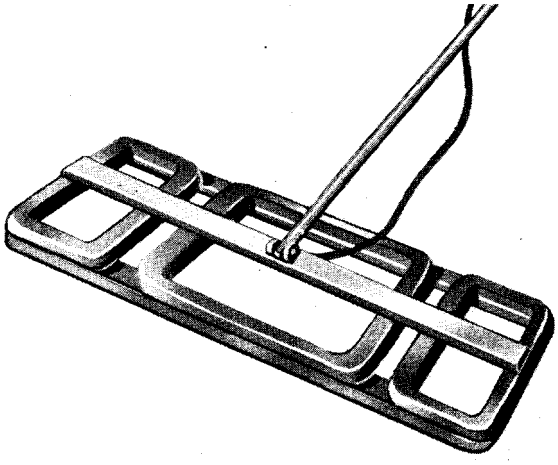


Figure 148. Three-search coil detector.

CHAPTER 9

MINE CLEARING EQUIPMENT

139. General

a. MANUAL MINE CLEARING DEVICES. The Soviet Army has a variety of grapnels, drags, and similar hand-operated mine clearing devices (par. 140), most of them field-improvised. They are used to clear trip wires, antipersonnel mines, and individual antitank mines. The Soviet engineer is issued a demining kit (par. 141) as standard equipment.

b. TANK-MOUNTED MINE CLEARING DEVICES. It is known that the Soviet Army received three United States tank-mounted flails under lend-lease during World War II. The Soviet Army developed several types of tank-mounted rollers during the war (par. 142). Most of these rollers will not clear a solid lane through a mine field but are designed to clear two wide tracks. There is no indication that the Soviets have developed tank-mounted linear charges or rocket type mine clearing devices.

c. MINE CLEARING PRACTICES.

(1) Soviet mine clearing doctrine closely parallels that of the United States Army as far as organization and methods of operation of clearing parties are concerned. However, during World War II the Soviet Army often used artillery to clear gaps through known mine fields. Reports indicate that they were much more successful in these tactics than were the Germans, evidently because the Germans most often laid standard Tellermines which were subject to sympathetic detonation, owing to the

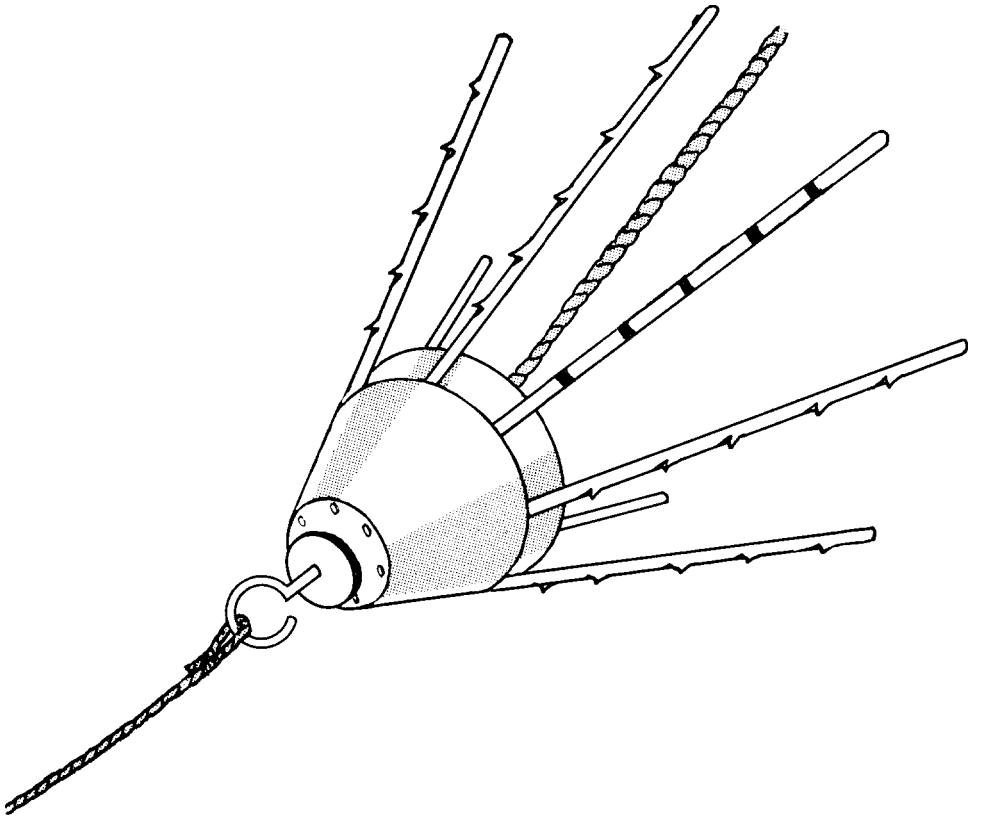


Figure 149. Conical drag.

large area of their pressure plates. The Soviets, however, used large numbers of field-improvised mines, most of which had no large pressure plates.

(2) German combat experience in World War II indicated that the usual Soviet procedure for an initial attack across mine fields is to make no attempt to locate and remove mines but to send successive waves of infantry across the field until the far side is reached. Mine detectors and mine clearing devices were used in later phases of assault operation (during mop-up and consolidation of ground gained) after defending fire power had been pushed back or wiped out.

140. Manual Mine Clearing Devices

a. CONICAL DRAG. The conical drag (fig. 149) is an improvised device designed for detonation of mines laid with trip wires in abatis and in high grass, bushes, weeds, and thick vegetation. It is made of metal rods (with notches cut in each) fastened to a conical head with a metal eye for attaching a rope.

b. METAL ROLLER DRAG. This device (fig. 150) consists of a two-wheeled axle with spokes projecting from each wheel and four or five two-pronged drags hinged at intervals to the axle. A tow bar is provided for pulling the drag either backward or forward. When dragged over the ground, the prongs actuate mines with trip wires.

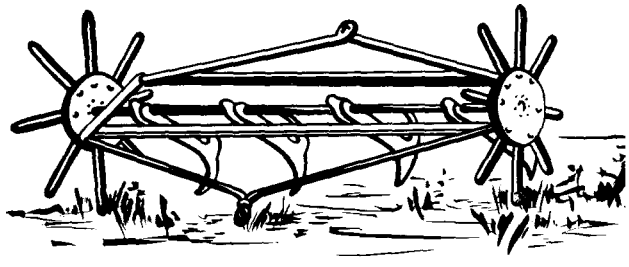
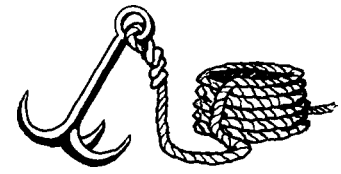


Figure 150. Metal roller drag.

c. GRAPPLES. The Soviets improvised a variety of grapnels to be thrown out and dragged across a trip-wire mine field. Two typical examples are shown in figure 151. The two-way grapnel is used by two soldiers, one on either side of a mined area, who pull the device back and forth.



ANCHOR GRAPNEL

TWO-WAY GRAPNEL

Figure 151. Typical Soviet grapnels.

d. PRESSURE-MINE DRAG. This device (fig. 152) is similar to the metal roller drag (fig. 150) but is designed for detonating mines with pressure fuzes. It has a series of studlike rods firmly fixed to the axle. The rods press into the ground as the device is rolled along.

141. Demining Kit, KR

This kit consists of a folding probe; a tripod with a pulley used in lifting located mines out of the ground with a grapnel and rope (fig. 153), a collection of nails, pins, and keys to be used as safety pins in neutralizing fuzes; a quantity of tracing tape; and a number of small red flags for marking located mines (par. 123). This kit is carried in a canvas bag.

142. Tank-Mounted Rollers (Tral'Shchik)

a. During World War II the Soviets produced several types of tank-mounted mine clearing rollers for clearing lanes through mine fields. World War II Finnish Army and German Army reports indicate that only a few of these Soviet devices were ever encoun-

tered, and that they were organic equipment of a special platoon called "Tankov Tral 'shchikov" attached to each forward Soviet armored force.

b. The first type of mine-clearing roller encountered by the Germans in World War II resembled an ordinary road roller mounted at the front of a tank. The roller was filled with rocks or concrete. A later type roller consisted of 2 groups of 5 disklike plates mounted on a common axle. It was connected to a tank by a steel yoke attached to the end of a steel guide frame mounted at the front of the tank (fig. 154). In one model of this later type, about 18 inverted A-shaped studs were bolted around the circumference of each disk, and in another model about 18 deep notches were cut around the circumference of each disk (fig. 154). These disk rollers were designed to clear 2 wide gaps through a mine field rather than a single gap.

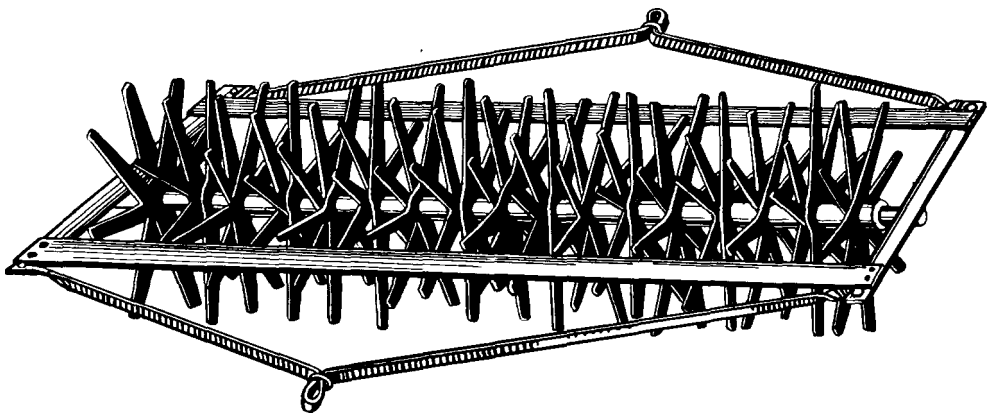


Figure 152. Pressure-mine drag.

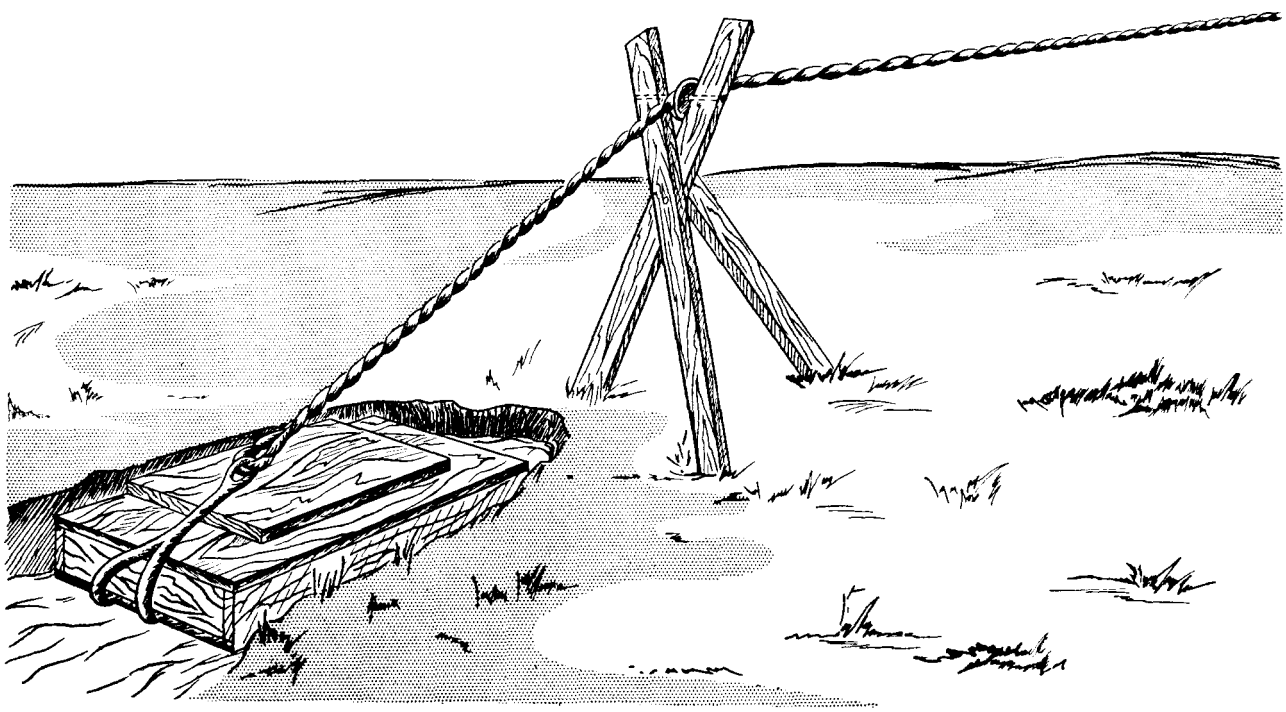


Figure 153. Use of grapnel, rope, and pulley to lift a mine.

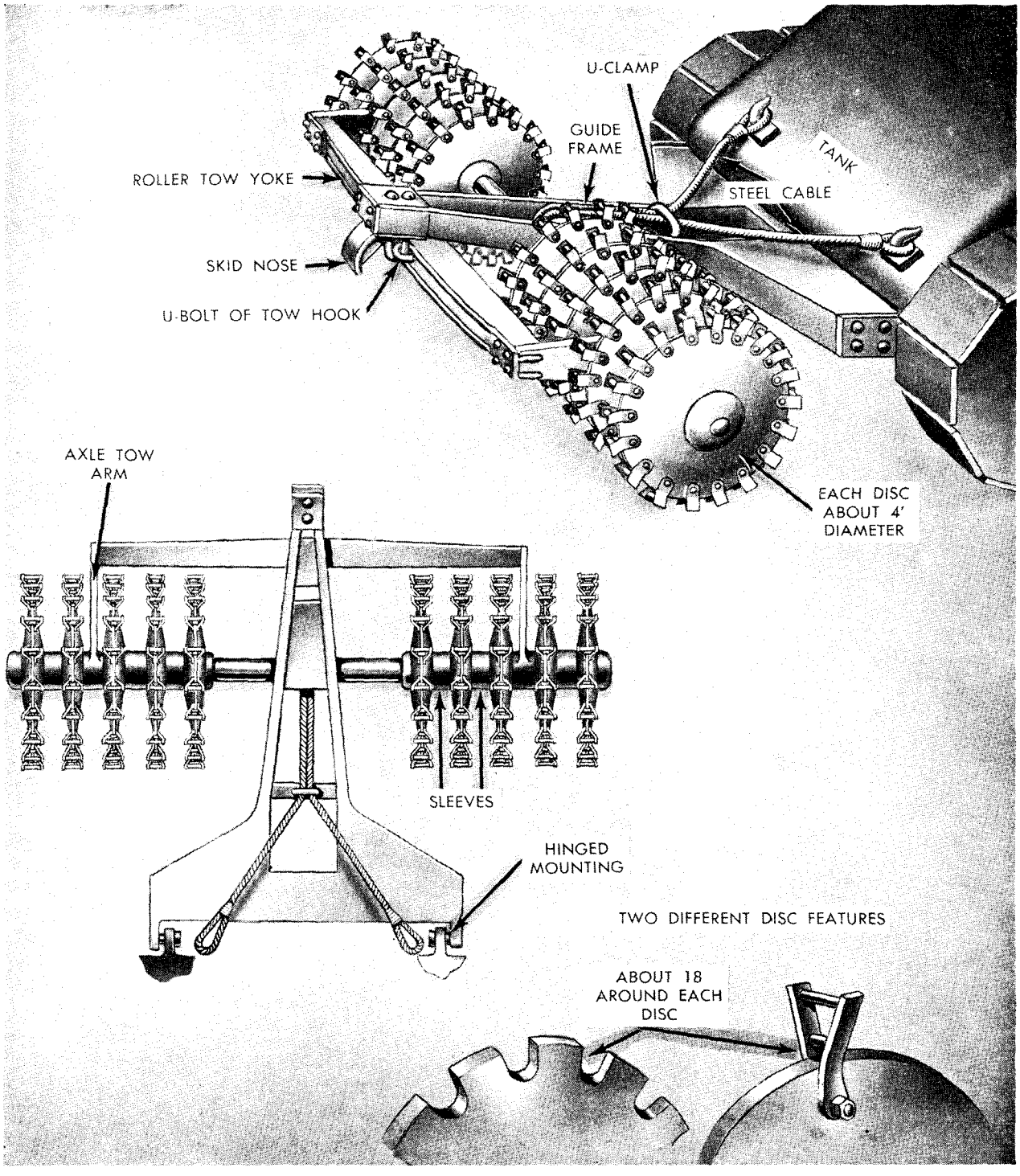


Figure 154. Tank-mounted mine clearing roller.

Russian		Transliteration		English	
Terms	Abbreviation	Terms	Abbreviation	Translation or Equivalent	
		FUSES (EXPLODERS)			
взрыватели	В	vzryvateli	V	exploders (fuzes)	
механический взрыватель	МВ	mekhanicheskiy vzryvatel'	MV	mechanical fuze	
химический взрыватель	ХВ	khimicheskiy vzryvatel'	KhV	chemical fuze	
электро-химический взрыватель	ЭХВ	elektro-khimicheskiy vzryvatel'	EKhV	electro-chemical fuze	
снаряженный взрыватель	СВ	snaryazhennyy vzryvatel'	SV	fully-equipped fuze (with percussion cap detonator attached)	
(прибор) снаряжение упрощенного взрывателя	СУВ	(pribor) snaryazhenie uproshchennogo vzryvatelya	SUV	(device for) arming (equipping) the simplified fuze	
упрощенный взрыватель	УВ	uproshchennyy vzryvatel'	UV	simplified fuze	
модернизированный упрощенный взрыватель	МУВ	modernizirovannyy uproshchennyy vzryvatel'	MUV	modernized simplified fuze	
взрыватель полевых фугасов	ВПФ	vzryvatel' polevykh fugasov	VPF	fuse for field fougasses	
часовой (минный) взрыватель	ЧВ (ЧМВ)	chasovoy (minnyy) vzryvatel'	ChV (ChMV)	clockwork (mines) fuze	
поездной взрыватель	ПВ	poezdnoy vzryvatel	PV	train (railroad) fuze	
взрыватель замедленного действия химической	ВЗДХ	vzryvatel' zamedlennogo deystviya khimicheskiy	VZDKh	chemical fuze for delayed action	
		ELECTRICAL FUSES (CIRCUIT CLOSERS)			
замыкатели	З	zamykateli	Z	circuit closers (electrical fuzes)	
замыкатель электро-механический	ЗМЗ (ЗЭМ)	zamykatel' elektro-mekhanicheskiy	EMZ (ZEM)	electro-mechanical electrical fuze	
электро-химический замыкатель	ЭХЗ	elektro-khimicheskiy zamykatel'	EKhZ	electro-chemical	
электро-химический предохранитель	ЭХП	elektro-khimicheskiy predokhranitel'	EKhP	electro-chemical safety element	
поездной замыкатель	ПЗ	poezdnoy zamykatel'	PZ	train (railroad) electrical fuze	
вибрационный замыкатель	ВЗ	vibratsionnyy zamykatel'	VZ	vibration electrical fuze	
часовой вибрационный замыкатель	ЧВЗ	chasovoy vibratsionnyy zamykatel'	ChVZ	clockwork vibration electrical fuze	
часовой замыкатель	ЧЗ	chasovoy zamykatel'	ChZ	clockwork electrical fuze	
часовой замыкатель-будильник	ЧЗ-Б	chasovoy zamykatel'-budilinik	ChZ-B	clockwork electrical fuze—alarm clock	
		MINES			
воздушные мины	ВМ	vozdushnye miny	VM	air mines	
морские мины	ММ	morskie miny	MM	sea mines	
речные мины	РМ	rechyne miny	RM	river mines	
донные мины		donnye miny		bottom mine (sea and river mines)	
якорные мины		yakornye miny		anchored mines (sea and river mines)	
плавучие мины		plovuchie miny		floating mines (sea and river mines)	
наземные мины	НМ	nazemnye miny	NM	ground (land) mines	
танковые мины	ТМ	tankovye miny	TM	tank mines	
дорожные мины	ДМ	dorozhnye miny	DM	transport (road, highway) mines	
пехотные мины	ПМ	pekhotnye miny	PM	infantry (personnel) mines	

Russian		Transliteration	English	
Terms	Abbreviation	Terms	Abbreviation	Translation or Equivalent
		MINES (cont.)		
мины-сюрпризы	МС	miny-syurprizy	MS	"mine-surprise" (booby-traps)
мины мгновенного действия	ММД	miny mgnovennogo deystviya.	MMD	instantaneous action mines
мины замедленного действия	МЗД	miny zamedlennogo deystviya.	MZD	delayed-action mines
управляемые мины	УМ	upravlyaemye miny	UM	controlled mines
автоматические мины	АМ	avtomaticheskie miny	AM	automatic mines
неизвлекаемые мины	НМ	neizvlekaemye miny	NM	booby-trapped (activated) mines
мины нажимного действия		miny nazhimnogo deystviya.		pressure action mines
мины натяжного действия		miny natyazhnogo deystviya.		pull action mines
фугас	Ф	fugas	F	fougasse (improvised stone scattering mine)
химический фугас	ХФ	khimicheskiy fugas	KhF	chemical fougasse (chemical mine)
мина заграждения	МЗ	mina zagrashdeniya	MZ	mine-obstacle, or, obstacle mine
танковая мина деревянная	ТМД	tankovaya mina derevyannaya	TMD	wooden antitank mine
танковая мина бумажная	ТМБ	tankovaya mina bumazhnaya	TMB	paper antitank mine
танковая мина смольно-бумажная	ТМСБ	tankovaya mina smol'no-bumazhnaya	TMSB	tarpaper antitank mine
ящичная мина	ЯМ	yashchichnaya mina	YaM	box mine
противотанковая мина заграждения	ПМЗ	protivotankovaya mina zagrazhdeniya	PMZ	antitank obstacle mine
автомобильная мина (полковника) Старинова	АМС	avtomobil'naya mina (polkovnika) Starinova	AMS	antivehicular mine (designed by) (Col.) Starinov
летучая мина Галицкого	ЛМГ	letuchaya mina Galitskogo	LMG	flying (rocket) mine (designed by) Galitsky
партизанская дорожная мина	ПДМ	partizanskaya doroshnaya mina	PDM	partisan antitransport mine
магнитная дорожная мина	МДМ	magnitnaya doroshnaya mina	MDM	magnetic antitransport mine
осколочно-заградительная мина	ОЗМ	oskolochno-zagraditel'naya mina	OZM	fragmentation obstacle mine
противопехотная осколочная мина заграждения	ПОМЗ	protivopekhotnaya oskolochnaya mina zagrazhdeniya	POMZ	antipersonnel fragmentation obstacle mine
противопехотная мина деревянная	ПМД	protivopekhotnaya mina derevyannaya	PMD	wooden antipersonnel mine
противопехотная мина-7ц (цельный)	ПМД-7ц	protivopekhotnaya mina-7ts (tselyy)	PMD-7ts	wooden antipersonnel mine—model 7, solid block
противопехотная мина картонная	ПМК	protivopekhotnaya mina kartonnaya	PMK	cardboard antipersonnel mine
противопехотная мина металлическая	ПММ	protivopekhotnaya mina metallicheskaya	PMM	metallic antipersonnel mine
		BLASTING CAPS (DETONATORS)		
запал		zapal		ignitor element (fuse, percussion cap and detonator combined)
детонатор	Д	detonator	D	detonator (blasting cap)
капсюль-воспламенитель	КВ	kapsyul'-vosplamenitel'	KV	capsule-igniter (percussion cap)
капсюль-детонатор	КД	kapsyul'detonator	KD	capsule-detonator
капсюль-детонатор № 8	КД № 8	kapsyul'-detonator No. 8	KD No. 8	detonator used in most non-electric blasting assemblies
капсюль-детонатор № 8, ТНРС азид свинца, тетрил	КД № 8, ТАТ	kapsyul'-detonator No. 8, TNRS, azid svintsa, tetril	KD No.8, TAT	capsule-detonator No. 8 (containing TNRS, lead azide & tetryl)

Russian		Transliteration	English	
Terms	Abbreviation	Terms	Abbreviation	Translation or Equivalent
		BLASTING CAPS (DETONATORS)—(cont.)		
капсюль-детонатор № 8, гремучая ртуть, тетрил.	КД № 8 ГРТ	kapsyul'-detonator No. 8, gremuchaya rtut', tetryl.	KD No.8, GRT	capsule-detonator No. 8, (containing) mercury fulminate & tetryl
капсюль-детонатор № 8, ТНРС, азид свинца, гексоген	КД № 8, ТАГ	kapsyul'-detonator No. 8 TNRS, azid svintsa, geksogen	KD No.8,TAG	capsule-detonator No. 8, (containing) TNRS, lead azide, hexogen
механический детонатор	МД	mekhanicheskiy detonator	MD	mechanical detonator (detonator & percussion cap combined)
электро-детонатор	ЭД	elektro-detonator	ED	electric detonator
электро-детонатор мгновенного действия		elektro-detonator mgnovennogo deystviya		instantaneous electric detonator
электродетонатор замедленного действия		elektrodetonator zamedlennogo deystviya		delayed-action electric detonator
		EXPLOSIVES		
взрывчатые вещества	ВВ	vzryvchatye veshchestva	VV	explosive substances (explosives)
инициирующие взрывчатые вещества	ИВВ	initsiiruyushchie vzryvchatye veshchestva	IVV	initiating explosives
бризантные взрывчатые вещества	БВВ	brizantnye vzryvchatye veshchestva	BVV	brisance (high) explosives
метательные взрывчатые вещества (пороха)	МВВ (П)	metatel'nye vzryvchatye veshchestva (porokha)	MVV(P)	propellant explosives (powder)
пиротехнические составы		pirotekhnicheskie sostavy		pyrotechnic mixtures
гремучая ртуть	ГР	gremuchaya rtut'	GR	mercury fulminate (an IVV)
азид свинца	А (АС)	azid svintsa	A (AS)	lead azide (an IVV)
тринитрорезорцинат свинца (стифнат свинца)	ТНРС	trinitrorezortsinat svintsa (stifnat svintsa)	TNRS	trinitroresorcinate of lead (lead styphnate)—(an IVV)
тетразен		tetrazen		tetrazen (an IVV)
		HIGH EXPLOSIVES		
нитроглицерин		nitroglitserin		nitroglycerine
тэн (пентрит)	Тэн	ten (pentrit)	Ten	penthrite
пироксилин		piroksilin		pyroxyline
коллоксилин		kolloksilin		coloxyline
тротил, тол, тнт	Тол, ТНТ	trotil, tol, TNT	Tol, TNT	trotyl, tol, TNT
мелинит, пикриновая кислота, тринитрофенол	Мел	melinit, pikrinovaya kislota, trinitrofenol	Mel	melinite, picric acid, trinitrophenol
тетрил	Т	tetril	T	tetryl
ксилил (тринитроксилол)		ksilil (trinitrokslil		xylyl (trinitroxylyl)
Динитробензол		dinitrobenzol		dinitrobenzol
Динитронафталин		dinitronaftalin		dinitronapthaline
гексоген	Г	geksogen	G	hexogen
Динамиты		dinamity		dynamites
гремучий студень		gremuchiy studen'		jellied fulminate
гризутки		grizutin		grisutine
селитра калиевая		selitra kalievaya		potassium nitrate
аммонийноселитренные		*ammoniynoselitrennye*		ammonium nitrates
аматолы		amatoly		amotals
аммоналы		ammonaly		ammonals
аммоксил		ammoksil		ammoxyl
аммониты		ammonity		ammonites

Russian		Transliteration	English	
Terms	Abbreviation	Terms	Abbreviation	Translation or Equivalent
		High Explosives—(cont.)		
аммонпек		ammonpek		ammonpek
динафталиты		dinaftality		dinapthalites
"шнейдерит"		"Shneyderit"		"Shneiderite" (a dinaphthalite)
динамоны		dinamony		dinamones
беллит		bellit		bellite
маисит		maisit		maisite
гудронит		gudronit		gudronite
оксиликвиты		oksilikvity		oxyliquites
хлоратит		khloratit		chloratite
перхлоратит		perkhloratit		perchloratite
		Propellants		
дымный порох (черный)		dymnyy porokh (chernyy)		smoke powder (black powder)
бездымный порох		bezdymnyy porokh		smokeless powder
пушечный пироксилиновый порох		pushechnyy piroksilinovyy porokh		pyroxyline powder for artillery shells
баллистит		ballistit		ballistite
кордит		kordit		cordite
		Pyrotechnic mixtures		
зажигательные составы		zazhigatel'nye sostavy		incendiary mixtures
осветительные составы		osvetitel'nye sostavy		illuminating mixtures
сигнальные составы		signal'nye sostavy		signal mixtures (for flares)
трассирующие составы		trassiruyushchie sostavy		tracer mixtures (for tracer bullets)
		MINE DETECTORS		
щуп		shchup		probe
миноискатель		minoiskatel'		mine detector
стетоскоп		stetoskop		stethoscope (for detecting clockwork electrical fuzes)
винтовочный миноискатель	ВИМ	vintovochnyy minoiskatel'	VIM	rifle-mounted mine detector
		Mine Laying Equipment		
координатный шнур		koordinatyy shnur		coordinating cord (mine-spacing cord)
		Mine Clearing Equipment		
носимый комплект для разминирования		nosimyy komplekt dlya razminirovaniya		demining kit
каток		katok		roller
трал		tral		drag
кошка		koshka		grapnel (claws; literally "eats")
		Relative Terms		
опасно		opasno		dangerous
безопасно		bezopasno		safe
верх		verkh		top
низ		niz		bottom

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