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DESCRIPTION OF FRENCH PERCUSSION DETONATING FUZE

24/31 MODEL 1899

TRANSLATED FROM THE FRENCH BY THE
GUN DIVISION, ORDNANCE DEPARTMENT

AUGUST 18, 1917



WASHINGTON
GOVERNMENT PRINTING OFFICE
1917



(Translation.)

MINISTER OF THE ARMAMENT
AND MANUFACTURE OF WAR.

ARTILLERY.

JANUARY 11, 1917.

NOTICE
RELATIVE TO
PERCUSSION DETONATING FUZES 24/31,
OF TYPE MODEL 1899.

(1)

9
PROPERTY OF U. S.

TRANSFORMATION UNITS.

1 meter (m.)	39.37 inches.
1 centimeter (cm.)	0.3937 inch.
1 millimeter (mm.)	0.03937 inch.
1 kilogram (kg.)	2.2046 pounds.
1 dekagram (dkg.)	0.3527 ounce.
1 gram	15.432 grains.
1 yard	0.9144 meter.
1 foot	0.3048 meter.
1 inch	2.54 centimeters.
1 square inch	6.452 square centimeters.
1 cubic inch	16.39 cubic centimeters.
1 cubic foot	0.02832 cubic meter.
1 cubic yard	0.7646 cubic meter.
1 ounce	28.35 grams.
1 pound	0.4536 kilogram.

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PREFACE.

The percussion detonating fuzes 24/31 type model 1899 comprise:

The detonating fuze 24/31, model 1899, with delay of 0.

The detonating fuze 24/31, model 1899, with delay of 0.05 second.

The detonating fuze 24/31, model 1899-1915, which can be either with delay of 0 or with delay of 0.05 second or with delay of 0.15 second.

These fuzes are intended to arm projectiles closed by a booster cup.

They can also be used with projectiles closed by a booster model 1895, on condition that this booster is supplied with a special cartridge relay of 147 millimeters and with a wedging ring.

Their placing in position is effected by a simple screwing with the hand.

Generally these fuzes should be supplied with a washer of felt, threaded upon the detonating socket and glued by means of gum-lac varnish. The presence of this washer is not indispensable; it has the advantage of causing at the end of the screwing a pressure which causes the immobility of the fuze and causes the distribution of a part of the effort of pulling of the detonator socket on the booster cup.

The construction of these different models of fuzes is indicated in the following chapters:

NOTE.—The dismounting of fuzes is absolutely forbidden. All fuzes which, contrary to this instruction, might have been dismounted should be destroyed. It is dangerous to manipulate or to fire a fuze which has been dismounted.

NOTICE RELATIVE TO PERCUSSION DETONATING FUZES 24/31 OF TYPE MODEL 1899.

CHAPTER I.

DETONATING FUZE 24/31 MODEL 1899.

(Pls. 1 and 2.)

(A) EXTERIOR.

The head comprises a truncated part surmounted by a cylindrical part.

The body is cylindrical and permits a threading in accordance with the tapping of the booster cup.

The stem is formed of a socket of a diameter less than that of the body.

This socket contains the detonator and is designed to penetrate into the stem of the plug of the booster cup.

(B) INTERIOR.

Three principal parts: The percussion apparatus, the safety lock, the detonator.

(1) THE PERCUSSION APPARATUS.

It comprises—

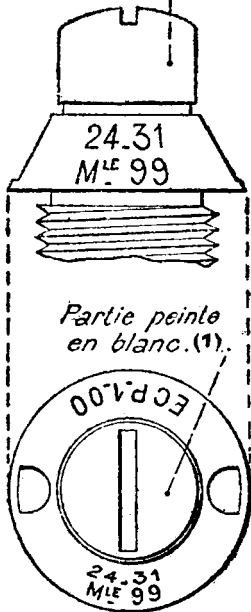
The arming clasp with its three curved tongues.

The primer holder with its two circular exterior shoulders and its central interior canal. In this canal there is a primer of fulminate resting upon an interior

shoulder and a charge of superfine powder, in the middle of which passes a bit of quick-match wick. The

MARQUES DISTINCTIVES.

*Partie peinte
en blanc :*



*Partie peinte
en blanc. (1).*

*Couleur de la
douille porte-amorce: laiton.*

Partie peinte en blanc: Part painted in white. Couleur de la douille porte amorce: Laiton. Color of the detonating socket: Brass.

lower extremity of the canal is threaded to receive the safety spring.

¹The preceding lots in applying rectification page No. 3 (July 23, 1916) to the tables of construction carry, besides, on this part, the marking "SR."

The arming spring, placed between the primer holder and the arming clasp.

The safety spring, screwed on the one part into the primer holder and on the other part into the fire relay.

The safety clasp, with its three curved tongues resting against the lower shoulder of the primer holder.

The brass firing pin carried by a crosspiece¹ located in the threaded plug.

The threaded plug which closes the upper part of the chamber of the percussion apparatus. This threaded plug has a cylindrical hole for the passage of the supporting piece and a diametrical notch for the seating of the crosspiece of the firing pin.

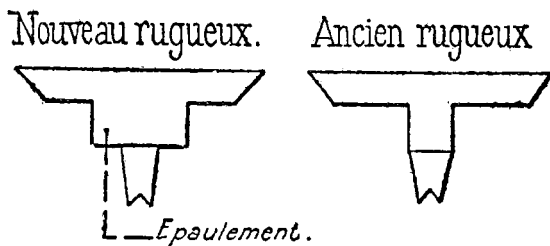
Two powder chambers, each of which has the shape of an arch, are besides provided at the lower part of the threaded plug, and are designed to receive a charge to reinforce the jet of flame of the primer holder.

(2) SAFETY LOCK.

It comprises—

The body of the apparatus of semihard steel screwed onto the body of the fuze; its lower edge rests on the

¹ In fuzes of recent make this crosspiece is supplied with a shoulder to prevent the firing pin from inclining at the shock of impact and to avoid consequently a cause of misfire (see figure below).



Nouveau rugueux, new firing pin.

Ancien rugueux, old firing pin.

Epaulement, shoulder.

threaded plug and supports the crosspiece of the firing pin.

The supporting piece of brass resting at its lower part on the primer holder is supplied with a diametrical slit for the passage of the firing pin. It rests by means of a large collar upon a brass washer¹ placed upon the threaded plug. Its upper part ends with a circular flange.

The plunger with its three tongues.

The arming spring of the safety lock placed between the flange of the supporting piece and the plunger.

(3) DETONATOR.

It comprises the detonator socket screwed on the body of the fuze. The primer with flange of copper, which contain 2 grams of fulminate of mercury, compressed. This fulminate is supported by a supporting tube of copper which itself is held secure by crimping and wedged at the lower part by a felt washer.

At the lower part of the supporting tube is made the hole for the passing of fire, closed by a cloth washer.²

The fire relay, brass, which has at its interior a threaded seat or bed in which is fastened the lower extremity of the safety spring; below is a charge of compressed powder having a central bore. The lower orifice of the fire relay is covered by a blotting-paper disk³ glued with gum lac; this disk is to prevent the fulminate in the primer, which might accidentally

¹ This washer is found only in fuzes of recent make. It was introduced to diminish the projection of the supporting piece which sometimes would wedge itself on the primer holder at the time of mounting.

² The lining of this cloth washer by a tin washer, to avoid all possibility of sifting of fulminate, is under consideration.

³ These disks exist only in fuzes of recent make.

have sifted through, from reaching the removable parts of the fuze.

The wedging washer, interpolated between the primer and the fire relay.

NOTE.—The construction specifications provide the possibility of using, in lieu of the fire relay screwed thereupon, and especially for the fuze of model 1899, the slightly modified delay-action device of the fuze model 1899-1908 and the relay holder of this device. The fuze then presents the construction shown by plate 2. The lower opening of the relay holder is in this case also covered by a blotting-paper washer.

(C) FUNCTIONING.

At the moment of fire the percussion apparatus and the safety lock are armed simultaneously. The plunger of the safety lock tends to remain behind by virtue of inertia and hooks itself upon the flange of the supporting piece by compressing the arming spring.

From that moment the supporting piece ceases to be immobile.

In the percussion apparatus the arming hook or clasp hooks itself to the upper shoulder of the primer holder by compressing the arming spring at the same time that its lower part straightens out the tongues of the safety clasp which then cease to bear upon the primer holder.

During the passage through air the arming clasp comes in contact with the primer holder; the safety spring and the tongues of the safety clasp, by reason of their bearing against the lower edge of the arming clasp, hold the whole system against the relay.

At the shock of impact this system continues its movement, the clasps and the safety spring give way, and the primer strikes the firing pin.

The fire of the primer is transmitted through the medium of the charge of powder of the primer holder and the relay to the detonator having 2 grams of fulminate, which causes the detonation of the melinite contained in the booster, and, consequently, that of the explosive constituting the charge of the projectile.

(D) CONDITIONS OF ACCEPTANCE.

The acceptance tests comprise principally two firings on natural ground in the 75-millimeter cannon at a distance of 2,500 meters, one at the charge of 0 kilogram 700 BSP, the other at the gauge pressure of 2,600 kilograms.

The proportions of those missing fire should not be greater than 7.5 per 100.

(E) CONDITIONS OF ARMING.

The minimum coefficient of acceleration¹ necessary to cause the arming of the fuze is 2,500.

The charges at which this fuze operates in the various guns with varying charge indicated below are as follows:

95-----	Charges 0 and 1.
120 long-----	Charges 000, 00, 0, 1, 2, and 3.
120 short-----	Charges 0, 1, 2, 3, 4, 5, 6, and 7.

¹We call the coefficient of acceleration of a projectile the relation of the acceleration communicated to this projectile by the gas from the powder, at the moment of maximum pressure, to the acceleration of the weight. The acceleration coefficient is arrived at approximately by the formula:

$$C = \frac{2 \times a}{4 \times p}$$

where a = the caliber expressed in centimeters, P = the maximum pressure, in kilograms to the square centimeter, and p = the weight of the projectile in kilograms.

- 155 long, model 1877 and 1877-1914..... Charges 000, 00, 0, 1,
2, and 3.
- 155 short, model 1890 or 1904, TR, or
1881-1912..... Charges 0, 1, 2, and 3.
- 155 short, model Schneider..... Charges 00, 0, 1, 2,
and 3.
- 155 short, model St. Chamond..... Charges 0, 1, 2, and 3.

The use of charges lower than those indicated above will positively exert sufficient force to arm the fuze.

100

CHAPTER II.

FUZE MODEL 1899-1908.

(Pl. 3.)

(A) EXTERIOR.

The exterior is the same as that of fuze model 1899.

(B) INTERIOR.

In the interior the fuze of model 1899-1908 differs from the fuze of model 1899 only in the construction of the part of the detonator where the delay is found.

The flash relay is replaced by two pieces fitting one into the other—the delay-pellet holder and the relay-pellet holder.

The delay-pellet holder admits into its central part the seat of the delay pellet. This seat is threaded at the upper part and the bottom is pierced with two flash holes. In these two flash holes is placed a bit of quick match bent into the form of \sqcup . At the bottom of the seat is found the delay pellet, formed by a charge of compressed powder, the time of burning of which is 0.05 second.

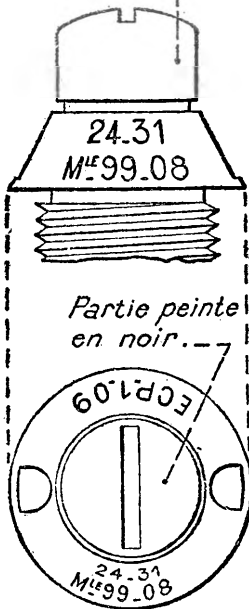
Upon the delay pellet rests a supporting washer of brass pierced by a central hole, and above, a threaded plug which is pierced by two holes at its upper part.

The position of the holes in the supporting washer and of the threaded plug forms an obstacle which has

for its object the prevention of the flash of the primer holder from reaching directly the delay pellet, which

MARQUES DISTINCTIVES.

*Partie peinte
en noir.*



*Partie peinte
en noir.*

*Couleur de la
douille porte-amorce : laiton*

Marques distinctives=Distinguishing marks. Partie peinte en noir=Part painted in black. Couleur de la douille porte amorce : laiton=Color of the detonator socket : brass.

could burst this latter and interfere with its functioning. Above the threaded plug is screwed the lower extremity of the safety spring.

The relay-pellet holder is a small brass cup carrying a grain of powder with central bore intended to transmit the fire of the delay pellet to the detonator.

As the delay forms obturation between the detonator and the percussion apparatus, no blotting-paper washer is provided to cover the lower opening of the relay-pellet holder in fuzes of model 1899-1908.

(C) FUNCTIONING.

The functioning is the same as that in fuze model 1899, but the fire of the percussion apparatus is transmitted to the detonator only at the end of 0.05 second.

(D) CONDITIONS OF ACCEPTANCE.

The tests for acceptance comprise the same firings on natural ground as for the fuze model 1899. One target firing is, moreover, executed to verify the regularity of the delay, the length of which should be about between 0.03 and 0.07 second.

(E) CONDITIONS OF ARMING.

The conditions of arming are the same as for the fuze model 1899.

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CHAPTER III.

FUZES MODEL 1899-1915.

(Pls. 4 and 5.)

[Types with long delay, with short delay, and without delay.]

(A) EXTERIOR.

The exterior is the same as that of the fuze model 1899 below the head.

The head has a special shape made of a cylindrical part surmounted by a truncated part.

(B) INTERIOR.

The construction of the interior of the fuze model 1899-1915 differs from that of fuzes models 1899 and 1899-1908, principally by the omission of the safety apparatus.

The rôle played by the safety apparatus in fuzes of 1899 and 1899-1908 is to double the percussion apparatus from the point of view of the resistance to transportation,¹ but the probability of a weakness of the percussion system in playing this rôle is infinitely improbable.

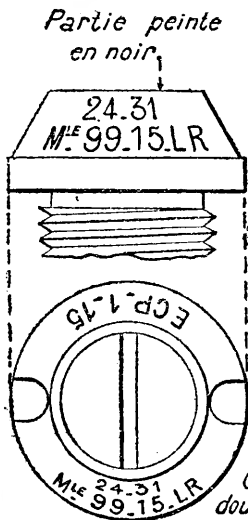
¹This safety lock plays no rôle in so far as concerns the security in the bore; it becomes armed at the firing of the shot at the same time with the percussion apparatus. Not only are there three tongues of the safety clasps, but again if these three tongues should fail, the forward movement of the primer holder is acted against by the action of the arming spring, independently of that of the safety spring.

On the contrary, the presence of this safety lock presents two important inconveniences:

First. The safety lock requires to arm itself an acceleration coefficient greater than the percussion ap-

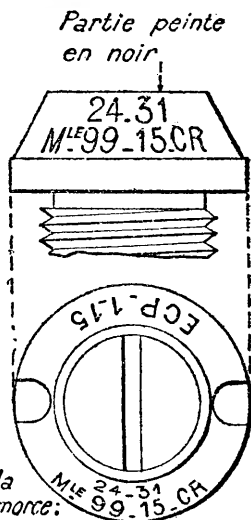
Marques distinctives.

Type à long retard.



violet.

Type à court retard.



laiton

Couleur de la douille porte-amorce:

Marques distinctives=distinguishing marks.

Type à long retard=type with long delay.

Type à court retard=type with short delay.

Partie peinte en noir=part painted in black.

Couleur de la douille porte-amorce: violet. laiton=color of detonator socket: Violet, brass.

paratus. Its presence therefore interferes with the functioning at low charges.

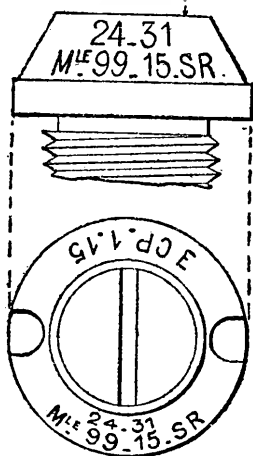
Second. The body of the safety apparatus which is at the exterior and in front of the fuze, is liable to

become deformed by the shock of impact, principally when the fuze is placed in projectiles which are a little heavy; or, entire deformation of the closing cap risks

— 13 —

Type sans retard

*Partie pointée
en blanc;*



Couleur de la douille porte-amorce : laiton.

b) INTÉRIEUR.

Type sans retard=type without delay.

Partie peinte en blanc=part painted in white.

Couleur de la douille porte-amorce; laiton.

Color of detonator socket, brass.

the prevention of the displacement of the supporting piece and, consequently, interference in the functioning.

It is for these reasons that the safety lock was omitted in the construction of fuzes of model 1899-1915.

This omission involves a particular arrangement of the firing pin.

The firing pin forms part of the firing-pin plug which closes the chamber of the percussion apparatus. This firing pin is itself protected by the head plug which closes the fuze.

The head also has a hardy form, and its deformation seldom causes misfire.

The other points upon which the fuzes 1899-1915 differ from those of model 1899 and 1899-1908 are as follows:

First. The charge of the primer holder is no longer supplied with a bit of quick match and is formed by a grain of powder with central perforation.

Second. In the delay fuzes the supporting washer and the threaded plug are placed in the primer holder beneath this grain of powder instead of being placed in the delay pellet holder.

Third. In the type with long delay the height of the mass of powder forming the delay has been increased in order that it might last about 0.15 second.

(C) FUNCTIONING.

The functioning is the same as that of the fuze model 1899-1908 for types with long delay and with short delay, and like that of the fuze model 1899 for type without delay.

(D) CONDITIONS OF ACCEPTANCE.

The tests for acceptance consist of two firings on natural ground, one of which in the 75-millimeter can-

non at a distance of 2,500 meters and at a gauge pressure of 2,600 kilograms, and the other from the 155-millimeter cannon (short or long) under an angle of about 30° at a gauge pressure of 425 kilograms, approximately.

The proportions of those missing fire should not be more than 10 to every 100.

For fuzes of short delay and those of long delay one additional firing to test the regularity of delay, which should be between 0.03 and 0.07 second (short delay) and between 0.10 and 0.24 second (long delay).

(E) CONDITIONS OF ARMING.

The minimum coefficient of acceleration necessary to cause the arming of fuzes model 1899-1915 is 1900.

This fuze functions with all practical charges of material of 155 and of smaller caliber, and with charges 000 to 6 of mortar of 220 millimeters, and 0 to 6 of mortar of 270 millimeters (siege).

Paris, January 5, 1917.

F. Gossot,

*The General of Division, Inspector of
Studies and Technical Experiments
of Artillery.*

Approved:

DUMEZIL,

*For the minister and by his order:
The General in Charge of Artillery,
Field and Personnel.*

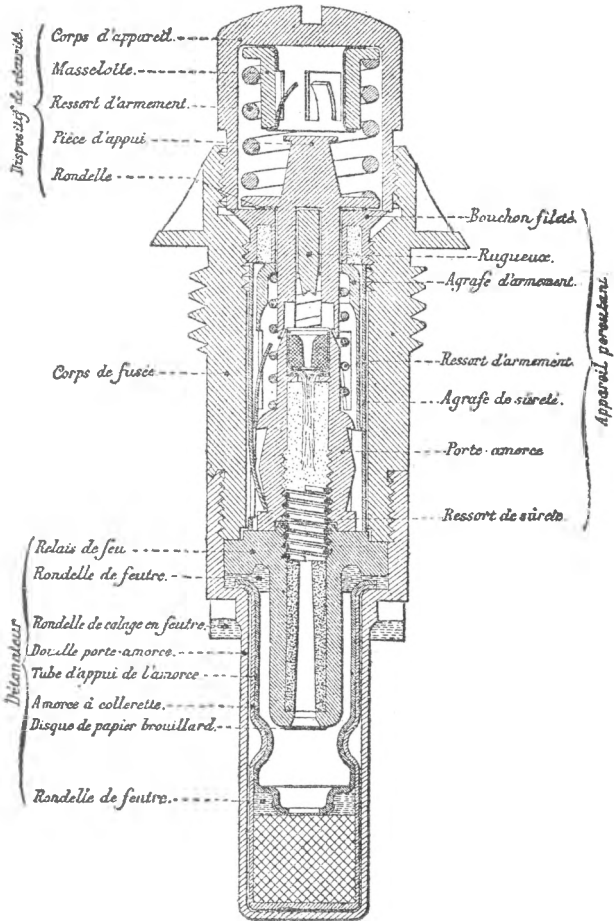
Paris, January 11, 1917.

WAR DEPARTMENT,

OFFICE OF THE CHIEF OF ORDNANCE.

Form No. 1805.

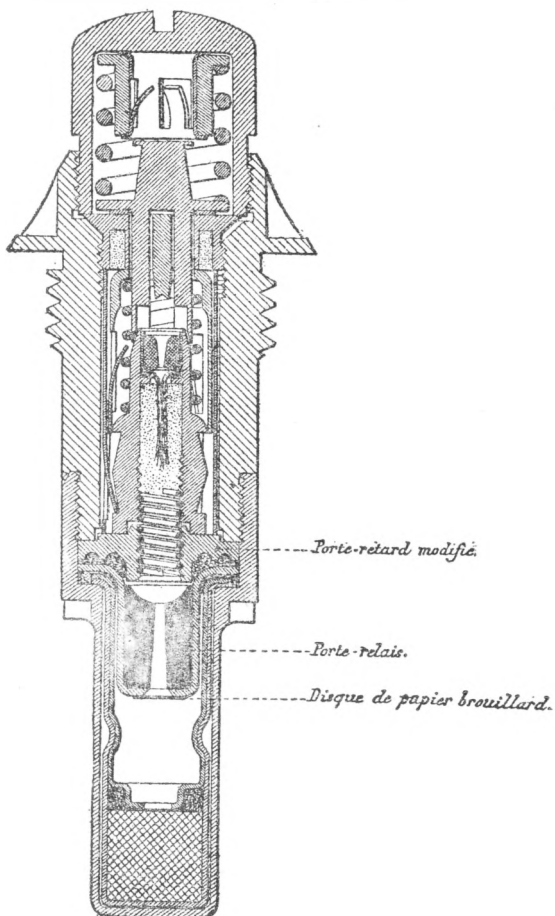
Ed. Oct. 20-17-7,000.

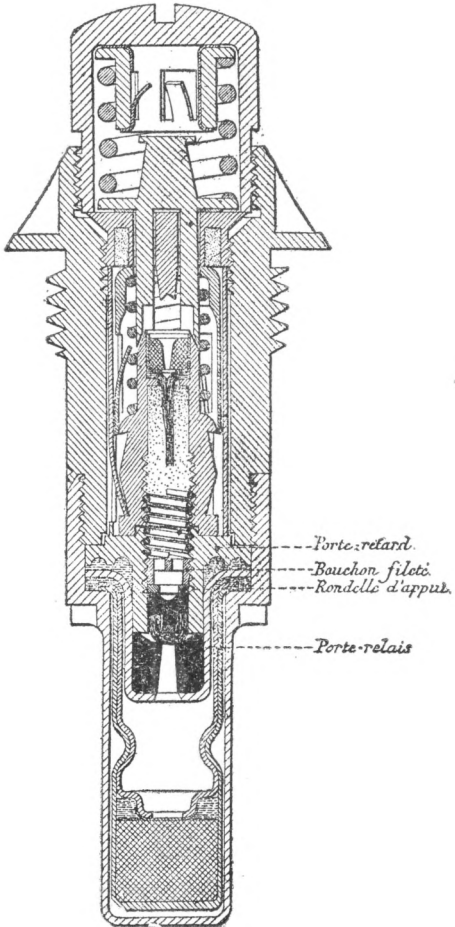
FUSÉE-DÉTONATEUR PERCUTANTE DE 24/31 M^{LE} 1899 (2/1).

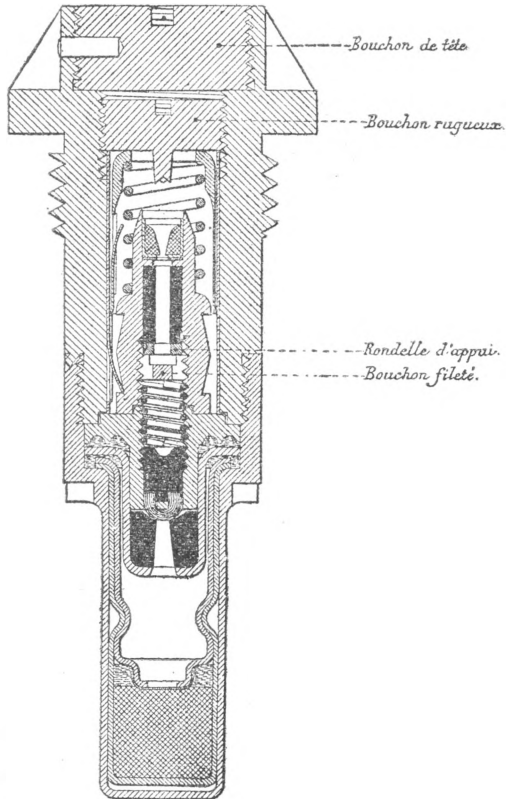
Corps d'appareil=closing cap.
Masselotte=plunger.
Ressort d'armement=arming spring.
Piece d'appui=supporting piece.
Rondelle=washer.
Bouchon fileté=threaded plug.
Rugueux=firing pin.
Agrafe d'armement=arming clasp.
Ressort d'armement=arming spring.
Agrafe de sureté=safety clasp.
Porte amorce=primer holder.
Ressort de sureté=safety spring.
Corps de fusée=fuze body.
Relais de feu=flash relay.
Rondelle de feutre=felt washer.
Rondelle de calage en feutre=felt wedging washer.
Douille porte amorce=detonator socket.
Tube d'appui de l'amorce=detonator supporting tube.
Amorce à collerette=detonator with fange.
Disque de papier brouillard=disc of blotting paper.
Rondelle de feutre=felt washer.

FUSÉE-DÉTONATEUR PERCUTANTE DE 24/31 M^{LE} 1899 ($\frac{2}{7}$),

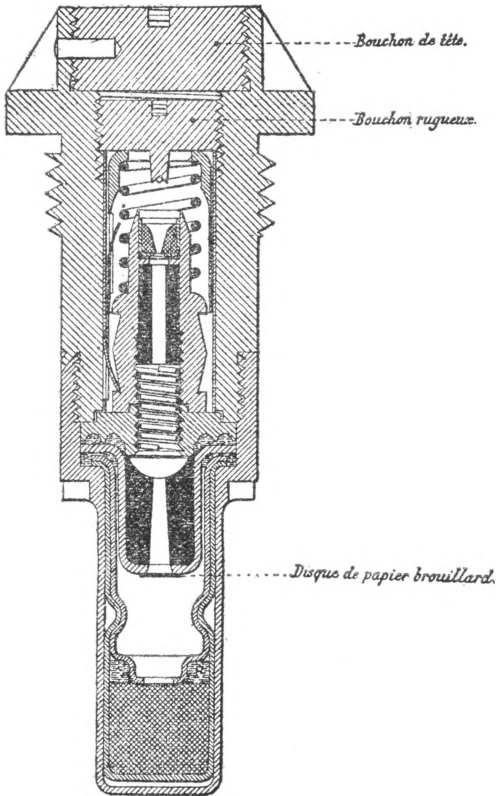
*Confectionnée en utilisant le porte-retard
et le porte-relais de la fusée M^{le} 1898-08.*



FUSÉE-DÉTONATEUR PERCUTANTE DE 24/31 M^{LE} 1899-08 ($\frac{1}{2}$).

FUSEE-DÉTONATEUR PERCUTANTE DE 24/31 M^{LE} 1899-1915 ($\frac{1}{2}$).Types à long^r retard ou à court retard ⁽¹⁾.

⁽¹⁾ Les 2 types ne diffèrent que par la hauteur du massif de poudre formant retard et par le nombre de spires du ressort de sûreté.

FUSÉE-DÉTONATEUR PERCUTANTE DE 24/31 M^{LE} 1899-1915 ($\frac{1}{4}$).*Type sans retard.*

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