

March 4, 1930.

N. E. METHLIN

1,749,643

SETTING DEVICE FOR TIME FUSES

Filed April 29, 1929

7 Sheets-Sheet 1

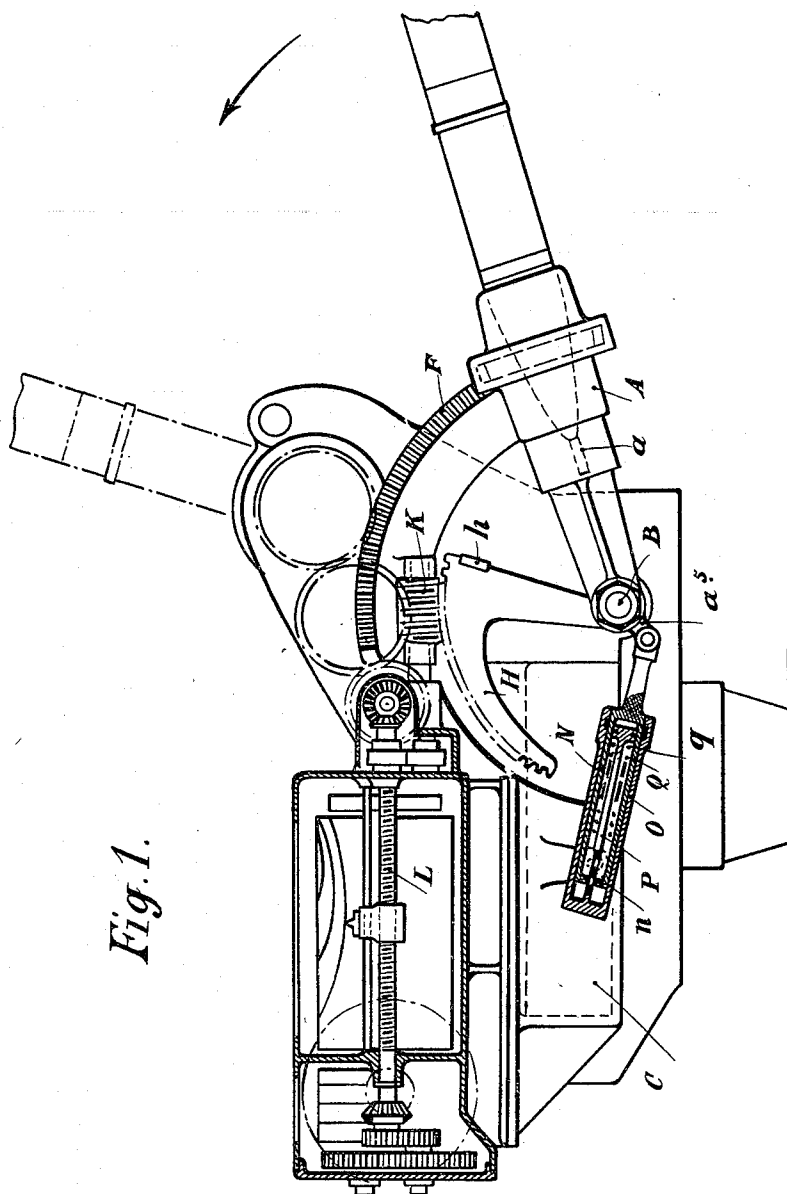


Fig. 1.

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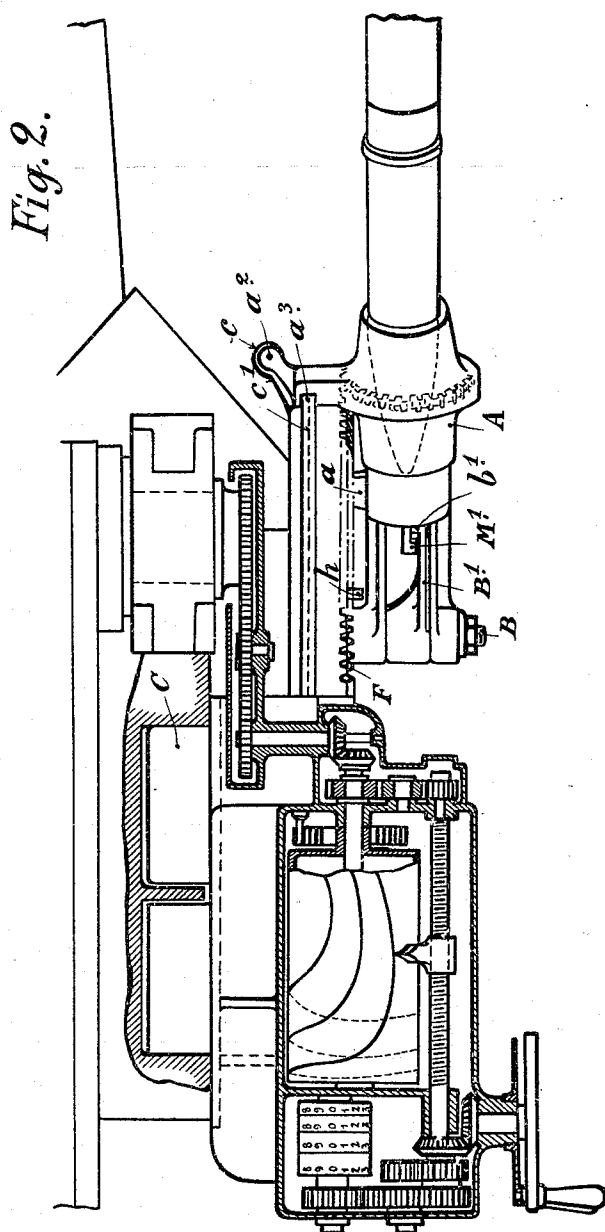
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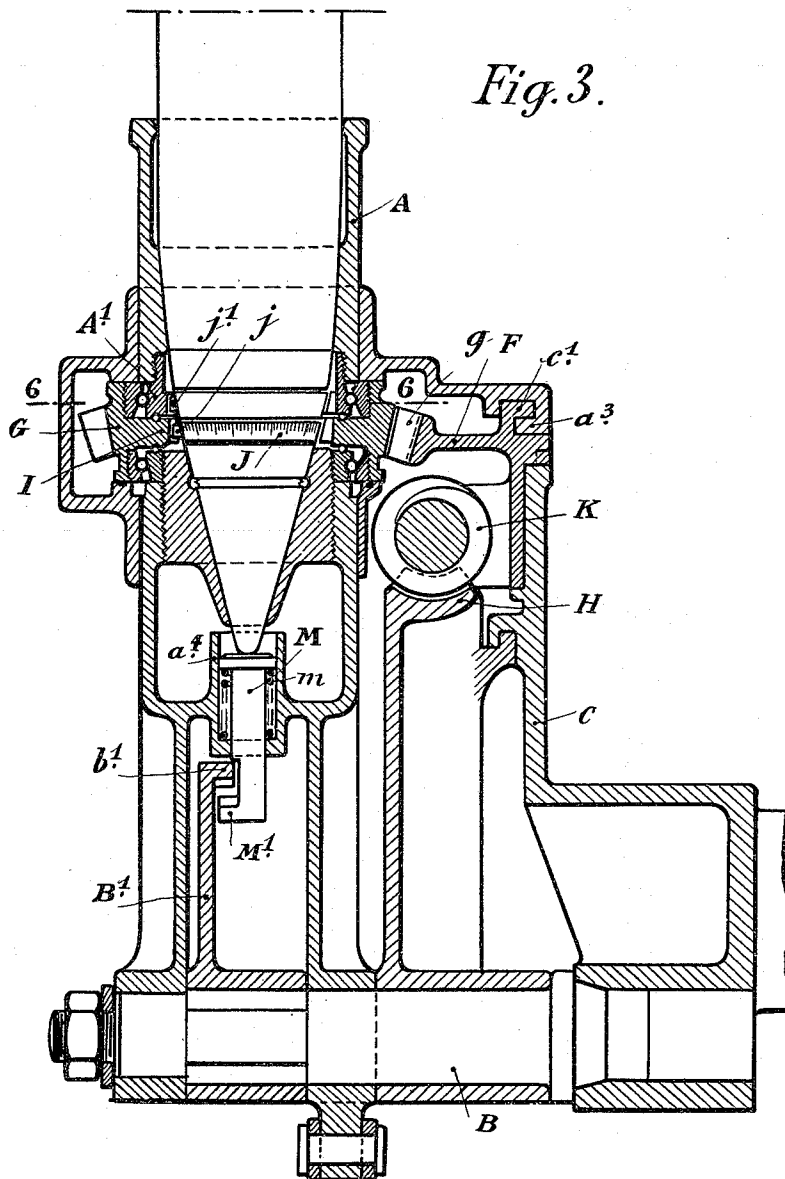
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Fig. 4.

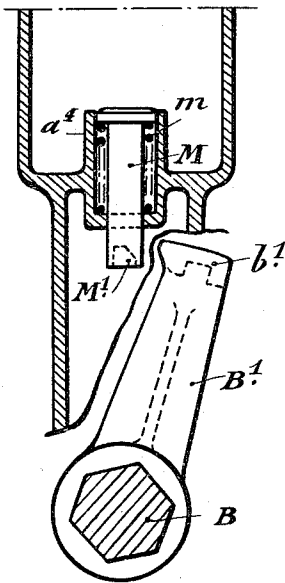


Fig. 5.

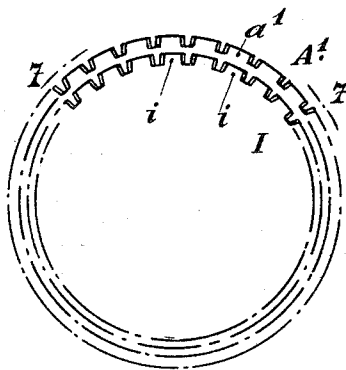
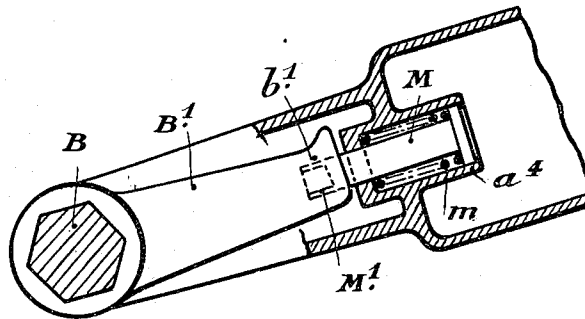


Fig. 6.

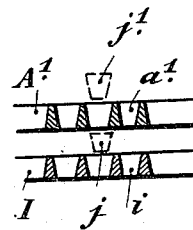


Fig. 7.

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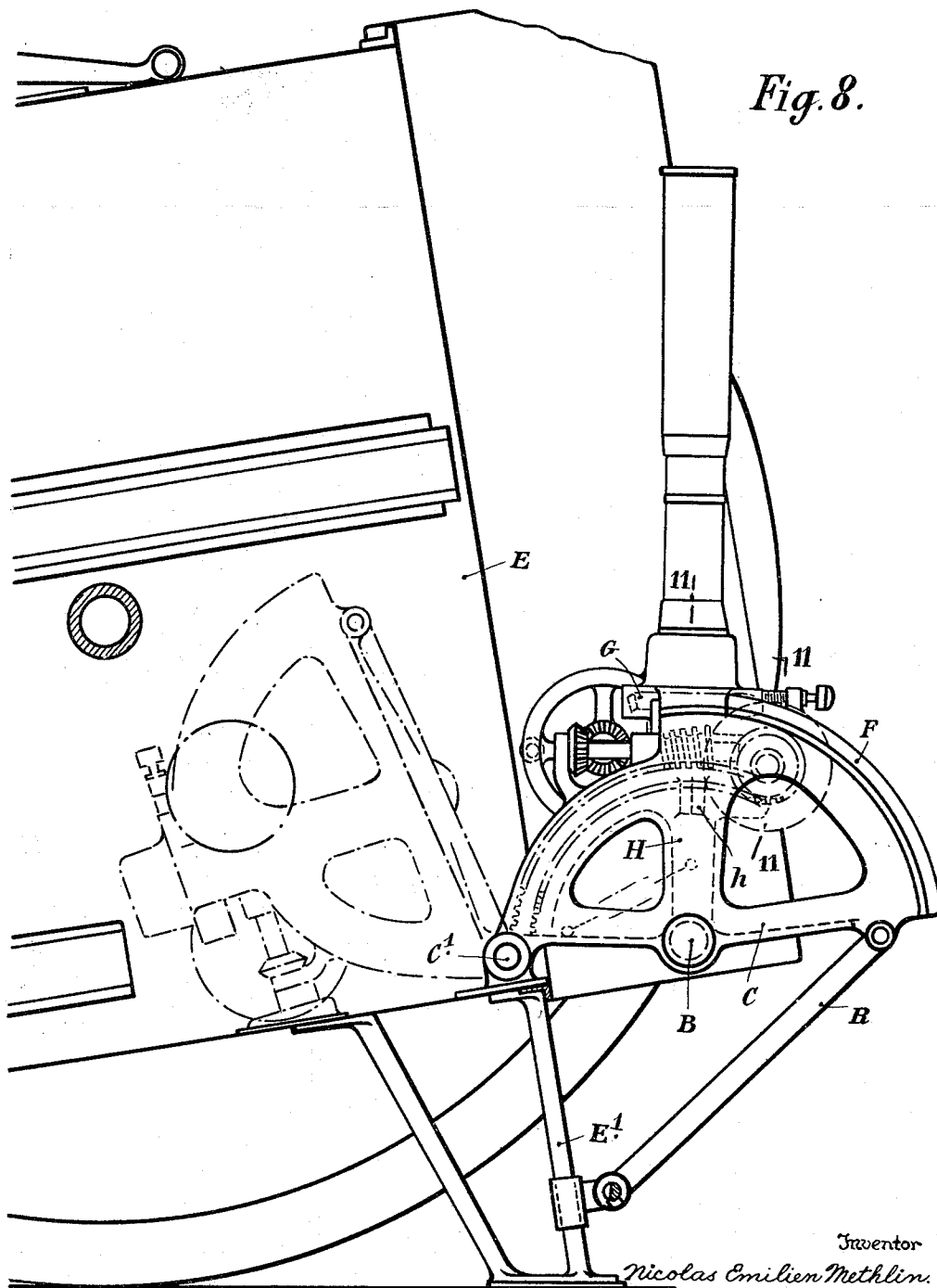
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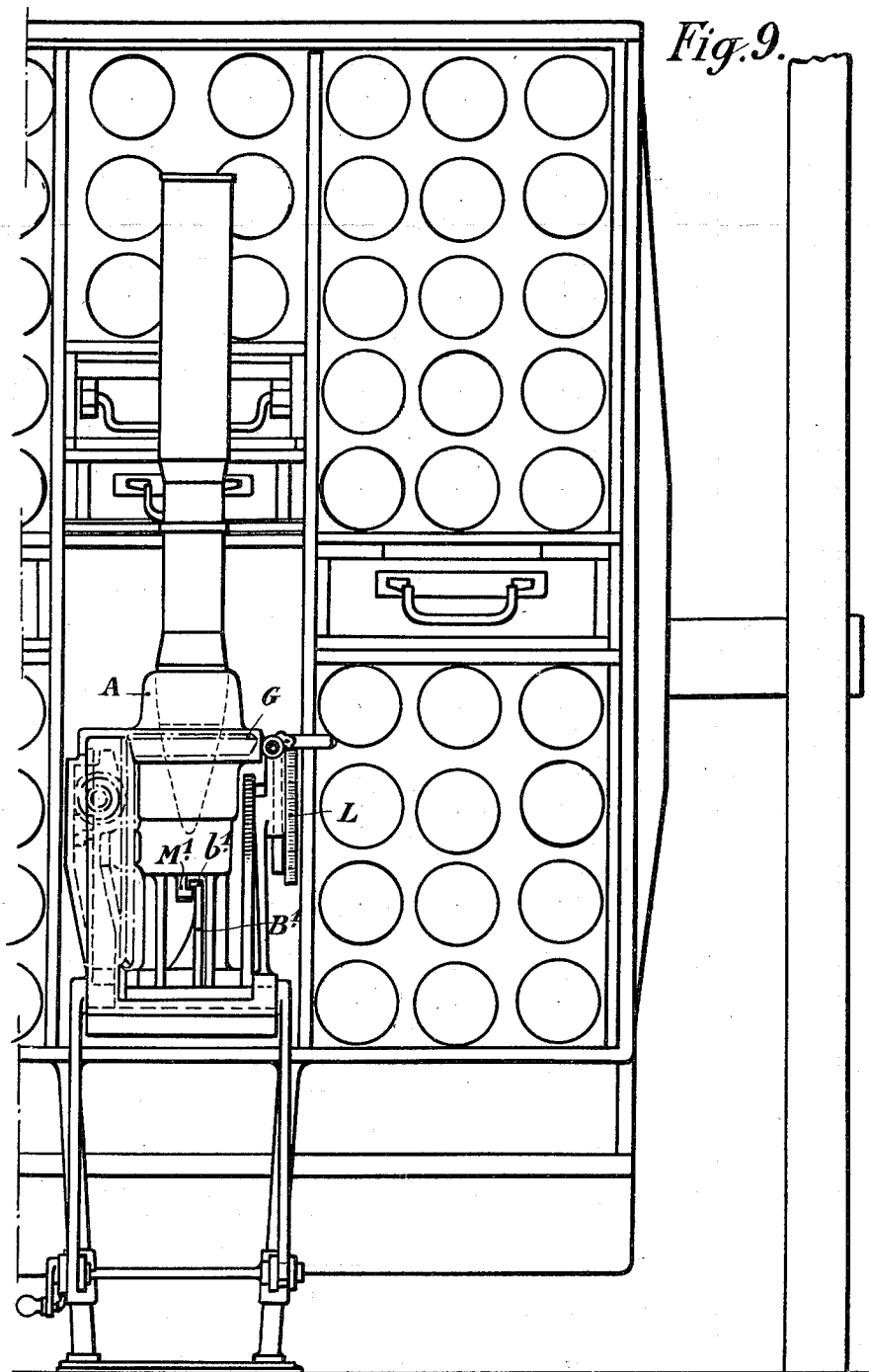
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SETTING DEVICE FOR TIME FUSES

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SETTING DEVICE FOR TIME FUSES

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Fig. 10.

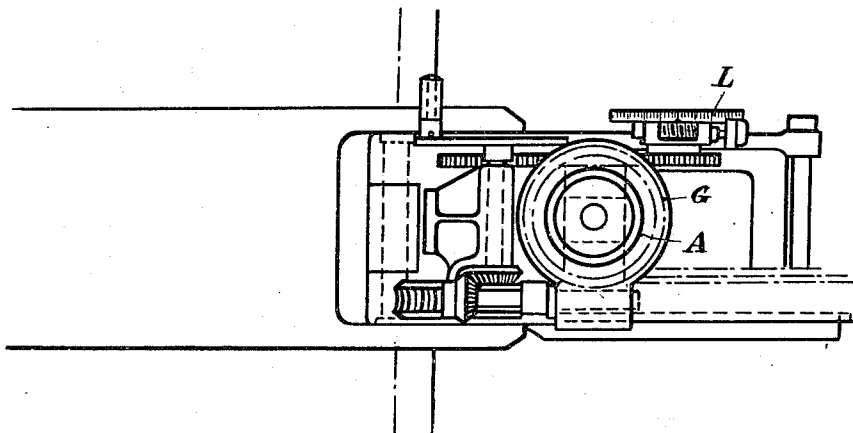
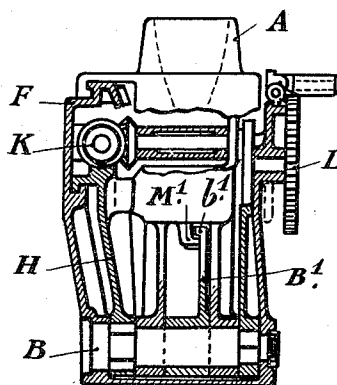


Fig. 11.



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UNITED STATES PATENT OFFICE

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SETTING DEVICE FOR TIME FUSES

Application filed April 29, 1929, Serial No. 359,090, and in France May 3, 1928.

A setting device for time fuses is described in prior U. S. Patent No. 1,680,902, which comprises, for producing the angular displacement, varying according to the range, of the movable time ring with respect to a fixed reference mark on the projectile, a fuse setter body in which is disposed a sleeve-box, one rotatable part of which is adapted to engage the movable ring and is displaced by a gun server so as to rotate the said ring until the sleeve-box encounters a stop which is moved by a second gun serves as a function of the setting to be obtained.

In this fuse setter the angular displacement of the movable ring was obtained by pushing the projectile together with the sleeve-box into the interior of the fuse setter body mounted at a fixed point on the gun carriage or of any other suitable support, the setting stop being formed by a member moving within the body of the fuse setter. The manipulation of this fuse setter, like that of other similar setting devices comprising an angular displacement of the movable time ring produced by pushing the projectile into the body of the fuse setter, requires the application of considerable force, since the movable time ring must offer a suitable resistance to displacement, for if the friction to be overcome in moving the movable time ring were reduced there would be a danger of the setting being accidentally changed.

The present invention relates to a fuse setter comprising, in the known manner and for producing the angular displacement of the movable time ring, a fuse setter body in which is mounted a sleeve-box, one rotatable part of which, within which the said ring engages, is displaced until the sleeve-box encounters a stop moved by a second gun server as a function of the setting to be obtained.

The setting device according to the invention presents the feature that it permits the sleeve to be rotated by means of an effective force applied to this sleeve which is much greater for the same effort exerted by the gun server who performs this operation.

For this purpose the body of the fuse setter is, according to the invention, pivoted about a shaft turning upon the gun carriage, upon

a wagon or any other suitable support to which is secured a toothed sector. The pivotal movement of the fuse setter body which the gun server can obtain by acting upon the projectile near the end of the latter or the end of the cartridge case in the case when use is made of cartridges, produces the rotation of the movable time ring by causing a toothed crown rigid with the rotatable part of the sleeve to roll upon a toothed sector keyed upon the pivot of the fuse setter body.

The abutment stop for this sleeve or casing is carried by a toothed sector loosely mounted upon the same pivot, this sector being displaced in the known manner through the medium of a drive controlled by the range indicating device.

Various embodiments of the invention are illustrated by way of example in the accompanying drawing.

Fig. 1 is a general arrangement view in elevation of the new fuse setting device mounted upon a gun carriage with the transmission gear for controlling the setting stop by means of a known range indicating device.

Fig. 2 is a corresponding plan view.

Fig. 3 is a longitudinal sectional view to a larger scale of the pivoting body of the setting device; the section being taken along a plane passing through the axis of the projectile and through the axis of the pivot.

Fig. 4 is a corresponding partial sectional elevation showing the arrangement for locking the body of the setting device upon its pivot.

Fig. 5 is a similar view to Fig. 4, showing the parts of the catch in the position of engagement while Fig. 4 shows these parts disengaged by the pressure of the projectile.

Fig. 6 is a diagrammatic plan view of a detail in section along the line 6—6 in Fig. 3 showing the parts of the sleeve-box in which the fixed time ring and the movable time ring of the fuse engage respectively.

Fig. 7 is a corresponding diagrammatic developed detail view in section taken along the line 7—7 in Fig. 4.

Figs. 8 and 9 show a longitudinal elevation and a front elevation respectively of a form of construction of an embodiment of

the new fuse setting device constructed for mounting upon an ammunition wagon.

Fig. 10 is a plan view of Fig. 8.

Fig. 11 is a section taken along the line 10—10 in Fig. 8.

In these various figures A is a setting device body pivoted at the end opposite its mouth about a shaft B mounted upon a support C itself secured to a gun carriage in the embodiment shown in Figs. 1 to 5, while in the examples shown in Figs. 8 to 11 it is pivoted at C¹ to a wagon E. Upon this support C is secured a toothed sector F with which engages a toothed crown *g* carried by a rotatable element G of the sleeve-box which the body A of the fuse setting device comprises. The body A of the setting device comprises a projection *a* adapted to make contact with a stop *h* which is formed upon a toothed sector H loosely mounted upon the fixed pivot B. The movable element G of the sleeve-box is, as in the device forming the subject of prior U. S. Patent No. 1,680,902 provided with a crown I having teeth *i* (Figs. 3, 6 and 7) for engagement with the lug *j* on the movable time ring J of the fuse, while the fixed element A¹ of the sleeve box comprises forwardly projecting teeth *a*¹ for engagement with the fixed lug *j*¹ of the fuse. The projecting lugs *j* and *j*¹ have, as shown in Fig. 7, the form of a trapezium with its larger base on the outside and engage easily between the corresponding teeth *i* and *a*¹, the gaps between the latter being of corresponding trapezoidal shape. The stop carrying sector H—H is arranged for control as a function of the setting to be obtained by means of a screw K which receives its movement through a suitable transmission gear from a range indicating device L, of any known type.

At rest the body A of the setting device in the example shown in Figs. 1 to 5, is pressed by a boss *a*² upon a stop *c* of the support G. During its movement it can obtain a guidance upon a rib *c*¹ of the support by means of a hock *a*³ of corresponding profile. As long as no projectile is engaged in the sleeve-box of the setting device, the spring locking bolt M—*m* guided in a sleeve *a*⁴ in the said body of the setting device keeps the latter locked by the engagement of the back M¹ in a recess *b*¹ formed upon the fixed part, for example upon an arm B¹ keyed upon the shaft B.

In order to make use of the setting device the projectile is slipped into the body of the setting device in such a way as to engage the lugs *j*¹ and *j* between the teeth *a*¹ and *i* of the sleeve-box respectively, this engagement being obtained with the greatest ease on account of the shape of the lugs and corresponding teeth. This inward movement produces a pressure upon the locking bolt

M—M¹ and causes the latter to become disengaged.

The stop *h* having previously been set by a gun server in the desired position corresponding to the range chosen, a second gun server who has driven in the projectile in order to place it in position in the sleeve-box and disengage the bolt M—M¹, acts upon the outer end of the cartridge case in order to turn the movable time ring J by travelling the teeth *g* of the movable element G over the fixed toothed sector F. The setting operation is terminated when the boss *a* of the body of the setting device abuts against the projection *h* of the sector H. It will be understood that the force to be exerted in order to turn the movable ring J is obtained easily on account of the powerful lever arm provided by the length of the cartridge.

After the setting operation has thus been effected the gun server removes the projectile from the setting device and can then load it immediately into the gun. In view of the fact that the position corresponding to the greatest range can only make the setting device approach the vertical, the latter, as soon as it is free is in the greater number of cases returned into its initial position under the action of its own weight, this return movement being moreover suitably damped, for example by means of the device shown in Fig. 1. This device may comprise, as shown in the figure a hollow piston N pivoted to a tail piece *a*⁵ on the body A of the setting device and moving in a cylinder O journaled upon a fixed part such as the gun carriage. At the bottom of the cylinder is secured a tapering counter-rod P engaged in the hollow piston N through a diaphragm *n*. The whole of the cylinder O and the hollow piston N is full of liquid.

During the setting operation the piston N moves out of the cylinder O forcing liquid out of the hollow piston into the chamber which is formed in this cylinder, the liquid flowing freely on account of the decreasing cross section of the counter rod P. When the setting device returns into its initial position the flow of the liquid is on the contrary restricted as the diaphragm *n* becomes positioned progressively before the continually increasing section of the counter rod P. In order to facilitate the return of the setting device into its initial position from a vertical position or a position approaching the vertical a spring Q is disposed in the hollow piston, one end of this spring being connected at *q* to the counter-rod and the other end of the spring being free and situated at a convenient distance from the diaphragm *n* when the setting device is in its position of rest. After a certain position during the lifting of the setting device A has been reached which corresponds to a predetermined range, the free end of the spring Q is encountered by the diaphragm so

that the said spring is compressed during all that part of the travel of the setting device comprised between the vertical and a suitably chosen inclination.

5 When the spring Q has been compressed during the setting operation as a consequence of the range chosen, the expansion of this spring is added to the action of the weight of the setting device in order to return the latter into its initial position as soon as the projectile has been removed from the setting device.

10 In the example shown in Figs. 8 to 10 inclusive, the setting device is mounted upon an ammunition wagon E. Upon the support C pivoted at C¹ to the wagon is formed on the one hand the pivot B for the pivotal connection of the body of the setting device and of the stop carrying sector H—h; this support carries as in the previous example the sector F cover which travels the movable element G of the sleeve-box. Upon the same support is mounted the range indicating device L and also the transmission gear between the latter and the stop carrying sector; the whole of this arrangement is adapted to be lowered into the interior of the wagon E for traveling by means of the pivotal connection provided at C¹.

25 In the position of use, the support C may be hooked by means of a rod R upon a catch mounted upon a lug E¹ on the wagon as shown in Figs. 8 and 9.

30 In this example the rotation of the movable time ring may as in the previous example be limited by its encounter with the top h; but a setting operation may also be effected by causing the movable time ring to be rotated by a displacement of the stop. In other words the projectile may for setting purposes be moved in one direction or the other. By starting for example from the initial position upon Fig. 8, the projectile may be moved in the various positions by moving it in a clockwise direction for increasing ranges. But the fuse may also be set at will for a greater range or a smaller range, starting from an intermediate position, by moving the projectile in a clockwise direction or in an anti-clockwise direction without having to bring the setting device into the initial starting position.

50 The range indicating device may in the known manner be completed by a compensating device.

55 Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, we declare that what we claim is:—

60 1. A setting device for time fuses which comprises, for producing the angular displacement, varying according to the range, of the movable time ring with respect to a fixed reference mark on the projectile, a fuse setter body in which is disposed a sleeve-box,

one rotatable element of which is adapted to engage the movable time ring and is displaced by a gun server for rotating the said ring until the said sleeve encounters a stop which is displaced by a second gun server as a function of the setting to be obtained, characterized by the feature that the body (A) of the setting device is pivoted about a shaft (B) mounted upon the gun carriage; upon a wagon or upon any other suitable support (C) to which is secured a toothed sector (F) upon which the pivotal movement of the said fuse setter body causes a toothed crown (g), rigid with the rotatable element (G) of the sleeve-box, to travel for rotating the movable time ring, the abutment stop (h) limiting the rotation of this sleeve being carried by a toothed sector (H) loosely mounted upon the fixed pivot (B) of the body of the setting device and being displaced in the known manner through the medium of a transmission gear (H—K) controlled by the range indicating device.

2. A setting device as claimed in claim 1, characterized by a locking arrangement between the body (A) of the setting device and a fixed part formed upon or carried by its pivot, this locking arrangement comprising a member such as a spring bolt (M—m) adapted to be disengaged by the pressure of the fuse body inserted in the said fuse setter body and normally in engagement in a recess (b¹) which may be formed in an arm (B¹) keyed upon the said pivot.

3. A setting device as claimed in claim 1, wherein the body of the setting device which is moved in rotation about its pivot for setting a fuse is automatically returned into its initial position under the action of its weight to which is added if desired the action of a spring (Q) stressed during the setting operation, this return movement being damped if desired by combining the spring with a hydraulic or other braking device, the spring being in this case lodged in a hollow piston (N) movable upon a tapering counter rod (P) which carries one of the supports for the spring, the other end of the spring being free and only being compressed by the hollow piston after a determined position during the lifting of the setting device has been reached.

In testimony whereof I have signed this specification.

NICOLAS EMILIE MATHLIN.

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