

(No Model.)

2 Sheets—Sheet 1.

M. DREGER & A. WRATZKE.
TIME FUSE FOR SHELLS.

No. 526,344.

Patented Sept. 18, 1894.

FIG. 3.

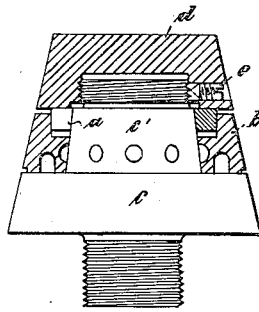


FIG. 1.

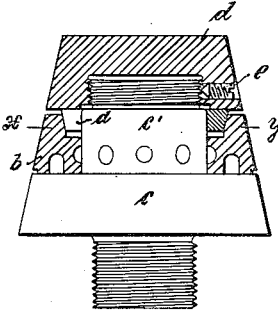


FIG. 4.

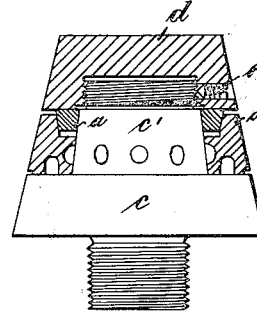


FIG. 5.

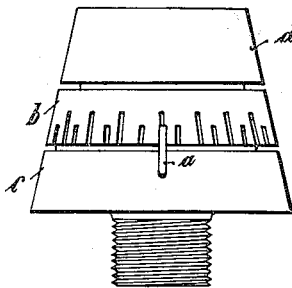


FIG. 2.

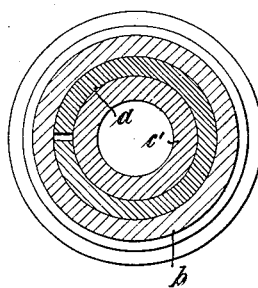


FIG. 7.

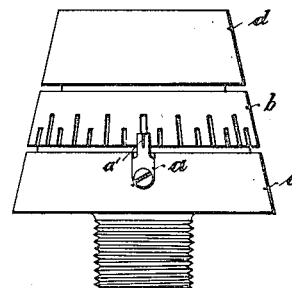


FIG. 6.

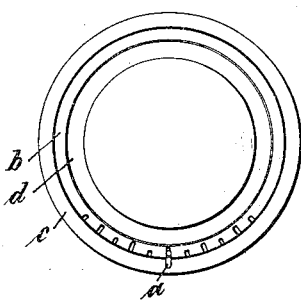
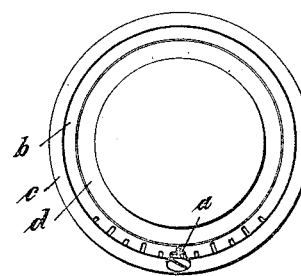


FIG. 8.



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(No Model.)

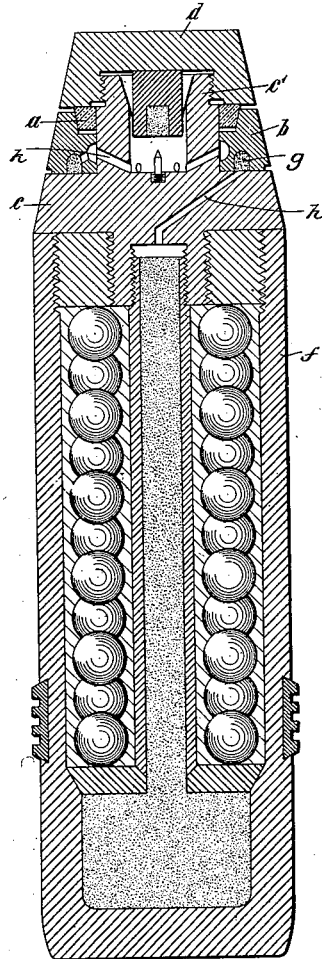
2 Sheets—Sheet 2.

M. DREGER & A. WRATZKE.
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FIG. 2a.



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UNITED STATES PATENT OFFICE.

MAX DREGER AND ALFRED WRATZKE, OF MAGDEBURG, ASSIGNORS TO THE
GRUSONWERK, OF MAGDEBURG-BUCKAU, GERMANY.

TIME-FUSE FOR SHELLS.

SPECIFICATION forming part of Letters Patent No. 526,344, dated September 18, 1894.

Application filed November 25, 1892. Serial No. 453,132. (No model.)

To all whom it may concern:

Be it known that we, MAX DREGER and ALFRED WRATZKE, both of Magdeburg, in the Kingdom of Prussia and German Empire, have invented new and useful Improvements in Time-Fuses, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to fuses for use in connection with explosive shells or cannon shot whereby the explosion of the shell is insured accurately within a certain predetermined time after the shot is fired, and our invention relates more particularly to that class of time fuses which employ two relatively adjustable parts, one of which carries a ring or annular film of slow burning composition having igniting connection with the explosive contents of the shell, while the other carries the initial lighting device operated in any suitable manner and having access at a point or points to the igniting ring. The operation which is well known in such devices, is such that the communication between the initial lighting device and the igniting ring of composition may be adjusted to a greater or less distance from the point of communication between the actuating ring of composition and the explosive contents of the shell so that a greater or smaller portion of this ring must be consumed before the fire can be communicated to the explosive contents of the shell. It has heretofore been proposed to have the adjustable part rotatable on that part which is fixed to the shell and to indicate, by a scale in one of the parts and an index in the other, the relative location of the point of communicating the initial lighting, and point of imparting the flame to the shell, and the consequent distance over which burning must take place, and therefore, just what length of time it will take for the shell to be exploded after firing.

Our present invention relates to certain improvements in the adjustment of the two parts of a fuse-plug intended to be constructed upon the same general principles as those above described, and has for its objects to enable an accurate adjustment of the burning periods to be effected in a convenient manner, and to prevent with certainty an

unintentional displacement of the body of the fuse. These objects are attained by artificially increasing the friction between the body of the fuse which is capable of rotation and a fixed part of the igniter body or cup to such an extent that while the automatic displacement of the adjusted body of the fuse by concussions or the like is hereby prevented, the turning of the said body of the fuse which is to be adjusted can still be effected by hand or by a suitable instrument.

Our invention further relates to an indicator for use in connection with the above described frictional device and consisting of a pointer on one of the relatively turning parts and notches or graduations on the other of said parts, whereby the adjustment of the initial guiding ring upon the spindle may be accurately indicated and which indicator by reason of its construction also serves as an additional safeguard against turning.

Figure 1 is a side elevation partly in central-section of a time fuse constructed according to this invention. Fig. 2 is a section on the line xy Fig. 1. Fig. 2^a shows a time fuse constructed according to this invention applied to a shell. Figs. 3, and 4 illustrate slight modifications hereinafter described. Fig. 5 is a side elevation. Fig. 6 is a plan of a further modification, and Figs. 7 and 8 show a still further modification.

Like letters indicate corresponding parts throughout the drawings.

Referring to Figs. 1 and 2 a split clamping ring a embraces the cylindrical spindle c' of the igniting cup c and lies between the adjusting nut d and the body of the fuse b . The said clamping ring is cone shaped on its exterior periphery, and said outer conical surface bears against a corresponding internal cone formed in the body of the fuse b . When the adjusting nut d is tightened it presses with its lower surface upon the upper flat face of the clamping ring a and forces the ring which acts as an annular wedge between the body of the fuse and the spindle so that between these latter two parts friction is produced. Before setting the fuse, the nut d is first screwed up so far that the body b of the fuse can only just be turned by hand. The adjusting nut is then locked by means of a

screw *e*. The setting of the fuse for any desired range may now be very accurately effected either by hand or by a suitable key, while the automatic displacement of the adjusted body of the fuse during transport or loading is prevented. The clamping ring *a* instead of being made conical on the outside, may be made conical on the inside as shown in Fig. 3, or both on the outside and inside as shown in Fig. 4, the spindle and the body of the fuse in both cases being made of corresponding form to fit therewith. In the form represented in Fig. 4 the clamping ring need not be split. By the described arrangement moreover this advantage is gained that, in the firing, the clamping ring *a*, by reason of its inertia, is pressed so firmly between the spindle and the body of the fuse that the friction thereby produced is greater than the effort tending to displace the body of the fuse, and produced by the rotation of the projectile on the one hand and by the inertia of the body of the fuse on the other hand, so that, displacement of the said body is prevented. In the time fuses represented in Figs. 5 to 8 the friction acting to prevent the turning of the body of the fuse is produced between the igniting cup and the body of the fuse by a snap spring.

Referring to Figs. 5 and 6 the fuse has a pointer *a*² made in the form of a spring pin fixed to the igniting cup *c* and bearing with its free end against the body *b* of the fuse. On this body the graduation lines indicating the burning periods or distances are formed in intaglio, so that the pointer *a*² can snap into said depressions during the turning of the body. The spring pointer *a*³ is sufficiently strong to prevent accidental turning of the body during transport, or loading, for example. The zero line of the graduations and the line indicating the dead point of the time fuse may be made somewhat deeper than the others, in order to entirely prevent the body of the fuse being accidentally turned from the positions in which it is set during transport. By the described arrangement for causing the pointer to snap into the graduations the advantage is moreover gained that the accurate adjustment of the body of the fuse is materially facilitated. The time fuse shown in Figs. 7 and 8 differs from that of Figs. 5 and 6 only in that the spring pin is replaced by a small spring plate *a* which is fixed to the igniting cup *c* by means of a screw or otherwise. This small plate is pressed inward at *a'* to form a wedge shaped ridge adapted to fit into the graduation lines.

While in general the clamping ring and

the spring pointer have the common function of preventing the automatic displacement of the body of the fuse by increasing the friction, the former has the special advantage of still further increasing the frictional momentum during the firing, and the latter has the advantage of facilitating the accurate adjustment of the body of the fuse. If it is desired to secure both advantages both devices are arranged together on the fuse.

In Fig. 2^a we have shown our time fuse applied to a shell *f*. In the body *b* of the time fuse is located the slow burning composition ring *g*, which, when ignited communicates with the explosive contents of the shell through the passage *h*, and located within the cylindrical spindle *c'* is the initial igniting device *i* which, as the projectile is driven forward, moves backward and is exploded on the needle *j*. The flame is carried to the slow burning composition through the passage *k*.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a time fuse, the combination with the igniting body or cup and the body of the fuse, of a frictional resistance device inserted between said parts to prevent accidental turning of one upon the other, but permitting the relative adjustment thereof for the purpose specified.

2. In combination with the relatively adjustable parts of a time fuse, a conical or tapered clamping ring inserted between said parts to produce between them friction for preventing the accidental turning of the same relatively to each other for the purpose specified.

3. The combination with the relatively adjustable parts of a time fuse, of the interposed friction ring wedging between said parts for regulating the friction of turning between them, and the screw cap bearing on the ring for increasing the wedging effect as explained.

4. In a time fuse, the combination with the igniting cup and the fuse movable thereon; of the indicating and locking device carried by one part and engaging in the other, for indicating the position and holding the adjustment of the fuse; and the automatic locking ring between the relatively movable parts, operated by inertia on firing the gun, substantially as and for the purposes set forth.

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