

BRITISH
ROCKETS AND FUZES



15 JULY 1945

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INTRODUCTION

GENERAL: The development of rocket-type ammunition was begun by the British several years prior to the entrance of Great Britain into World War II. As early as 1936 experiments were begun in the field of rocketry. It was felt that, though experimentation should proceed in all types of rocket weapons, the development of a satisfactory anti-aircraft weapon should be given the greatest emphasis. Anti-aircraft rockets, though far less accurate than artillery, none the less were inexpensively made and could be manufactured in quantities sufficient to allow complete saturation of a defensive area.

Accordingly, in 1940 when the German "blitz" began, two anti-aircraft rocket weapons were introduced into service use, the 2" U.P. (2-inch "Unrotated Projectile") and the 3" U.P. These consisted of high explosive heads fitted to a standard type, fin-stabilized rocket motor, and fuzed with impact or pyrotechnic aerial burst fuzes.

At about the same time, a 5" Chemical rocket, the 5" U.P., was adopted for land service use. The rocket proved to have few profitable uses and was turned over to the British Navy. The Navy manufactured a high explosive, a smoke, and an incendiary shell for the rocket, mounted the launcher on a converted landing craft, and used it for beach barrage purposes, christening it the "Sea Mattress".

Not much later, a novel type anti-aircraft defense was developed in the "Wire Barrage" or "Aerial Mine Field" apparatus. This device was propelled or towed by a standard rocket motor. Its function was to suspend from a parachute a steel cable or a long length of piano wire with a small H.E. bomb attached. The apparatus served to break up an aircraft, if it struck the wire or cable, or to cause the aircraft to take evasive action and thus leave its target run. This type of apparatus was found to be particularly effective for defense of merchant ships against low-level or dive-bombing aircraft.

Developments in other fields of rocketry included aircraft rockets for attacks against armored vehicles, merchant shipping, and submarines. More recently an assault rocket for infantry use and a land barrage rocket, designed as a medium range artillery support weapon, have been introduced.

STABILIZATION: Though all British service rockets are designed solely for fin stabilization, more recent types incorporate fins of greatly reduced surface. To decrease the amount of dispersion caused by venturi variations, spiral rails have been fitted to the inside of the launcher barrel. The short fins engage these rails and impart a spin of about 800-900 r.p.m. to the rocket. However, this is not spin-stabilization in the accepted sense of the term.

PROPELLANT: The British rocket program was aided in its early stages by the ready availability in large quantities of a good and relatively inexpensive rocket propellant. The British have long employed a type of cordite as their principal projectile propellant charge, and solventless extruded cordite proved remarkably adaptable to rocket use. Solventless cordite, identified by the code letters "S.U.", is a double base powder consisting of 41.5% nitroglycerine, 49.5% nitrocellulose, and 9.0% carbamate, as a stabilizer. Flashless cordite is obtained by adding potassium cryolite. Flashless charges are identified by the symbol "/X." added to the propellant code letters.

Several different propellant shapes have been designed by the British, always in an attempt to gain the most efficient burning of the propellant. The charge shapes and identifying symbols are as follows:

<u>PROPELLANT SHAPE</u>	<u>SYMBOL</u>
Tubular, drilled	/D.
Tubular, slotted	/S.
Tubular, slotted & grooved	/S.G.
Cruciform	/X.
Cogged	/C.

These code letters and symbols will be found stencilled on all rocket motors, giving a complete description of the propellant grain used. Thus the letters "S.U./k./X." would indicate a cruciform grain of flashless solventless cordite; the letters "S.U./S.G.", a tubular grain of solventless cordite, slotted and grooved; etc.

The standard ignition mechanism for British rockets consists of an electric squib (Fuze, Electric, No. F 53), inserted in a paper tube or metal cylinder, which also contains a quantity of igniting composition. The composition comprises magnesium, potassium nitrate, and a small amount of acaroid resin as a stabilizer. The igniter is generally fitted into castellations cut in the head of the propellant grain.

INTRODUCTION

(Cont'd.)

NOMENCLATURE: British rocket nomenclature differs somewhat from that employed by U.S. forces. British and American equivalents follow:

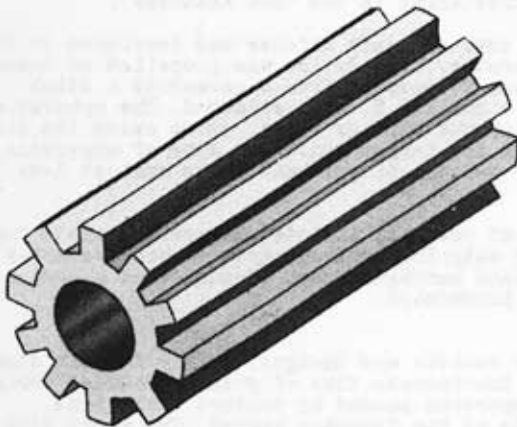
BRITISH

- *1. Tail Propelling.
- 2. Shell - with H.E., Smoke, Chemical, or Incendiary filling.
Head - flares, targets, etc.
- Shot - solid steel bodies.
- 3. Venturi.
- 4. Drum.
- 5. C.E.

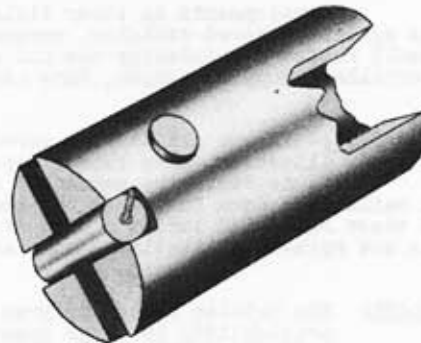
AMERICAN

- 1. Rocket Motor.
- 2. Body.
- 3. Nozzle.
- 4. Shroud.
- 5. Tetryl.

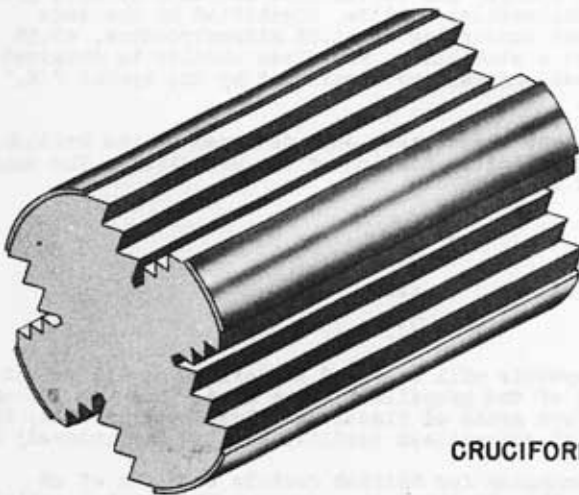
* Note: Tail Propelling is the original British nomenclature. It has been recently proposed by the British to revise their nomenclature, using the term Rocket Motor. Where applicable, the proposed new nomenclature has been included in the discussion of the individual rocket motors.



COGGED CHARGE



TUBULAR CHARGE AND IGNITER



CRUCIFORM CHARGE

PROPELLANT GRAINS

SECTION NO. 1



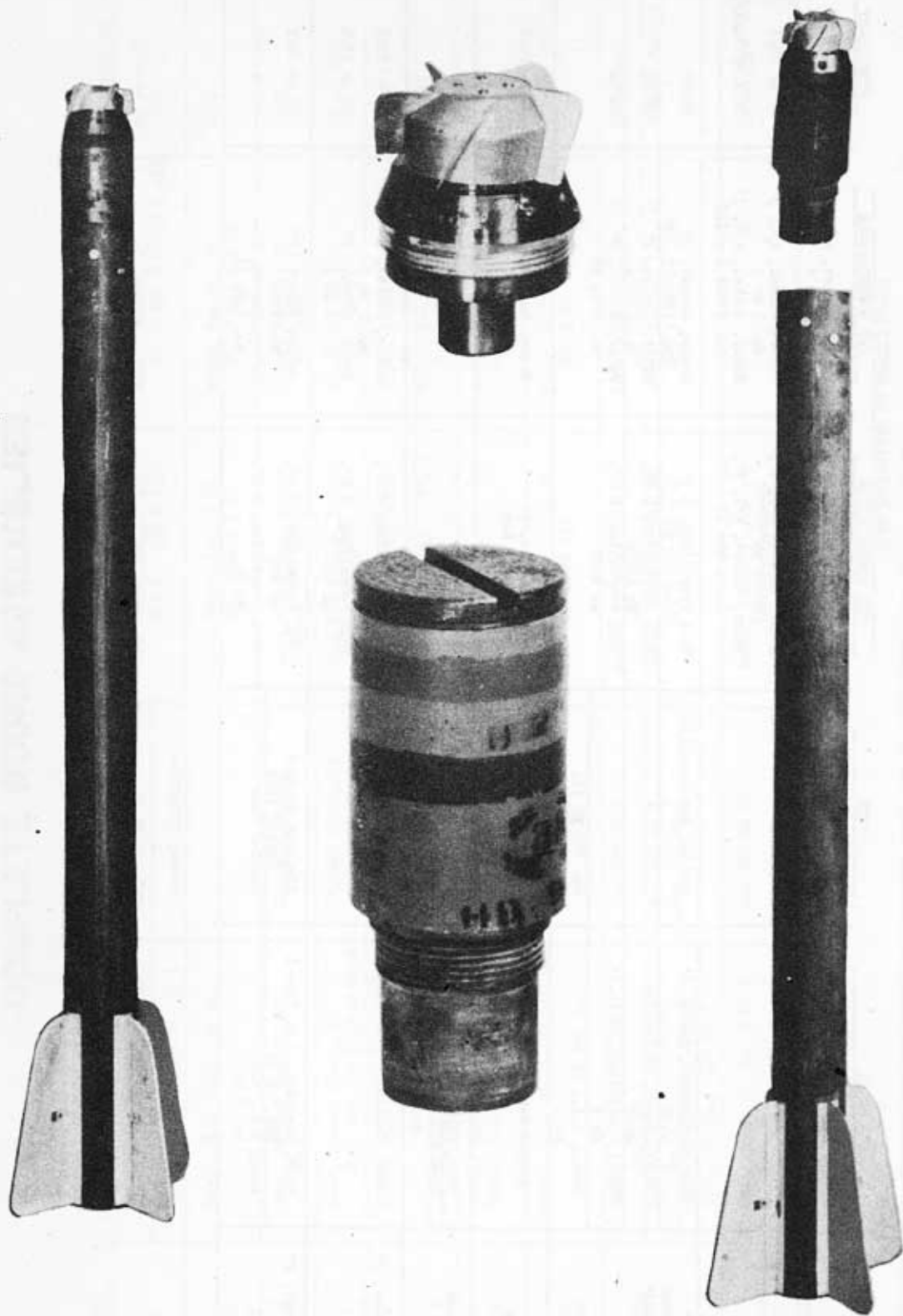
Rocket
ASSEMBLIES

CONFIDENTIAL

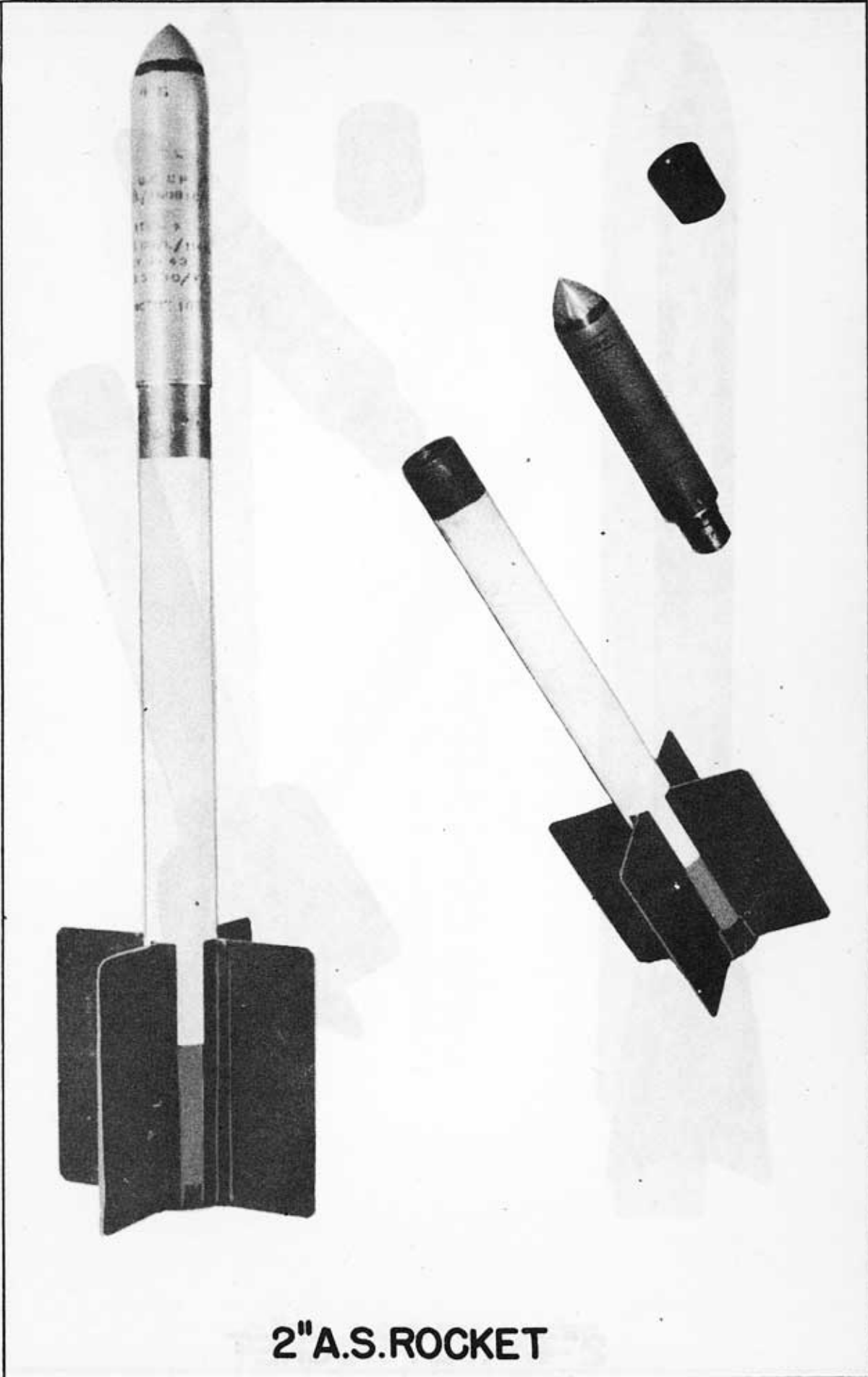
COMPLETE ROUND ASSEMBLIES

ROCKET ASSEMBLY	SHELL	FUZE	TAIL PROPELLING OR ROCKET MOTOR		PROPELLANT
			OLD NOMENCLATURE	NEW NOMENCLATURE	
1. U.P. 2" Anti-Aircraft Rocket	Shell, H.E. 2", Mks I & II	No. 720 Mk IV	Tail Propelling, U 2", Mks I - III & VII	Motor, Rocket, 2" No. 1 Mks I - III & VII	SU or SU/K
	Shell, Smoke Trace 2", Mk I	Thermal Initiator			
2. U.P. 2" Anti-Submarine Rocket	Shell, H.E. 2.45", 10 lb.		Tail Propelling, U 2", A/S, Mks I & II	Motor, Rocket, 2" No. 5 Mks I & II	SU/C
3. 2" Target Rocket	Head, Rocket Target, 2" Mk I	Special Igniter	Tail Propelling, Rocket Target, 2", Mks I & II	Motor, Rocket, 2" No. 4 Mks I & II	SU/C
4. 2" Flare Rocket	Head, Rocket Flare, 2" No.1 Mks I & II, No.2 Mk I	Thermal Initiator	Tail Propelling, Rocket Flare, 2", Mk VI	Motor, Rocket, 2" No. 1 Mk VI	SU or SU/K
5. U.P. 3" Anti-Aircraft Rocket	Shell, H.E. 3", No. 1 Mk I	No. 700 Mks I - III No. 730 Mk I No. 731 Mk I	Tail Propelling, U 3", Mk I	Motor, Rocket, 3" No. 1 Mk I	SU or SU/D SU/K or SU/K/D
	Shell, H.E. 3", No. 2 Mk I	No. 701 Mk I	Tail Propelling, U 3", Mk II	Motor, Rocket, 3" No. 2 Mk I	SU/K/X
6. 3" Assault Rocket "LILLO"	Shell, H.E. 3", No. 5 Mk I Shell, H.E. 3", No. 6 Mk I	No. 297 Mk I	-----	Motor, Rocket, 3" No. 7 Mk I	SU/C or SU/K/C
7. 3" Barrage Rocket "LAND MATTRESS"	Shell, H.E. 29 lb. 3", Mk I	No. 721 Mk I (with spoilers)	Motor, Rocket, A/C, 3", No. 1 Mk III	Motor, Rocket, A/C, 3" No. 5 Mk II	SU/X or SU/K/X
8. 3" Aircraft Rocket	Shell, H.E. 60 lb., "F" No. 1 Mk I	No. 899 Mk I	Motor, Rocket, A/C, 3", No. 1 Mk I	Motor, Rocket, A/C, 3" No. 1 Mk I	SU or SU/K
	Shell, H.E. 60 lb., "SAP" No. 2 Mk I	No. 865 Mk I No. 878 Mk I	Motor, Rocket, A/C, 3", No. 1 Mks II - IV	Motor, Rocket, A/C, 3" No. 5 Mks I - III	SU/X or SU/K/X
	Shot, 25 lb., "SAP" Mk I Shot, 25 lb., "AP" Mk I				
9. 3" Aircraft Rocket (Air-to-Air)	Shell, H.E. 3", No. 2 Mk I	No. 720 Mk IV	Motor, Rocket, A/C, 3", (Sunflower-Seed) Mks I & II		SU or SU/K

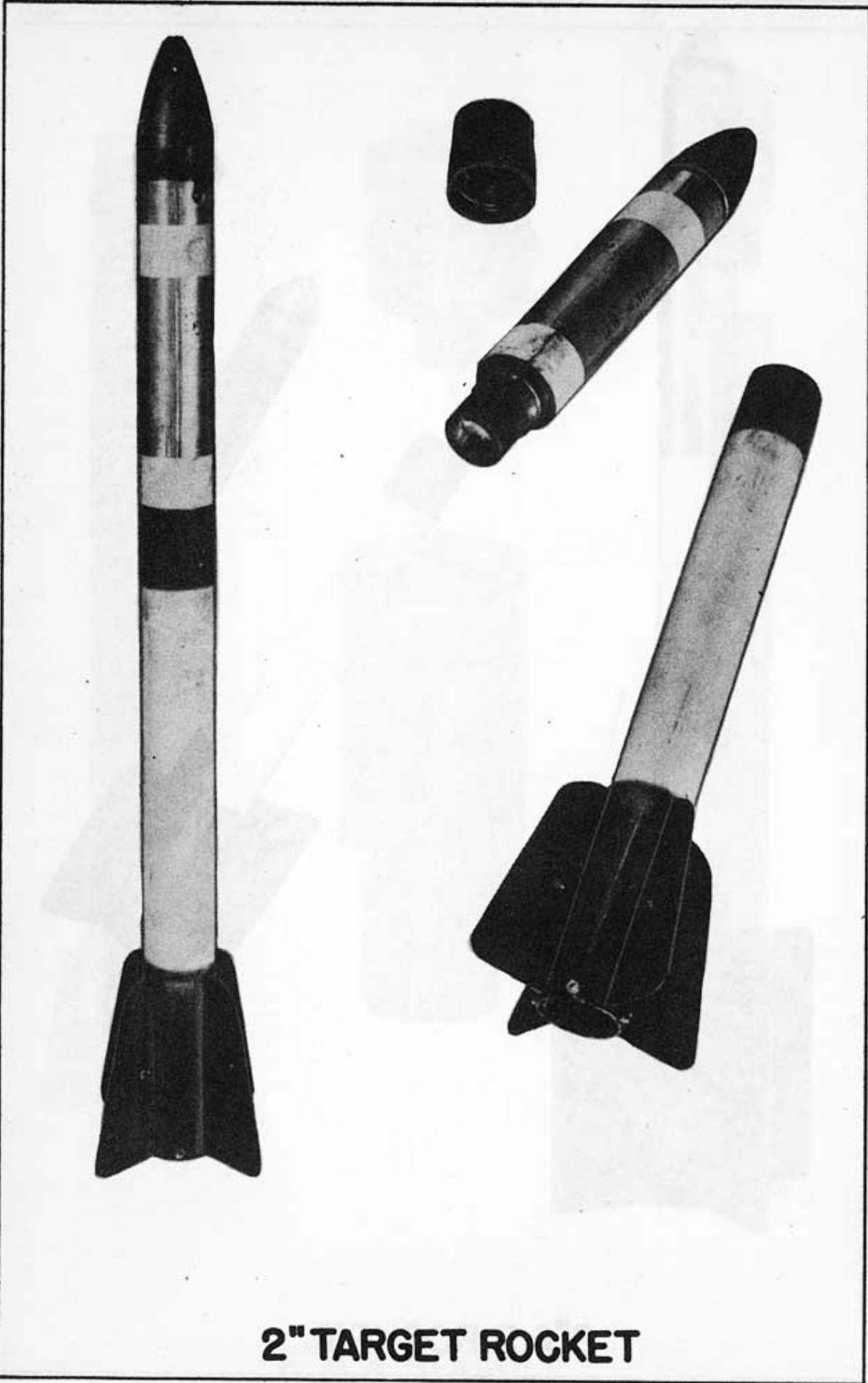
ROCKET ASSEMBLY	SHELL	FUZE	TAIL PROPELLING OR ROCKET MOTOR		PROPELLANT
			OLD NOMENCLATURE	NEW NOMENCLATURE	
10. 3" Aircraft Rocket Flare	Head, Rocket Flare, A/C, 3" Mk I (Glow-Worm)	Special Igniter	Motor, Rocket, A/C, 3", (Rocket Flare) Mk I Motor, Rocket, A/C, 3", No. 1 Mk I Motor, Rocket, A/C, 3", No. 1 Mks II - IV	Motor, Rocket, A/C, 3" No. 4 Mk I Motor, Rocket, A/C, 3" No. 1 Mk I Motor, Rocket, A/C, 3" No. 5 Mks I - III	SU or SU/K SU/X or SU/K/X
11. U.P. 5" Barrage Rocket "SEA MATTRESS"	Shell, Chemical, 30 lb. 5" Mk I	No. 721 Mks I - III	Tail Propelling, U 5", Mks I - V	Motor, Rocket, 5" No. 1 Mks I - V	SU/SG
	Shell, Smoke, 29 lb. 5" Mk I		Tail Propelling, U 5", Mk III/N	Motor, Rocket, 5" No. 2 Mk I	SU/SG
	Shell, Incendiary, 25 lb. 5" Mk I		Tail Propelling, U 5", Mk VI/N	Motor, Rocket, 5" No. 2 Mk II	SU/SG
	Shell, H.E., 29 lb. 5" Mk I	No. 722 Mk III			
12. 5" Cordtex Net	Cordtex Net (Obsolete)		Motor, Rocket, 5" Cordtex Net Mk I	Motor, Rocket, 5" No. 3 Mk I	SU or SU/K
13. Wire Barrage A.D. Type B Mk I	Head, Canister, A.D. Type B	Thermal Initiator	Special Motor		SU/K
	Bomb H.E., A.A.D. No. 2 Mk I	Special Fuze			
14. Wire Barrage, 2" A.D. Type J Mks I & II	Head, Canister, A.D. Type J	Thermal Initiator	Tail Propelling, U 2", Mk IVA	Motor, Rocket, 2" No. 2 Mk I	SU or SU/K
			Tail Propelling, U 2", Mk VA	Motor, Rocket, 2" No. 2 Mk II	SU or SU/K
15. Wire Barrage, 2" A.D. Type L Mks I & II	Head, Canister, A.D. Type L Mks I & II	Electric Squib & Safety Fuse	Tail Propelling, U 2", Mk IVB	Motor, Rocket, 2" No. 3 Mk I	SU or SU/K
	Bomb, H.E., A.A.D. No. 8 Mk I	Special Fuze	Tail Propelling, U 2", Mk VB	Motor, Rocket, 2" No. 3 Mk II	SU or SU/K



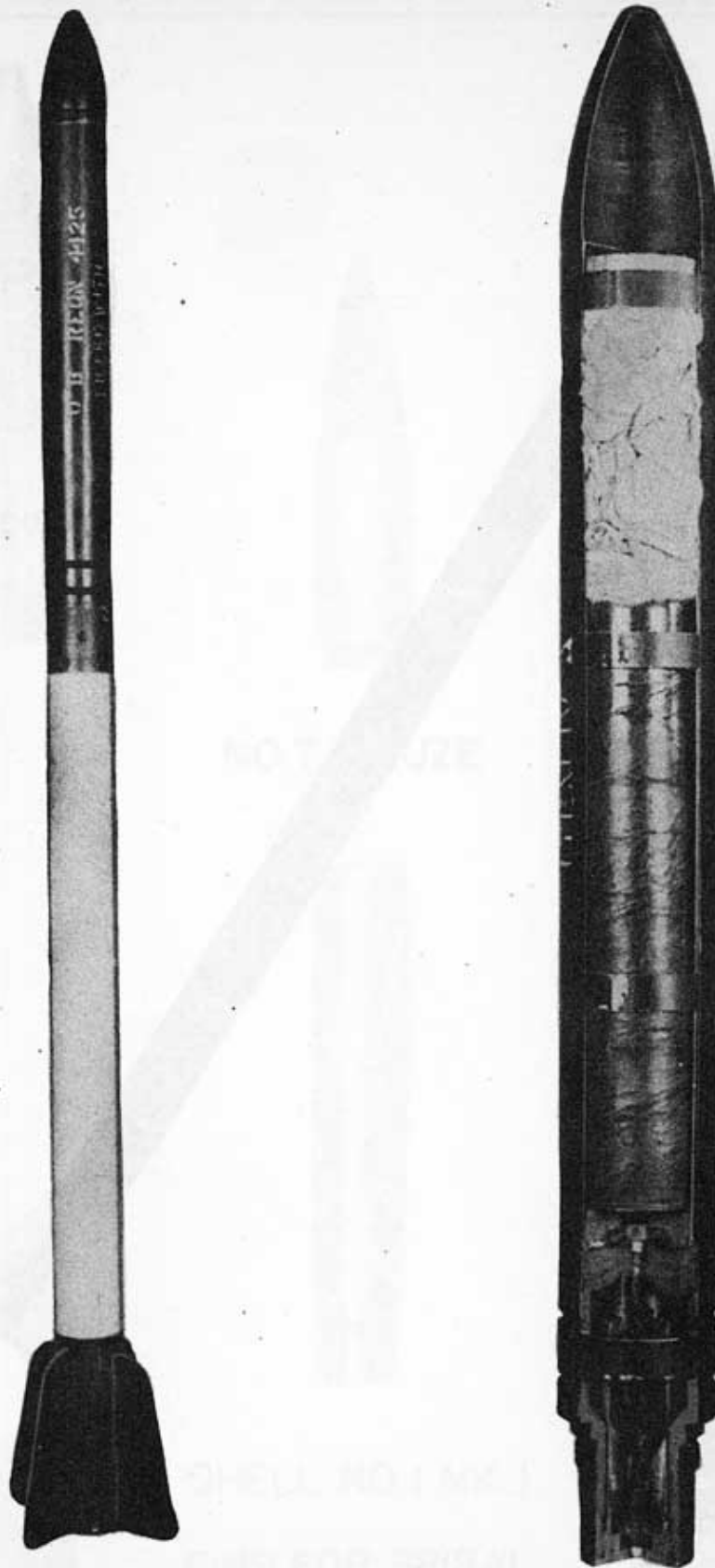
2" A.A. ROCKET



2" A.S. ROCKET



2" TARGET ROCKET



2" FLARE ROCKET



NO. 700 FUZE

SHELL NO. 1 MK. I

3" A.A. ROCKET



NO.731 FUZE



SHELL NO.1 MK.1

FINS FOR SPIRAL PROJECTOR



3" A.A. ROCKET

SHELL NO.5 MK.1

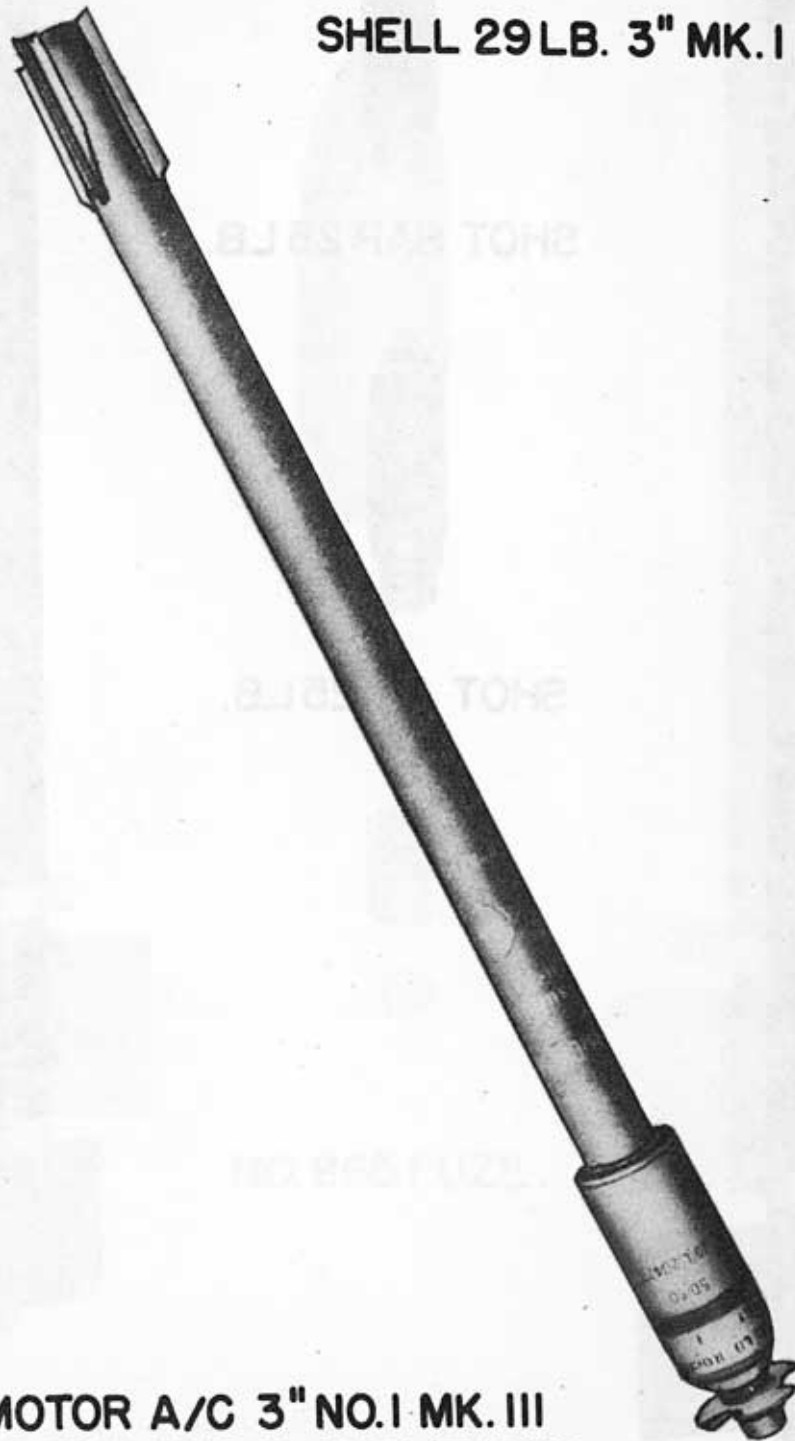
SHELL NO.6 MK.1



MOTOR NO.7 MK.1
FINS FOR SPIRAL PROJECTOR

3" ASSAULT ROCKET "LILO"

SHELL 29LB. 3" MK. I



MOTOR A/C 3" NO. I MK. III
FINS FOR SPIRAL PROJECTOR

3" BARRAGE ROCKET "LAND MATTRESS"



SHOT SAP 25 LB.

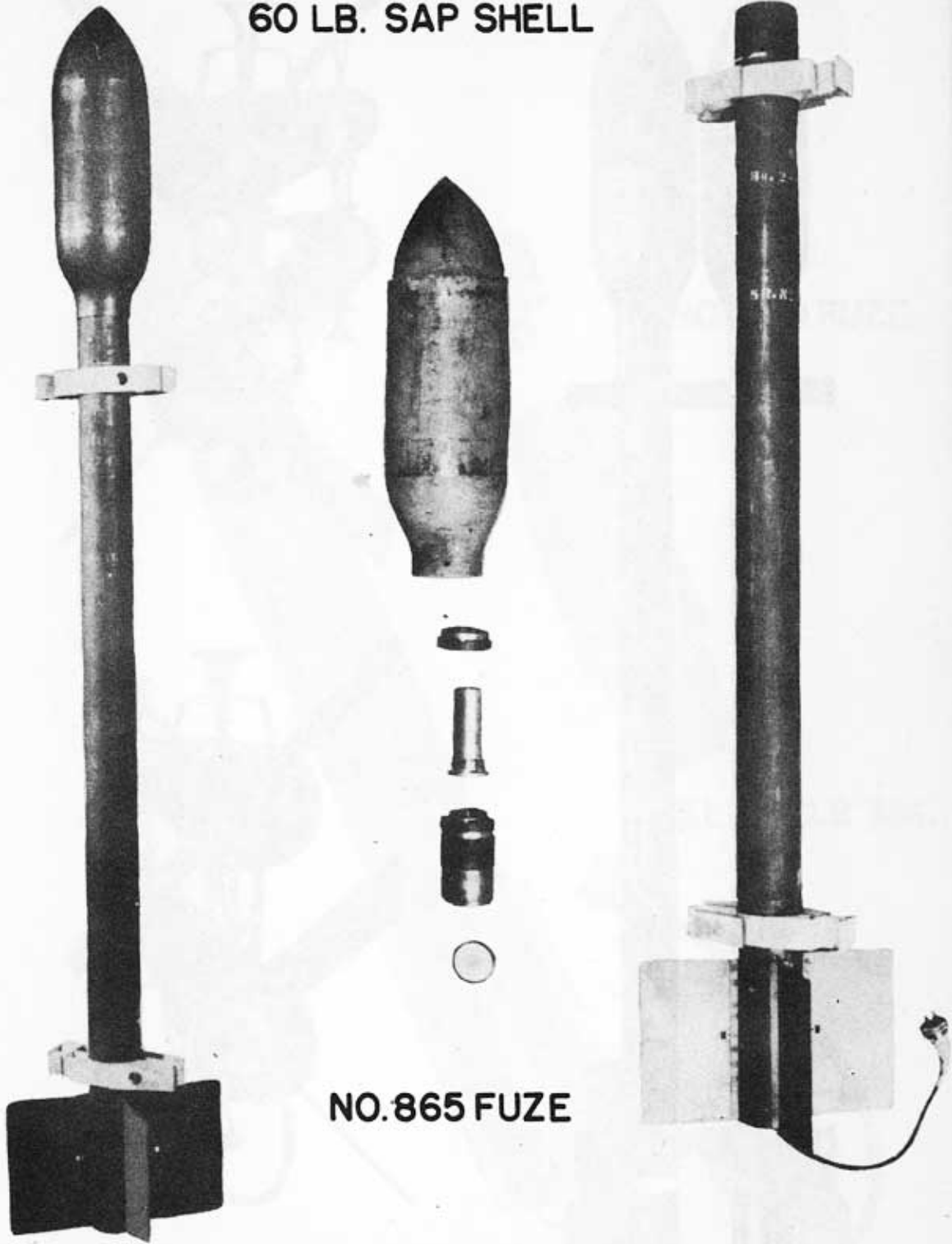


SHOT AP 25 LB.



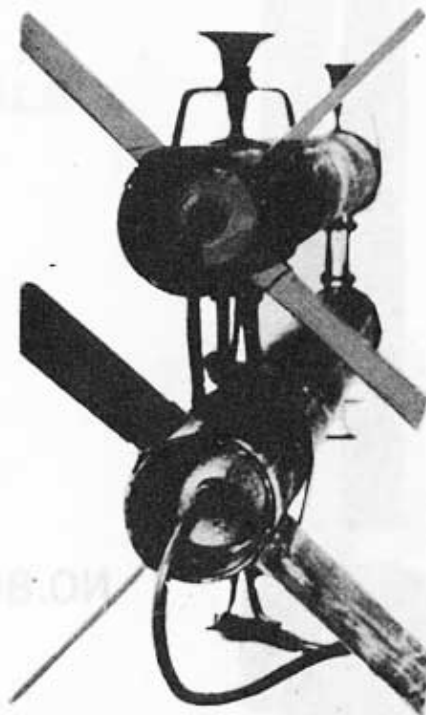
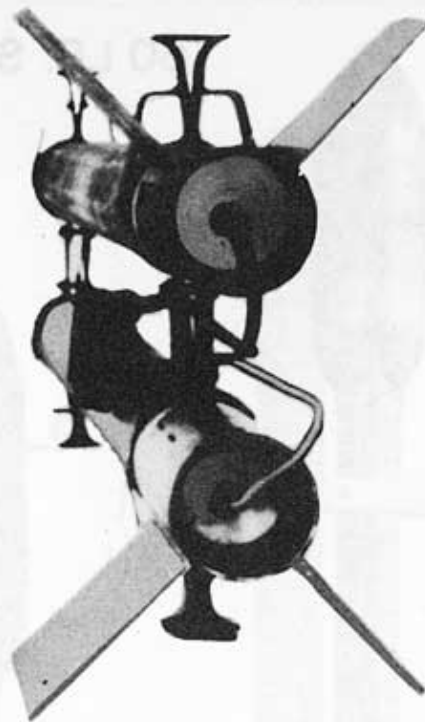
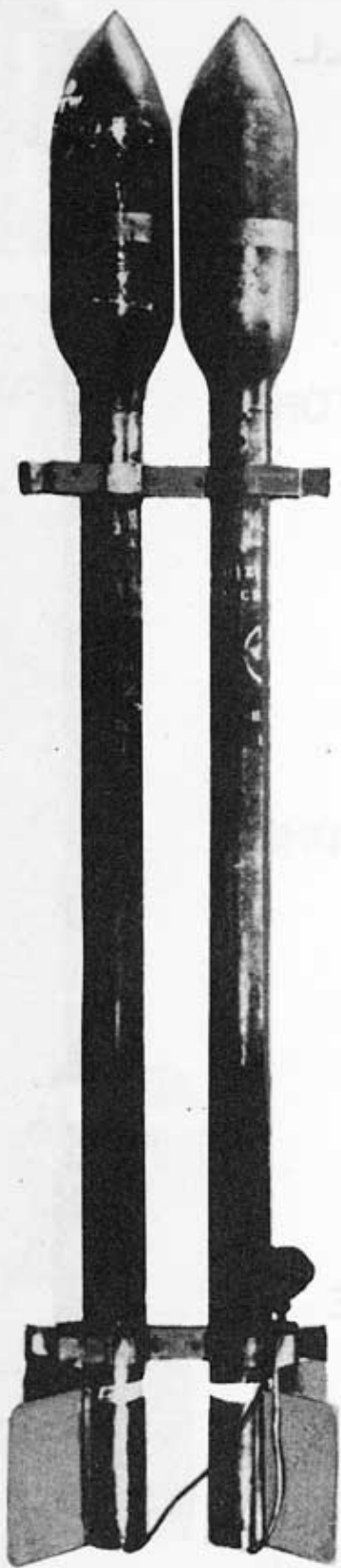
3" A/C ROCKET

60 LB. SAP SHELL



NO. 865 FUZE

3" A/C ROCKET



DUPLEX SADDLE

3" A/C ROCKET

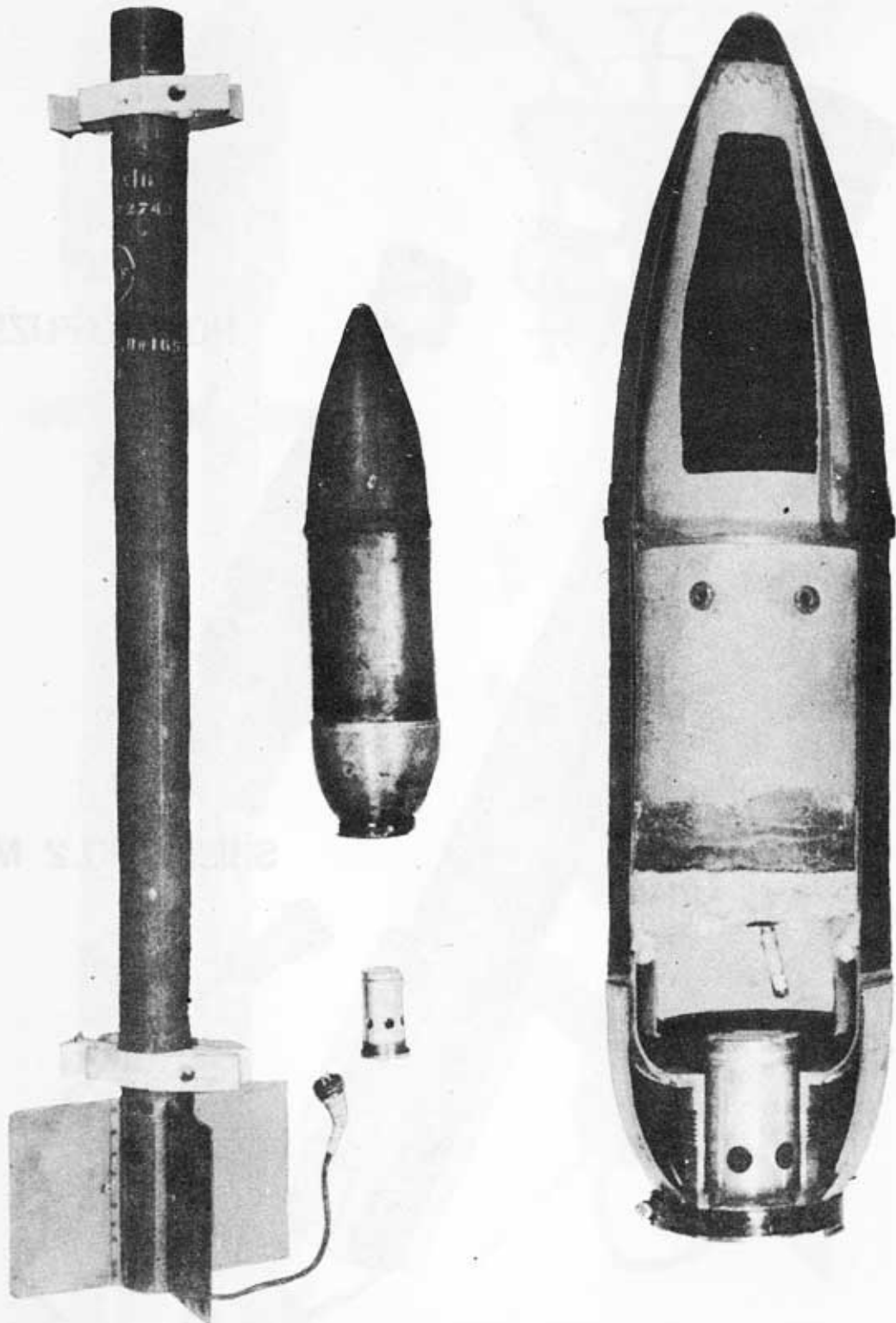


NO. 720 FUZE

SHELL NO. 2 MK. I

SUNFLOWER SEED MOTOR

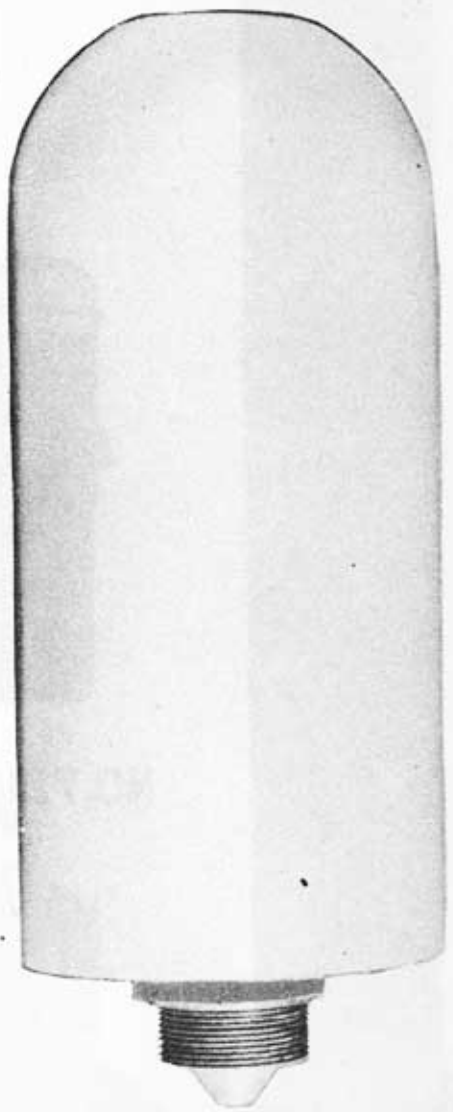
3" A/C ROCKET (AIR TO AIR)



3" A/C ROCKET FLARE



NO. 722 FUZE

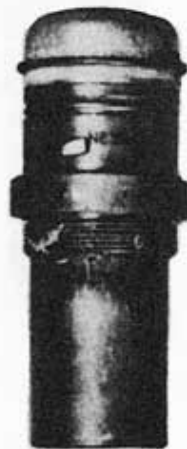
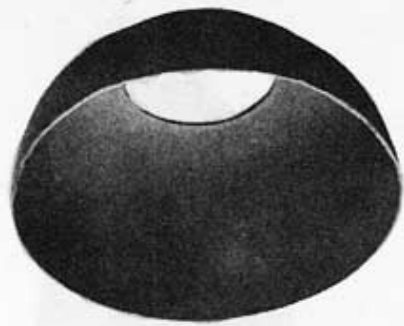


29 LB. H.E. SHELL

5" BARRAGE ROCKET "SEA MATTRESS"



NOSE FAIRING

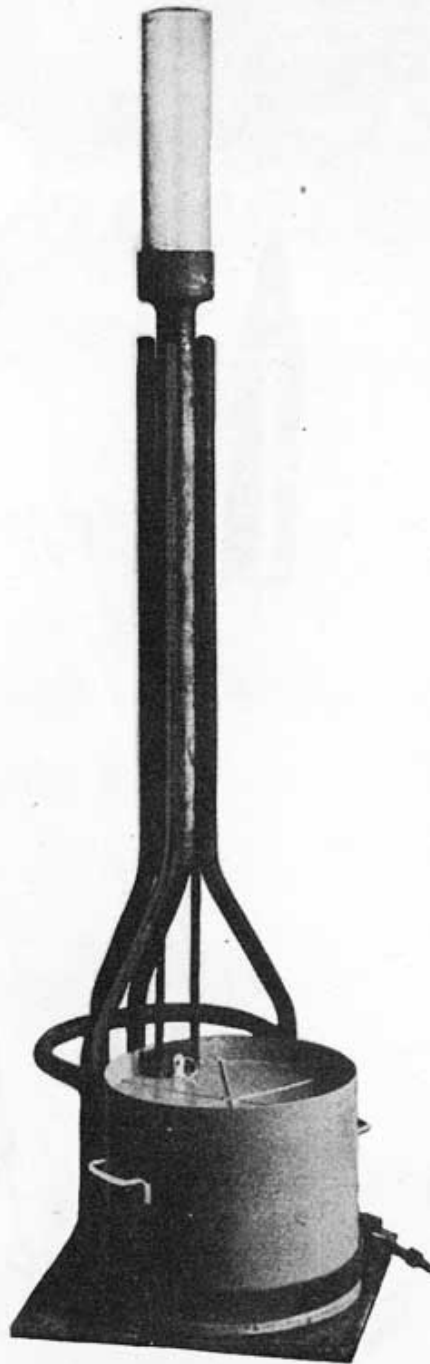


NO. 721 FUZE

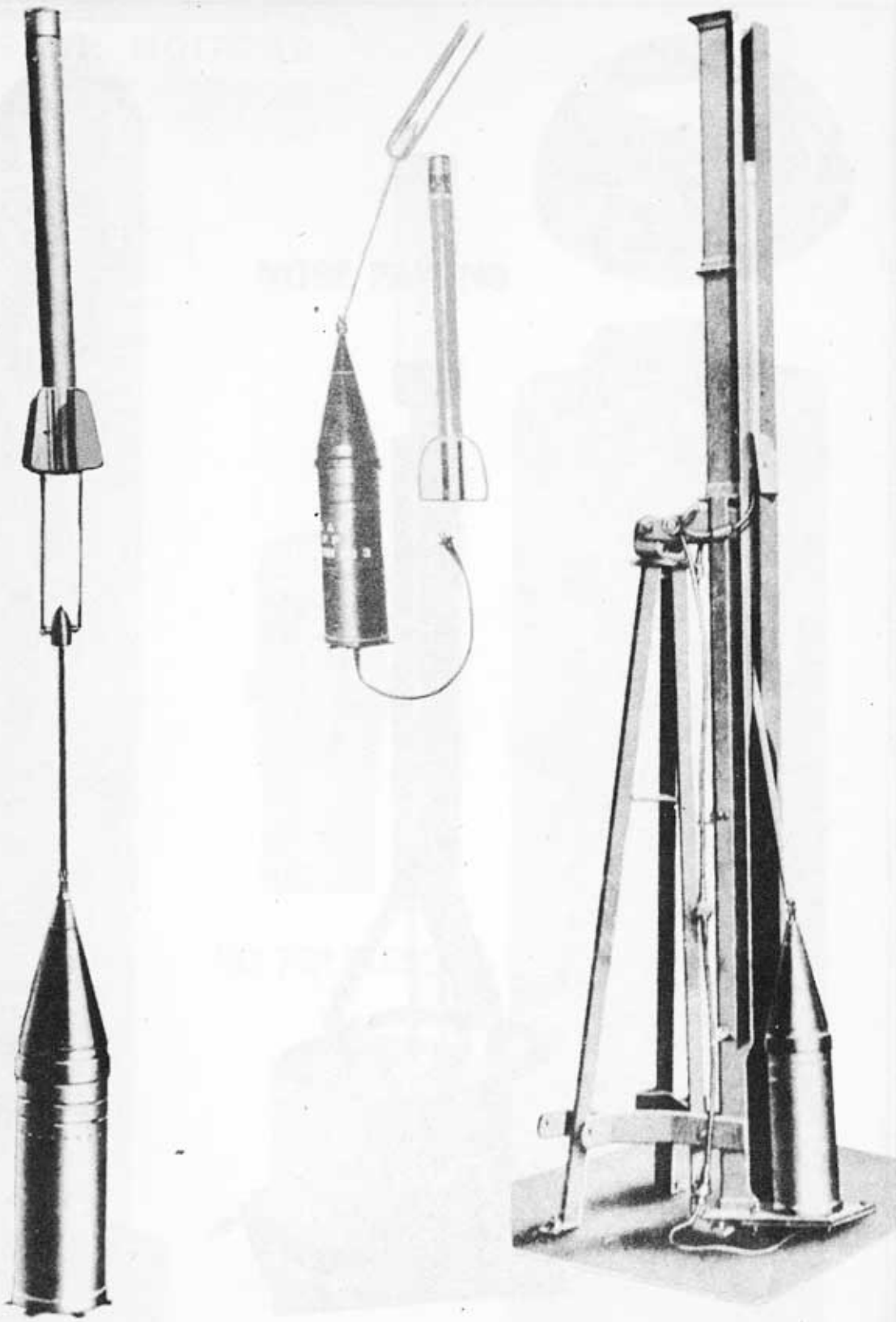


30 L.B. CHEMICAL SHELL

5" BARRAGE ROCKET "SEA MATTRESS"



A.A.D. TYPE J 2" WIRE BARRAGE

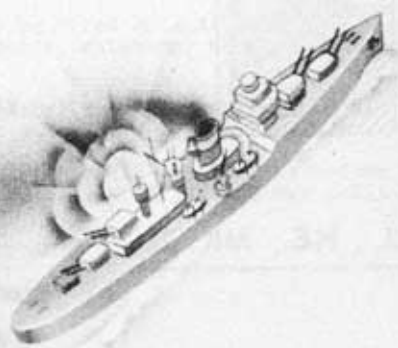
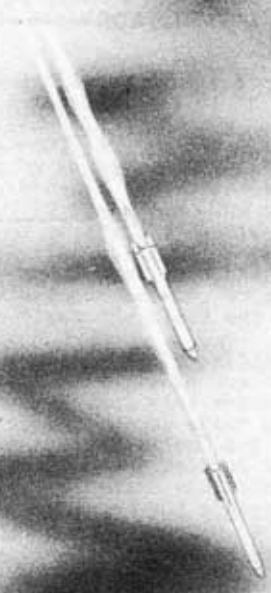


A.A.D. TYPE L 2" WIRE BARRAGE.

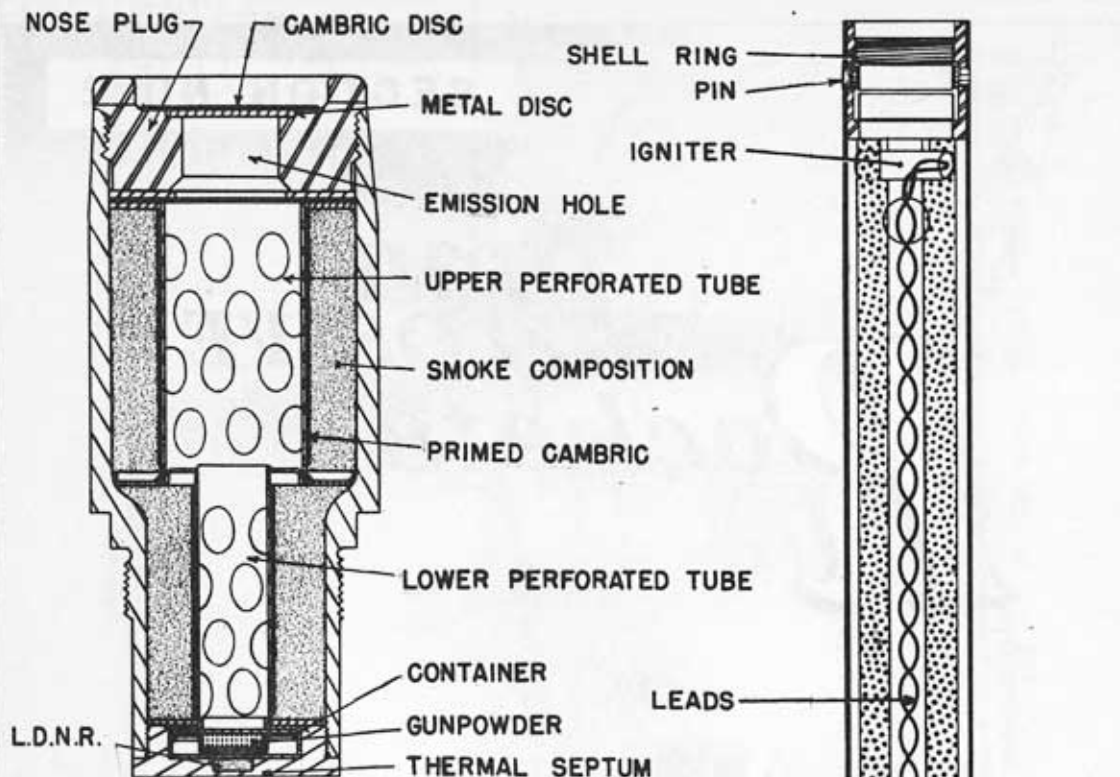
SECTION NO. 2



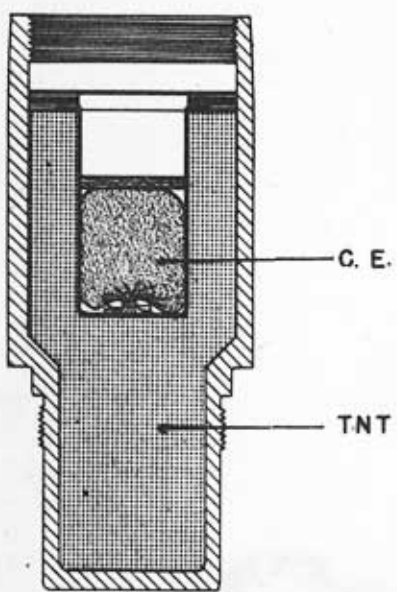
**HIGH
EXPLOSIVE**
Rockets



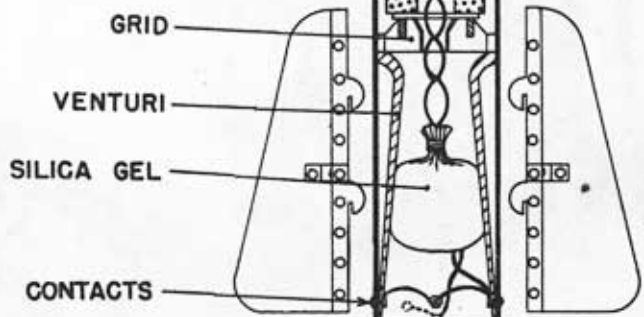
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SHELL, SMOKE TRACE, MK. I



SHELL, H.E., MK. II



MOTOR NO. I MK. III

2" ANTI-AIRCRAFT ROCKET

CONFIDENTIAL

BRITISH ROCKET

<u>SHELLS</u>	<u>H.E.</u>	<u>SMOKE TRACE</u>
OVERALL LENGTH	5.25 in.	5.5 in.
DIAMETER	2.25 in.	2.25 in.
TOTAL WEIGHT	2.5 lbs.	
FUZES USED	No. 720	Thermal Initiator
FILLING	T.N.T.	Smoke "P.N.83(M)"
FILLING WEIGHT	9 oz.	5.6 oz.

**2" U.P.
ANTI-AIRCRAFT**

(Service)

<u>TAIL PROPELLING, U-2", MKS I-III & VII</u>	
OVERALL LENGTH	31 in. (approx)
DIAMETER	2.25 in.
WIDTH OF FINS	2.375 in.
TOTAL WEIGHT	7.50 lbs.
PROPELLANT	Cordite, tubular
PROPELLANT WEIGHT	2.5 lbs.
BURNING TIME	0.9 secs. at 60° F.

GENERAL:

This rocket is designed for shipboard use against aircraft in close range attack. Because of the possible danger to adjacent craft resulting from spent rounds, the H.E. shell is fitted with a self-destroying fuze. The components of the complete round include a fuzed Shell H.E. 2", Mks I or II; a Shell Smoke Trace 2", Mk I; and a Tail Propelling, 2", Mks I-III and VII, complete with fin assembly.

DESCRIPTION:

Shell H.E. 2", Mks I & II: This shell is a normal H.E. type, internally threaded at the nose to receive the fuze, and threaded externally at the base to screw into the shell ring of the rocket motor. The Mk I shell, having 12 external threads per inch, will fit only the Mk I motor. The Mk II shell is machined with 14 threads per inch and will fit all other motors. The shell is painted buff overall, with a 1/2" red band painted around the nose portion of the shell and a 1/2" green band painted around the body. The initials of the filling are stencilled in black on the green band.

Shell Smoke Trace 2", Mk I: This shell consists of an H.E. Mk II shell body, modified by drilling and tapping the base of the shell. A nose plug is threaded into the forward end of the shell and is centrally drilled to allow smoke emission. The drilled hole is closed by a thin metal disc and a cotton cambric disc. Separated from the nose plug by two millboard washers are upper and lower perforated tubes surrounded by primed cambric. The smoke filling is loaded around these tubes in two increments. Beneath the lower perforated tube is located a metal container filled with 7 grains of G.20 gunpowder. The after end of the shell is closed by a threaded thermal septum of accurately machined thickness, in the center of which are pressed 2½ grains of LDNR. The shell is painted light green overall, with two 1/2" red bands painted around the body. Heat from the rocket motor initiates the LDNR, firing the gunpowder charge and primed cambric, which initiates the smoke composition. The gunpowder explosion also blows the discs out of the nose plug of the shell.

Tail Propelling, U-2", Mks I-III & VII: The motor consists of a welded steel cylinder, in the head of which a threaded shell ring is attached by means of spring-locked pins which engage corresponding holes in the motor body. A venturi tube is welded in the after end of the motor body. The tubular cordite grain is castellated at the forward end and rests in the motor body supported by a metal grid at the after end. The propellant is initiated by an electric igniter placed in the castellations at the forward end. (The Mk VII differs from the other motors in that the castellations are omitted and a cylindrical metal cased igniter is employed.) The tail orifice is sealed by a cardboard, plastic, or metal closing disc, and a silica gel bag is included as a moisture-proofing measure.

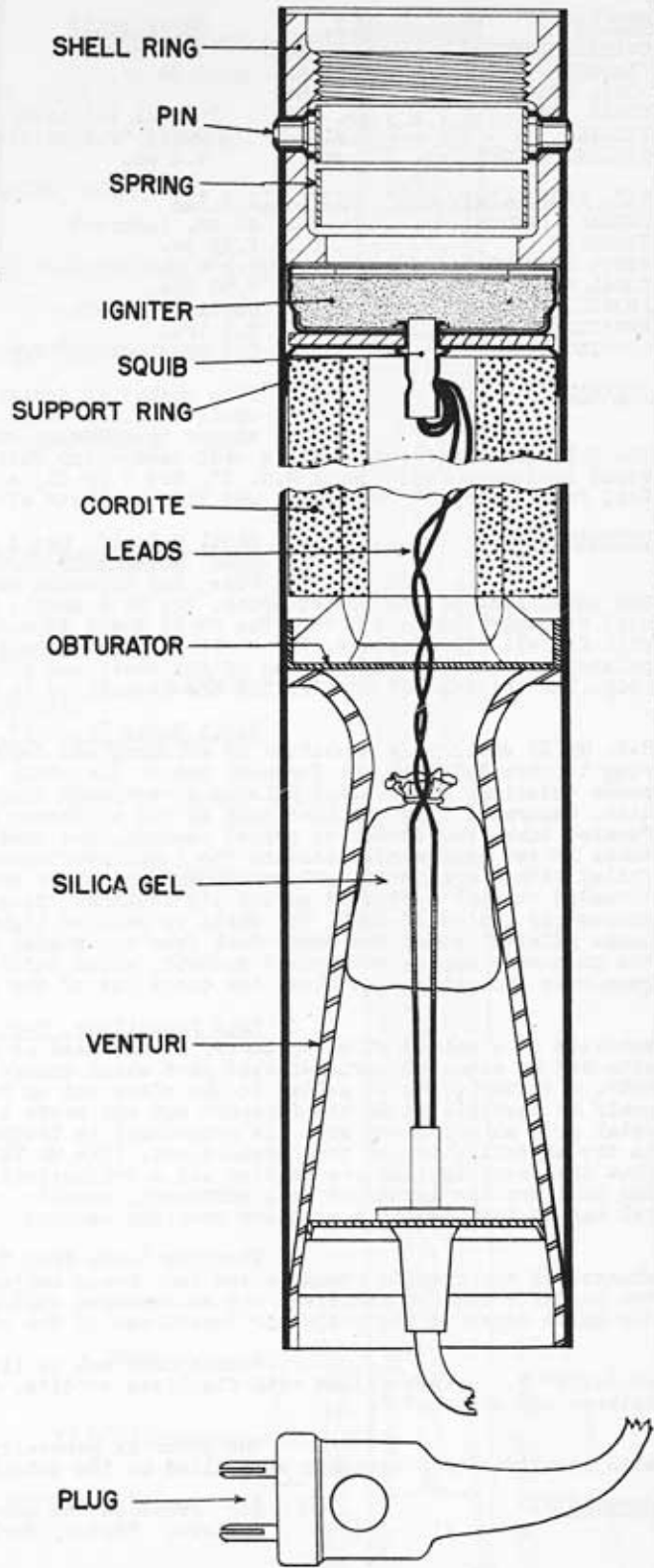
Electric leads from the igniter pass through the central channel of the cordite grain to the four brass contacts on the tail. These contacts, two positive and two negative, are so arranged that proper contact is maintained with the knife edges on the projector regardless of the angle at which the round is loaded.

Rounds must not be fired outside of the temperature range of 0-120° F., unless filled with flashless cordite, which may be fired at temperatures between -5° and 130° F.

The motor is generally painted white or green overall, with identification markings stencilled on the outside.

REMARKS:

(1) Proposed new nomenclature for the motors is as follows: "Motor, Rocket, 2", No. 1 Mks I-III & VII".



MOTOR 2" NO. 5 MK. II

2" U.P. ANTI-SUBMARINE ROCKET

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BRITISH ROCKET

SHELL, U-2.45", H.E., 10 lb. C.P.

OVERALL LENGTH
DIAMETER 2.45 in.
TOTAL WEIGHT 9.828 lbs.
EXPLOSIVE
EXPLOSIVE WEIGHT
FUZING

TAIL, PROPELLING, U-2", A/S, MKS I & II

OVERALL LENGTH 20.25 in.
DIAMETER 2.25 in.
WIDTH OF FINS
TOTAL WEIGHT 8.5 lbs.
PROPELLANT Cordite, cogged.
PROPELLANT WEIGHT 1.85 lbs.
BURNING TIME 0.45 seconds at 60° F.

**2" U.P.
ANTI-SUBMARINE**

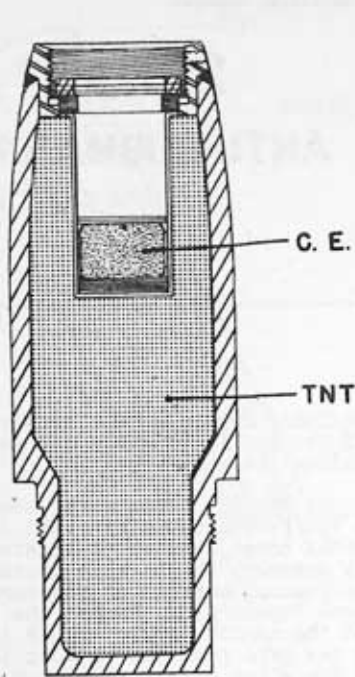
(Service)

DESCRIPTION:

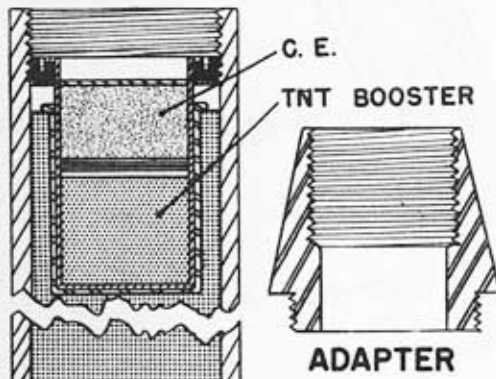
No information is as yet available regarding the construction, filling, or fuzing of the 10 lb. Shell. Drawings and data will be included in this publication when received.

Tail, Propelling, U-2" A/S, Mks I & II: This motor consists of a cylindrical steel body with a shell ring fixed in the forward end by eight locking pins held in engagement by a circular band spring. A metal cased igniter is located immediately behind the shell ring. An electric squib is inserted in the base of the igniter, the leads from the squib extending through the central annulus of the cogged cordite grain and the venturi and ending in a two pronged Nippon plug. Behind the igniter, positioned by a metal support ring, is located the cordite grain, which is supported at its after end by a metal grid. Separating the grid from the venturi is a thin metal tail obturator. The venturi is located in the after end of the motor body and contains a small bag of silica gel as a moisture-proofing measure.

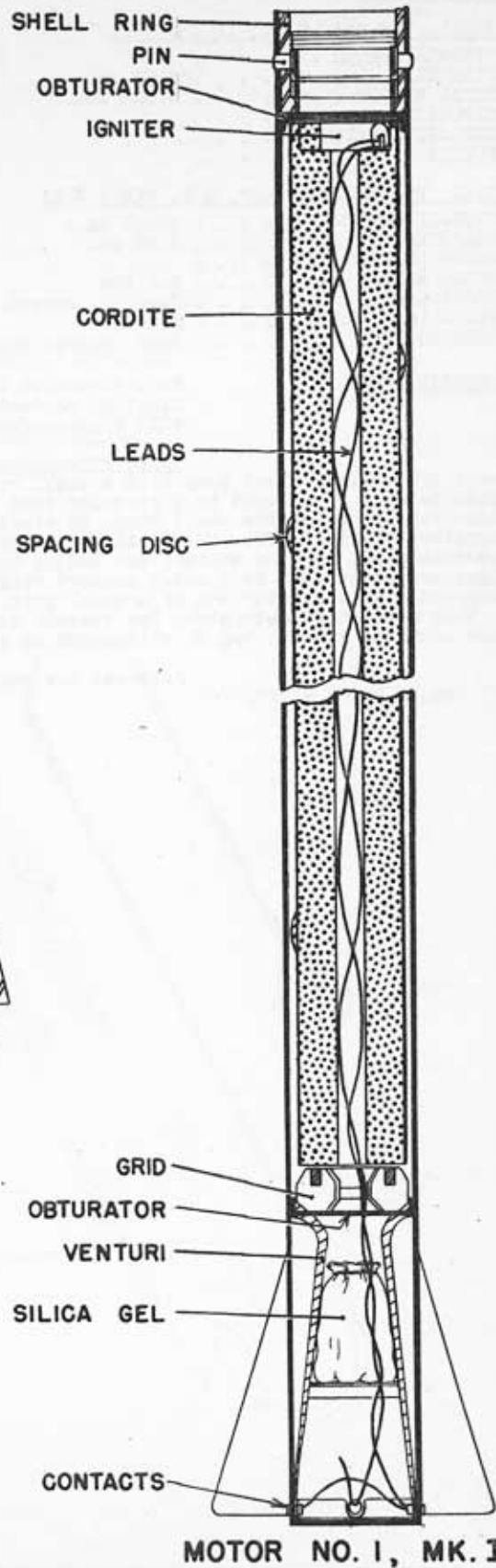
Proposed new nomenclature for these motors is "Motor, Rocket, 2", No. 5 Mks I & II".



SHELL, H.E.
NO. 2 MK. I



SHELL, H.E.
NO. 1 MK. I



MOTOR NO. 1, MK. I

3" ANTI-AIRCRAFT ROCKET

CONFIDENTIAL

BRITISH ROCKET

<u>H.E. SHELLS</u>	<u>NO.1 MK I</u>	<u>NO.2 MK I</u>
OVERALL LENGTH	14 in.	9.29 in.
DIAMETER	3.25 in.	3.25 in.
TOTAL WEIGHT	17.75 lbs.	7.6 lbs.
EXPLOSIVE	T.N.T.	T.N.T.
EXPLOSIVE WEIGHT	4.28 lbs.	2.125 lbs.
FUZING	No. 700 No. 731	No. 701

3" U.P.

ANTI-AIRCRAFT

(Service)

<u>ROCKET MOTORS</u>	<u>MK I</u>	<u>MK II</u>
OVERALL LENGTH	55.19 in.	55.19 in.
DIAMETER	3.25 in.	3.25 in.
WIDTH OF FINS	3.5 in.	3.5 in.
TOTAL WEIGHT	31.2 lbs.	31.5 lbs.
PROPELLANT	Cordite, tubular	Cordite, cruciform
PROPELLANT WEIGHT	12.7 lbs.	13.0 lbs.
BURNING TIME-60° F.	1.6 secs.	2.25 secs.

GENERAL:

These rockets are designed for anti-aircraft purposes, and thus are always fitted with some type of time (aerial burst) fuze.

DESCRIPTION:

Shell, H.E., No. 1 Mk I: This shell consists of a steel cylinder, reduced in diameter at the base and threaded externally to screw into the shell ring of the rocket motor. The forward end of the shell is threaded internally to receive the base of the No. 731 fuze or the adapter ring employed with the No. 700 fuze. Held in the nose fuze cavity by a locking ring is an exploder container with a booster charge consisting of a 26 dram C.E. (tetryl) pellet and a 4 ounce T.N.T. pellet separated by a felt disc. A gaine, or booster, No. 13 Mk I is employed with fuzes used in this shell.

Shell, H.E., No. 2 Mk I: This shell consists of a light steel ogive struck with a 30 inch radius. The after part of the shell body is reduced in diameter and threaded externally to screw into the shell ring of the rocket motor. An internally threaded fuze adapter is welded to the forward end of the shell body. A cardboard exploder container is inserted into the main explosive filler beneath the fuze adapter and contains a 12 dram C.E. (tetryl) booster pellet.

Tails Propelling, U 3", Mks I & II: These motors are identical except that the Mk I contains a tubular grain, while the Mk II grain is cruciform in shape. The motor body consists of a steel cylinder, slotted at the tail end to receive the four tail fins. A shell ring, fitted in the head end of the body, is internally threaded to receive the base of the shell, and has eight holes to correspond with those in the motor body. Locking pins, flanged on their inner ends, are inserted through these holes and are retained in position by two circular band springs. A copper or cadmium plated steel obturator is placed in the rear of the shell ring and is separated from the propellant grain by a cardboard disc and two cardboard washers. The propellant grain is castellated at the forward end to receive the igniter, and a washer of dummy cordite attached to the base of the grain bears against the ring of the grid. Spacing discs and tabs are attached to the exterior of the cordite grain by a special cement. The igniter consists of a 10 gram charge of magnesium with an electric squib enclosed in a paper tube. The insulated electric leads pass through the central channel of the cordite grain to the contacts at the after end of the motor body. The tail obturator, positioned between the grid and the venturi tube, is made in the form of a steel cup with a central perforation. The steel venturi tube is attached to the motor body by screws and welding and contains a small bag of silica gel as a moisture-proofing measure. The leads from the igniter are connected to the four contacts around the outside of the motor body, so positioned that they make contact with the knife edges on the launcher regardless of the angle at which the rocket is loaded.

Though generally fin-stabilized, these rockets are sometimes fitted with narrow 3/4" fins, stabilization being obtained by spiralling the rails on the inside of the launcher barrel.

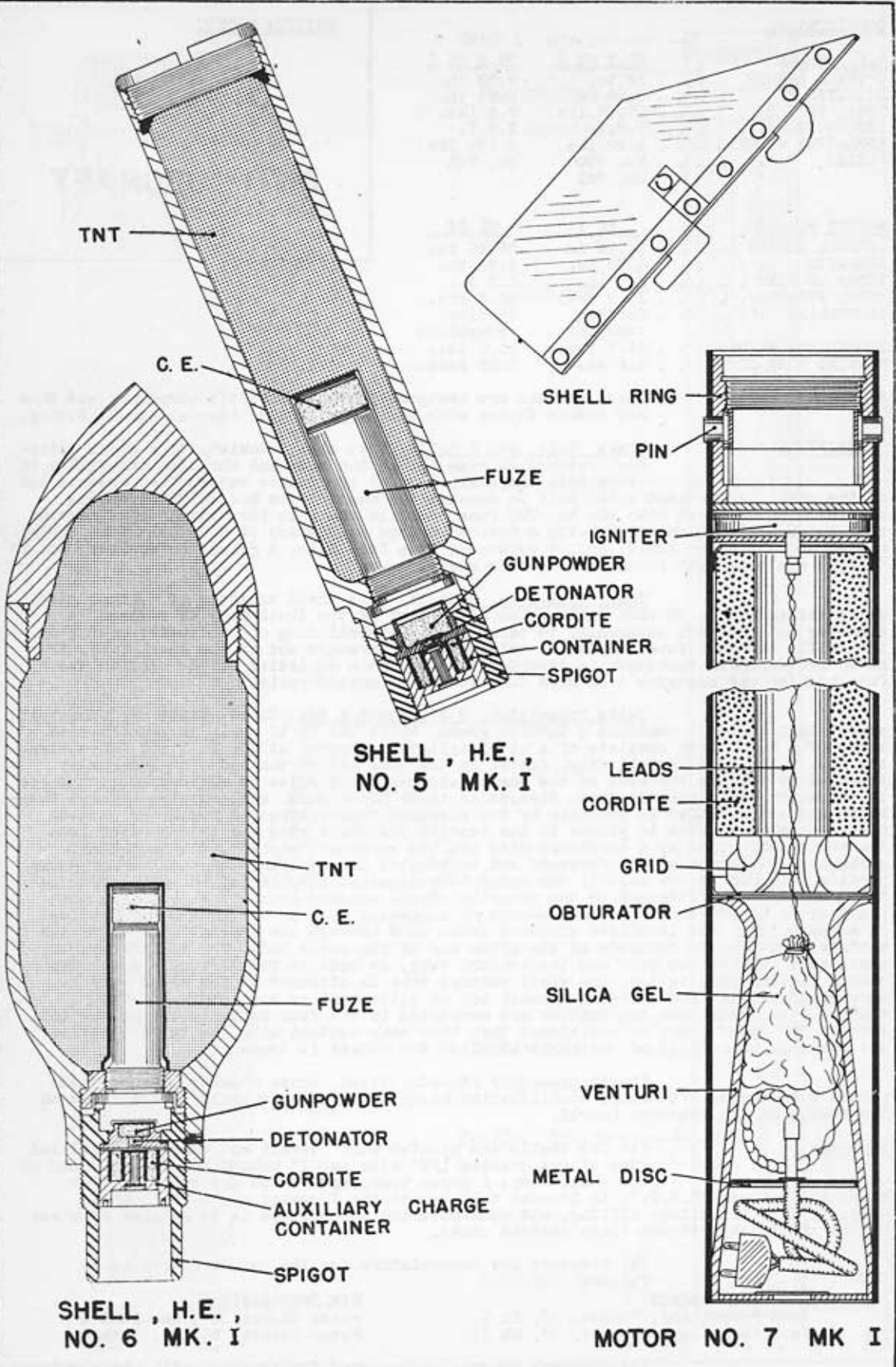
REMARKS:

(1) The shells are painted buff overall and carry a stencilled ring of red crosses 1/2" wide and 1" behind the forward end of the shell body. A green band, upon which are stencilled in black the letters "T.N.T.", is located 4.5" behind the forward end of the shell. Complete identification, filling, and manufacturing information is stencilled in black on the shell body between these painted rings.

(2) Proposed new nomenclature for the rocket motors is as follows:

<u>Old Nomenclature</u>	<u>New Nomenclature</u>
Tail Propelling, Rocket, 3", Mk I	Motor Rocket, 3", No. 1 Mk I
Tail Propelling, Rocket, 3", Mk II	Motor Rocket, 3", No. 2 Mk I

(3) Although originally designed for assembly with these motors, the No. 2 Mk I H.E. Shell has never been so employed.



3" ASSAULT ROCKET "LILO"

CONFIDENTIAL

<u>SHELL, H.E.</u>	<u>21 Lb. No. 5</u>	<u>60 Lb. No. 6</u>
OVERALL LENGTH . . .	14.25 in.	17.50 in.
DIAMETER	3.25 in.	6.0 in.
TOTAL WEIGHT	21 lbs.	60 lbs.
FUZZING	No. 297 Mk I	No. 297 Mk I
FILLING	T.N.T.	T.N.T.
FILLING WEIGHT	4 lbs.	16.75 lbs.

MOTOR, ROCKET, 3", No. 7 Mk I:
OVERALL LENGTH 34.5 in.
DIAMETER 3.25 in.
WIDTH OF FINS 1.75 in. (approx.)
TOTAL WEIGHT 18.25 lbs.
PROPELLANT Cordite, cog-shaped
PROPELLANT WEIGHT . . . 4.25 lbs.
BURNING TIME 0.5 secs. at 60° F.

GENERAL:

This rocket is designed as a heavy offensive weapon for infantry use against lightly reinforced obstacles. Only small fins are provided on the rocket motor; so stabilization in flight has been achieved by incorporating spiral rails in the interior of the launcher body. The rocket is fired from a small portable launcher by means of a light dry cell battery, a U.S. Army 10 cap exploder, or a U.S. Navy "Magnavox" firing key.

DESCRIPTION:

Shell, H.E., 21 lb., No. 5 Mk I: This shell consists of a steel cylinder closed at the forward end by a flat steel nose plug. The after end is externally threaded and reduced in diameter to screw into the shell ring of the rocket motor. A steel spigot is threaded into the after end of the shell body and contains the cordite-filled auxiliary charge container. Separated from the auxiliary cordite charge by a thin steel plate is a small detonator and a gunpowder pellet. Beneath this pellet the No. 297 Mk I base percussion fuze is threaded directly into the shell body. A single C.E. (tetryl) exploder pellet is located beneath the fuze in a cardboard exploder container.

Shell, H.E., 60 lb., No. 6 Mk I: The 60 lb. Shell contains a No. 297 fuze and an auxiliary charge container almost identical to that incorporated in the 21 lb. Shell. A slightly different spigot arrangement is employed, however, the spigot itself being externally threaded for attachment to the shell ring of the rocket motor. The nose portion of the shell is ogival and threads into the cylindrical shell body portion.

Motor, Rocket, 3", No. 7 Mk I: The motor consists of a steel tube fitted with a shell ring at one end and at the other with a venturi tube. The threaded shell ring is held in position by eight locking pins engaged by a circular band spring. The venturi is welded to the inside of the motor body. A steel grid, separated from the venturi tube by the tail obturator, supports the cog-shaped cordite propellant grain. A metal closing disc in the venturi tube supports the igniter leads, which terminate in a two-pronged plug. The after end of the venturi is sealed by a cardboard closing disc. The igniter leads extend from the plug through the central annulus of the propellant grain to the metal igniter housing, which contains a small electric squib surrounded by a charge of gunpowder. Behind the metal closing disc in the venturi is located a bag of silica gel as a moisture-proofing measure. The four fins are assembled to the motor by engaging their hooks in the fin slots in the after end of the motor body and pressing home the locking catches on the fins. An extension cable 10 yards long is provided with each motor for firing purposes, allowing personnel to take cover when firing occurs. The extension is plugged at one end and contains a two hole socket at the other for attachment to the plug connected to the igniter leads of the motor.

-50 to 135° F.

The motor must not be fired outside the temperature range of

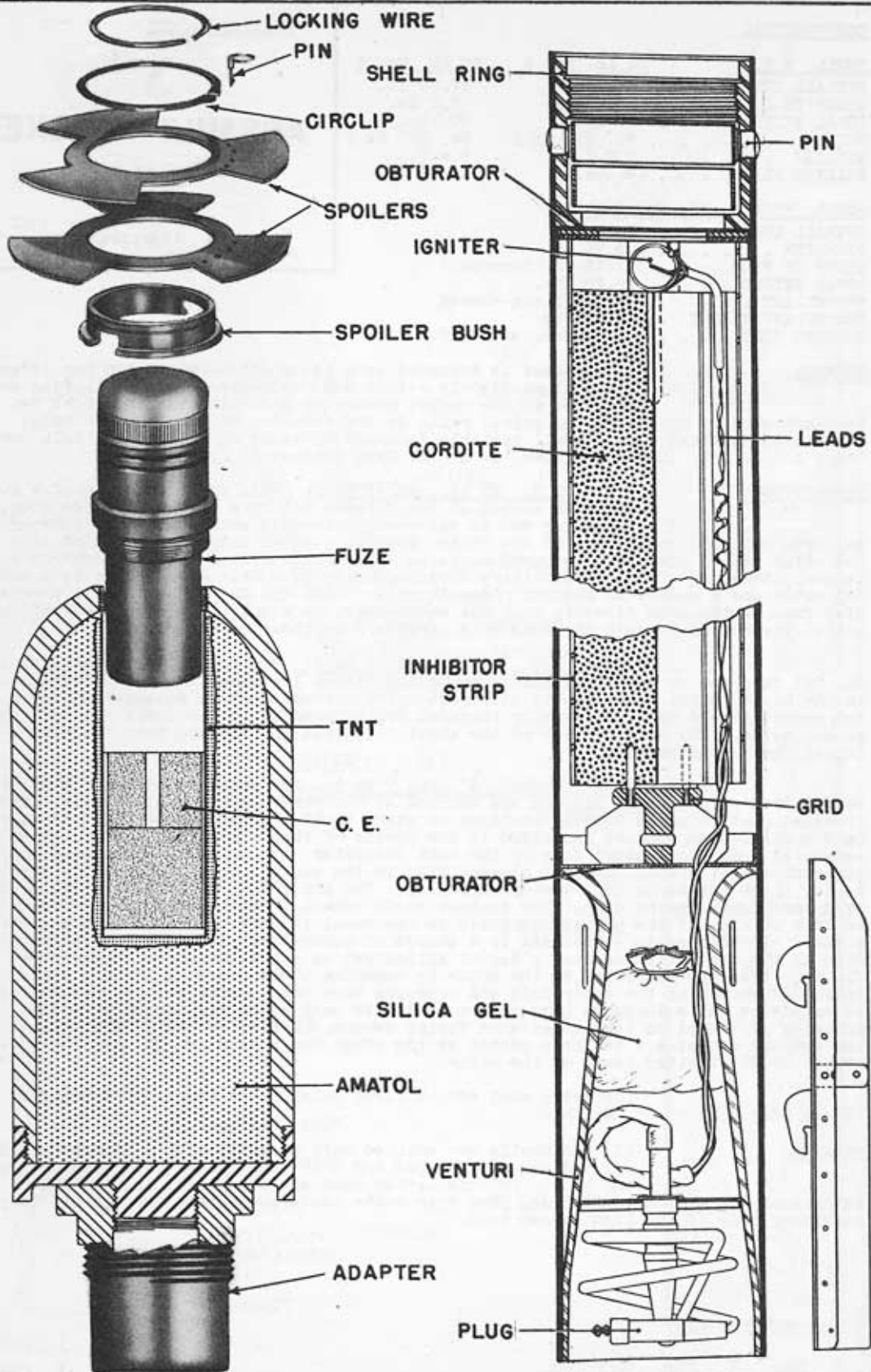
REMARKS:

(1) The Shells are painted buff overall, with a 1/2" red band painted around the nose and a 1" light green band painted around the body. On this latter band are stencilled in black the letters of the explosive filling. Two thin white bands are painted around the body on either side of the light green band.

BRITISH ROCKET

3"
ASSAULT ROCKET
LILLO

(Service)



SHELL, 29 LB., 3" MK. I

MOTOR A/C NO. I MK. III

3" BARRAGE ROCKET "LAND MATTRESS"

RESTRICTED

SHELL

OVERALL LENGTH 14.75 in.
DIAMETER 5.0 in.
TOTAL WEIGHT 34.25 lbs.
MOTOR Motor, Rocket, A/C,
No. 1 Mk I
FUZING No. 721 Mk II* & III
FILLING Amatol 60/40 or 50/50

MOTOR

OVERALL LENGTH 55.19 in.
DIAMETER 3.25 in.
WIDTH OF FINS 0.75 in. (approx.)
TOTAL WEIGHT 30 lbs.
PROPELLANT Cordite - cruciform
WEIGHT OF PROPELLANT 11.5 lbs.
BURNING TIME 1.5 seconds at 60° F.

GENERAL:

The Land Mattress rocket is designed as a barrage rocket for land service use. The motor employed is an adaptation of a 3" aircraft rocket motor, the modification consisting of cutting down the tail fins. Loss of stabilization due to the reduced tail surfaces is regained by imparting a spin to the rocket with spiral rails in the barrel of the launcher.

DESCRIPTION:

Shell, H.E., 29 lb., 3" Mk I: This shell is a modification of the 29 lb. H.E. shell used with the 5" Barrage Rocket. The modifications consist of a threaded adapter screwed to the spigot on the base plate of the shell. The adapter is externally threaded to screw into the shell ring of the 3 inch rocket motor. Further modification of the shell includes alteration of the exploder pocket to receive the larger booster assembly of the No. 721 fuze. The shell is painted buff overall, with a 1/2" red band painted around the nose portion of the shell and a 1" green band painted around the shell body. On this band are stencilled in black the initials of the type of filling used.

Motor, Rocket, A/C, 3", No. 1 Mk III: This motor is identical to the No. 1 Mk II motor described on page 37, except that a single pronged plug has been substituted for the two-pin plug on the end of the igniter leads. The motor, when used with the Land Mattress rocket, employs tail fins of a reduced width instead of the standard 5" fins.

REMARKS:

(1) A novel method of varying range is incorporated in this rocket. Two spoiler plates, which consist of metal discs with three equi-spaced cut-out segments, are placed face to face and are fitted to a spoiler bush. The spoiler bush is a collar which fits over the top of the No. 721 fuze and is recessed so as not to foul the protruding ends of the fuze shear wire. The bush engages with the top cannellure of the fuze and is held attached to the fuze by a locking wire around the fuze body. The spoiler plates are secured to the spoiler by a spring steel circlip which engages a groove in the bush just above the spoiler plates. Four small holes are drilled in one segment of each plate. Range variations are obtained by varying the relative positions of the spoiler plates to give different areas of wind resistance. The setting given to the spoiler plates is maintained by passing a special locking pin through the aligned holes in the plates.

Three different sizes of plates may be used, the smallest is painted red on one side; the medium size, blue; the largest, white.

BRITISH ROCKET

3"
BARRAGE ROCKET
"LAND MATTRESS"

(Service)



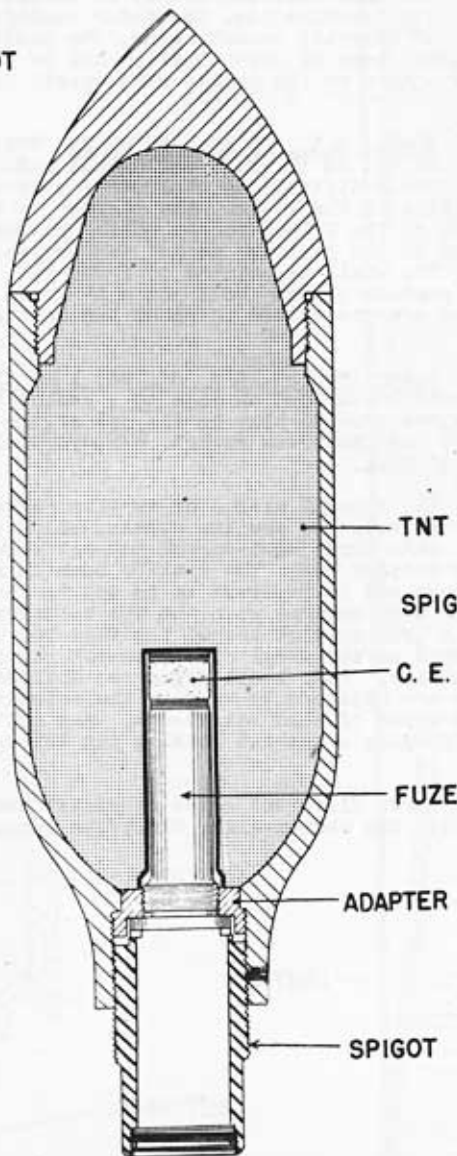
SHOT A.P.
MK. I



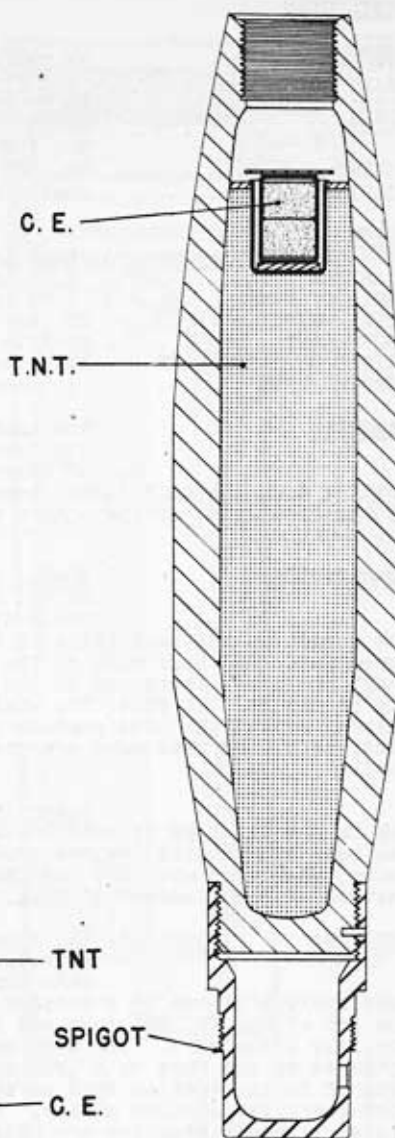
SHOT S.A.P.
MK. I



THERMAL
INITIATOR



SHELL , S.A.P.
NO. 2 MK. I



SHELL , F ,
NO. 1 MK. I

3" AIRCRAFT ROCKET

CONFIDENTIAL

GENERAL:

This is an aircraft rocket weapon, designed primarily for use against submarines and merchant shipping, although more recently wide use of the rocket has been made against land targets of an unarmored or lightly armored nature. The complete round consists of a 3" aircraft rocket motor and one of the four following heads: Shell, H.E., 60 lb. F., No. 1 Mk I; Shell, H.E., 60 lb. S.A.P., No. 2 Mk I; Shot, 25 lb., S.A.P., Mk I; and Shot, 25 lb. A.P., Mk I. In addition, two concrete practice heads are also used, one weighing 25 lbs., the other 60 lbs.

BRITISH ROCKET

3"
AIRCRAFT ROCKET

(Service)

	<u>60 lb. F Shell</u>	<u>Shell 60 lb. S.A.P.</u>	<u>Shot 25 lb. A.P. & S.A.P.</u>
OVERALL LENGTH	22.0 in.	21.8 in.	12.4 in.
DIAMETER	4.5 in.	6.0 in.	3.44 in.
TOTAL WEIGHT	46 lbs. 14 oz.	60 lbs.	25 lbs.
FUZZING	No. 899 Mk I	No. 865 Mk I No. 878 Mk I	None
FILLING	T.N.T. or RDX/ TNT 60/40	T.N.T. or Amatol 60/40	None
FILLING WEIGHT	3 lbs. 14 oz.	12 lbs.	

DESCRIPTION:

Shell, H.E., 60 lb. F., No. 1 Mk I: This shell has been manufactured by modifying a 4.5 inch Howitzer shell. The nose of the shell is recessed and internally threaded to receive the nose fuze, while the base portion carries a threaded spigot for attachment to the shell ring of the rocket motor. The shell is painted dark green overall, with the marking "F. 60 lb. No. 1 Mk I" stencilled in 1/2" yellow letters around the shell body.

Shell, H.E., 60 lb. S.A.P., No. 2 Mk I: This shell consists of a cylindrical steel body internally threaded to receive a heavy steel ogival nose cap. The after portion of the body is internally threaded to receive a spigot, by which the shell is attached to the shell ring of the rocket motor. In the spigot is carried a gunpowder thermal initiator and a base fuze, beneath which is located a C.E. (tetryl) booster pellet. The shell is painted dark green overall with a 1/2" white and a 1/2" red band near the nose. A 1" light green band is painted around the shell body, and on this band are stencilled the initials of the explosive main filling.

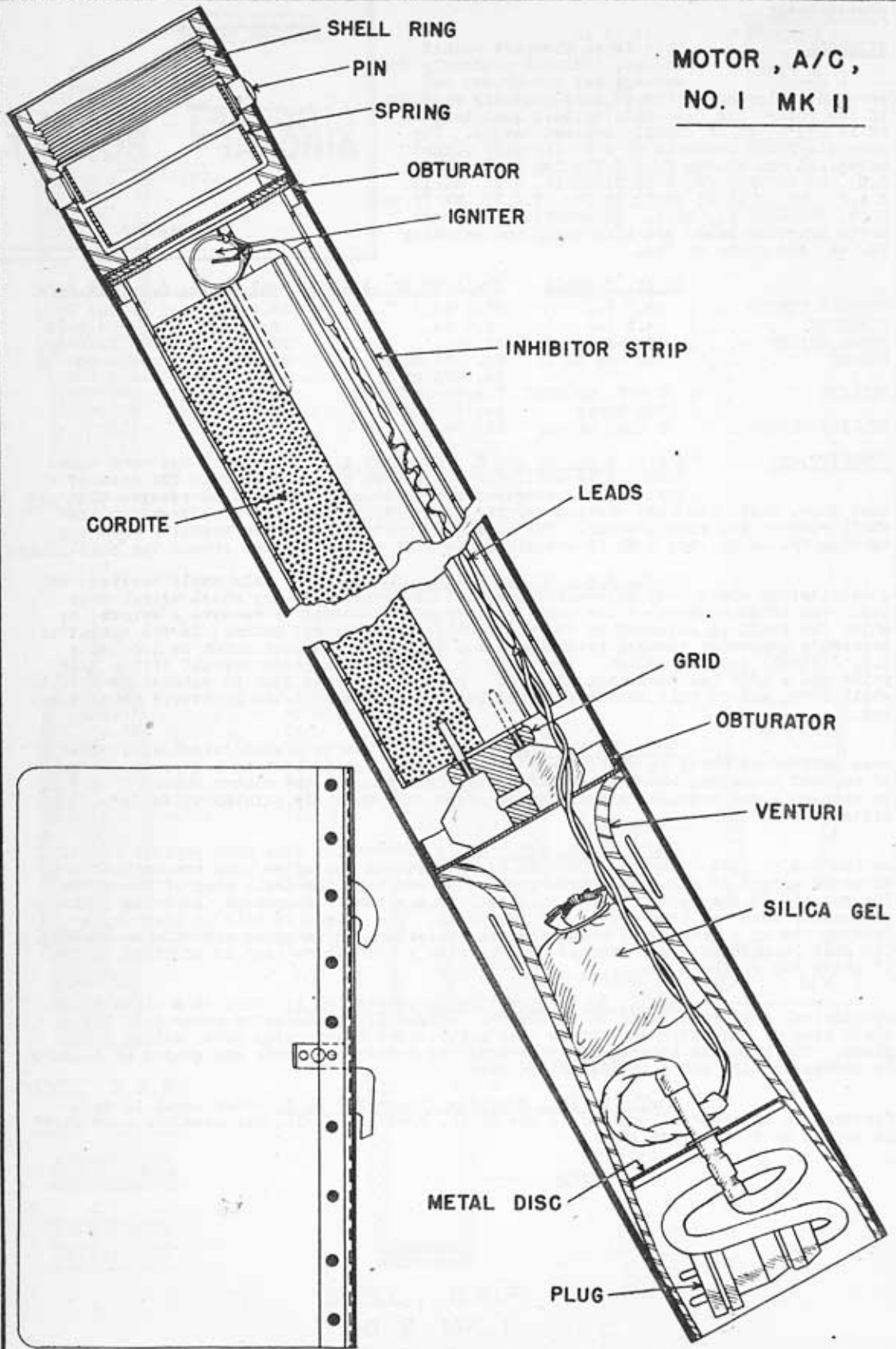
Shot, 25 lb. S.A.P., Mk I: This is a solid steel shot, the nose portion of which is ogival, the after portion terminating in a threaded spigot of reduced diameter, which screws into the shell ring of the rocket motor. The shot is painted black overall, except for the nose end, which is painted white for a distance of 1 inch.

Shot, 25 lb. A.P., Mk I: Externally this shot appears identical to the S.A.P. shot. The nose portion is ogival, and the after body consists of a threaded spigot of reduced diameter, which screws into the shell ring of the motor. The spigot, in the case of the A.P. shell, is a separate component, screwing into the internally threaded base portion of the shell. The spigot is held in place by a locking pin or a set-screw, which pierces the spigot and engages with the shell body. The shot is painted black overall, but carries a 1/2" white band in addition to the 1" white dip on the nose.

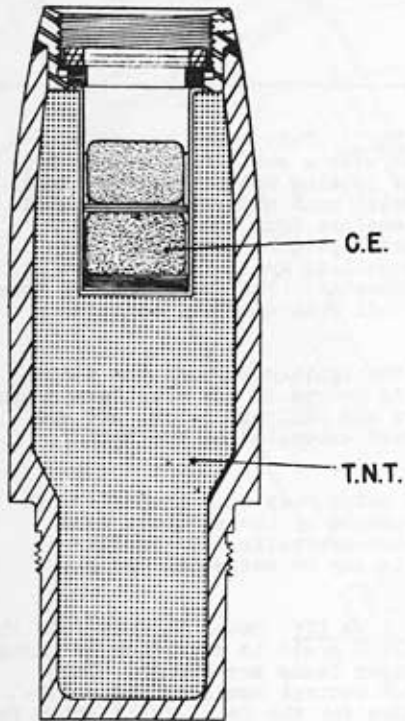
Shell, 60 lb. Practice (Concrete) Mk I: This is a blunt nosed cylindrical head consisting of an adapter, externally threaded to screw into the shell ring of the motor and fitted with eight steel reinforcing rods, welded into place. The concrete is then formed around the reinforcing rods and shaped to measure 20 inches overall and 6 inches in diameter.

Shell, 25 lb., Practice (Concrete) Mk I: This shell is manufactured in an identical manner to the 60 lb. Practice Shell, but measures only 11.5" in length by 5" in diameter.

MOTOR, A/C,
NO. 1 MK II



3" AIRCRAFT ROCKET



SHELL H.E. 3", NO. 2 MK. 1

3" AIRCRAFT ROCKET (AIR TO AIR)

CONFIDENTIAL

SHELL, H.E. 3", NO. 2 MK I

OVERALL LENGTH 9.29 in.
DIAMETER 3.25 in.
TOTAL WEIGHT 7.6 lbs.
FILLING T.N.T.
FILLING WEIGHT 2.125 lbs.
FUZING No. 720 Mk IV

MOTOR, ROCKET, A/C 3", "SUNFLOWER SEED", MKS I & II

OVERALL LENGTH 31 in.
DIAMETER 3.25 in.
WIDTH OF FINS 0.75 in.
TOTAL WEIGHT 19 lbs. (approx.)
PROPELLANT Cordite, tubular, 7 grains.
PROPELLANT WEIGHT 4.2 lbs.
BURNING TIME 0.3 seconds at 40 F.

GENERAL:

This rocket was designed for upward vertical firing from heavy bomber aircraft to disrupt attacking formations of enemy fighters. The rocket head is fitted with a self-destroying fuze so that misses will not fall on friendly aircraft or territory after expiration of burning of the rocket motor. The round consists of a No. 2 Mk I 3" light ogival shell fitted with a No. 720 Mk IV fuze, and a Motor, Rocket, A/C 3", "Sunflower Seed", Mks I & II.

DESCRIPTION:

Shell, H.E. 3", No. 2 Mk I: This shell was originally designed for use with the 3" Anti-aircraft rocket and the No. 701 fuze, but has been slightly modified for use with this rocket weapon. The shell consists of a light steel ogive struck with a 30 inch radius. The after part of the shell body is reduced in diameter and is threaded externally to screw into the shell ring of the rocket motor. An internally threaded fuze adapter is welded into the forward end of the shell body. A cardboard exploder container is inserted into the main explosive filling beneath the fuze adapter and contains two 12 dram C.E. (tetryl) booster pellets.

The shell is painted buff overall and carries a stencilled ring of red crosses 1/2" wide and one inch below the forward end of the shell body. A green band, upon which are stencilled the black letters "T.N.T.", is located 4.5" below the forward end of the shell. Complete identification, filling, and manufacturing information is stencilled in black on the shell body between these two rings.

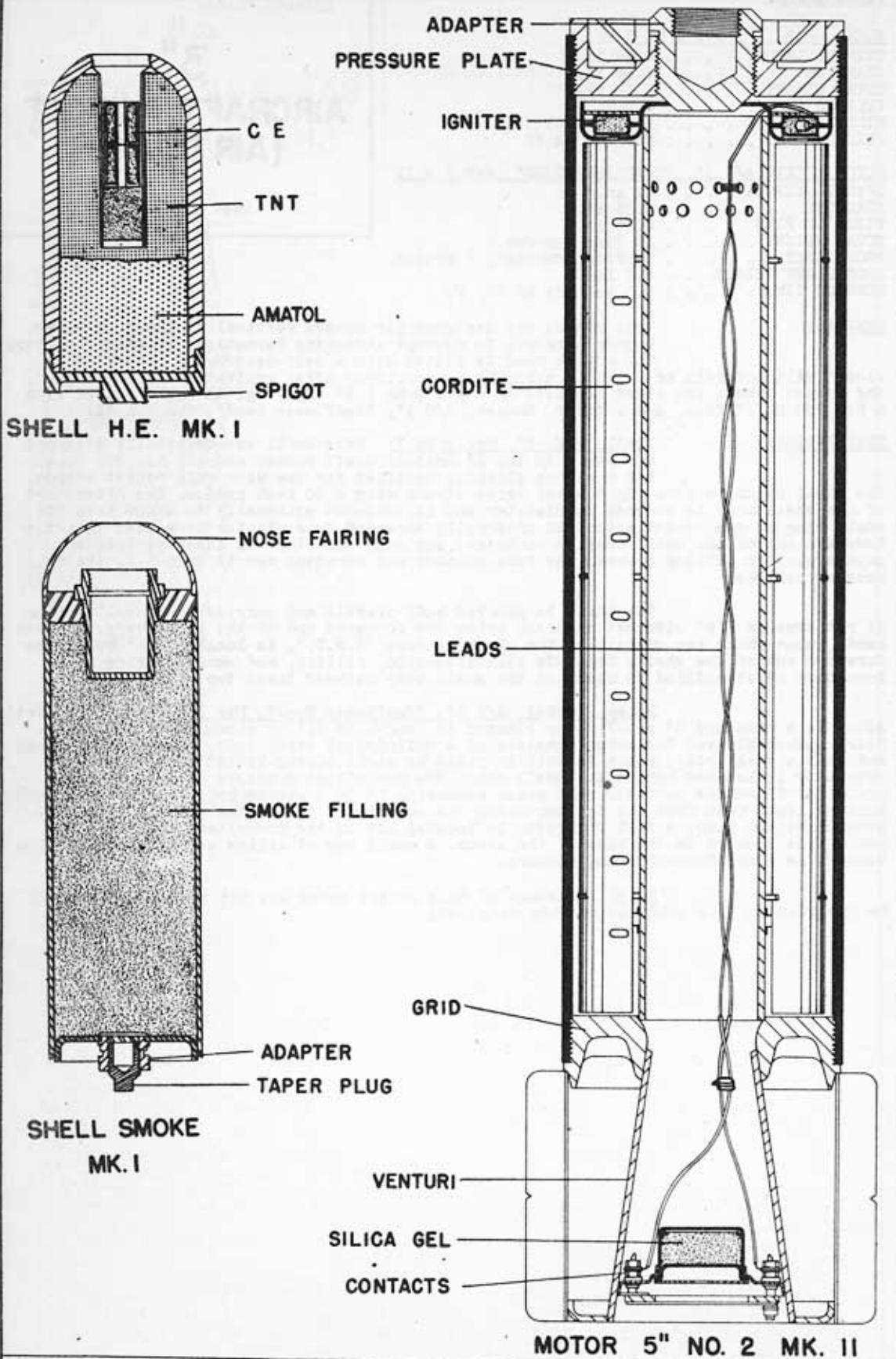
Motor, Rocket, A/C 3", "Sunflower Seed", Mks I & II: The rocket motor is a standard 3" proof motor reduced in length to 31" by elimination of a cardboard spacer-sleeve. The motor consists of a cylindrical steel body, fitted at the head end with a shell ring, which is held in place by eight spring-locked pins. A head obturator is located behind the shell ring. The propellant consists of seven tubular grains of flashless cordite, each grain measuring 1" in diameter by 18" in length. The igniter leads pass from the igniter along the outside of the grains and end in a two-pronged Nippon plug. A tail obturator is located aft of the propellant grains, and a venturi is located in the base of the motor. A small bag of silica gel is placed in the venturi as a moisture-proofing measure.

Note: Drawings of this rocket motor are not available but will be included in this publication when received.

BRITISH ROCKET

3"
**AIRCRAFT ROCKET
(AIR TO AIR)**

(Not in Service)



5" BARRAGE ROCKET "SEA MATTRESS"

CONFIDENTIAL

ROCKET MOTOR

OVERALL LENGTH 25.75 in.
 DIAMETER 5.0 in.
 TOTAL WEIGHT 29.0 lbs.
 PROPELLANT Cordite, tubular, 11 grains
 PROPELLANT WEIGHT 5.5 lbs. (approx.)
 WIDTH OF FINS 1.9 in.
 BURNING TIME 0.35 seconds at 60° F.

COMPLETE ROUNDS

1. H.E. Shell & Tail Propelling, U-5", Mk VI/N
2. Chemical Shell & Tail Propelling, U-5", Mks I-V
3. Incendiary Shell & Tail Propelling, U-5", MkVI/N
4. Smoke Shell & Tail Propelling, U-5", Mk III/N

BRITISH ROCKET

5"
BARRAGE ROCKET
"SEA MATTRESS"

(Service)

<u>SHELLS</u>	<u>H.E. MK I</u>	<u>SMOKE MK I</u>	<u>INCENDIARY</u>	<u>CHEMICAL MK I</u>
OVERALL LENGTH	11.6 in.	19.7 in.	19.7 in.	19.7 in.
DIAMETER	5.0 in.	5.0 in.	5.0 in.	5.0 in.
TOTAL WEIGHT	29 lbs.	29 lbs.	25 lbs.	30 lbs.
FUZING	No. 722	No. 721	No. 721	No. 721
FILLING	Amatol (60/40 or 50/50) or Amatol & TNT	C.S.A., F.M. or W.P.	Perpex Ben- zole Gel	Chemical mixture

GENERAL:

These rockets are intended primarily for beach barrage from landing craft. The incendiary shell is employed only for ranging purposes, providing a visual indication of the attainment of the proper range. A change-over is then made to H.E., Smoke, or Chemical shells.

DESCRIPTION:

Shell, H.E., 29 lb., 5", Mk I: This shell consists of a thin-walled steel forging, closed at the after end by an externally threaded base plate. The base plate carries a threaded spigot which screws into the shell adapter of the rocket motor. Set into the explosive filling at the nose end of the shell is an exploder container with two perforated and one solid C.E. (tetryl) booster pellets. The shell may be alternatively filled with Amatol or an upper layer of T.N.T. and a lower layer of Amatol. If the former filling is employed, a T.N.T. surround is located around the exploder container. The shell is painted buff overall.

Shells, Smoke, Chemical, and Incendiary, 5", Mk I: These shells are of identical construction, differing only in the nature of the filling. The shell body consists of a metal cylinder welded to a closing plate at the nose end and to a tail plate at the rear. The closing plate is internally threaded to receive the fuze adapter, and a spigot is welded into the central opening in the base plate. This spigot is externally threaded to screw into the rocket motor and threaded internally to receive a tapered filling plug. For better ballistic qualities a sheet steel nose fairing is fitted over the nose fuze, which protrudes through a central opening in the fairing. The fairing is held in place by a metal circlip around the outside of the fuze body.

Tail Propelling, U-5", Mk VI/N: This motor consists of a cylindrical steel body, the forward end of which is closed by a cast iron pressure plate and a transit plug. Within the after end is a cast iron venturi tube, closed by a closure plate to which is attached the automatic contact leads. A drum and four fins are attached to the after end of the motor for stabilization.

Ignition of the cordite propellant is achieved by a magnesium igniter fitted at the forward end of the cordite grains. The igniter is fired by an electric squib, "Fuze, Electric, No. F. 53 Mk I", whose leads pass to two sockets fitted to but insulated from the venturi closing plate. An automatic contact disc is fitted to the outer side of the closure plate, two leads from which are fitted to two sockets in the closure plate. The automatic contact disc connects one of the igniter leads to "earth", in this case the motor body. The central brass disc of the automatic contact disc makes contact with an insulated spring finger on the projector.

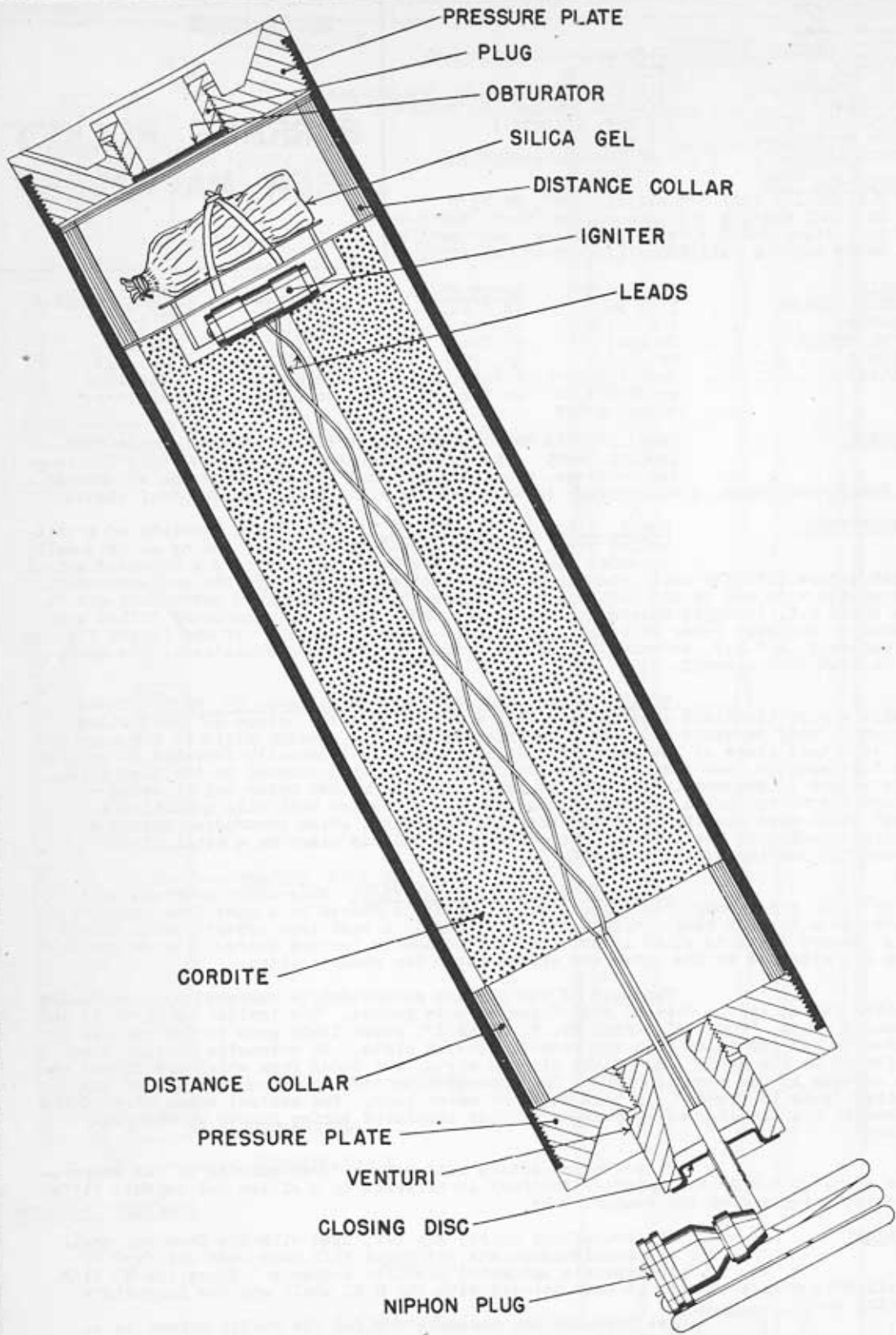
These rocket motors must not be fired outside of the temperature range of 0-120° F. Moisture-proofing is effected by a silica gel capsule fitted into the after end of the venturi tube.

REMARKS:

(1) Propelling Tails, Mks I-V, used with the Chemical shell, are obsolescent. Mks III/N and VI/N have been modified to incorporate automatic electric contacts. Since the Mk VI/N is slightly more accurate, it must be used with the H.E. shell and the Incendiary ranging shell.

(2) Proposed new nomenclature for the rocket motors is as follows:

<u>Old Nomenclature</u>	<u>New Nomenclature</u>
Tail, Propelling, U-5", Mks I-V	Motor, Rocket, 5", No. 1 Mks I-V
Tail, Propelling, U-5", Mk III/N	Motor, Rocket, 5", No. 2 Mk I
Tail, Propelling, U-5", Mk VI/N	Motor, Rocket, 5", No. 2 Mk II



5" CORDTEX NET ROCKET

CONFIDENTIAL

OVERALL LENGTH 18.25 in.
MAXIMUM BODY 4.75 in.
DIAMETER
PROPELLANT Cordite, tubular.

BRITISH ROCKET

5"
CORDTEX NET

(Service)

GENERAL:

This motor was originally used to tow a specially constructed net of Cordtex (Primacord) used for demolition purposes. The net itself has been declared obsolete and is not in service use. The motor, however, remains a 'service' item and may be used in the future for other purposes. The motor was originally called "Motor, Rocket, 5", Cordtex Net, Mk I". Proposed new nomenclature for the motor is "Motor, Rocket, 5", No. 3 Mk I".

DESCRIPTION:

The motor consists of a steel cylinder, threaded at each end to receive a pressure plate. The pressure plates are threaded internally, the forward one to receive a pressure plate plug and obturator, the after plate to receive the venturi. Two distance collars are beneath the pressure plates to position the cordite propellant grain, which is castellated at the forward end to receive the igniter.

The igniter consists of an electric squib, Fuze, Electric, No. F 53, surrounded by a magnesium charge enclosed in a cartridge. The igniter leads pass through the central annulus of the cordite grain, through the venturi and closing disc, and end in a two-pronged Nippon plug.

As a moisture-proofing measure, a bag of silica gel is fitted in the forward end of the motor cylinder.

During shipment and storage, the Nippon plug and igniter leads are protected by a tall closing cup, which is fastened to the motor body by adhesive tape.

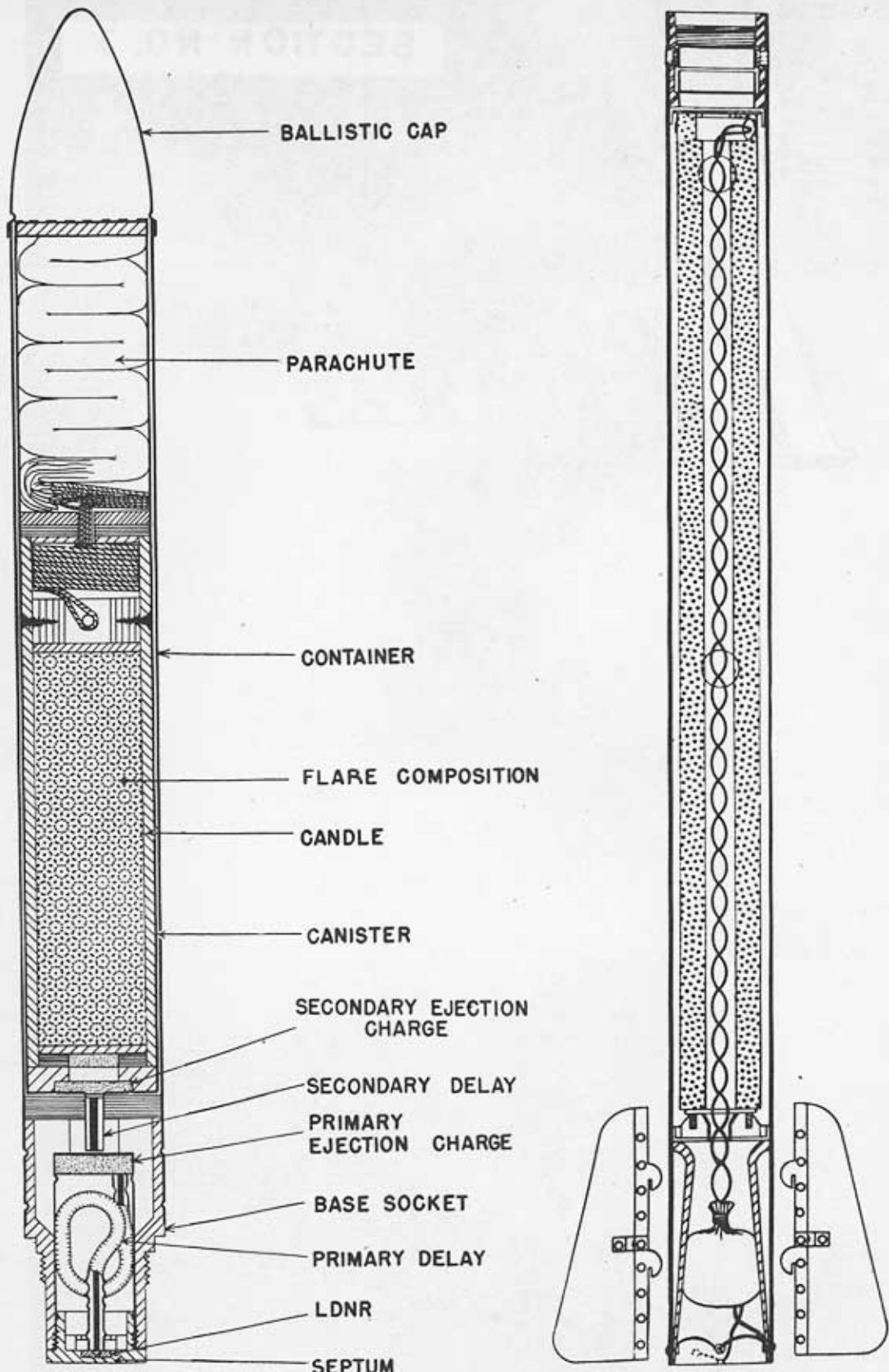
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SECTION NO. 3



Rocket
FLARES

CONFIDENTIAL



FLARE HEAD

MOTOR 2" NO. 1 MK. VI

2" ROCKET FLARE

CONFIDENTIAL

FLARE HEAD, NO. 1 MKS I & II, NO. 2 MK I
 OVERALL LENGTH 22 in. (approx.)
 DIAMETER 2.25 in.
 TOTAL WEIGHT 4.75 lbs.
 FUZING Thermal Initiator

TAIL PROPELLING ROCKET, 2", MK VI
 OVERALL LENGTH 31 in. (approx.)
 DIAMETER 2.25 in.
 WIDTH OF FINS 2.375 in.
 TOTAL WEIGHT 7.50 lbs.
 PROPELLANT Cordite, tubular
 PROPELLANT WEIGHT 2.5 lbs.
 BURNING TIME 0.9 seconds at 60° F.

BRITISH ROCKET

**2" U.P.
ROCKET FLARE**

(Service)

GENERAL:

This flare is used to illuminate enemy targets at night. It is used in conjunction with medium caliber cannon, a flare launcher being mounted on either side of the gun shield at a fixed angle of 30 degrees. This arrangement makes it possible to keep a target illuminated and at the same time engage it with the main armament.

DESCRIPTION:

Rocket Flare Head, 2": The flare head consists of a cylindrical finned-plate container, with two cannelures near the base. Inserted in the container is a metal canister, which houses the illuminating candle and attached parachute assembly. A ballistic cap is fitted to the forward end of the container, to which it is secured with adhesive tape. A base socket is secured to the other end of the container by indenting the cannelures. The base socket screws into the shell ring of the rocket motor and contains the thermal ejector. This latter consists of a steel base plate, in the center of which is a metal septum of accurately machined thickness. The lower end of a length of safety fuse (primary delay), cut to burn approximately 22 seconds, makes intimate contact with 2-1/2 grains of lead-dinitro-resorcinate (LDNR), which is stemmed into the septum recess. The upper end of the safety fuse extends into a magazine containing about 40 grains of G.12 gunpowder (primary ejection charge). Protruding from the base end of the canister is a short length of safety fuse (secondary delay) cut to burn for 3 seconds. The lower end of this secondary delay is in close proximity to the primary ejection charge, and its upper end projects into a magazine containing about 40 grains of G.12 gunpowder (secondary ejection charge).

Tail Propelling, Rocket, 2", Mk VI: This motor is identical to the Mk III motor described on page 25, except that the obturator of the latter is perforated, while that of the former is not, but rather is rust-proofed to allow free conduction of heat to the thermal fuze in the flare head. For this reason, Mk VI motors are marked "T.H.", indicating their use with thermal initiators. No other motor may be used with the flare head.

The complete round (flare head and motor) weighs 12.25 lbs. and measures 51 inches in overall length.

Proposed new nomenclature for the rocket motor is "Motor, Rocket, 2", No. 1 Mk VI".

OPERATION:

When the rocket is fired, heat from the burning propellant grain is transmitted through the head obturator and the thin septum of the thermal ejector, igniting the LDNR and initiating the lower end of the primary delay. After 22 seconds the primary ejection charge is ignited, and the canister is ejected from the container in a forward direction. The secondary delay is initiated by the flash from the primary ejection charge and after three seconds initiates the secondary ejection charge, which ignites the candle and ejects the parachute, cable, and candle in a forward direction from the canister. The parachute opens when ejected from the canister, and the lighted flare candle is suspended in mid-air.

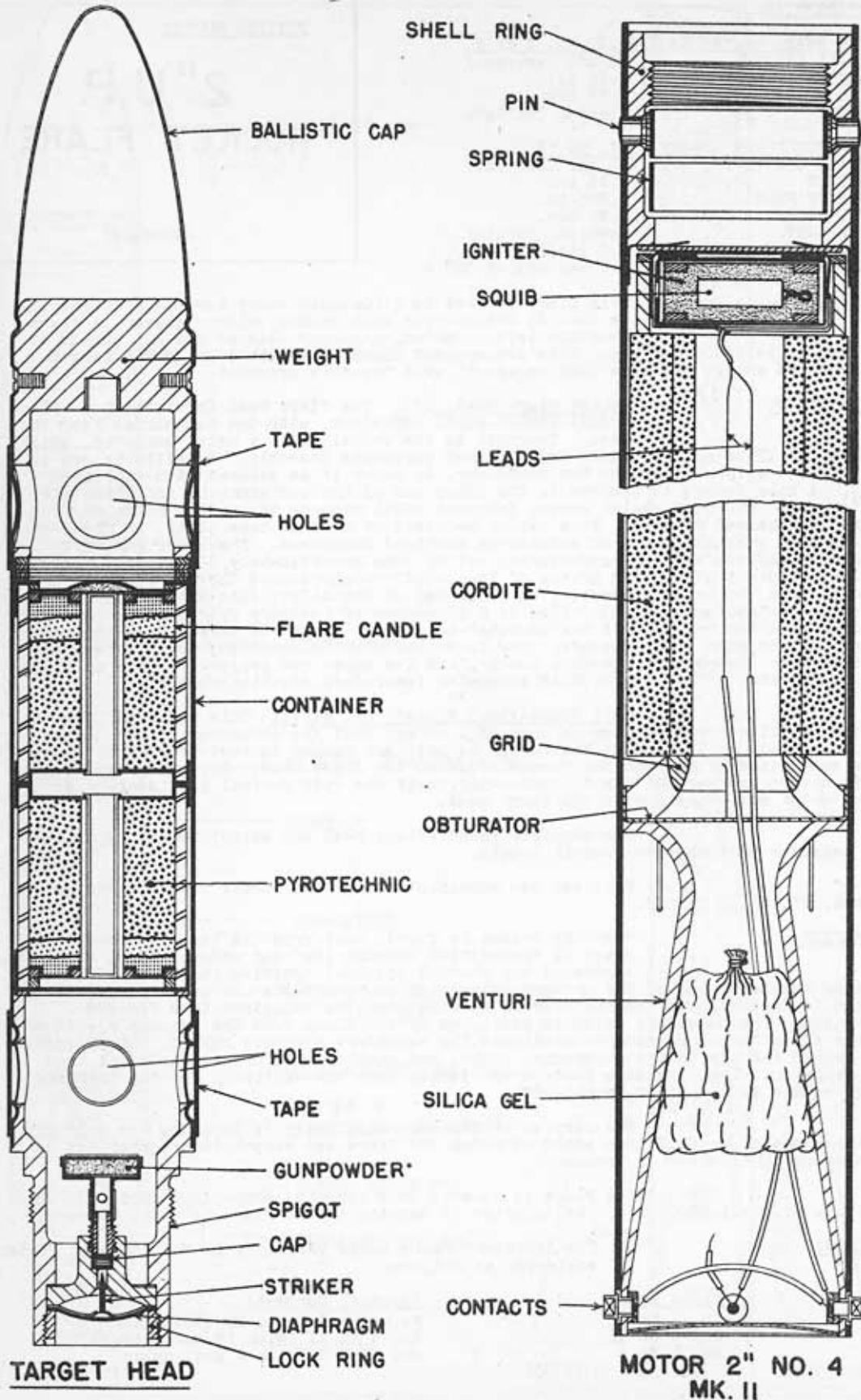
The purpose of the secondary delay is to allow the velocity of the canister to fall to a speed at which the flare and parachute assembly may be ejected without danger of break-up.

The flare is ejected at a range of about 5000 yards and an altitude of about 2000 feet. The duration of burning of the flare is about 70 secs.

REMARKS:

(1) The different flare heads vary only in the Ejector, Contents employed, as follows:

<u>Flare Head</u>	<u>Ejector, Contents</u>
No. 1 Mk I	No. 4 Mk I (with 22 sec. delay)
No. 1 Mk II	No. 4 Mk II (with 18 sec. delay)
No. 2 Mk I	No. 5 Mk I (with 9 sec. delay)



2" TARGET ROCKET

CONFIDENTIAL

HEAD, ROCKET TARGET, 2" MK I

OVERALL LENGTH 15.75 in.
DIAMETER 2.25 in.
TOTAL WEIGHT 4.5 lbs.
FUZING Special Igniter

TAIL PROPELLING, ROCKET TARGET, 2" MK II

OVERALL LENGTH 20.25 in.
DIAMETER 2.25 in.
WIDTH OF FINS 2.375 in.
TOTAL WEIGHT 6.0 lbs.
PROPELLANT Cordite, cogged.
PROPELLANT WEIGHT 1.25 lbs.
BURNING TIME 0.45 seconds at 60° F.

BRITISH ROCKET

2" U.P.
TARGET ROCKET

(Service)

GENERAL:

This rocket is designed to give, by means of a flare, a visible aiming mark for anti-aircraft batteries. The target has a range of about 5000 yards at a speed of 250 to 400 knots. The target can be used at night and is suitable for use either aboard ship or ashore.

DESCRIPTION:

Head, Rocket Target, 2" Mk I: The target head consists of a thin sheet metal container holding a flare candle. Separated from the flare candle by a steel washer is an externally threaded spigot, by which the head is attached to the shell ring of the rocket motor. The spigot is fixed to the target head body by means of a double crimp. A weight is fitted into the forward end of the body and is fixed to the body with 4 screws. A ballistic cap is crimped to the forward end of the weight.

Four holes are drilled through the body and the weight just forward of the flare candle, and a similar set of 4 holes is drilled aft of the candle through the body and the spigot. The two sets of holes are covered with a strip of tape 1.5" wide wrapped around the body.

An igniter mechanism, consisting of a diaphragm operated striker, a percussion cap, and a gunpowder charge, is inserted into the after end of the spigot and is held in place by a threaded locking ring.

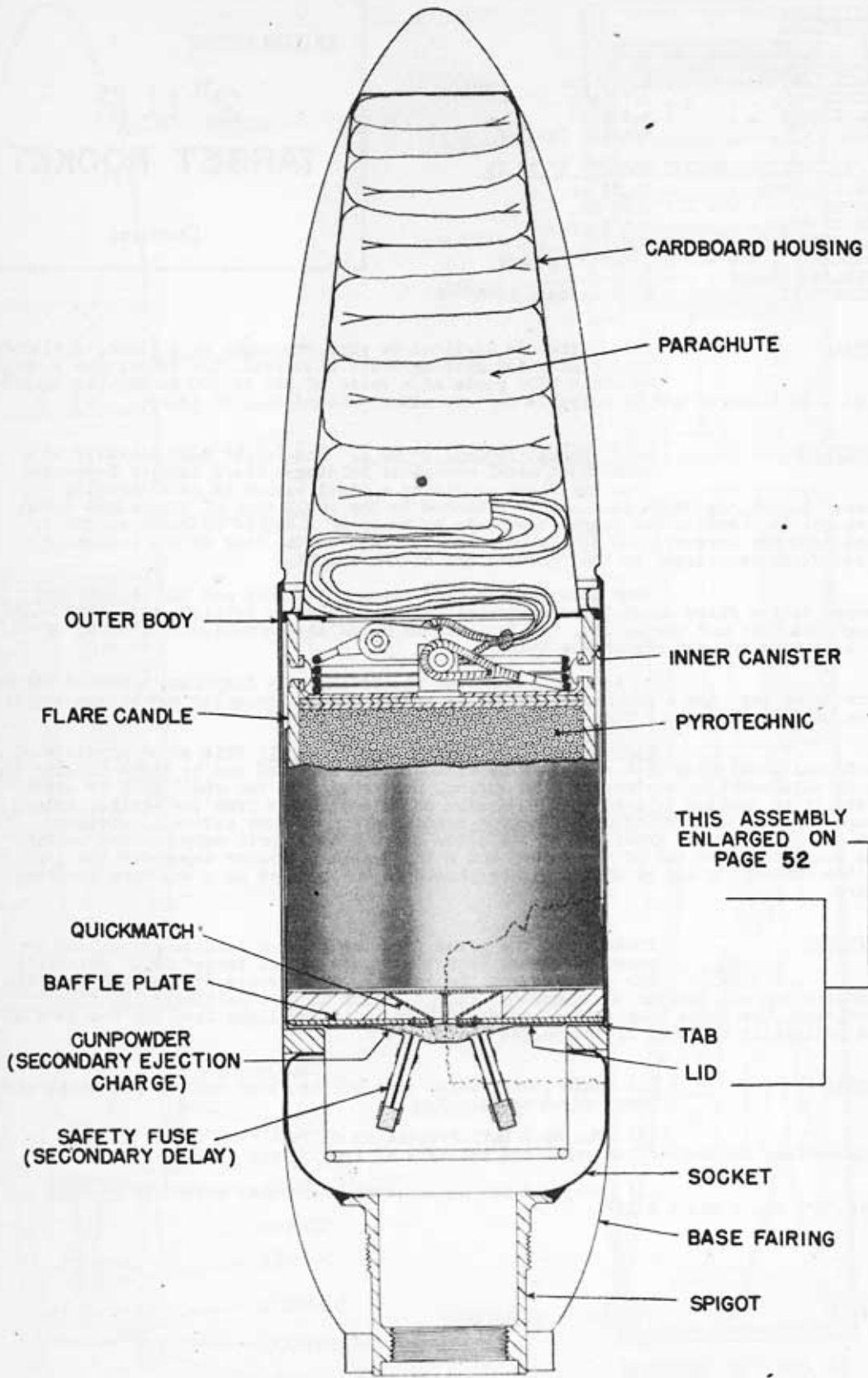
Tail Propelling, Rocket Target, Mk II: This motor consists of a cylindrical steel body with a shell ring fixed in the forward end by eight locking pins held in engagement by a circular band spring. Separated from the shell ring by steel washers is an igniter in a moulded cardboard container. Leads from the igniter extend through the central annulus of the cogged cordite grain to four automatic contacts fixed 45° apart on the after end of the motor body. A metal grid supports the cordite grain near the after end of the motor, and a thin metal obturator separates the grid from the venturi. A bag of silica gel is placed in the venturi as a moisture proofing measure.

OPERATION:

Pressure of the gases from the burning cordite propellant grain passes forward into the spigot of the target head, reversing the diaphragm of the igniter. This forces the striker into the percussion cap and ignites the gunpowder charge, which in turn initiates the flare composition. The flare composition burns brightly, emitting light from the two sets of holes drilled in the body of the target head.

REMARKS:

- (1) This rocket motor must not be fired outside the temperature range of -5 to 130° F.
- (2) The Mk I Tail Propelling differs from the Mk II only in the dimensions of the cordite grain and the type of igniter employed.
- (3) Proposed new nomenclature for these motors is "Motor, Rocket, 2", No. 4 Mks I & II".



3" AIRCRAFT ROCKET FLARE

CONFIDENTIAL

BRITISH ROCKET

HEAD, ROCKET FLARE, A/C, 3" Mk I

OVERALL LENGTH 22.5 in.
 MAXIMUM DIAMETER 5.45 in.
 TOTAL WEIGHT 14.7 lbs.
 CANDLEPOWER 1,000,000
 BURNING TIME 80 secs.
 TIME TO PRIMARY EJECTION . 16 secs.
 TIME TO LIGHT UP 19 secs.
 RANGE TO LIGHT UP 4800 yds. (fired from
 ground); 5600 yds.
 (fired from aircraft
 at 140 knots).

3"
AIRCRAFT
ROCKET FLARE

(Service)

GENERAL:

This head is designed for use with 3" Rocket Motors, A/C, described on page 37, and may be fired either from aircraft or from ground launchers.

DESCRIPTION:

The flare head consists of an outer body assembly and an inner canister. The inner canister is brought to an ogive at its forward end and also serves as a ballistic cap. A parachute, enclosed in a cardboard housing, is contained in the upper portion of the inner canister. The long cylindrical portion of the canister is then brought down inside the main body assembly, and tabs on the bottom edge of the canister are then bent over a metal lid, retaining the lid in position. The lid consists of a metal disc, perforated in the center to accommodate the ends of two lengths of safety fuse. A baffle plate is located between the lid and the flare candle. Lengths of quickmatch extend from the base of the candle through the center of the baffle plate and into a gunpowder charge located between the baffle plate and the metal lid. This charge constitutes the secondary ejection charge; and the safety fuse leading to it, the secondary delay.

A socket is fixed to the lower part of the body assembly, and to the socket is welded a spigot. The spigot is threaded externally to screw into the shell ring of the rocket motor and is internally threaded to receive the Ejector, Contents, No. 7 Mk I. The Ejector, Contents, consists of a threaded body, housing a diaphragm operated striker, a percussion cap, and a double length of safety fuse which extends into a gunpowder charge.

A base fairing is loosely assembled over the lower portion of the body assembly. The after end of the fairing is notched to form several tabs, and a metal clip is placed around these tabs and tightened up to ensure a firm attachment to the rocket motor. The fairing serves merely to cover the joint between the flare head and the rocket motor, enhancing the streamlining of the complete round.

OPERATION:

The pressure of the propellant gases from the rocket motor reverses the diaphragm of the Ejector, Contents, firing the cap and the safety fuse in the ejector. After the expiration of this primary delay (16 seconds) the primary gunpowder ejector charge is fired, expelling the inner container from the flare body assembly. The explosion of the primary charge also ignites the secondary delay.

When the secondary delay expires, the secondary ejection charge is initiated, igniting the lengths of quickmatch beneath the flare candle and blowing the lid out of the after end of the inner container, bending back the tabs on the base of the container.

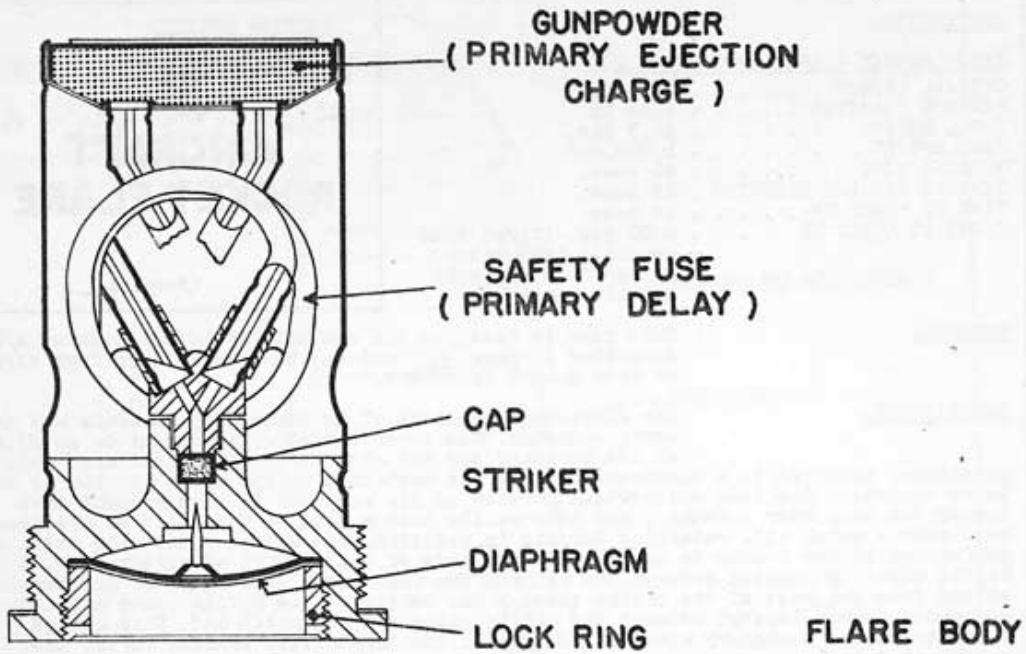
The flare candle and the parachute assembly are now free to fall out of the after end of the container. The flare has been ignited by the flash from the lengths of quickmatch and is now suspended in mid-air by the open parachute. The purpose of the primary delay and ejection charge is to allow the flare ample time to loose velocity sufficiently so that an undue strain will not be placed on the parachute.

REMARKS:

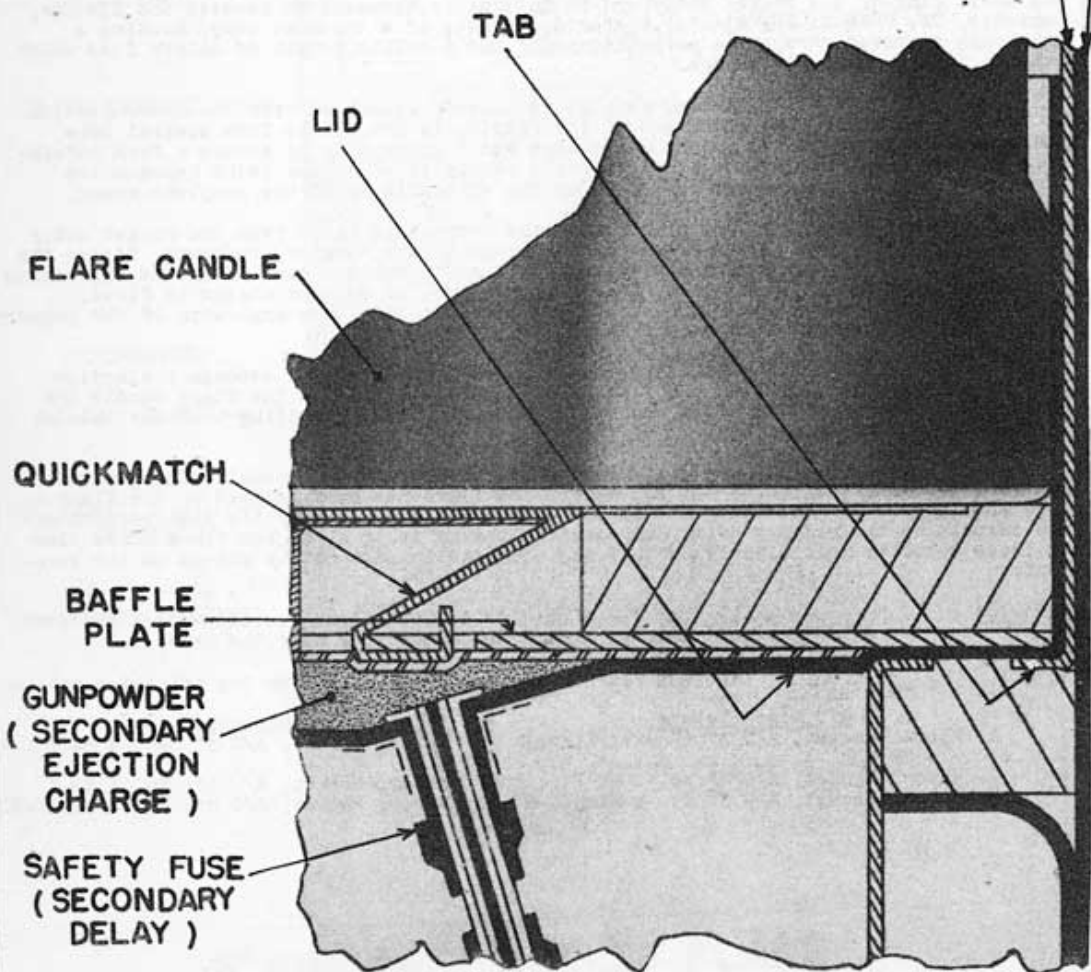
(1). The flare head is painted black overall with a 1/2" red band painted around the flare body near the base.

(2) This flare head may be employed with the following motors:

<u>Old Nomenclature</u>	<u>Proposed New Nomenclature</u>
1. Motor, Rocket, A/C 3" (Rocket Flare) Mk I	1. Motor, Rocket, A/C 3", No. 4 Mk I
2. Motor, Rocket, A/C 3" No. 1 Mk I	2. Motor, Rocket, A/C 3", No. 1 Mk I
3. Motor, Rocket, A/C 3" No. 1 Mks II-IV	3. Motor, Rocket, A/C 3", No. 5 Mks I-III



EJECTOR, CONTENTS NO. 7 MK I



INNER CONTAINER, BODY, AND LID ASSEMBLY

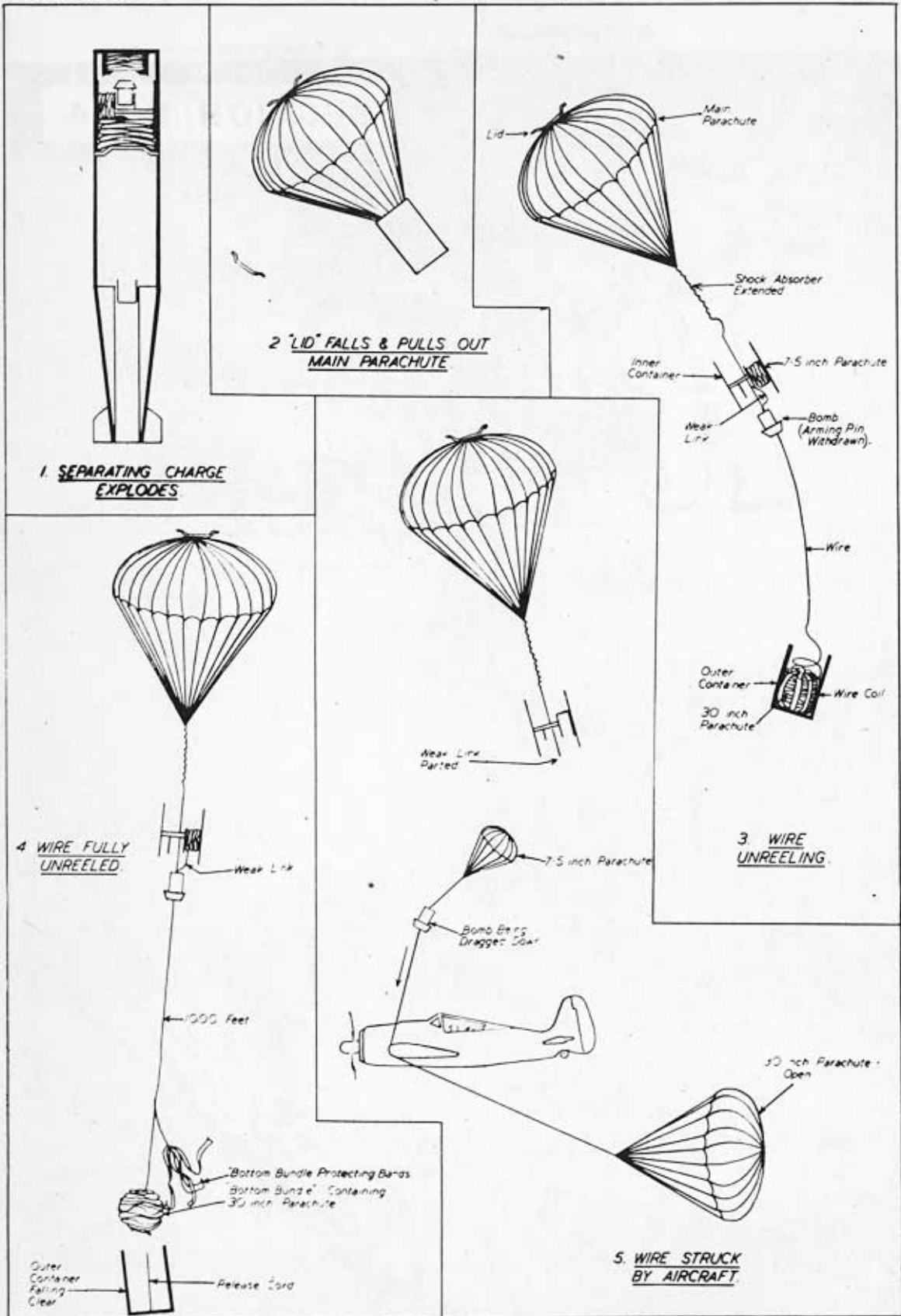
3" AIRCRAFT ROCKET FLARE

SECTION NO. 4

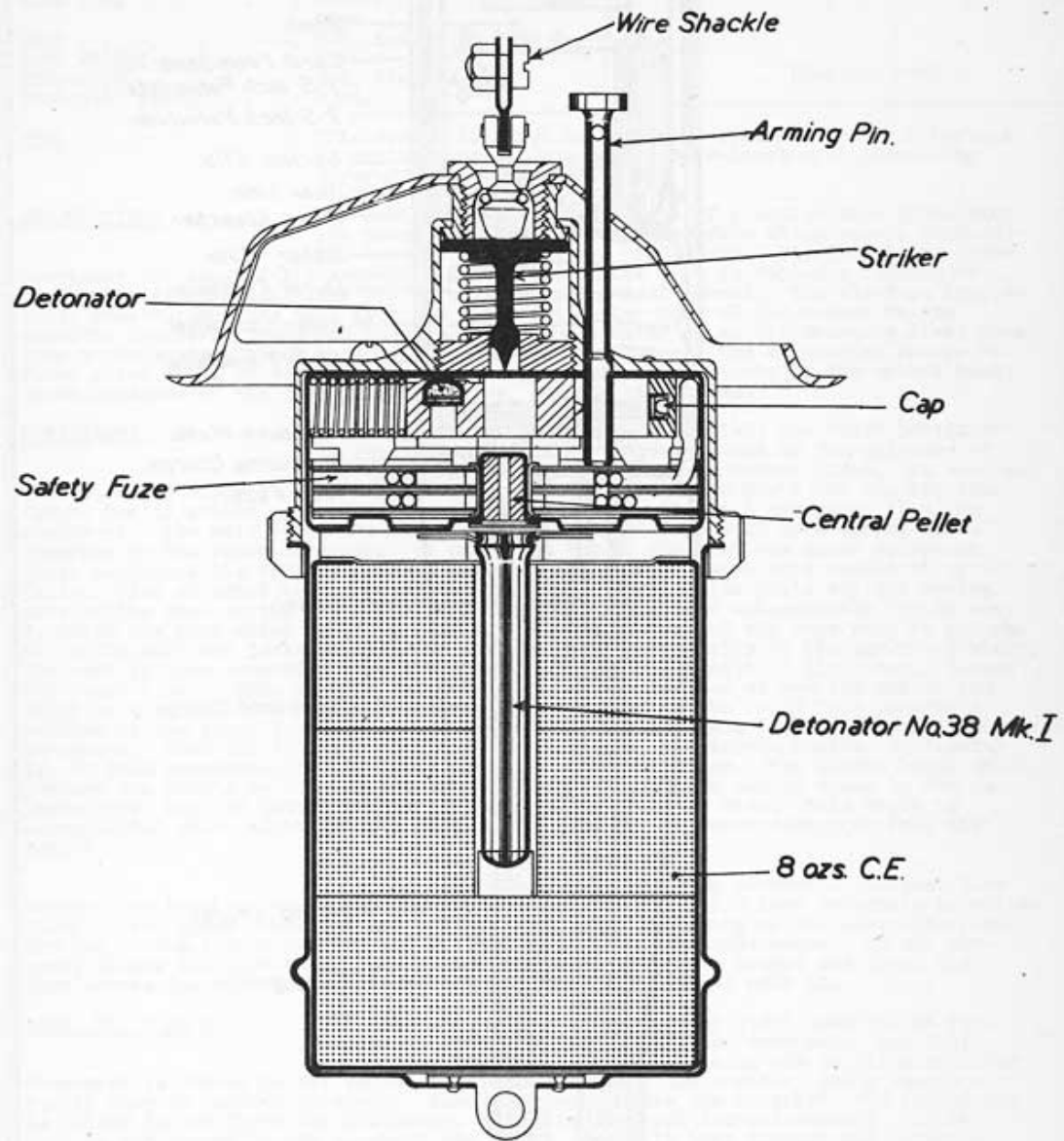


Rocket
WIRE
BARRAGE

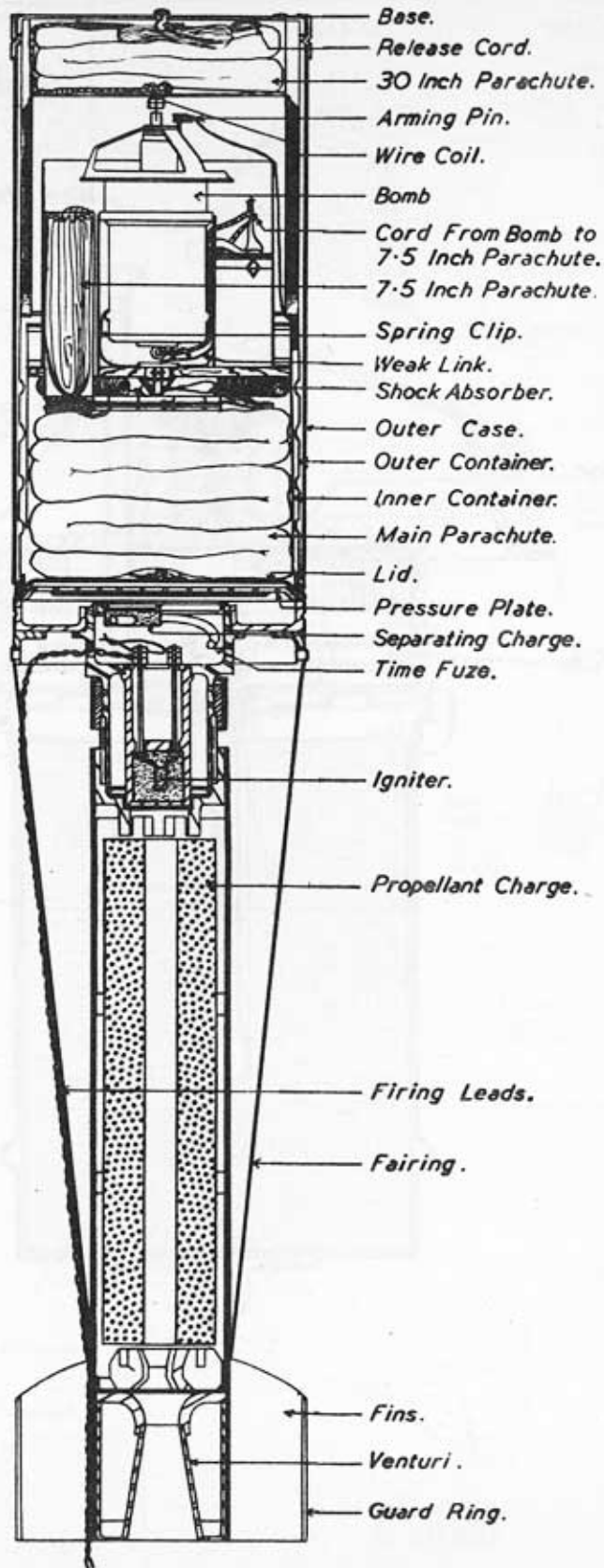
CONFIDENTIAL



APPARATUS A.D. TYPE B MK I



BOMB A.A.D. NO.2 MK I



APPARATUS A.D. TYPE B MKI

CONFIDENTIAL

OVERALL LENGTH 37.0 in.
DIAMETER 7.0 in.
TOTAL WEIGHT 37 lbs.
PROPELLANT Cordite, tubular.
PROPELLANT WEIGHT 3.9 lbs.
CHARGE IGNITER Magnesium (S.R. 371)
SEPARATING CHARGE G.12 Gunpowder, 154 grains
MINE WIRE 1000 ft. of steel piano
wire.
BOMB H.E., A.A.D., No. 2 Mk I
BOMB WEIGHT 1 lb..
EXPLOSIVE C.E. (tetryl)
EXPLOSIVE WEIGHT 8 oz.

BRITISH ROCKET

**APPARATUS A.D.
TYPE B MK I**

(Obsolescent)

USE:

This rocket is fired as a barrage employed to lay a curtain of aerial mines in the path of low-level or dive-bombing aircraft attacking a ship.

DESCRIPTION:

The tail of the rocket consists of a center tube containing the propellant charge, the gases from which emerge through the venturi to propel the projectile. The propulsive force continues for about 1-1/2 seconds. Around the center tube is fitted a fairing to which are attached tail fins protected by a cylindrical shroud. The electric igniter leads pass through the tail fins and enter the center body of the rocket to the electric igniter. Connected in parallel to the igniter is an electrically fired time fuze which burns through to ignite the separating charge. The separating charge is fired after about 10 seconds flight time and ejects the contents of the rocket head, which consists of the bomb, the mine wire, and the parachutes.

OPERATION:

When the separating charge is ignited, the outer container is ejected forward from the outer case by the pressure of the exploding charge against the pressure plate. As soon as the outer container is clear of the outer case, the pressure plate and the lid fall clear, the lid acting as a pilot parachute to withdraw the main parachute from the container. The main parachute opens, and since it is connected by a spring shock absorber to the inner container, it pulls the latter clear of the outer container, which continues its falling flight, paying out the coiled mine wire inside it as it falls. Also attached to the outer container is a cord, which pulls out the arming wire of the bomb as the two containers separate. This cord subsequently breaks away to clear the wire which is being paid out. The upper end of the mine wire is attached to the bomb and jerks it clear of its retaining spring clip in the inner container. The bomb is then suspended from the shock absorber by a length of light cord, termed the 'weak link'. This cord is secured to the shock absorber at one end and at the other to a length of heavy cord leading from the bomb to the 7-1/2 inch parachute carried in the inner container. The heavy cord is thus slack between the knot and the parachute. When all the mine wire has been paid out, the bottom bundle, containing the 30 inch parachute, is withdrawn from the outer container. The canvas bands which protect the bundle on its way out of the container are then pulled clear by the release cord, and the bottom bundle is left hanging from the wire. This state is accomplished about eight seconds after separation of the outer container from the rocket.

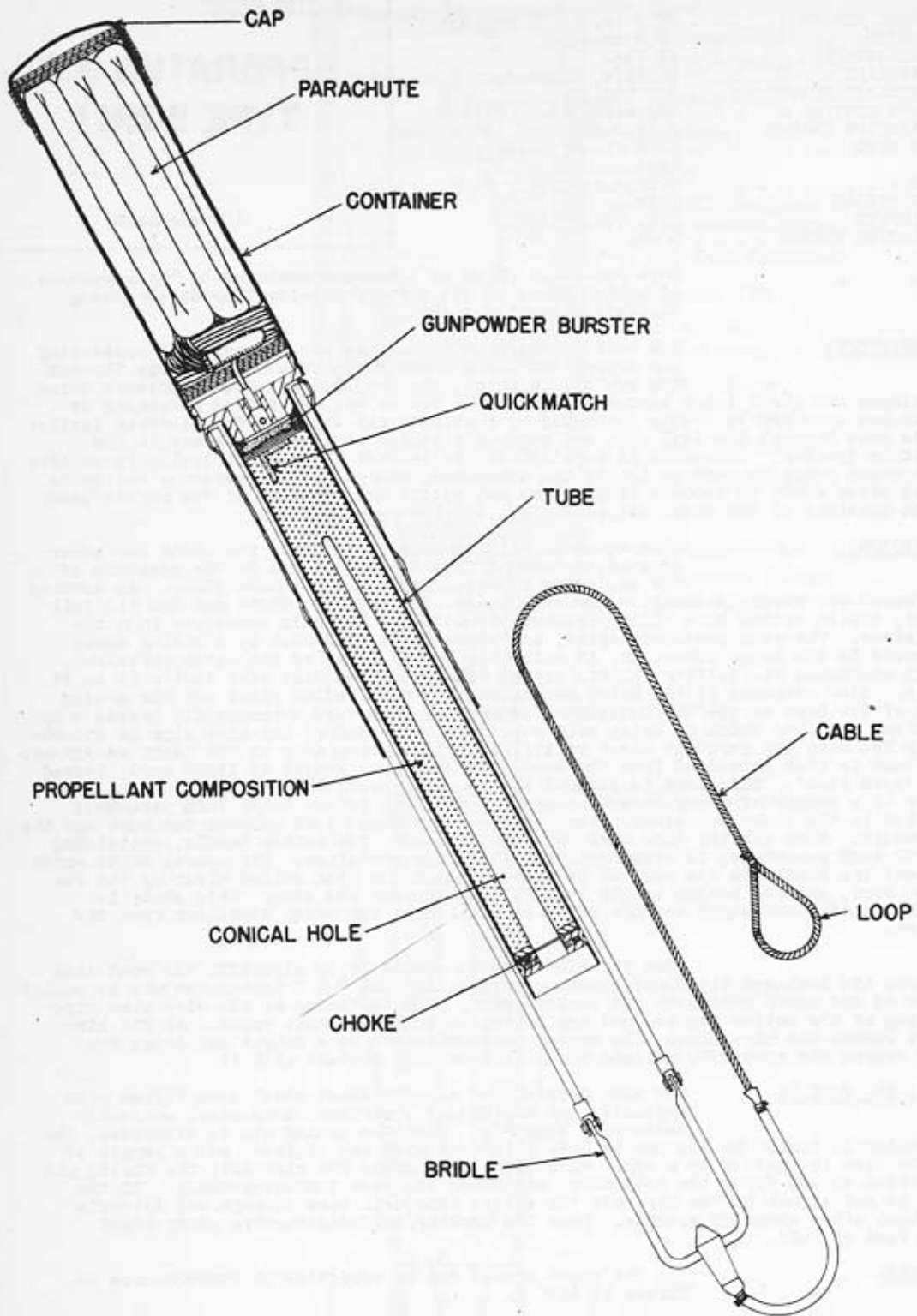
When the mine wire is struck by an aircraft, the weak link between the bomb and the shock absorber breaks, and the 7-1/2 inch parachute is pulled clear of the inner container and springs open. The tautening of the wire also rips the bag of the bottom bundle, and the bottom 30 inch parachute opens. As the aircraft pushes the wire along, the bottom parachute acts as a drogue and drags the wire across the aircraft, pulling the mine down into contact with it.

BOMB, NO. 2 MK I:

The bomb consists of a light sheet steel case filled with explosive and containing a striker, detonator, and self-destroying assembly. When the arming pin is withdrawn, the detonator is forced by its spring into alignment with the striker, and a length of safety fuse is ignited by a cap. When the bomb strikes the aircraft, the firing pin is forced in and fires the detonator, exploding the bomb instantaneously. If the wire is not struck by the aircraft the safety fuse will burn through and detonate the bomb after about 95 seconds. Thus the bomb is self-destructive after about 1250 feet of fall.

REMARKS:

(1) The round should not be subjected to temperatures in excess of 140° F.



APPARATUS A.D. TYPE D MK. III

RESTRICTED

OVERALL LENGTH . . . 34.25 in. (approx.)
MAXIMUM DIAMETER . . . 3.45 in.
TIME OF EJECTION . . . 5 secs.
LETHAL PERIOD . . . 7 secs.
VISIBLE DETERRENT . . 12 secs.

BRITISH ROCKET

**APPARATUS A.D.
TYPE D MK.III**

(Service)

GENERAL:

This rocket is designed to erect lethal wires vertically over a ship in the path of low-level or dive-bombing aircraft. The wire is carried into the air by a rocket and is suspended by a parachute which is carried in a container in the head of the rocket motor. A parachute on the lower end of the wire opens when a plane strikes the wire and offers sufficient resistance to throw the aircraft momentarily out of control or to cause it to break up. The apparatus remains lethal until its lower parachute strikes the water, about 7 secs. after ejection of the upper parachute. It continues to act as a visible deterrent for an additional 5 secs., by which time the upper parachute has fallen to an ineffective height.

DESCRIPTION:

The rocket consists of a tube filled with rocket propelling composition with a conical hole down the center. This hole is aligned with that in a choke in the after end of the tube. A length of quickmatch and a gunpowder burster charge is located in the forward end of the tube immediately below the parachute container. The parachute container holds the folded parachute and is closed at the forward end by a metal cap. The parachute is connected to the forward end of the rocket motor tube.

A steel bridle and a cable are attached to the motor tube, the cable being fitted with a loop for attachment to the main cable from the lower canister.

The lower canister consists of a cylindrical or rectangular box, which contains about 400 ft. of cable. To the lower end of the cable is attached a 38 in. drag parachute. The forward end of the cable is attached to the cable leading from the bridle on the rocket motor.

OPERATION:

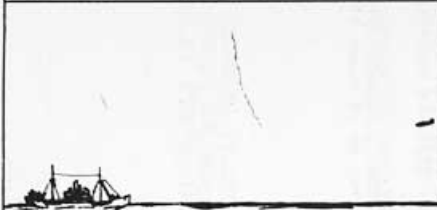
When the projector, loaded with rocket and cartridge, is fired, the flash from the cartridge ignites the rocket propellant composition, which propels the rocket along its trajectory. As the rocket rises, it uncoils and carries with it the main cable from the lower container, which remains fixed to the rocket projector. When the cable is completely uncoiled, it withdraws the drag parachute from the container. This parachute is fitted with an explosive link arrangement, allowing the parachute to open 3 secs. after firing.

When the propellant composition is completely burned through, the length of quickmatch in the head of the tube is ignited and in turn initiates the gunpowder burster charge. This charge ejects the upper parachute from its container, leaving the rocket tube and the wire cable suspended in the air.

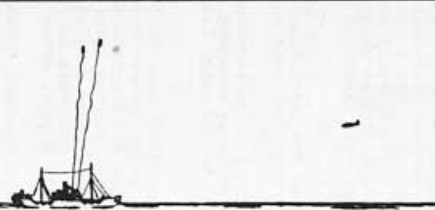
When an aircraft strikes the wire, the lower parachute opens and offers sufficient resistance to throw the plane out of control or to cause it to break up.

APPARATUS A.D. TYPE J MK. 18 II

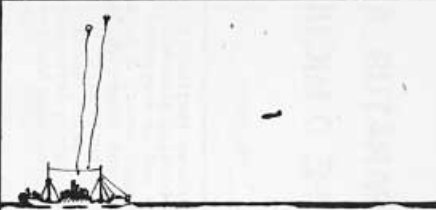
1. INSTANT OF FIRING; AIRCRAFT WITHIN 800 YARDS OF SHIP.



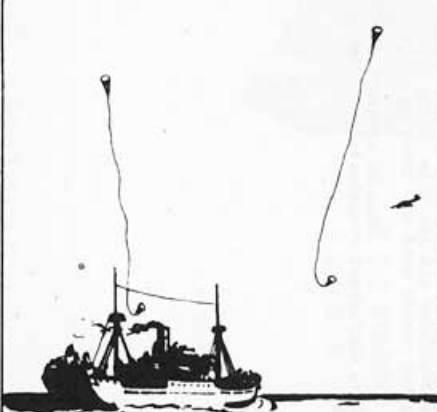
2. AFTER 3½ SECONDS, WIRE IS FULLY RUN OUT AND HAS BECOME A VISIBLE DETERRENT.



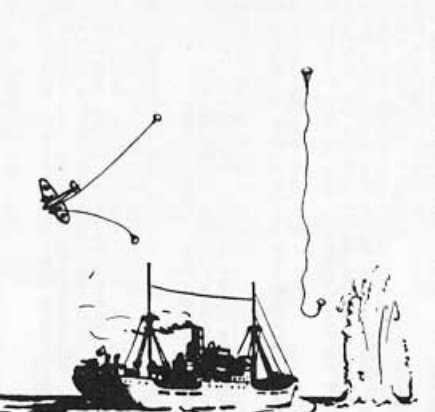
3. AFTER 6½ SECONDS, BARRAGE IS FULLY EXTENDED, AND TOP PARACHUTE OPENS AT HEIGHT OF ABOUT 1100 FEET.



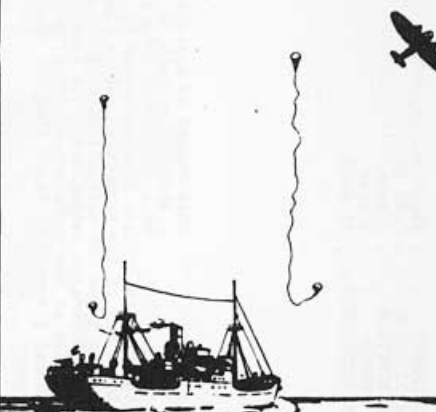
4. WIRES NOW COMMENCE TO FALL; 5½ SECONDS LATER THE LOWER PARACHUTE BUNDLE ENTERS THE WATER.



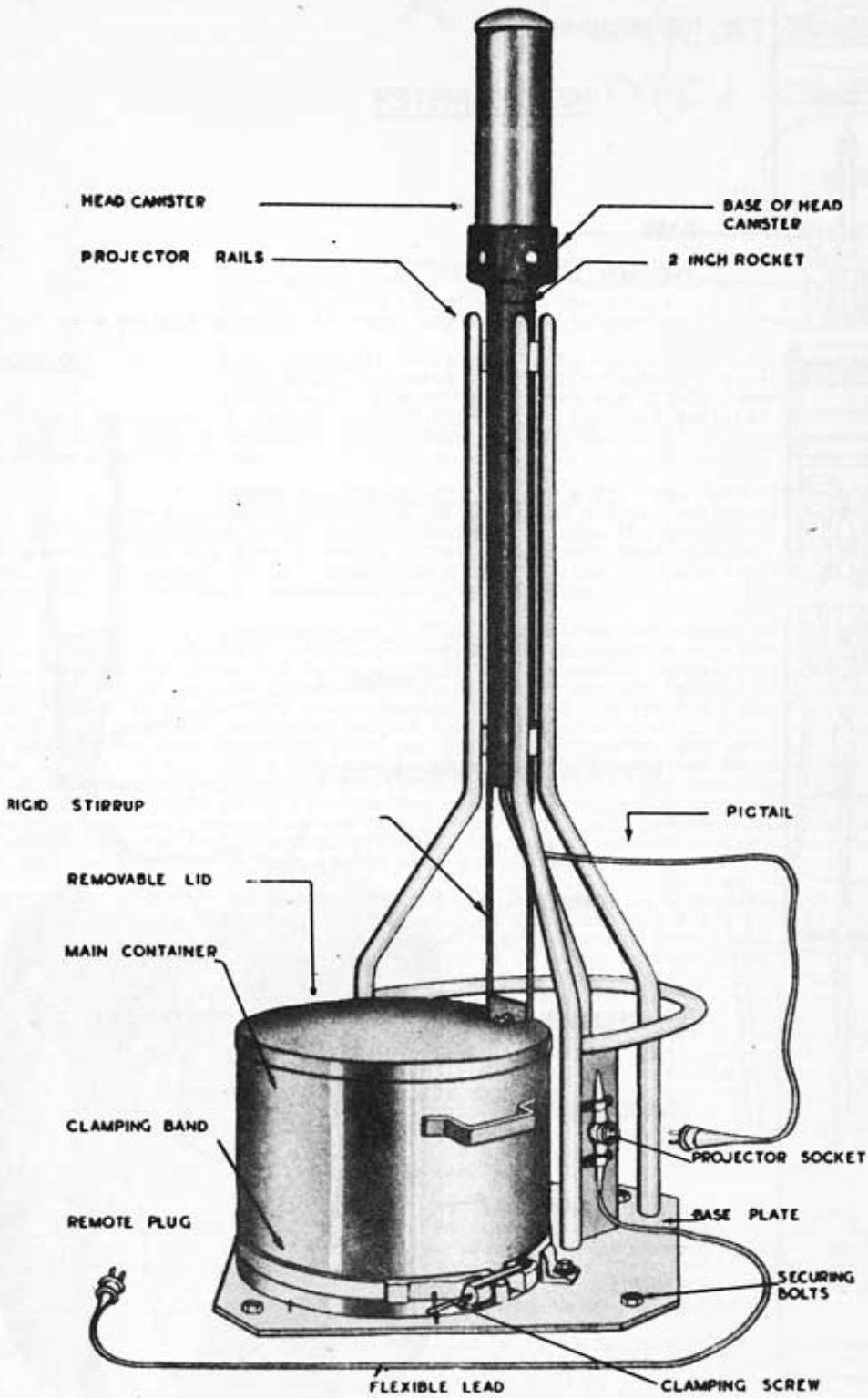
5. THE WIRES ARE LETHAL FOR 8½ SECS.; EFFECTIVE FOR 20½ SECS., DURING WHICH THE PLANE MAY BECOME ENTANGLED AND LOSE CONTROL, OR....



6. ABANDON THE ATTACK TO AVOID THE BARRAGE.

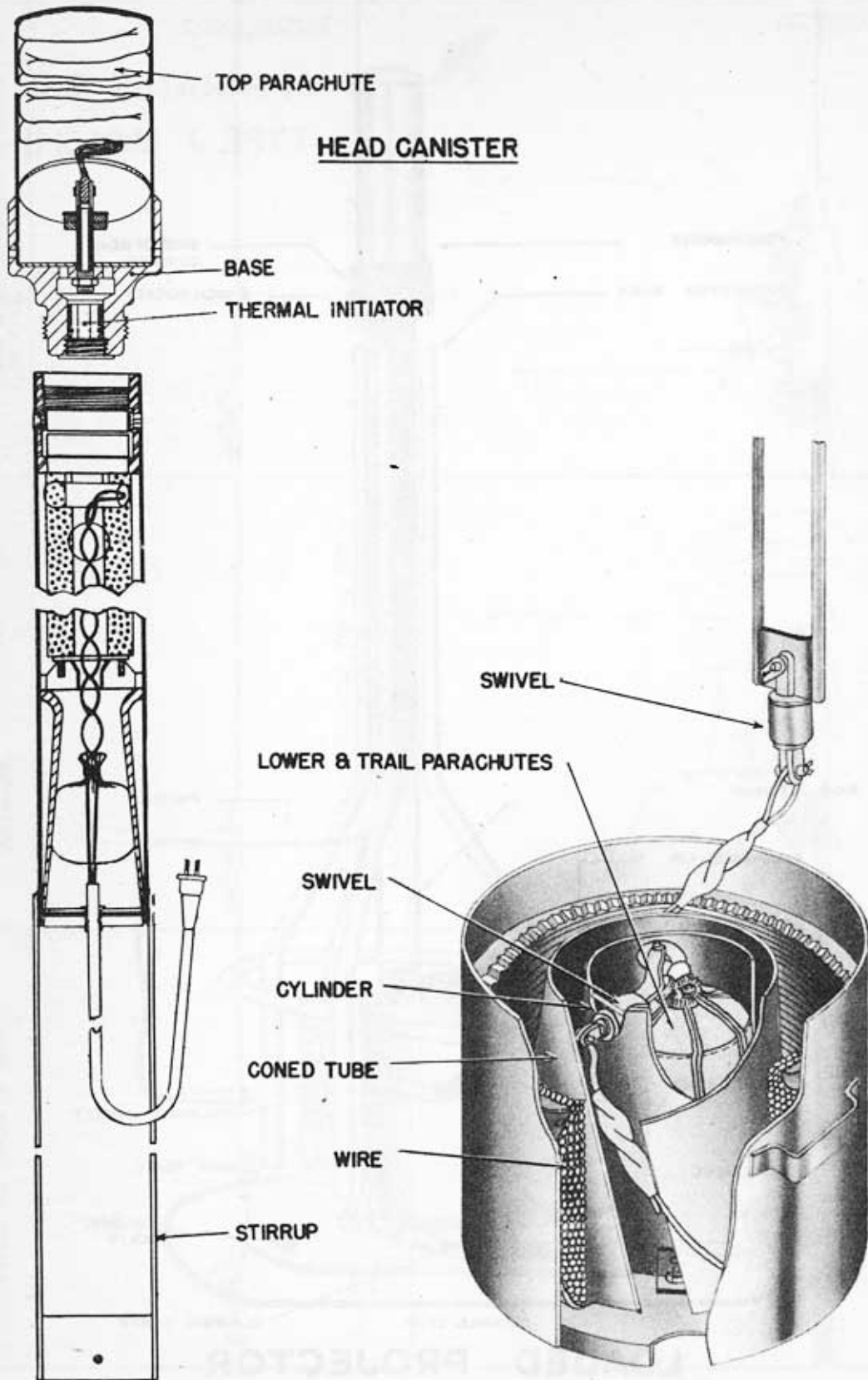


CONFIDENTIAL



LOADED PROJECTOR

APPARATUS A.D. TYPE J MK.1&11



MOTOR 2^a NO. 2 MK. II

MAIN CONTAINER

APPARATUS A.D. TYPE J MK. I & II

CONFIDENTIAL

BRITISH ROCKET

APPARATUS A.D. TYPE J MK.I&II

(Service)

USE: This rocket is designed to erect vertically over a ship a lethal wire in the path of low-level or dive-bombing aircraft. The wire acts both to bring down the aircraft if it strikes the wire and as a visible deterrent to force the aircraft to abandon the attack.

DESCRIPTION: **Head Canister:** This is a light cylindrical metal container, into which is packed a 62 inch parachute (called the 'top parachute'), the cords of which are firmly secured to the base of the head canister. A thermal fuze is fitted into the head canister and consists of a pellet of LDNR, a length of safety fuse, and 100 grains of G.12 gunpowder, which acts as an ejection charge.

Tails Propelling, 2", Mks IVA & VA: The propelling unit consists of a standard 2 inch rocket motor, with a rigid stirrup welded to the after end. No fins are fitted to the motor. Contained within the motor body is a tubular cordite grain, into the head of which is fitted an electrical igniter. The after end of the motor is sealed off by a light metal closing disc, through which pass the ends of the igniter leads terminating in a two-pin plug.

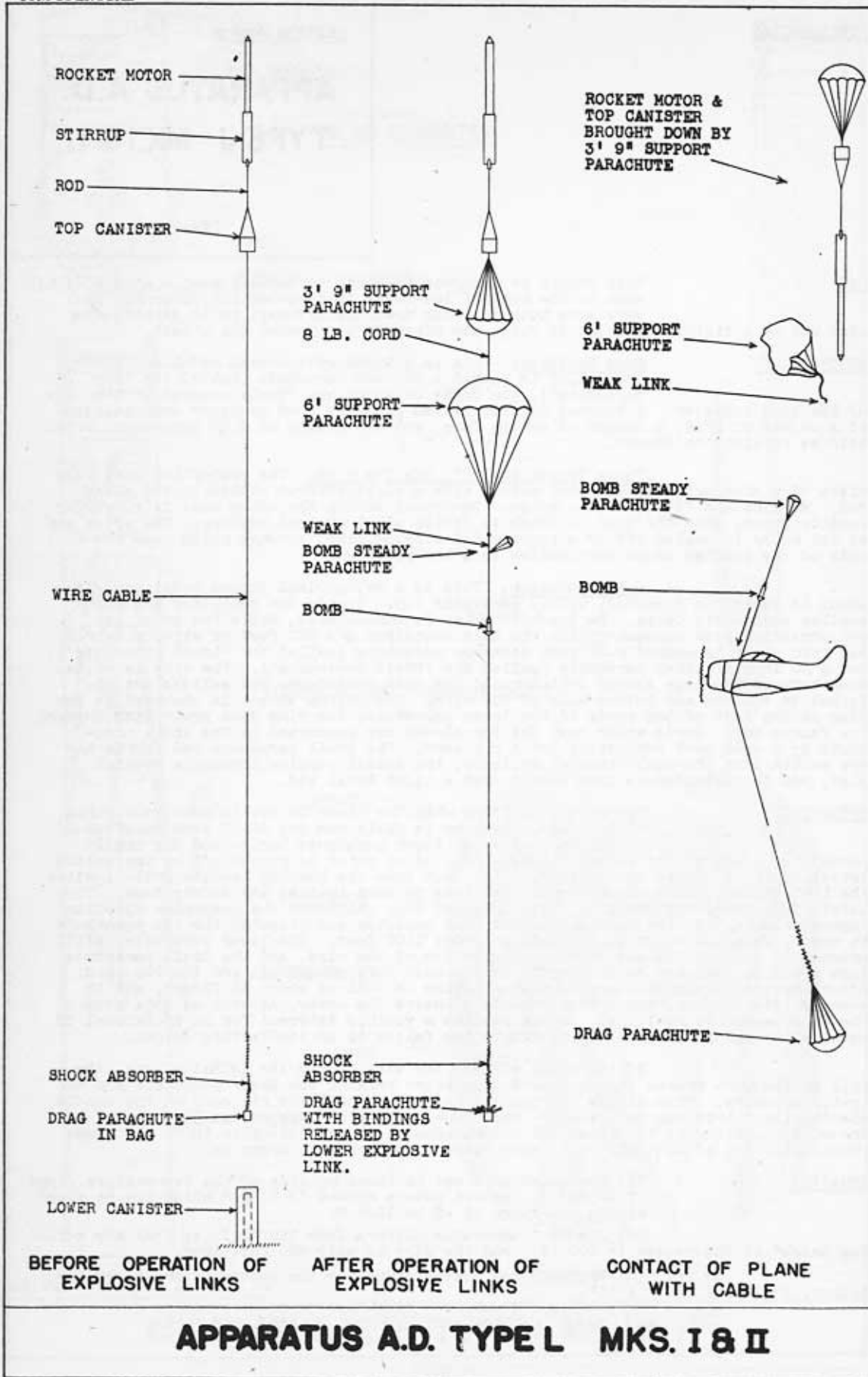
Main Container: This is a cylindrical shaped metal container about 14 inches in diameter, with a removable lid. Inside the container are two smaller concentric tubes, the outer of which is cone-shaped, while the inner is cylindrical. Also encased within the main container are 825 feet of wire, a fabric bag into which is packed a 62 inch diameter parachute (called the 'lower parachute'), and a 20 inch diameter parachute (called the 'trail parachute'). The wire is coiled down between the cone shaped cylinder and the main container, and swivels are attached to the top and bottom ends of the wire. The bottom swivel is shackled to the ring at the foot of the cords of the lower parachute, the ring just protruding through the fabric bag. Cords which keep the bag closed are connected to the trail parachute by a weak cord connection and a rip cord. The trail parachute and fabric bag are packed into the small central cylinder, the swivel passing through a special slot, and the cylinder is then sealed with a light metal lid.

OPERATION: The rocket is fired when the plane is within about 800 yards of the ship. The wire is fully run out 3-1/2 seconds after firing and pulls the lower parachute bundle and the trail parachute up out of the inner cylinder, the lid of which is ripped off by the bottom swivel as it is pulled up. Meanwhile the heat from the burning cordite grain ignites the LDNR pellet in the thermal fuze, and this in turn ignites the safety fuse. The safety fuse burns for about 6-1/2 seconds and then initiates the gunpowder ejection charge, blowing off the top part of the head canister and allowing the top parachute to open. This occurs at an altitude of about 1100 feet. The lower parachute, still wrapped in its bag, is suspended at the bottom of the wire, and the trail parachute (now open) is attached to the bundle by the weak cord connection and the rip cord. After the top parachute opens, the wire begins to fall at about 42 ft/sec, and 12 seconds after firing, the bottom parachute enters the water. As soon as this occurs, the wire ceases to be lethal, but it remains a visible deterrent for an additional 12 seconds, by which time the top parachute has fallen to an ineffective height.

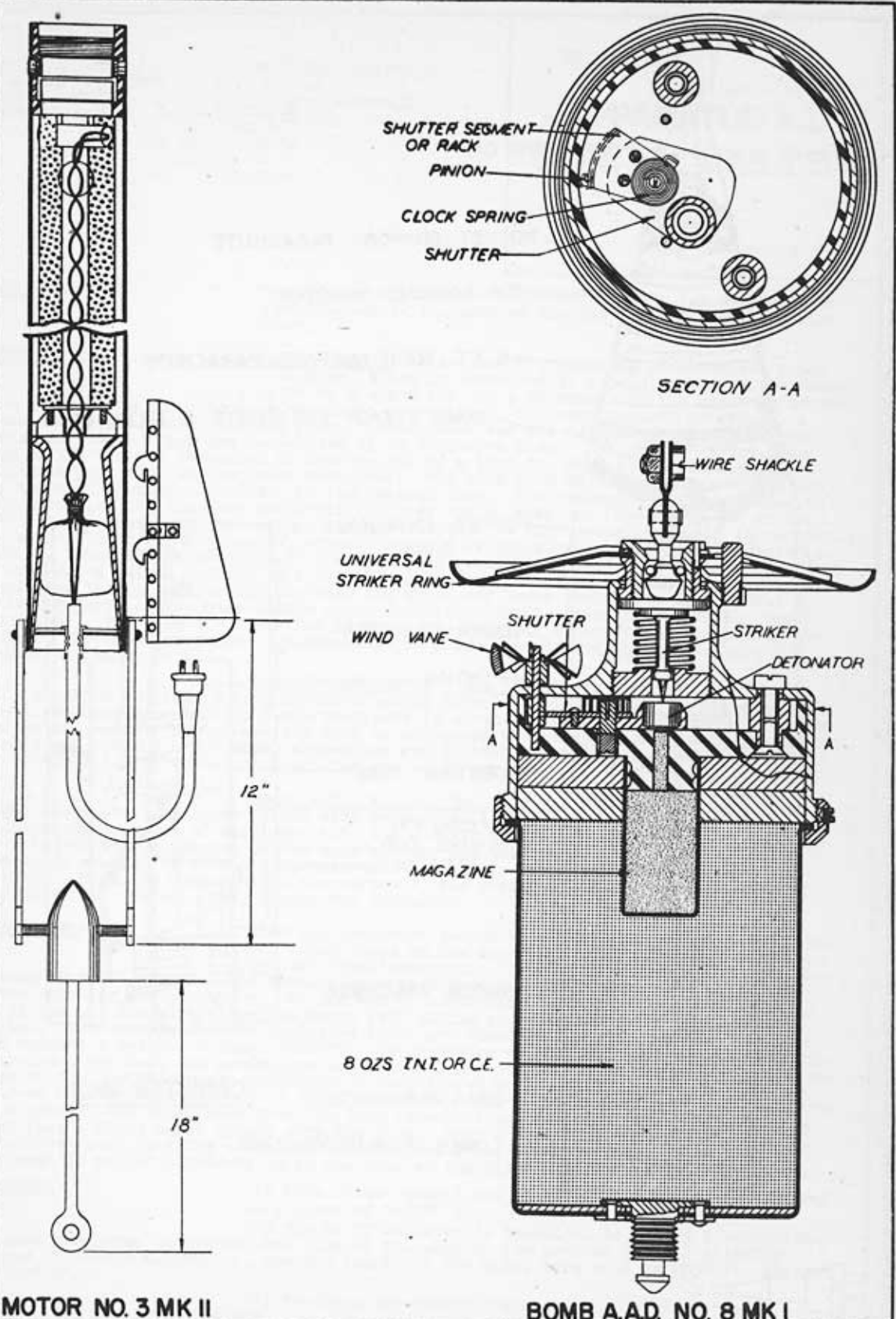
If the plane strikes the wire during its lethal stages, the pull on the wire breaks the weak cord connection between the lower parachute and the trail parachute. This allows the trail parachute to pull the rip cord on the bundle, opening the fabric bag and freeing the lower parachute. The sudden jerk caused by the wind operating on the lower and top parachutes is sufficient to throw the plane momentarily out of control, or in some cases to cause it to break up.

REMARKS:

- (1) The round must not be fired outside of the temperature range of 0-120° F., except motors marked "S.U./K." which may be fired within the range of -5 to 130° F.
- (2) The Mk I Apparatus differs from the Mk II in that the ceiling height of the rocket is 800 ft., and the wire is only 600 feet long.
- (3) Proposed new nomenclature for the rocket motors is "Motor, Rocket, 2", No. 2 Mks I & II".



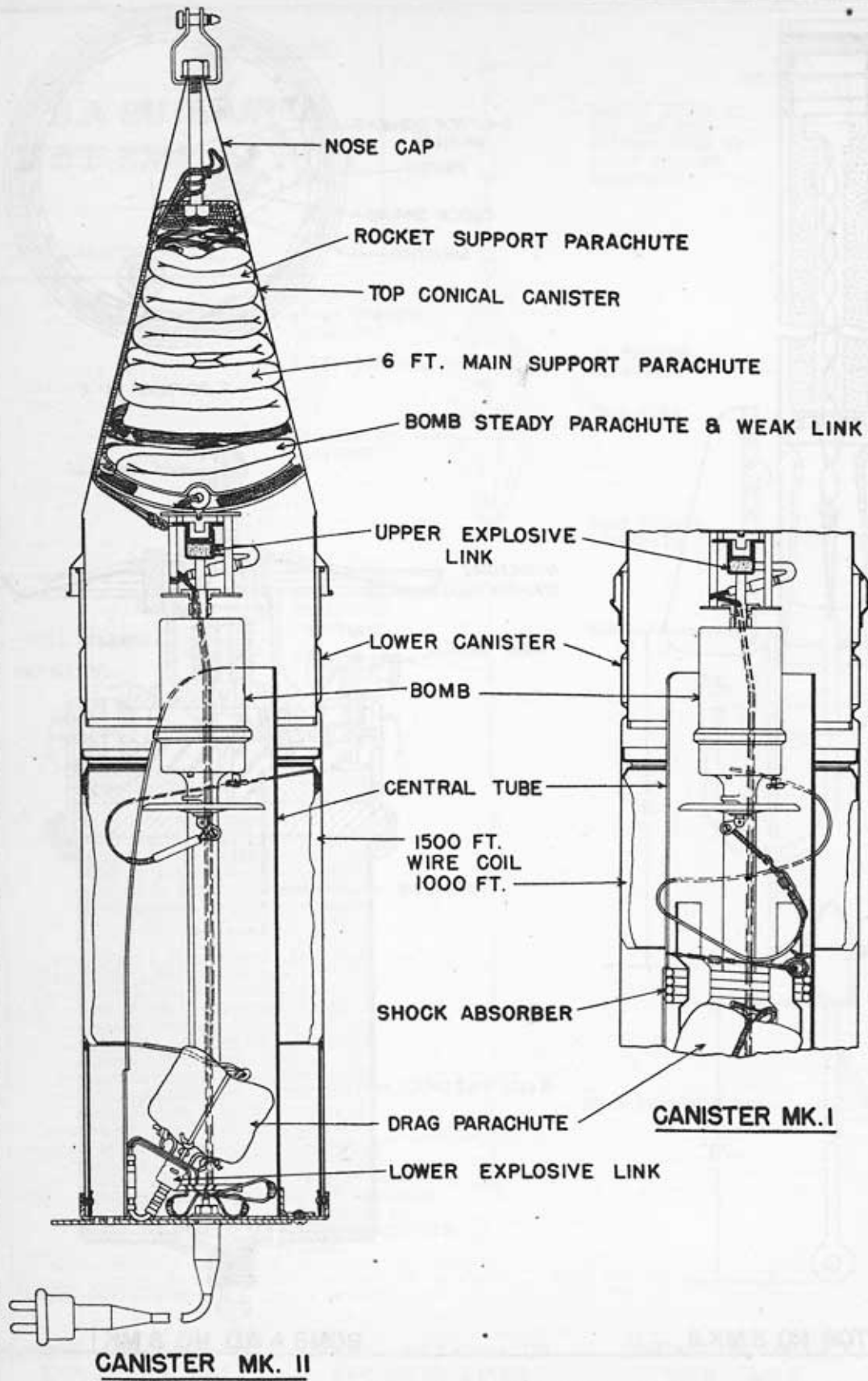
APPARATUS A.D. TYPE L MKS. I & II



MOTOR NO. 3 MK II

BOMB A.D. NO. 8 MK I

APPARATUS A.D. TYPE L MKS. I & II



APPARATUS A.D. TYPE L MKS. I & II

CONFIDENTIAL

CANISTER LENGTH 32.7 in. (approx.)
CANISTER DIAMETER 6.8 in.
MOTOR LENGTH 31 in. (approx.)
MOTOR DIAMETER 2.25 in.

BRITISH ROCKET

**APPARATUS A.D.
TYPE L MKS. I & II**

(Service)

USE:

The purpose of the Type L Apparatus is to lay a curtain of aerial mines in the path of low-level or dive-bombing aircraft.

DESCRIPTION:

Canister Mk I: This assembly consists of a conical upper container, which is connected to the tail of a 2 inch rocket motor by a short rod and a stirrup. In the upper container are a parachute to bring down the spent motor, etc., the main support parachute, a bomb steady parachute, and the bomb. These items are all held in position by three retaining cords which are controlled by an explosive link. The swivel on the lower end of the bomb is connected to the top end of a 1000 ft. coil of steel piano wire, which is contained in the lower container. The wire from the bomb passes to the top of the coil through a slot cut in the central tube. The central tube is provided to aid in unspooling the wire and avoid failures due to kinking. The lower end of the 1000 ft. coil of wire passes back through the slot in the central tube and is connected to a long light shock absorber, whose lower end is attached to the drag parachute assembly. This latter consists of a 32 in. drag parachute housed in a bag and prevented from opening on the initial jerk at pick-up by four retaining cords controlled by an explosive link. The junction between the upper and lower containers is effected by crimping parts of the base of the upper container lightly over the top of the lower container. The electric leads for igniting the electric delay fuses extend from the base of the lower container and terminate in a two-pinned plug which fits into a socket on the projector.

Tail Propelling, 2", Mks IVB & VB: This motor consists of a slightly modified 2 inch standard rocket motor. A closing plug is placed in the shell ring and the electric leads terminate in a two-pin plug, which engages a socket on the projector. The propelling unit is connected to the Canister Assembly by a 12 inch steel stirrup and a steel connecting rod 18 inches long. A quick-fastening bolt is provided in the top of the canister for rapid connection to the connecting rod.

Bomb, H.E., A.A.D., No. 8 Mk I: The bomb consists of a light sheet steel cylinder filled with explosive. A detonator is held in a shutter which is normally kept out of alignment with the striker by a clock spring. An arming vane is attached to the outside of the bomb casing, and this vane, by means of a pinion wheel, is enabled to move the shutter sufficiently to align the detonator with the striker. When the bomb strikes the aircraft, the firing pin is forced downwards by the universal striker ring, firing the detonator.

OPERATION:

When the projector switch is closed, the rocket itself and the delay fuses on the upper and lower explosive links are ignited simultaneously. The rocket motor tows the top container into the air, and the wire is unspooled from the lower container, which remains fixed on the projector. At the end of unspooling, the drag parachute assembly is picked up, the snatch tension being kept within safe limits by the long shock absorber. The upper and lower explosive links are timed to operate when the container has reached a height of about 2000 ft. On operation of the explosive link in the top container, the bomb and parachutes are released and pulled out of the container. Ejection of the rocket support parachute is facilitated by a very weak cord connection between the rocket parachute is fully withdrawn. The operation of the lower explosive link removes the constraint from the drag parachute and leaves the parachute free to open when a plane makes impact with the wire. When a plane hits the wire, the drag parachute opens, and the weak link securing the 6 ft. support parachute will part. The bomb is pulled downwards on to the wing of the plane by the drag parachute.

REMARKS:

- (1) This rocket should not be fired outside of the temperature range of 0-120° F.
- (2) The Mk II canister is identical to the Mk I except that no shock absorber is fitted, one side of the slot in the central tube is slightly flared to assist unspooling, and the length of the piano wire coil is 1500 ft. instead of 1000 ft.
- (3) Proposed new nomenclature for the motor is "Motor, Rocket, 2", No. 3 Mks I & II".

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SECTION NO. 5

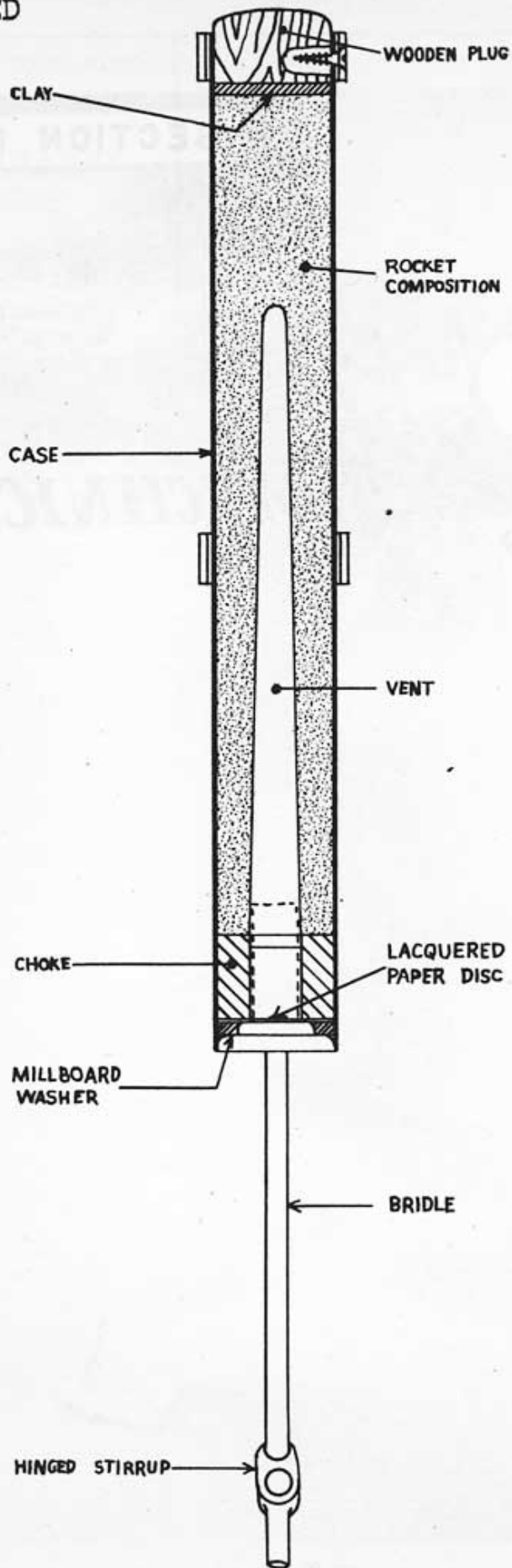


*R*ocket *PYROTECHNICS*



CONFIDENTIAL

RESTRICTED



KITE LAUNCHING ROCKET MK. II

RESTRICTED

OVERALL LENGTH . . . 10.25 in.
MAXIMUM DIAMETER . . . 1.25 in.

BRITISH ROCKET

KITE LAUNCHING MK. II

(Service)

GENERAL:

These rockets are used to enable kites to be raised easily from emergency dinghies. They are fired from a 1 in. signal pistol fitted with a barrel extension.

DESCRIPTION:

The main rocket propellant composition is contained in the case, the nose of which is closed by a wooden plug and a layer of clay. The after end of the case houses a plaster of paris choke, which is covered by a millboard washer and a paper disc. In the rocket propellant is a conical vent which is aligned with a hole through the choke. The end of the vent nearest the choke is coated with gunpowder priming.

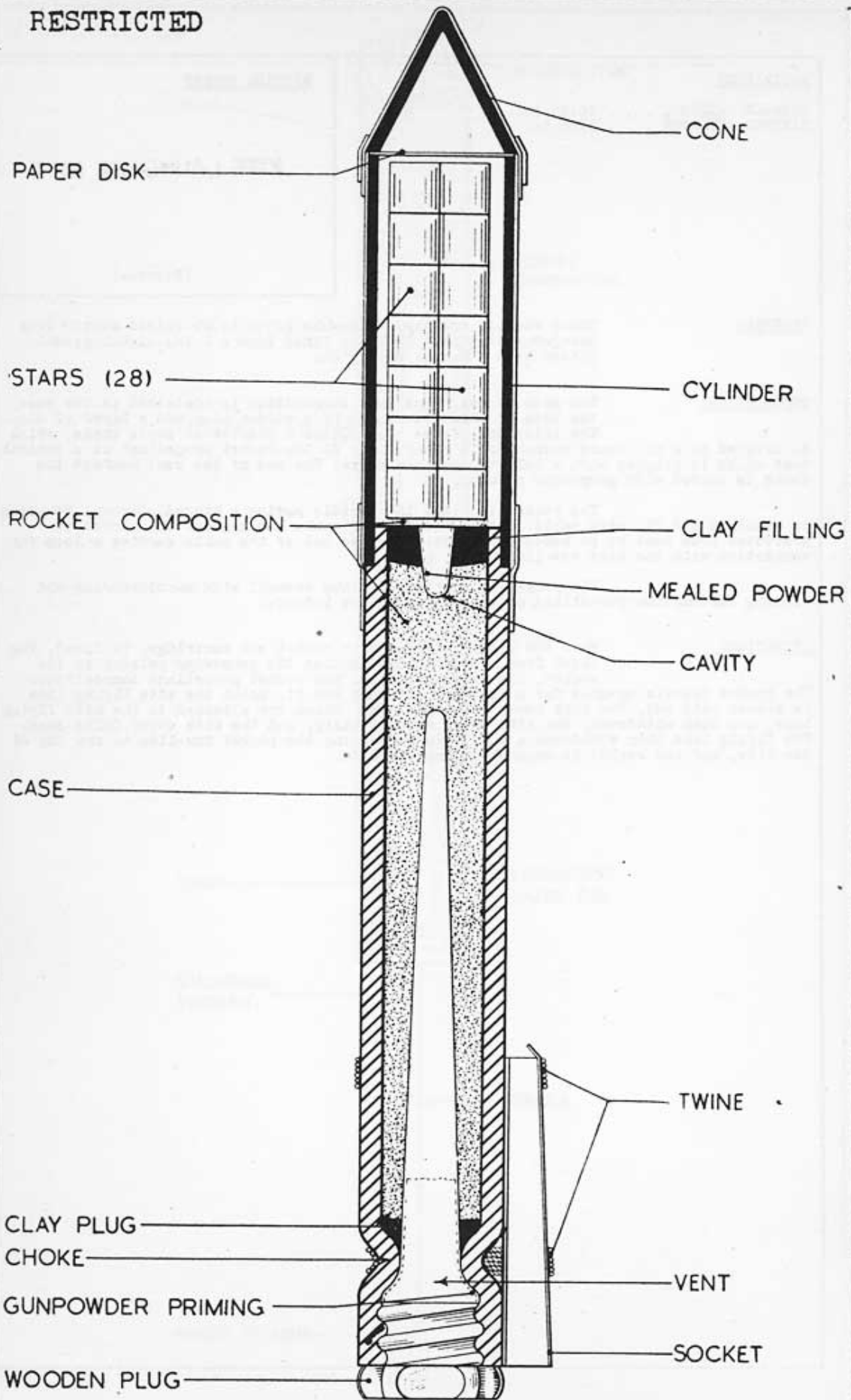
The rocket is fixed in a bridle having a hinged stirrup, to which is attached a 2 ft. wire cable. During flight, the cable end nearest the rocket is protected from heat by an asbestos sheath. The free end of the cable carries a loop for connection with the kite tow-line.

The rocket is painted aluminum overall with manufacturing and filling information stencilled on the case in black letters.

OPERATION:

When the pistol, loaded with rocket and cartridge, is fired, the flash from the cartridge ignites the gunpowder priming in the rocket. The priming ignites the rocket propellant composition. The rocket travels upwards for a distance of about 200 ft. until the kite flying line is almost paid out. The kite cover retaining pins, which are attached to the kite flying line, are then withdrawn; the kite opens automatically, and the kite cover falls away. The flying line then withdraws a split pin connecting the rocket tow-line to the top of the kite, and the rocket is separated from the kite.

RESTRICTED



SIGNAL ROCKET 1 LB. MK. III

RESTRICTED

OVERALL LENGTH 16.4 in.
MAXIMUM DIAMETER 1.8 in.
TOTAL WEIGHT 1 lb.
COLOR OF STARS White
NUMBER OF STARS 28

BRITISH ROCKET

SIGNAL 1LB. MK. III

(Service)

GENERAL:

This rocket is designed for day or night signalling. The components consist of a propellant composition filled case, closed by a wooden plug, and an upper cylinder containing 28 white stars.

DESCRIPTION:

The case consists of a rolled paper tube choked near the lower end to form a vent and threaded below the choke to receive the wooden plug. The tube is filled with rocket propellant composition, a conical cavity being left in the center. A clay filling with a tapered hole is located in the top of the tube, and the recess and the face of the clay are primed with mealed powder. A small charge of rocket composition is dusted over the top face of the clay. A clay plug with a tapered hole is located immediately above the choke, the recess and the choke being primed with gunpowder. A metal socket for accommodating the stick is glued to the outside of the case and also bound with twine.

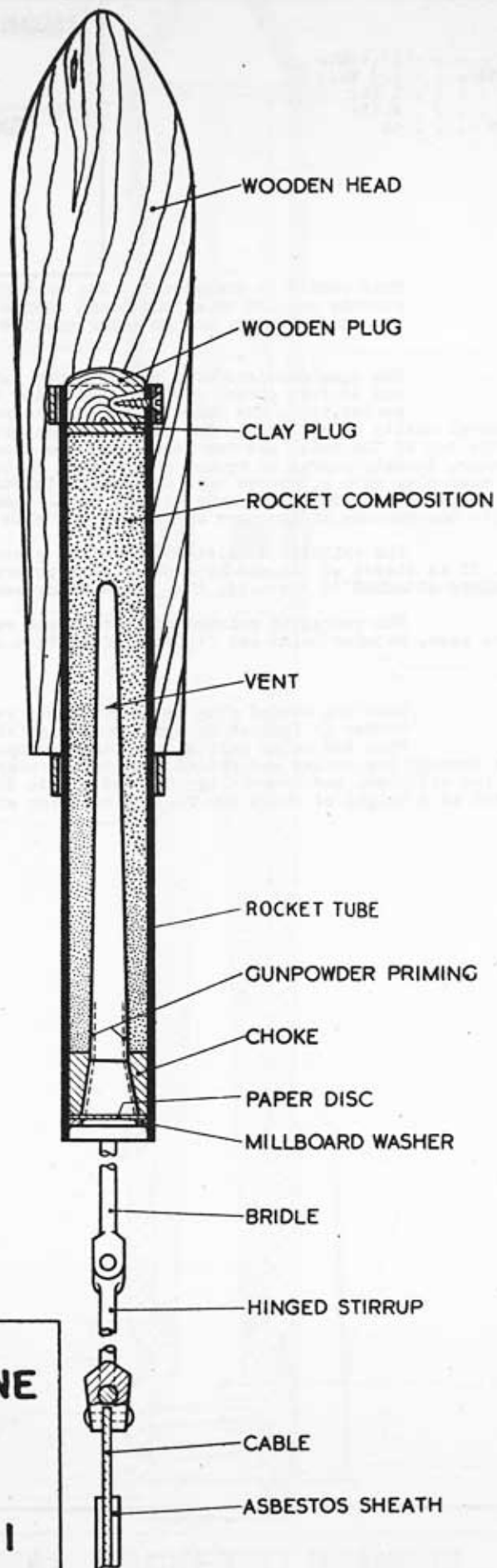
The cylinder consists of a rolled paper tube and is filled with 28 white stars. It is closed at one end by a paper disc covered with a paper cone, and at the other end is attached to the case, the joints being sealed with paper strips.

The rocket is painted olive drab and carries a white instructional label around the case. Manufacturing and filling information is stencilled on the cylinder.

OPERATION:

When the wooden plug is removed, the vent is exposed and the rocket is ignited by applying a lighted portfire to the vent. When the major part of the rocket composition has burned, combustion spreads through the cavity and primed hole in the clay filling to the rocket composition in the cylinder, and thereby ignites and ejects the stars. The burning stars are ejected at a height of about 900 ft. and burn for about 9 seconds.

RESTRICTED



**BUOYANT LINE
CARRYING
ROCKET
NO. 2 MK. 1**

RESTRICTED

OVERALL LENGTH 28.0 in.
MAXIMUM DIAMETER 2.75 in.
TOTAL WEIGHT 3.25 lbs.

BRITISH ROCKET

BUOYANT LINE CARRYING

NO. 2 MK I

(Service)

GENERAL:

This rocket is fired from a hand-firing rocket projector and is initiated by a 30 grain percussion cartridge. The rocket is designed for rescue purposes on marine craft and for use by airfields situated in coastal areas as a means of contacting crews of aircraft which have crashed into the sea immediately after take-off.

DESCRIPTION:

The rocket consists of a wooden head made in two halves, which are held together with screws round the head of the rocket tube. The rocket propellant composition is contained in the tube, the nose end of which is closed by a wooden plug and a clay plug. The after end of the rocket tube houses a plaster of paris choke, which is covered by a millboard washer and an oiled paper disc. A conical vent is formed in the rocket propellant composition in line with a tapered hole in the choke. The end of the vent nearest the choke and the hole in the choke are coated with gunpowder priming.

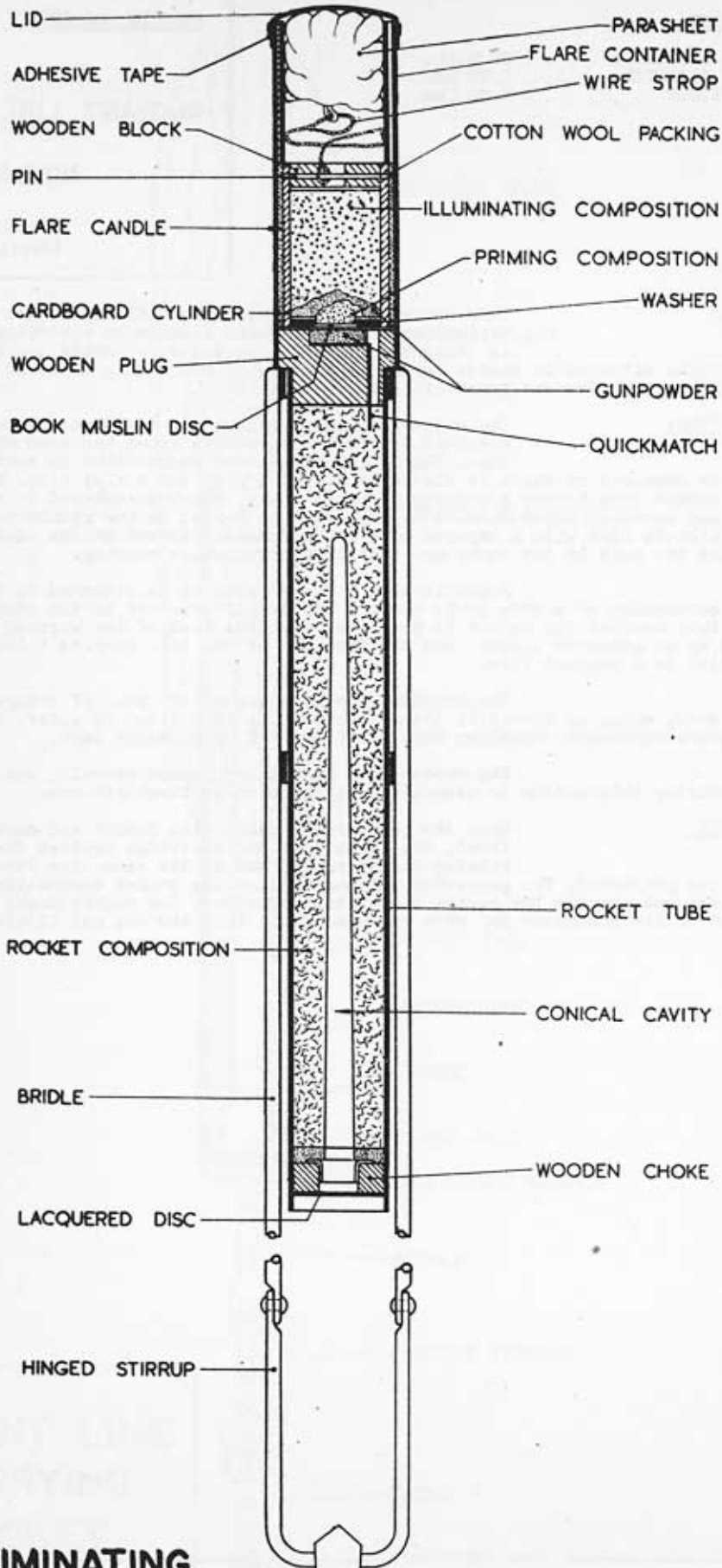
A bridle with a hinged stirrup is attached to the rocket, and a tail consisting of a wire cable about 3 ft. long is secured to the stirrup. The part of the tail nearest the rocket is protected from the heat of the burning rocket composition by an asbestos sheath, and the free end of the tail carries a loop for connection to a buoyant line.

The buoyant line consists of 250 yds. of orange colored cotton cord, which is specially treated so that it will float on water. It is coiled in a square cardboard container with a lid secured by adhesive tape.

The wooden head is painted yellow overall, and filling and manufacturing information is stencilled on the head in black letters.

OPERATION:

When the projector, loaded with rocket and cartridge, is fired, the flash from the cartridge ignites the gunpowder priming in the rocket and at the same time forces the rocket out of the projector. The gunpowder priming ignites the rocket composition, which then takes over and propels the rocket along its trajectory. The rocket draws the buoyant line out of its container and when expended falls into the sea and floats on the surface.



**ILLUMINATING
3 3/4 LB. NO. 2 MK. I**

RESTRICTED

RESTRICTED

OVERALL LENGTH 30 in.
MAXIMUM DIAMETER 2.25 in.
TOTAL WEIGHT 3.75 lbs.
HEIGHT OF EJECTION 750 ft.
OF FLARE
BURNING TIME 45 seconds
CANDLEPOWER 180,000

BRITISH ROCKET

**ILLUMINATING 3 3/4 LB.
NO. 2 MKI**

(Service)

GENERAL:

This rocket is currently employed only by the Air/Sea Rescue Service to assist in sea rescue searches at night. It is fired from a hand-firing projector and is initiated by a 30 grain percussion cartridge.

DESCRIPTION:

The rocket consists of a steel rocket tube containing a rocket propelling composition which has a conical cavity left in the center. The rocket tube is fitted at one end with a metal flare container housing a wooden plug, a flare candle, and a cotton parasheet attached to the candle by a wire strop. Crimped into the other end of the tube is a wooden choke sealed by a paper disc.

Secured to the rocket tube is steel bridle, which extends beyond the wooden choke and carries a hinged stirrup, to the base of which is secured one end of a steel rope tail. This end of the tail is protected from the heat of the burning propellant composition by an asbestos sheath. The other end of the tail is spliced to form a loop to which is attached a hemp rope 12 ft. long. The rope is coiled into a paper envelope, which has a cotton loop attached to it. The envelope, with the rope inside, is attached to the rocket by a rubber band when supplied.

The wooden plug in the flare container carries a recess which houses a small quantity of gunpowder and a length of quickmatch. The quickmatch contacts the gunpowder and the rocket composition.

The flare candle consists of a cardboard cylinder held in place in the flare container with cotton wool packing, and closed at one end by a wooden block. This block has a pin passing through it to take one end of the wire strop of the parasheet. At the other end of the cardboard cylinder is secured a washer housing some gunpowder, which is held in place by a muslin disc. Above this disc is placed a small amount of priming composition. An illuminating composition fills the remainder of the candle.

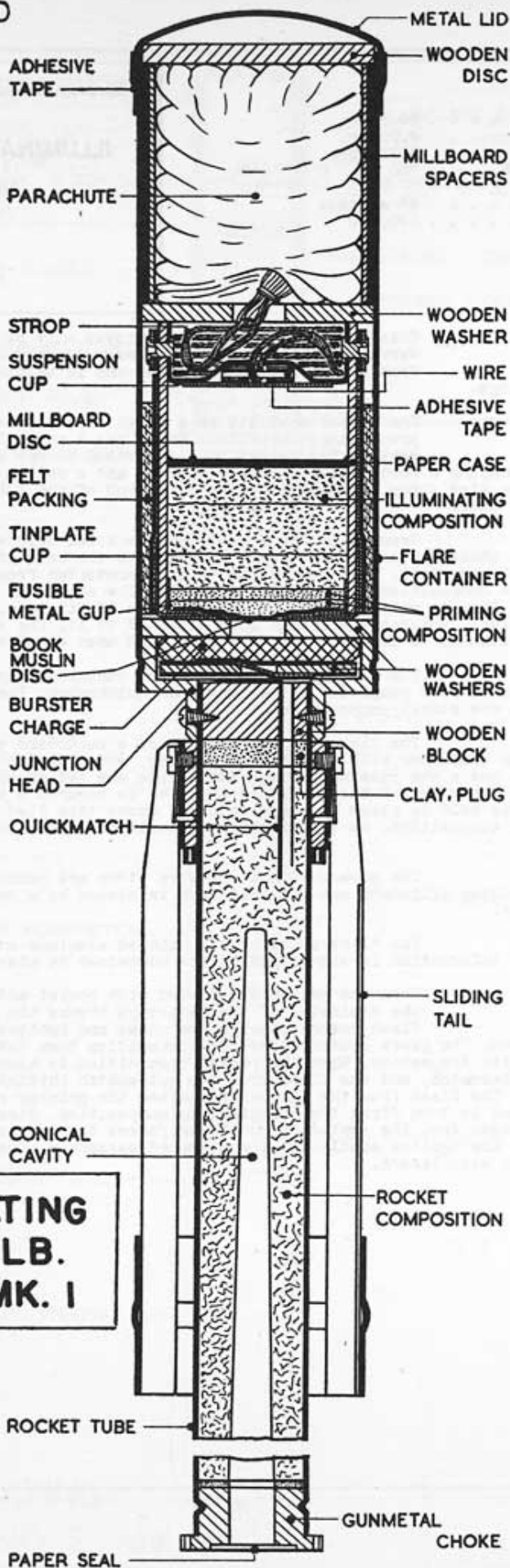
The parasheet and the wire strop are packed into the flare container with packing cylinders and the container is closed by a metal lid secured with adhesive tape.

The flare container is painted aluminum overall, and filling and manufacturing information is stencilled on the container in black letters.

OPERATION:

When the projector, loaded with rocket and cartridge, is fired, the explosion of the cartridge breaks the paper disc, and the flash passes through the choke and ignites the rocket propellant composition. The gases generated by the composition then take over and force the rocket along its trajectory. When the rocket composition is almost burned through, it ignites the quickmatch, and the flash from the quickmatch initiates the gunpowder in the wooden block. The flash from the gunpowder ignites the priming composition in the flare candle, which in turn fires the illuminating composition. Simultaneously, the pressure of the gases from the exploding gunpowder forces the lid from the flare container and ejects the ignited candle and its attached parachute. The tail and the hemp rope act as flight stabilizers.

RESTRICTED



**ILLUMINATING
6 1/4 LB.
NO. 1 MK. I**

RESTRICTED

OVERALL LENGTH 22.5 in.
MAXIMUM DIAMETER 3.5 in.
TOTAL WEIGHT 6.25 lbs.
HEIGHT OF EJECTION 800 ft. (approx.)
BURNING TIME 45 secs. (approx.)
CANDLEPOWER 300,000

BRITISH ROCKET

**ILLUMINATING 6 1/4 LB
NO 1 MK I**

(Service)

GENERAL:

This rocket is currently used by the Royal Observer Corps to indicate to patrolling fighters the presence of low-flying enemy aircraft, and by the Air/Sea Rescue Service to assist in sea rescue searches at night. The rocket is fired from a Type B Rocket Projector, Mk's III or IV, using a 60 grain percussion cartridge.

DESCRIPTION:

The rocket consists of a rocket tube, a sliding tail, and a flare container housing a burster charge, flare candle, and parachute. The rocket tube is filled with a rocket propellant composition, a conical cavity being left in the center, and is closed at one end by a gunmetal choke crimped in position. The choke is closed by a paper seal. At the other end of the rocket tube is a wooden block and a clay plug, with a hole to receive a length of quickmatch. The flare container is crimped to a metal junction head secured by screws to the wooden block. Housed in the junction head is a wooden washer, covered with primed cambric, and the burster charge, which is held in place by another wooden washer.

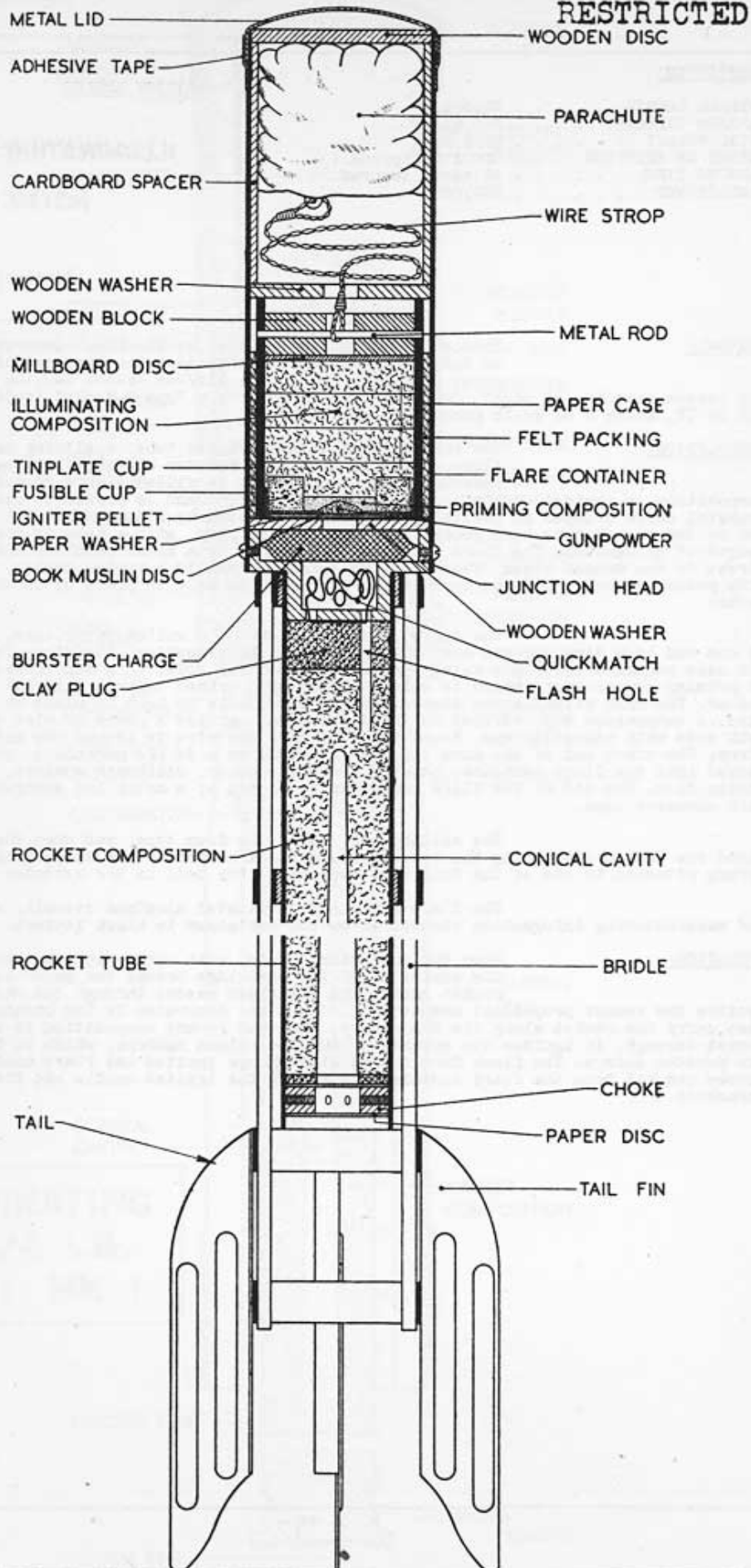
The flare candle consists of a rolled paper case, strengthened at one end by a tinplate cup and held in place by felt packing. The strengthened end of the case contains a fusible metal cup having a central hole. This cup houses a quantity of priming composition, which is held in place by a primed cambric disc and a paper washer. The main illuminating composition of the candle is held in place by a millboard disc. A suspension cup, riveted to the paper case, carries a piece of wire wrapped at both ends with adhesive tape. Round the middle of the wire is looped one end of a wire strop. The other end of the wire strop is attached to a 36 in. parachute, which is packed into the flare container between a wooden washer, millboard spacers, and a wooden disc. The top of the flare container is closed by a metal lid secured in place with adhesive tape.

The sliding tail is of the drum type, and when the rocket is fired the tail slides along the rocket tube until arrested by the metal choke. A leaf spring attached to one of the tail fins then holds the tail in the extended position.

The flare container is painted aluminum overall, with filling and manufacturing information stencilled on the container in black letters.

OPERATION:

When the projector, loaded with rocket and cartridge, is fired, the explosion of the cartridge breaks the paper seal on the rocket choke, and the flash passes through the choke and ignites the rocket propellant composition. The gases generated by the burning propellant then carry the rocket along its trajectory. When the rocket composition is almost burned through, it ignites the quickmatch and the primed cambric, which in turn fires the burster charge. The flash from the burster charge ignites the flare candle and forces the lid from the flare container, ejecting the ignited candle and its attached parachute.



ILLUMINATING 9 LB. MK. 2

RESTRICTED

OVERALL LENGTH 36 in.
MAXIMUM DIAMETER 8 in.
WEIGHT 9 lbs.
HEIGHT OF EJECTION 1500 ft. (approx.)
BURNING TIME 60 - 70 seconds.
CANDLEPOWER 300,000

BRITISH ROCKET

**ILLUMINATING 9 LB.
MK II**

(Service)

GENERAL:

This rocket is currently used only by the Royal Observer Corps to indicate to patrolling fighters the presence of low-flying enemy aircraft. The rocket is fired from a Type B Rocket Projector, Mk IV, using a 60 grain percussion cartridge.

DESCRIPTION:

The rocket consists of a steel rocket tube, a tail, and a metal flare container housing a parachute, flare candle, and burster charge. The rocket tube is filled with a propellant composition, a conical cavity being left in the center. At one end of the rocket tube is a gunmetal choke crimped in position and closed with a paper disc. At the other end of the steel tube is a clay plug provided with a flash hole. The flare container is fastened with screws to a metal junction head, which houses the burster charge and a length of quickmatch. The burster charge is held in position by a wooden washer, covered with primed cambric. Attached to the flare container is a waterproof sleeve, which fits over the projector barrel, when the projector is loaded, to prevent rain from entering the barrel.

The flare candle consists of a rolled paper case, strengthened at one end by a tinplate cap and held in place with felt packing. The strengthened end of the cap contains a fusible metal cup having a central hole. Housed in this cup is a quantity of gunpowder, priming composition, and two igniter pellets, the gunpowder and priming composition being held in place by a muslin disc. The main illuminating filling of the candle is pressed in position and held in place by a millboard disc. A wooden block, resting on the millboard disc, has a central hole to receive one end of a wire strop, which is looped around a metal rod passing through the wooden block. The block is riveted to the paper case. The other end of the wire strop is attached to a 36 in. parachute packed in the flare container between a wooden washer, cardboard spacers, and a wooden disc. The top of the flare container is closed by a metal lid secured to the container with adhesive tape.

The rocket is stabilized in flight by a tail secured to the rocket tube. The tail consists of four fins attached to a bridle fitted to the rocket tube.

The flare container is painted aluminum overall, with filling and manufacturing information stencilled on the container in black letters.

OPERATION:

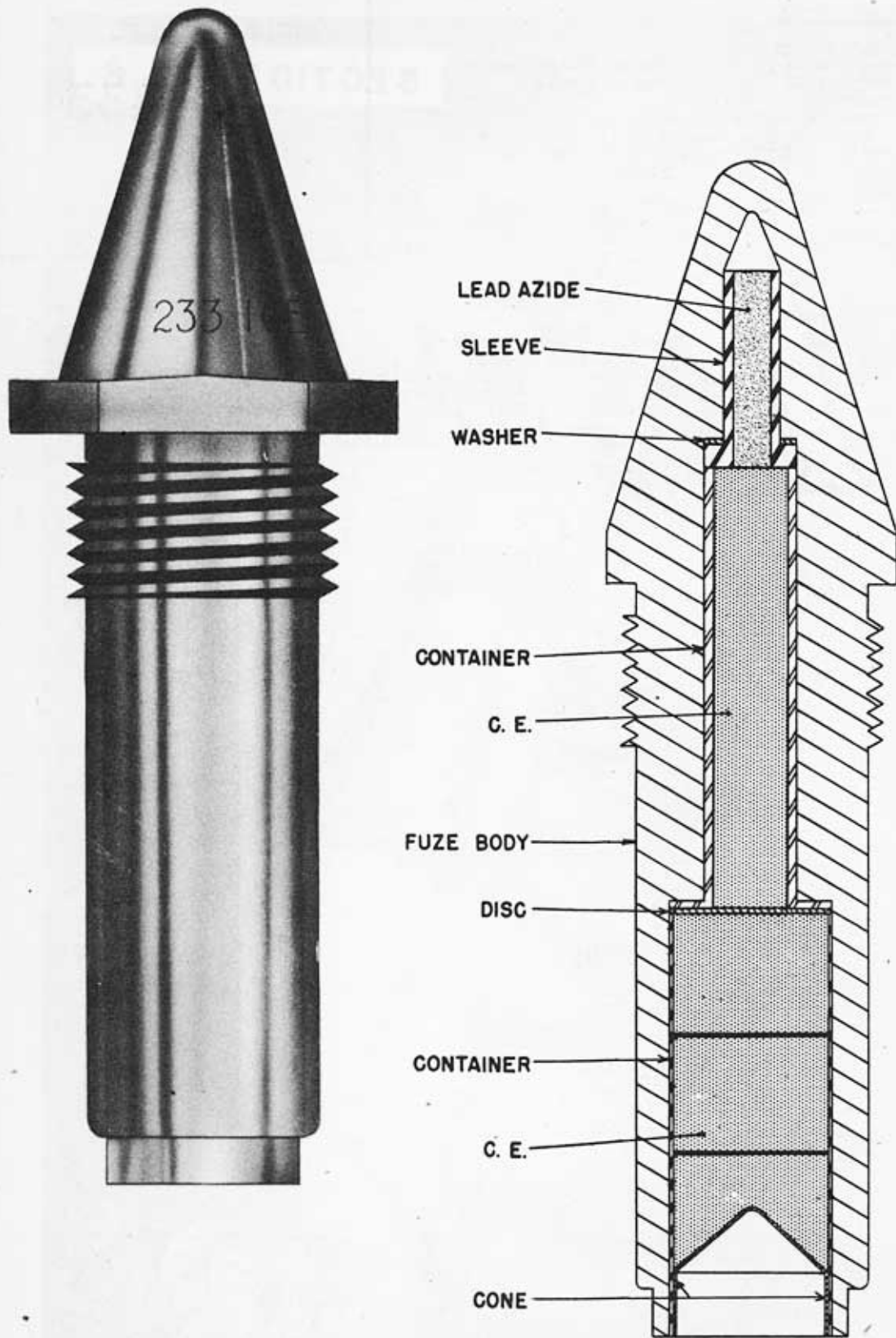
When the projector, loaded with rocket and cartridge, is fired, the flash from the cartridge breaks the paper sealing disc, passes through the choke, and ignites the rocket propellant composition, which then forces the rocket along its trajectory. When the rocket composition is almost burned through, the flame passes through the flash hole and ignites the length of quickmatch and the burster charge. The flash from the burster charge ignites the flare candle and forces the lid from the flare container, ejecting the ignited candle and its attached parachute.

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SECTION NO. 6

*R*ocket *FUZES*

CONFIDENTIAL



ROCKET NOSE FUZE NO. 233 MK. I

CONFIDENTIAL

BRITISH ROCKET FUZE

ROCKETS USED IN . . .
FUNCTIONING Impact Instantaneous
ARMING TIME Instantaneous
DIAMETERS:
Base of Ogive . . . 0.75 in.
Lower body 0.43 in.
OVERALL LENGTH 2.25 in. (approx.)
COLOR Brass
MATERIAL OF
CONSTRUCTION Fuze body: Brass;
Sleeve & Containers: Aluminum
MARKINGS "231 I GES 4AC"

NO. 233

MK. I

(Service)

DESCRIPTION:

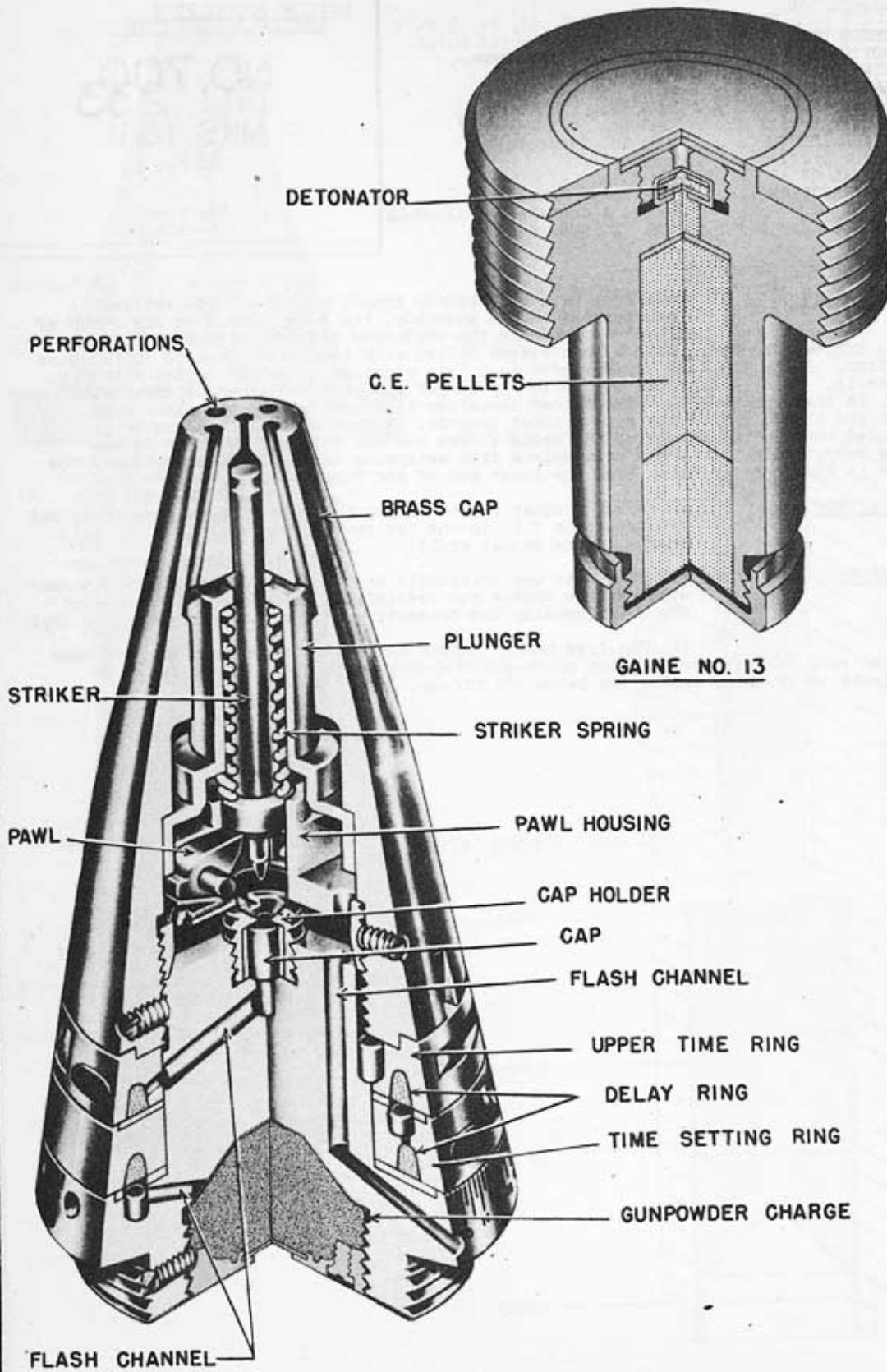
This fuze is a very simple impact type fuze. No striker is incorporated in the assembly, the fuze relying on the shock of impact to detonate the explosive filling. The fuze consists of a hollow fuze body, with a thin sleeve filled with lead azide located in the nose portion. Below the lead azide sleeve is a thin aluminum container filled with C.E. (tetryl). This is followed by a slightly larger aluminum container, stemmed with C.E. in three increments. The latter container is closed with a tin-plate cone, with the closed end of the cone pointed inwards. A thin brass dished washer is located between the flange of the azide sleeve and the internal shoulder in the fuze body, and a thin brass or tinplate disc separates the two C.E. containers. The fuze is closed by crimping over the lower end of the fuze body.

OPERATION:

On impact against a hard target the lead azide sleeve fires and detonates the C.E. in the two containers, exploding the main charge of the rocket shell.

REMARKS:

- (1) This fuze was originally designed for use in the 95 mm and other hollow charge gun projectiles, the cone in the base of the fuze focusing the detonation to the main charge in the shell.
- (2) The fuze has no safety devices incorporated, but has been proved safe against normal rough usage and dropping tests and will not function reliably at striking velocities below 500 ft/sec.



ROCKET NOSE FUZE NO. 700 MK. II

RESTRICTED

ROCKETS USED IN Shell, H.E. 3", No. 1 Mk I
FUNCTIONING Pyrotechnic aerial burst.
ARMED CONDITION No external evidence.
ARMING TIME 1.2 secs. (approx.)
MAX. BODY DIAMETER 2.4 in.
OVERALL LENGTH 4.7 in.
COLOR Bronze lacquer.
MATERIAL Brass

BRITISH ROCKET FUZE

NO. 700
MKS. I & II

(Service)

DESCRIPTION:

This fuze, designed for anti-aircraft purposes, is a pyrotechnic time fuze. Variable settings, from 0 to 30 seconds, are obtained by rotating the time setting ring. The time settings are indicated by numbered graduations, sub-divided to 1/4 seconds, engraved on the fuze body below the time setting ring.

The fuze consists of a brass fuze body, a brass cap, and an upper time ring and lower time setting ring.

The brass nose cap has a flat top with five perforations, the center one leading to the striker recess and the remaining four leading to the recess accommodating the plunger. In this nose cap are located the striker and the striker spring. The spring is enclosed in an aluminum alloy plunger. Supporting the striker and the plunger are two brass pawls, pivoted in a pawl housing which is screwed into the bottom of the nose cap.

Pivoted in a recess in the fuze body is a safety lever, the upper arm of which intervenes between the striker and the percussion cap in the unarmed position. The lower end of the lever is rectangular in cross-section and fits into a spring-loaded catch. The outer end of the catch engages a recess in the time setting ring when the fuze is set on "SAFE". A turning movement is imparted to the safety lever when the outer end of the catch leaves the recess in the time setting ring, removing the upper lever arm from beneath the striker.

Beneath the percussion cap is located a flash channel leading to the upper time ring. A second channel leads from the lower time setting ring to the charge of gunpowder in the base of the fuze. Leading from the top of the fuze body through to the base of the fuze is a third channel provided for the escape of air pressure.

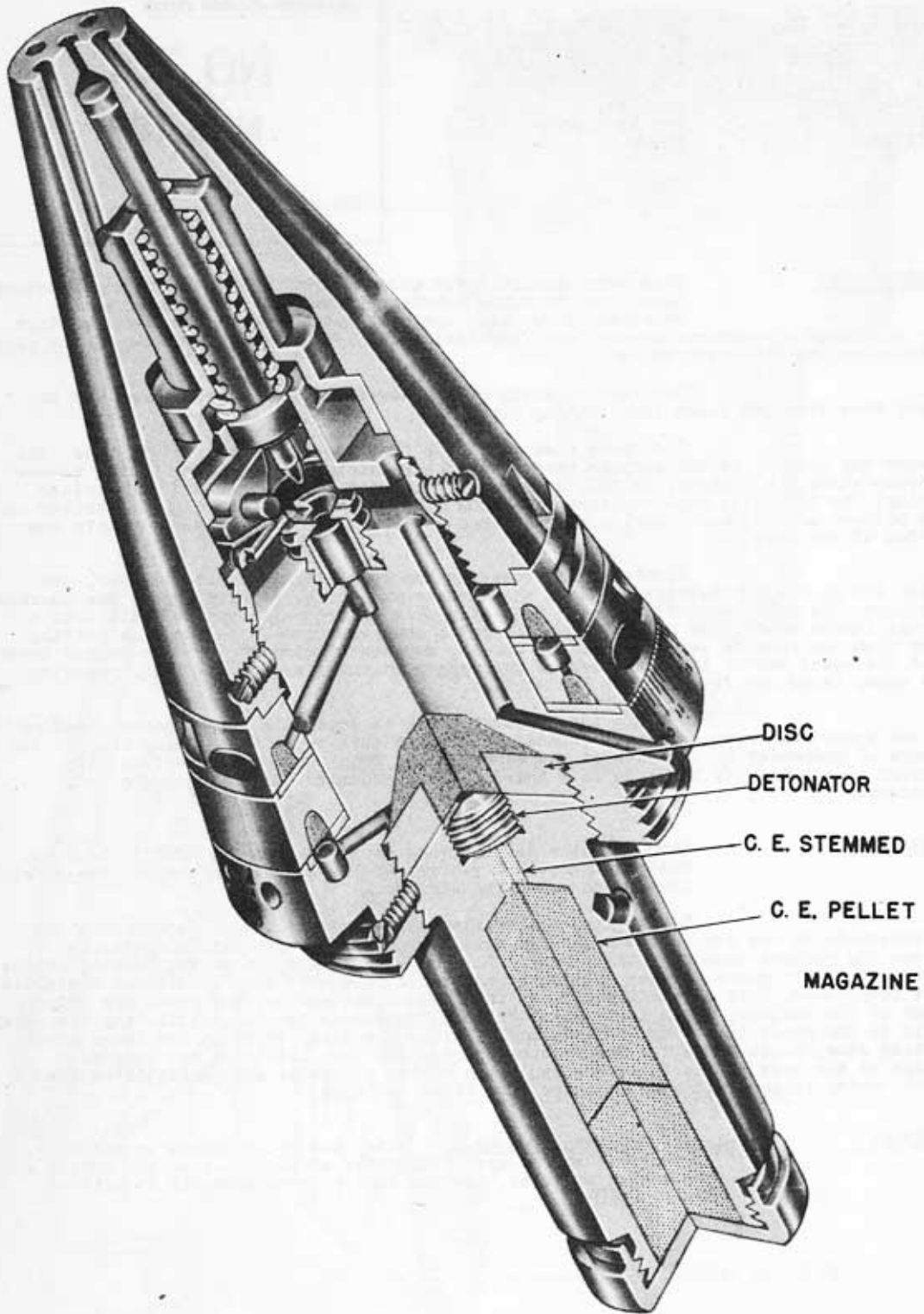
OPERATION:

When the time setting ring is moved from the "SAFE" position, the safety catch moves out of its recess and rotates the safety lever from under the striker.

During the acceleration period of the rocket, air enters the perforations in the top of the brass cap, and the pressure which builds up inside forces the plunger down over the striker. The lower edge of the plunger, bearing on the outer end of the pawls, causes the inner end to lift the striker. The striker spring is thus compressed. This movement continues until the inner ends of the pawls are rotated clear of the striker, which is then driven into the percussion cap, initiating the delay train in the upper time ring. This in turn ignites the delay train in the lower time setting ring, which burns for the required period and then initiates the gunpowder charge in the base of the fuze. The explosion of the gunpowder charge initiates the gaine, which is located in the adapter ring below the fuze.

REMARKS:

(1) Fuze No. 700 Mk II: This fuze is identical to the Mk I, described above, except that the striker, pawls, and spring are somewhat modified, and the safety lever assembly is omitted.



ROCKET NOSE FUZE NO. 701 MK. I

RESTRICTED

ROCKETS USED IN Shell, H.E. 3", No. 2 Mk I
FUNCTIONING Pyrotechnic aerial burst.
ARMED CONDITION No external evidence.
ARMING TIME 1.2 seconds (approx.).
MAX. BODY DIAMETER 2.4 in.
OVERALL LENGTH 4.7 in.
COLOR Brass.
MATERIAL Brass.

BRITISH ROCKET FUZE

NO. 70I
MK. I

(Not in Service)

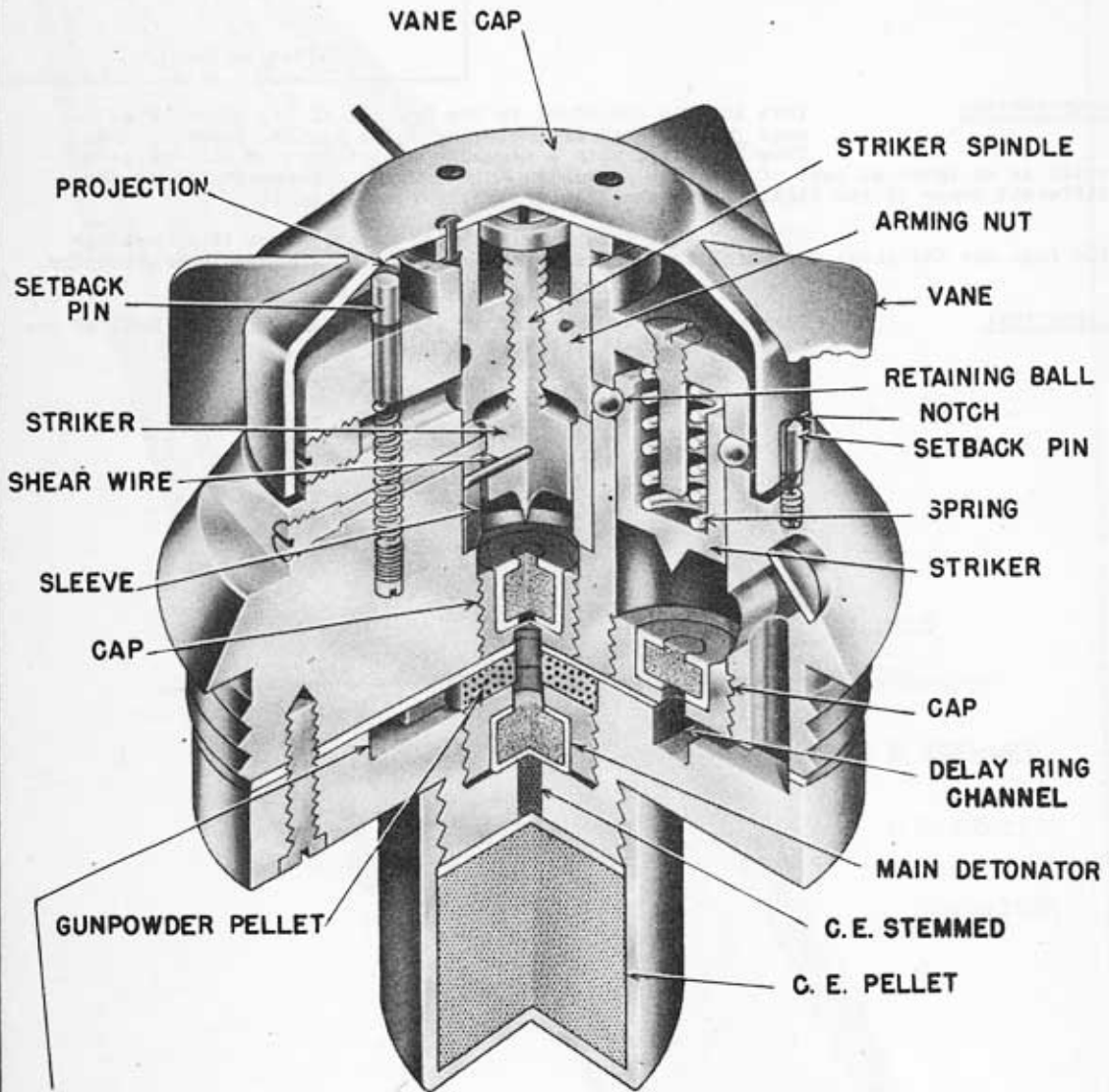
DESCRIPTION:

This fuze is identical to the No. 700 Mk II, illustrated on page 86. Instead of employing Gaine No. 13, however, this fuze is fitted with a magazine containing two C.E. pellets, which is an integral part of the fuze assembly. This change is necessitated by the different shape of the light ogival shell in which the fuze is employed.

Although this fuze is classified as a service item, neither the fuze nor the shell for which it was designed has ever been employed operationally.

OPERATION:

The operating sequence of this fuze is identical to that of the No. 700 Mk II, illustrated on page 86.



THIS CHANNEL FILLED WITH GUNPOWDER CYLINDER AND DELAY COMPOSITION

ROCKET NOSE FUZE NO. 720 MK. IV

RESTRICTED

ROCKETS USED IN . . . Shell, H.E., 3rd, No. 2 Mk I
(Air to Air)
Shell, H.E., 2nd, Mks I & II
FUNCTIONING Impact instantaneous - self-
destroying.
ARMED CONDITION . . . Safety pin removed; vane cup
.2nd above fuze head.
ARMING TIME 5 vane revolutions
MAX. BODY DIAMETER. . . 2.1 in.
VANE SPAN 2.1 in.
OVERALL LENGTH 2.85 in.
COLOR Vanes: Unpainted steel
Body : Green painted alloy
Base : Bronze lacquered brass.

BRITISH ROCKET FUZE

NO. 720
MK. IV

(Service)

DESCRIPTION:

This fuze is a direct acting impact fuze in which is incorporated a spring loaded self-destroying device designed to operate the shell in the event of a miss. The fuze is designed for Naval anti-aircraft purposes.

The fuze consists of a metal fuze body, a vane cap, and a base piece containing the magazine, detonator, and pyrotechnic delay ring leading from the self-destroying assembly.

Firmly fixed to the vane cap is an arming nut, into the bottom of which is screwed a threaded striker spindle. The top of the spindle is shaped to form a collar, preventing the striker from unscrewing completely from the arming nut. The other end of the spindle is fixed to the striker, which is held in the striker sleeve by a brass shear wire. Five vanes are attached to the outside of the vane cap. These vanes project into the inside of the vane cap, forming five stops, which are engaged by a setback pin.

The striker sleeve is inserted into a central channel in the fuze body and is held firmly fixed in place by a set-screw. A safety pin passes through the top of the fuze body and the arming vane cap.

Two spring-loaded setback pins located in the top of the fuze body prevent the vane cap from rotating until the rocket is fired. The first pin, located outside the vane cap, engages a notch cut in the bottom edge of the vane cap. The second, located beneath the cap, engages one of the five stops formed by the internal projections of the vanes.

Offset from the center of the fuze body is a channel for the self-destroying mechanism, consisting of a spring-loaded striker held up by two retaining balls. The inner ball is kept engaged in a groove in the striker by the arming nut; the outer, by the vane cap. A pyrotechnic delay ring leads from the percussion cap of the self-destroying mechanism to the main detonator. All explosive and pyrotechnic elements are located in the base piece, to which the magazine is threaded.

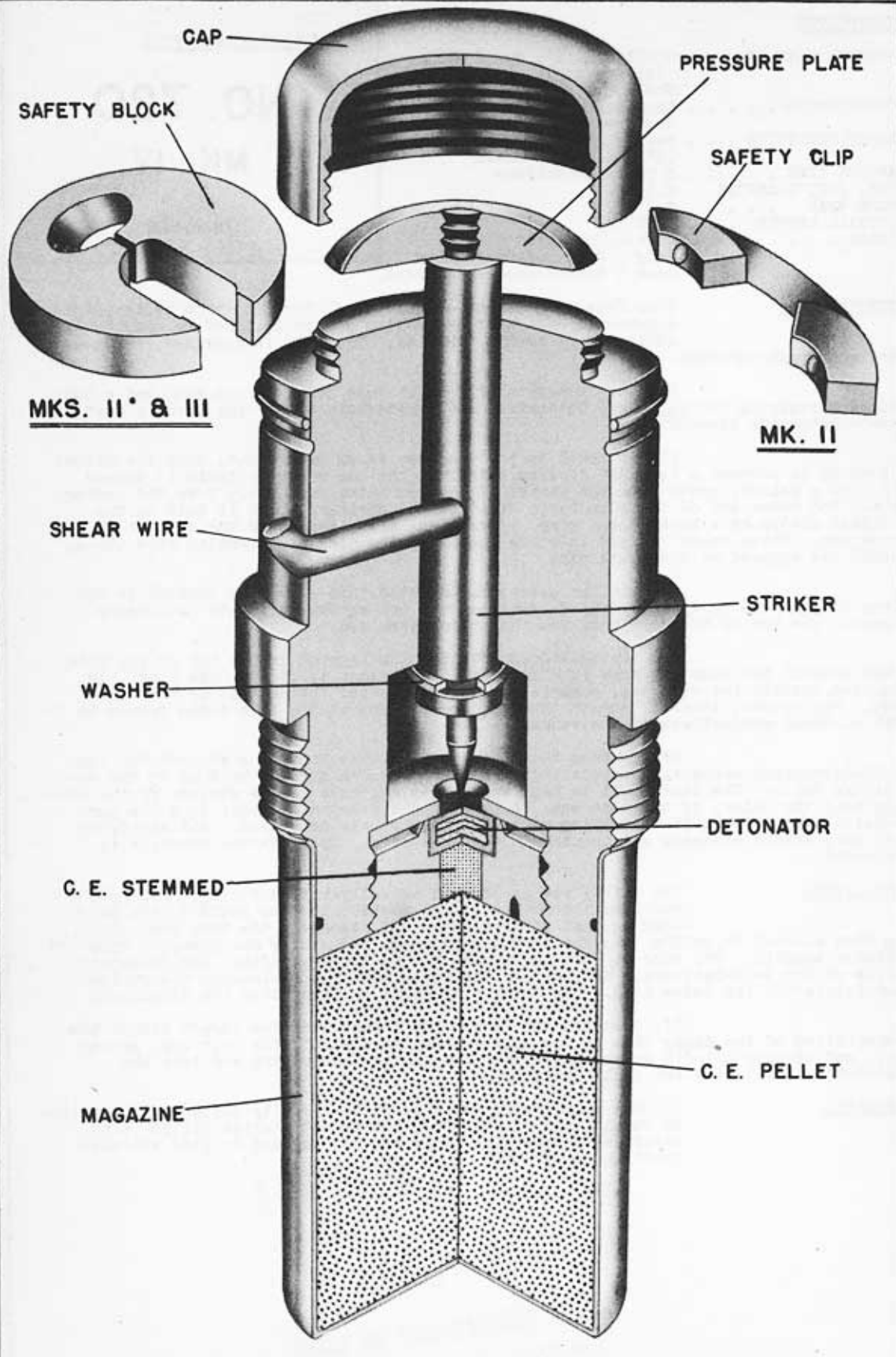
OPERATION:

The safety pin is removed manually before firing. During the acceleration period of the rocket, the two setback pins move back against their springs and disengage the vane cap, which is then allowed to rotate. As the vane cap rotates, the arming nut unscrews from the striker spindle. The vane cap and the arming nut no longer confine the retaining balls of the self-destroying device, and the balls move out, releasing the striker and initiating the delay ring. The delay ring burns out and fires the detonator.

If, however, the fuze makes impact with the target before the termination of the delay time of the self-destroying element, the vane cap, arming nut, and striker spindle drive the striker through the shear wire and into the detonator, initiating the shell directly.

REMARKS:

(1) The self-destroying element is normally designed to function at an altitude of 4500 ft., but an alternative filling composition for the time rings can be provided to give self-destruction at 7500 ft.



ROCKET NOSE FUZE NO. 721 MKS. II, II*, & III

RESTRICTED

ROCKETS USED IN Shell, H.E., 3", 29 lb, Mk I
Chemical, Incendiary &
Smoke, 5", Mks I

FUNCTIONING Impact, instantaneous

ARMED CONDITION No external evidence

ARMING TIME Instantaneous

MAX. BODY DIAMETER . . . 2.33 in.

OVERALL LENGTH 6.4 in. (with cap and
magazine)

COLOR Safety Cap: Unpainted alloy
Body: Black
Magazine: Brass

BRITISH ROCKET FUZE

NO. 721

MKS. II, II* & III

(Service)

DESCRIPTION:

This fuze is a simple impact fuze consisting of a striker and attached pressure plate held away from the detonator by a thin aluminum shear wire. A safety cap is screwed over the head of the fuze, and the sides of the safety cap hold a safety clip in position beneath the pressure plate of the striker. The safety clip consists of two metal segments riveted one at each end of a short strip of spring steel.

The detonator is carried in a brass detonator holder screwed into the underside of the body. The channel in the bottom of the detonator holder is stemmed with C.E., and above the holder, interposed between the detonator and the striker is a small brass retaining disc supported on a washer of similar material.

The magazine consists of a brass cup crimped to the body of the fuze.

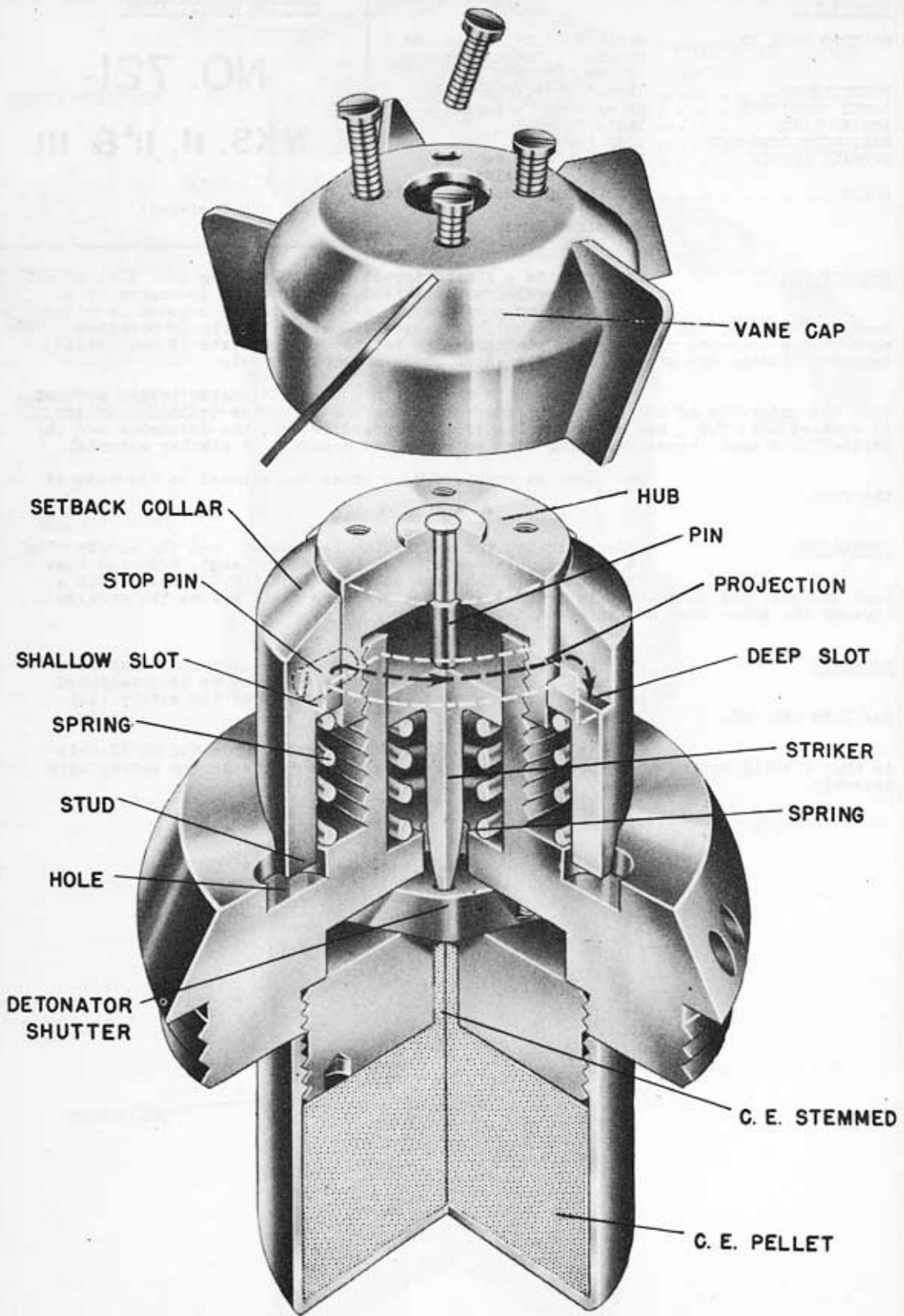
OPERATION:

Before firing, the safety cap is removed, and the safety clip is ejected. The safety cap is then replaced, ensuring that the round will not fire on water impact. On impact with a hard surface, the safety cap is crushed, and the pressure plate drives the striker through the shear wire and into the detonator.

REMARKS:

(1) It should be noted that an unexploded round found with the safety cap in position is by no means to be considered safe, as the safety cap is replaced after the safety clip has been removed.

(2) Mks II* & III: These Marks differ from the Mk II only in that a solid horseshoe shaped metal safety block replaces the spring safety clip assembly.



ROCKET NOSE FUZE NO. 722 MK. III

RESTRICTED

ROCKETS USED IN Shell, H.E.5", 29 lb. Mk I
FUNCTIONING Impact; Instantaneous
ARMED CONDITION Safety clip removed;
vane cap and setback
collar missing.
ARMING TIME 5½ to 6 vane revolutions
MAX. BODY DIAMETER 2.14 in.
OVERALL LENGTH 2.96 in.
VANE SPAN 2.1 in.
COLOR Vane cap: Unpainted alum-
inum.
Body: Bronze lacquered
brass.

BRITISH ROCKET FUZE

NO. 722

MK. III

(Service)

DESCRIPTION:

The fuze consists of a vane cap, fuze body, and magazine. The vane cap is firmly attached to the vane cap hub, which is threaded over a hollow projection on the top of the fuze body. Extending down from the center of the hub is a pin, which in the unarmed position forces the striker downwards against its spring. Two small pins are located 180° apart on the outer edges of the hub. In the unarmed position these pins are engaged in two shallow slots in the setback collar.

The setback collar is a brass sleeve fitting around the vane hub and resting on the inertia spring. On the bottom edge of the collar are four studs, which engage in holes drilled in the top of the fuze body, when the fuze is unarmed. The tapered top edge of the setback collar is cut away in two places to form two shallow slots, two deep slots, and a cut down portion connecting them.

In the lower portion of the fuze body is located a shuttered detonator. This detonator is held offset in the unarmed position by the point of the striker. A magazine adapter is screwed into the bottom of the fuze body, and a thin metal magazine is screwed to the adapter.

OPERATION:

When the rocket is fired, the setback collar moves down against its spring and disengages the stop pins on the hub from the shallow slots. The arming vanes then rotate through an arc of 45°, moving the hub around until its stop pins come up against the tapered edge of the setback collar. The fuze is held in this position until the expiration of the burning period of the rocket. At this time acceleration ceases, and the setback collar rises, the stop pins on the hub moving into the deep slots in the collar. The collar is allowed to move up far enough to disengage the four studs from the holes in the fuze body. The vanes are now free to rotate both the hub and the setback collar through the remaining 5 or 5½ rotations to arm the fuze. At this point the whole arming assembly falls clear of the fuze.

As the vane hub rises, the striker is forced upward by its spring, eventually removing the point of the striker from the detonator shutter. The shutter spring then aligns the detonator with the striker. On impact, the striker is driven down against its spring into the detonator, initiating the C.E. (tetryl) stemming in the stemmed disc, which in turn fires the C.E. (tetryl) pellet in the magazine.

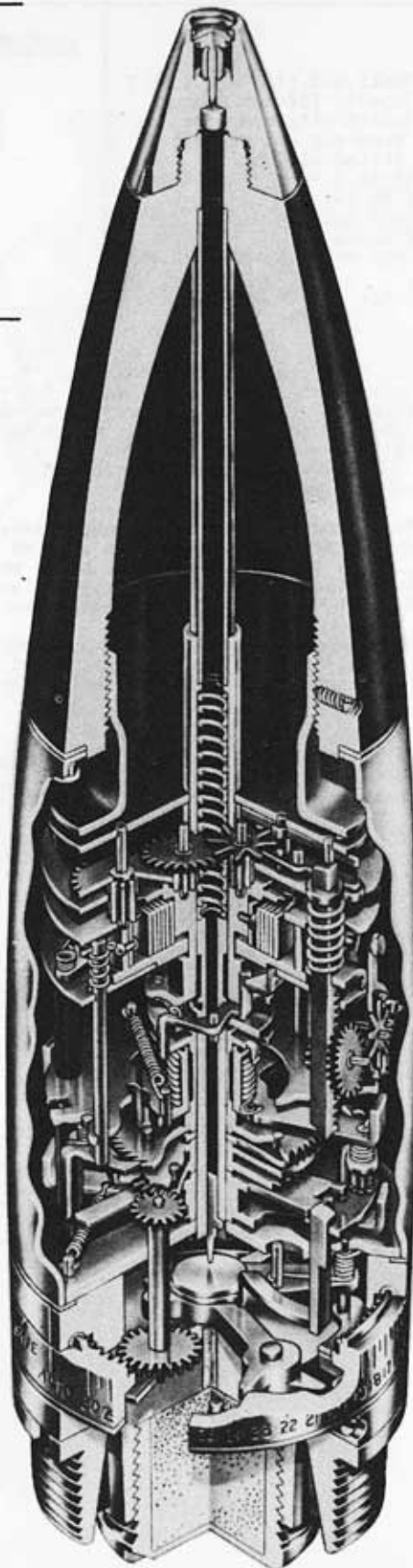
REMARKS:

1. The fuze is fitted with a shipping safety clip (not illustrated), which engages in one of the two drilled holes in the outside of the fuze body and carries a stud which prevents rotation of the arming vanes. The clipped is locked in place by a lead seal and is removed manually before the rocket is fired.

SECTION 1
(SEE PAGE 101)

SECTION 2
(SEE PAGE 98)

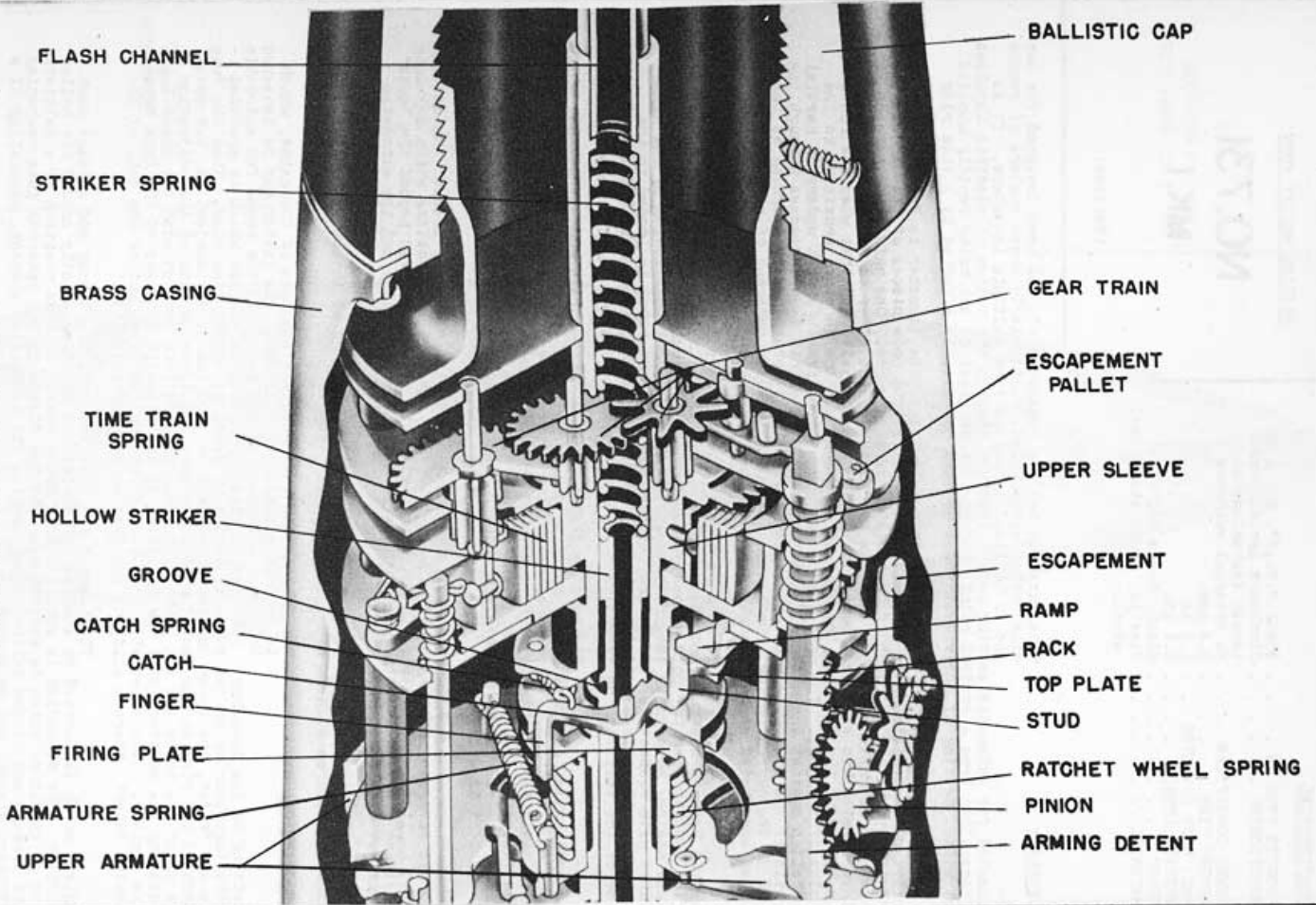
SECTION 3
(SEE PAGE 100)



ROCKET NOSE FUZE NO. 731 MK. I

ROCKET NOSE FUZE NO. 731 MK. 1

SECTION 2 (SEE PAGE 96)



NO. 731

MK. I

(CONTINUED)

(Service)

the pallet on setback, starting the clockwork. Rate of movement of the detent is governed by a gear train and escapement through the medium of a pinion engaging on a rack on the edge of the detent. This control is such that displacement is completed in about 0.4 seconds when the fuze is subjected to a mean acceleration of 60 g. A safety shutter carried on a spindle pivoted in the base of the fuze is normally held under the striker by its arcuate arm, which bears against the side of the detent. When the latter has moved to its fully setback position, the arcuate arm is allowed to move into a slot in the detent, moving the safety shutter under the action of the shutter spring out of the path of the striker and locking the detent in position. A small initial movement of the detent suffices to release the pallet arm and thus allow the clockwork timing train to start with a minimum delay on projection, but the fuze will remain safe until full displacement of the detent permits movement of the arming shutter.

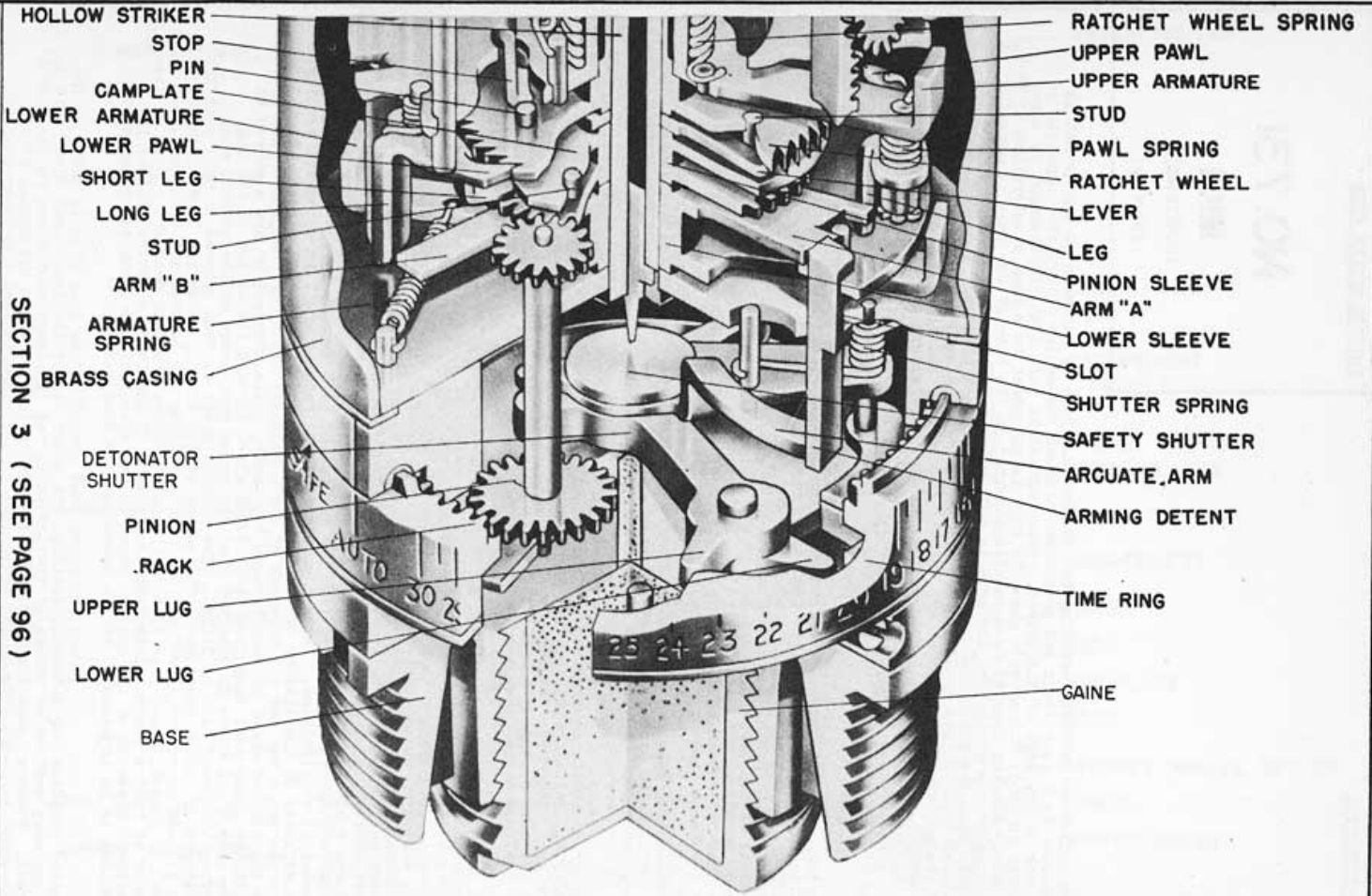
The striker is held cocked against the action of the striker spring by a catch pivoted on the top plate carried by the upper sleeve, to which is attached the inner end of the time train spring. The catch engages a groove in the striker. A downwardly extending finger of the catch, resting against the edge of the firing plate, prevents movement of the catch, under action of the catch spring, and release of the striker, until movement of the timing train brings the finger into a position adjacent to the slot in the firing plate. The time of release of the striker is thus determined by the initial position of the slot in the firing plate relative to the catch finger. Since contact of the finger with the firing plate during the setting operation would introduce undesirable friction, the catch is provided with a stud which serves to lift the finger from the firing plate by initially engaging a ramp carried by a fixed plate of the fuze. The stud rides off the ramp during the early stages of the movement of the timing train.

Automatic setting of the fuze is accomplished by a pair of iron cruciform armatures arranged for limited rotary movement in opposite directions under the influence of magnetic impulses and against the action of the armature springs. The upper armature carries a spindle of an upper pawl tending to be forced by the pawl spring into contact with the ratchet wheel. The ratchet wheel is carried on the same sleeve that carries the firing plate. Normally, the upper pawl is held out of contact with the ratchet wheel by a depending leg on the pawl abutting against an arm A attached to the lower sleeve, to which is also fixed the lower armature. Movement of the upper armature against the action of its spring will first break the contact of the leg and arm and permit the upper pawl to engage the ratchet wheel and by continued movement turn the ratchet wheel through a distance of one tooth against the action of the ratchet wheel spring. The lower pawl, having two depending legs, which engages the ratchet wheel when the fuze is set on "auto" retains the ratchet wheel while the upper armature is allowed to return to its original position. Repetition of the movement of the armature will cause the ratchet wheel to move a distance of one tooth for each oscillation and as each tooth corresponds to half a second, the fuze setting will be reduced from the maximum of 30.5 seconds by the corresponding number of oscillations. Reverse movement of the ratchet wheel in automatic setting is effected by oscillation of the lower armature and its attached sleeve, which carries arm A and arm B. Movement of arm A releases the upper pawl which then bears on the ratchet wheel halfway between two teeth, while movement of arm B serves to lift the lower pawl away from the ratchet wheel through the medium of the leg. The arms A and B are so designed that the upper pawl bears on the ratchet wheel before the lower pawl is lifted. The ratchet wheel is thus allowed to move back the distance of half a tooth under the action of its spring. When the lower armature is allowed to return, the lower pawl first engages the ratchet and then the upper pawl is raised, thereby permitting the ratchet wheel to move backward a further distance of half a tooth. Thus each oscillation of the lower armature results in backward movement of the ratchet wheel to the extent of one tooth and consequently results in an increase of half a second in the fuze setting.

It will be noted that when the fuze time ring is moved to the "auto" position for automatic setting, the short leg of the lower pawl then rests in a cut-away portion or recess of the camplate, and the lower pawl bears on the ratchet wheel. However, when the time ring is moved to the "safe" or the manual setting, the short leg will ride in the outer edge of the camplate, and the lower pawl will be out of contact with the ratchet wheel. The latter will then be free to return under action of its spring, thus cancelling any setting given by automatic means.

ROCKET NOSE FUZE NO. 731 MK. 1

SECTION 3 (SEE PAGE 96)



CONFIDENTIAL

CONFIDENTIAL

BRITISH ROCKET FUZE

NO.731

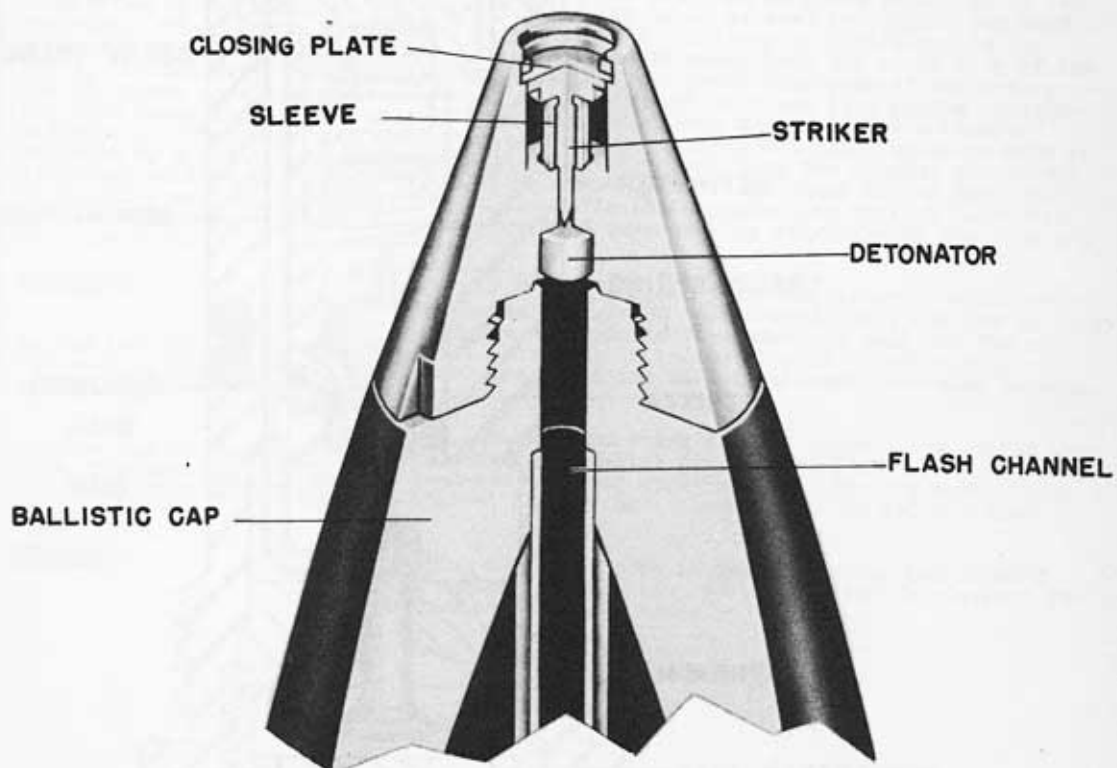
MK. I

(CONTINUED)

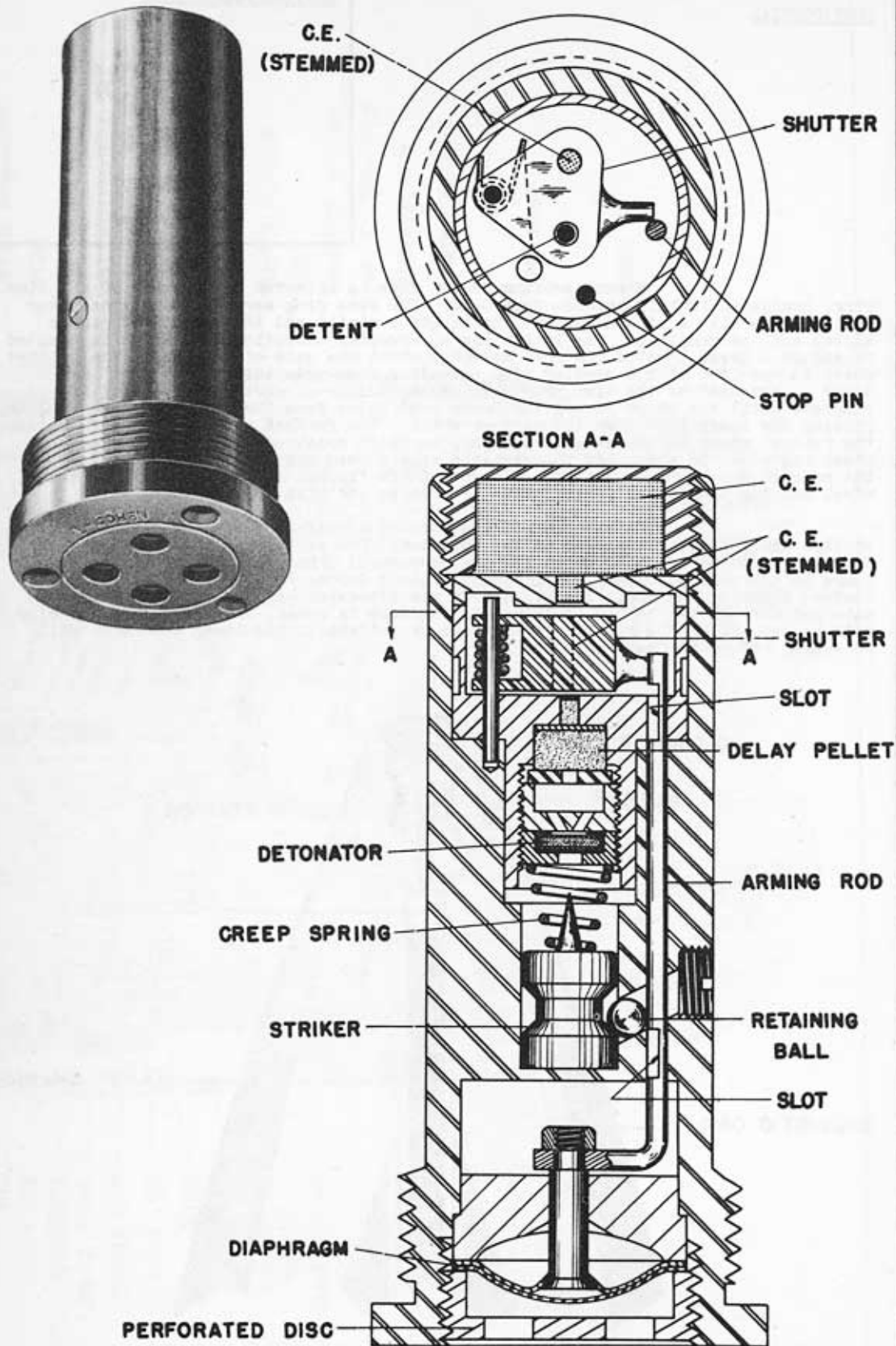
(Service)

Manual setting of the fuze is effected by movement of the time ring, graduated in half-seconds from 0-30. The time ring carries an internal gear which meshes with a pinion assembly to rotate a pinion and its associated pinion sleeve and the camplate. The latter has an upwardly extending stud which is adapted to engage a lever mounted for free movement about the axis of the fuze. The ratchet wheel is provided with a similar stud extending downwards into the path of the lever. Movement of the time ring will cause counter-clockwise movement of the camplate until the short leg of the lower pawl rises from the recess of the camplate, raising the lower pawl from the ratchet wheel. The ratchet wheel spring then returns the ratchet wheel to the maximum setting, in which position the pin on the ratchet wheel bears on the stop, and the camplate stud forces the lever into contact with the ratchet wheel stud. Further movement of the timing ring will cause the ratchet wheel and its associated firing plate to move as one with the camplate.

Functioning of the fuze on impact is caused by operation of a striker and detonator arranged in the nose cap. The striker is held by a metal cup designed to collapse under about 150 lbs. pressure. The upper end of the striker bears on the closing plate. On impact the plate forces the striker into the detonator, crushing the cup. The flash from the detonator passes down the central tube and through the hollow striker. If the fuze is armed, the shuttered detonator will be set off by the blast. If the fuze is not armed, the lower detonator will be sealed off by the safety shutter.



SECTION I (SEE PAGE 96)



ROCKET BASE FUZE NO.865 MK I

RESTRICTED

ROCKETS USED IN (a) & (b) Shell, H.E.,
60 lb., S.A.P., No. 2 Mk I.
(c) Shell, H.E., 21 lb.,
S.A.P., No. 5 Mk I.
Shell, H.E., 60 lb.,
S.A.P., No. 6 Mk I.
FUNCTIONING (a) & (c) Delay, impact.
(b) Instantaneous, impact.
ARMED CONDITION No external evidence.
ARMING TIME

MAX. BODY DIAMETER . . . 2 in.
OVERALL LENGTH 4.3 in.
COLOR Unpainted brass

BRITISH ROCKET FUZE

A. NO.865 MK. I
B. NO.878 MK. I
C. NO.297 MK. I

(Service)

DESCRIPTION:

These fuzes, identical except that the No. 865 incorporates a delay element whereas the No. 878 is instantaneous, are base detonating fuzes, armed by gas pressure from the rocket motor unit.

The fuze consists of a cylindrical brass housing, closed at one end by a perforated brass plug, and at the other end by a magazine cup containing a booster charge of C.E. Immediately beneath the perforated brass cup is located a metal diaphragm, to which is attached a long arming rod. This arming rod travels through the fuze in a channel drilled off-center through the fuze body. In a central chamber in the fuze body is located a pointed striker and creep spring. In the unarmed position, this striker is held away from the detonator by a retaining ball, which engages an annular groove in the striker and a hole in the fuze body. The ball is held engaged in the striker by the arming rod. Beneath the striker is located a detonator containing about 2 grams of composition "A" or "Al" mixture, a delay pellet of G 20 gunpowder (in the No. 865), a second detonator of lead azide, and a C.E. detonator lead-out. Beneath the lead-out is located a shutter containing a booster lead-in of C.E. In the unarmed position, this lead-in is offset, and the explosive channel is sealed off by the metal body of the shutter. In the armed position, however, the stemmed C.E. channel in the shutter is aligned with the rest of the explosive train, forming a direct line to the booster charge in the magazine. The shutter is held offset in the unarmed position by the lower part of the arming rod. Two notches are cut in the arming rod, allowing passage to the shutter and clearance for the retaining ball when the fuze is armed.

The fuze is armed by the pressure of gases generated by the combustion of gunpowder in the thermal initiator which is used in conjunction with the fuze. The purpose of the fuze is armed. The initiator is positioned in the base of the shell adapter, and when the shell is threaded into the shell ring of the motor, the initiator is brought closely against the front obturator of the motor. The initiator consists of a thin steel base, adjacent to which is a septum containing LDNR composition (lead dinitro resorcinate). Above the septum is a chamber containing a charge of G 20 gunpowder confined by a cardboard disc, which is held in position by a metal disc with a central hole. The heat from the burning propellant is conducted through the head obturator in the motor and the base of the initiator to the LDNR composition, which is ignited. The LDNR composition in turn initiates the G 20 gunpowder, and the pressure produced reverses the diaphragm of the fuze and arms the fuze.

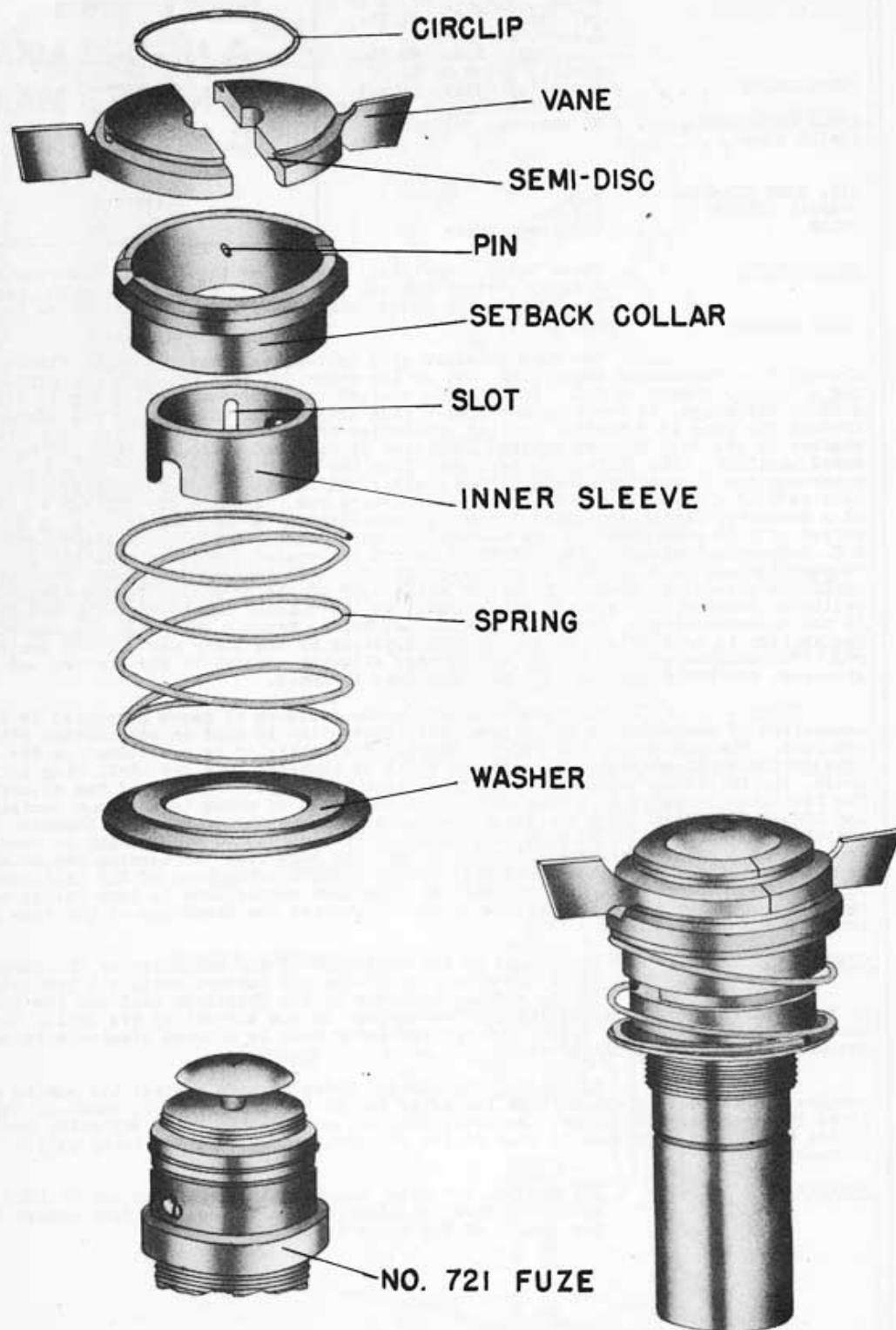
OPERATION:

Depression of the diaphragm by the explosion of the thermal initiator moves the arming rod forward until the two notches in the rod are adjacent to the retaining ball and the pin on the lead-in shutter respectively. The shutter is now aligned by its spring with the rest of the explosive train, and the retaining ball is allowed clearance to move out of engagement with the striker.

On impact, the striker rides forward against its spring and strikes the detonator, which fires the delay pellet (in the No. 865), which in turn fires the secondary detonator, lead-out, lead-in, and booster. The explosive train in the No. 878 is identical to that of the No. 865, except that the delay pellet is removed.

REMARKS:

(1) The No. 297 fuze, used in the shells for the 3" LILLO assault rocket, is identical to the No. 865 fuze except for the length of the delay time.



ROCKET NOSE FUZE NO. 899 MK. I

CONFIDENTIAL

ROCKETS USED IN Shell, H.E., 60 lb. "F"
No. 1 Mk I
FUNCTIONING Impact, Instantaneous
ARMED CONDITION Vanes and semi-discs missing.
ARMING TIME 0.6 to 0.8 secs.
MAX. BODY DIAMETER 2.33 in.
OVERALL LENGTH 5.9 in.
VANE SPAN
COLOR Vanes: Unpainted alloy
Body: Black
Magazine: Brass

BRITISH ROCKET FUZE

NO. 899

MK. I

(Service)

DESCRIPTION:

This fuze consists of the No. 721 Mk III fuze (See page 93) modified for safe carriage on aircraft. These modifications consist of the removal of the safety cap and safety clip from the standard No. 721 Mk III fuze and the addition of two semi-discs fitted with vanes, a circlip, a setback collar, an inner sleeve, a spring, and a spring retaining washer.

In the unarmed position, the two semi-discs are inserted between the pressure plate of the striker and the head of the fuze body, preventing the striker from moving downwards. The semi-discs are retained by a circlip which fits into an annular groove machined around the top of the two discs. Rotation of the vanes and the semi-discs is prevented by two grooves on the top edge of the setback collar in which the vanes engage. A Pin located inside the setback collar rides in a slot cut in the inner sleeve, preventing the collar from rotating. The inner sleeve, in turn, is prevented from rotating by its engagement with the protruding ends of the shear wire of the fuze. The setback collar is held in the raised position by the inertia spring, which is retained by the spring retaining washer.

OPERATION:

When the rocket is projected from the aircraft, the setback collar rides down against the action of the inertia spring. The semi-discs are thus disengaged from the setback collar, and are free to be rotated by the attached vanes. When the rotational speed of the semi-discs reaches about 3000 rpm the centrifugal force thus created overcomes the restraint of the circlip, and the two semi-discs fly free of the fuze.

Impact with the target causes the pressure plate to force the striker through the aluminum shear wire into the detonator, firing the magazine and exploding the shell.