R. REDPATH AND H. HELLBERG.

AUTOMATIC TIME FUSE SETTER.

APPLICATION FILED FEB. 19, 1918.

1,307,639.

Patented June 24, 1919.

3 SHEETS—SHEET 1.

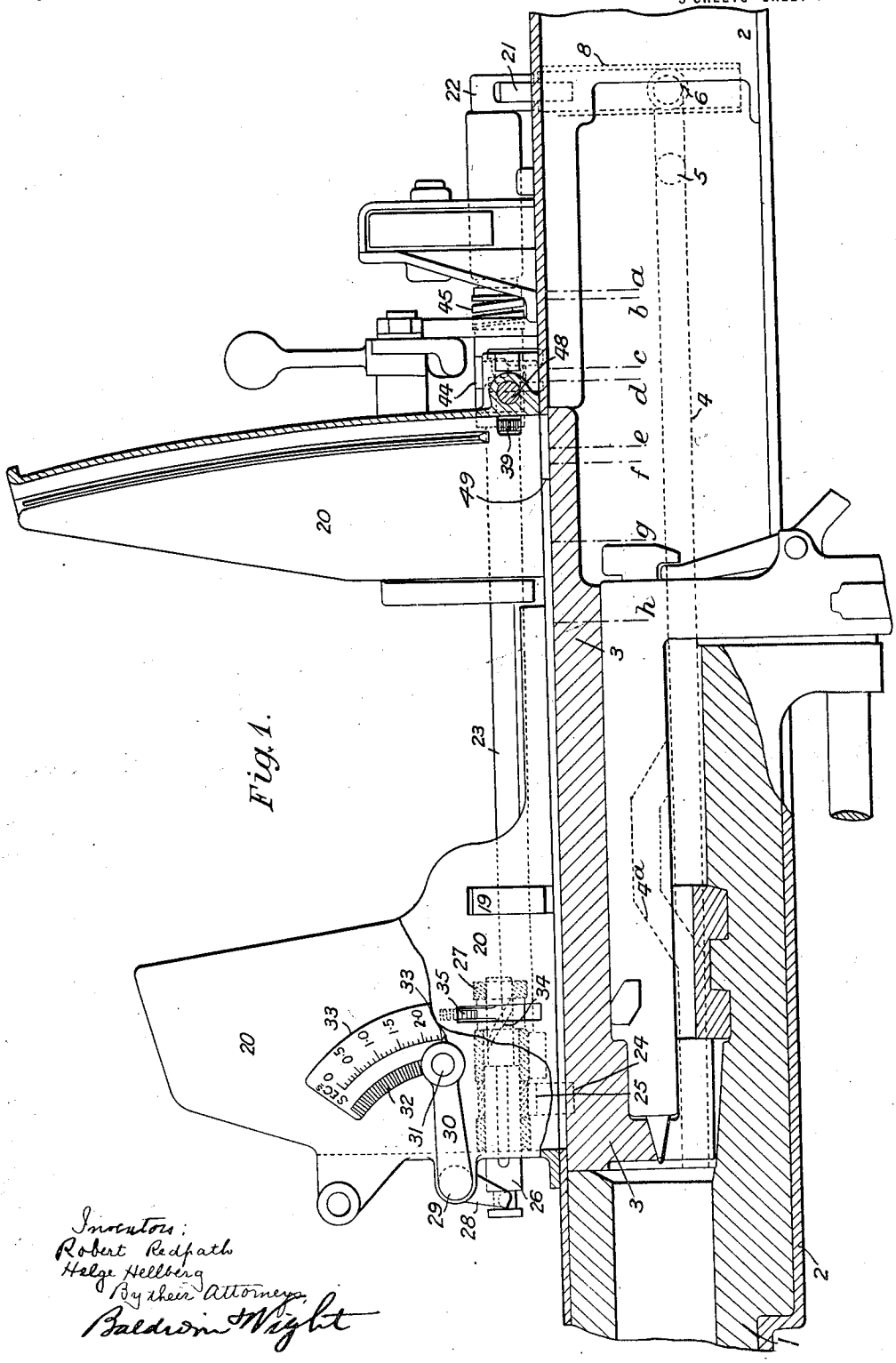

Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 7.

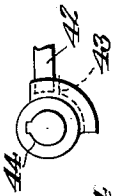


Fig. 6.

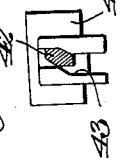
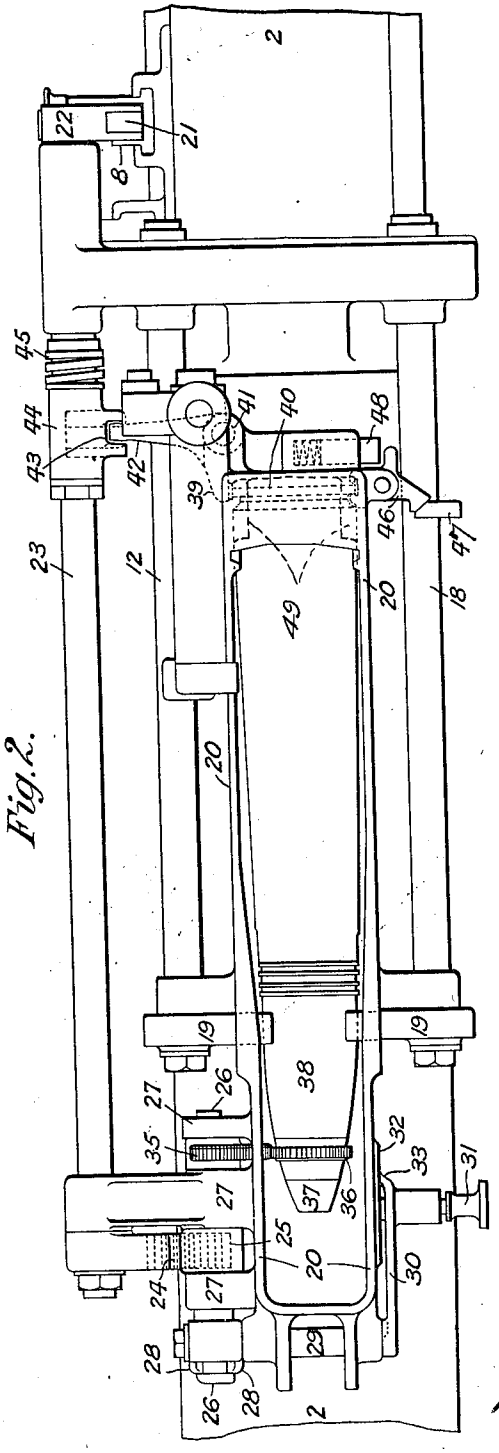


Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

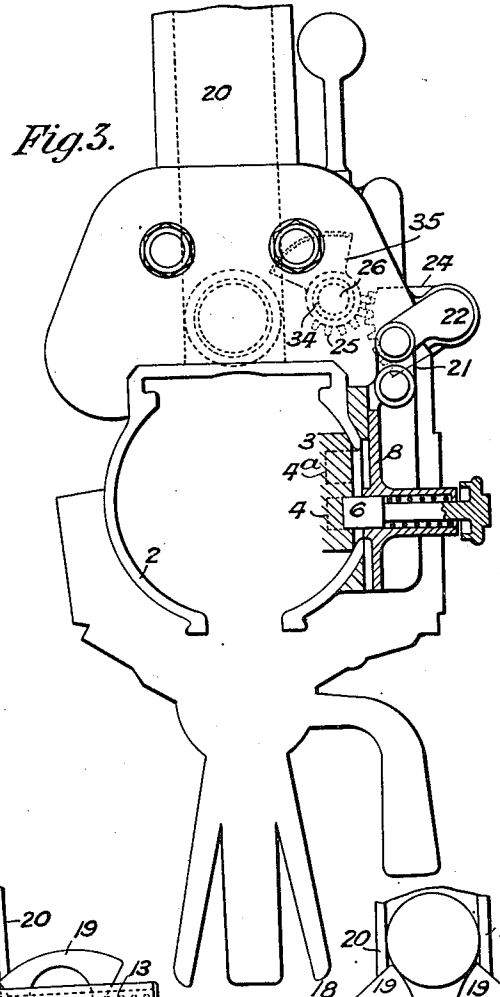


Fig. 4.

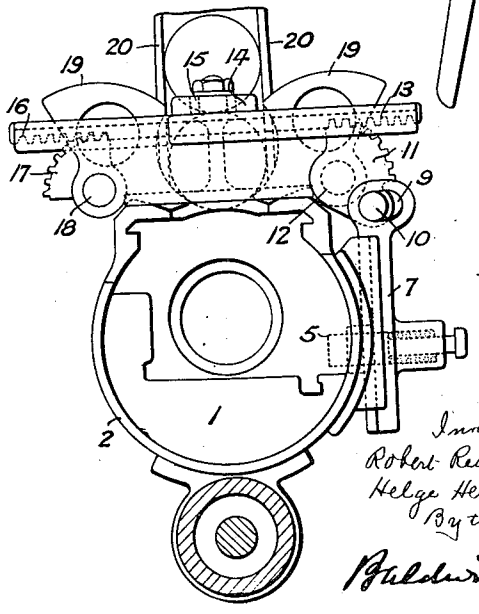
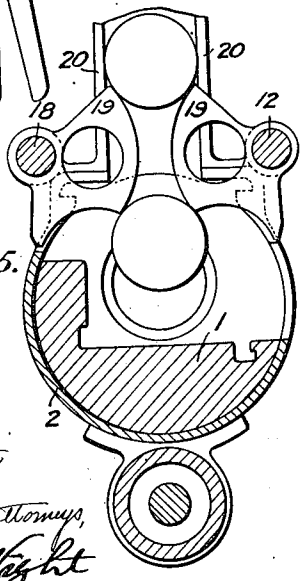


Fig. 5.



Inventors:
Robert Redpath
Helge Hellberg
By their attorneys,
Baldwin & Wright

UNITED STATES PATENT OFFICE.

ROBERT REDPATH AND HELGE HELLBERG, OF COVENTRY, ENGLAND, ASSIGNORS TO THE COVENTRY ORDNANCE WORKS LIMITED, OF ORDNANCE WORKS, COVENTRY, ENGLAND.

AUTOMATIC TIME-FUSE SETTER.

1,307,639. Specification of Letters Patent. Patented June 24, 1919.

Application filed February 19, 1918. Serial No. 218,136.

To all whom it may concern:

Be it known that we, ROBERT REDPATH, a subject of the King of Great Britain, and HELGE HELLBERG, also a subject of the same King, both residing at Ordnance Works, Coventry, England, have invented a new and useful Improvement in Automatic Time-Fuse Setters, of which the following is a specification.

This invention relates to means whereby the time ring of a shell fuse can be automatically set.

Our invention is illustrated by the accompanying drawings, Figure 1 of which is a left hand elevation partly in section of a magazine and part of a gun, Fig. 2 is a plan, Fig. 3 is a rear elevation partly in section and Figs. 4 and 5 are vertical sections showing the parts in different positions. Figs. 6 and 7 are detail views of devices for turning the jaw which grips the rim of the cartridge case.

1 is the gun carried in a cradle 2 and having a breech block 3. The gun and breech block recoil together and at the end of recoil the breech block is retained in its rearmost position by any convenient means which are not shown as they form no part of this invention. The barrel immediately returns to battery leaving the breech block behind it. As the barrel reaches its foremost position the breech block is released and moves forward. A groove 4 is cut in the right hand side of the breech block and in this groove work two spring plungers 5, 6. The plunger 5 is carried by a rod 7 capable of vertical movement on the cradle, and the plunger 6 is similarly carried by a rod 8 capable of vertical movement. The groove 4 is so cut that as the breech block moves to the rear the plungers are not moved vertically, but the front part of the groove is deeper than the rear part so that toward the end of recoil the plungers move inward under the pressure of their springs, and as the block moves forward the shoulder formed by the deepening of the groove causes the plungers to ride up the inclined portion 4^a, shown plainly in Fig. 1, and they then return to their original positions in the groove. The top of the rod 7 is slotted at 9 to embrace a pin 10 upon a quadrant 11 fast on a spindle 12; this quadrant has upon it teeth meshing with a rack 13 so that as the quadrant is turned anti-clockwise the rack is moved to the left. The rack is pivoted to one arm of a lever 14 on a vertical pivot 15, the other arm being pivoted to a second rack 16 meshing with a toothed quadrant 17 on a second spindle 18. The two spindles 12 and 18 pass forward at each side of the magazine and their front ends carry feed cams 19 which support the projectile of the lowest round in the magazine 20. As therefore the breech block commences to move forward, the two feed cams 19 are moved quickly from the position shown in Fig. 4 to that shown in Fig. 5 to lower the projectile, so that the continued movement of the breech block can thrust it into the chamber, and this continued movement also, owing to the shape of the groove 4, returns the cams 19 to the position shown in Fig. 4, so that they catch the projectile of the next round. It will be seen from Figs. 4 and 5 that the cams are so shaped that they prevent the second round from descending during the greater part of their movement. The rod 8 is connected by a link 21 to an arm 22 upon a longitudinal shaft 23, journaled on the cradle. At the first portion therefore of the forward movement of the breech block this shaft will be rocked through a small angle clockwise and then back through the same angle. At the forward end of the shaft is a toothed segment 24 meshing with a second segment 25 fast on a spindle 26 which is capable of longitudinal movement in its bearings 27; it can be set in these bearings by means of a fork 28 upon a cross shaft 29 fast on which is an arm 30 provided with a handle 31 by means of which it can be set upon a rack 32 against which an indicator 33 upon the arm 30 can be read. The spindle 26 has cut in it a helical keyway 34 in which works a key in the bore of a segment 35 which is toothed or milled to engage the milled exterior of the time ring 36 of a fuse 37 of a projectile 38. The segment 35 is incapable of longitudinal movement and it will be seen therefore that longitudinal movement of the spindle 26 will rotate the segment 35 and that when the spindle 26 is rocked by

means of the gear 25, 24, from the shaft 23, the segment 35 will also be rocked; thus the longitudinal position of the spindle 26 determines the angular position of the segment 35, and when the latter is rocked counterclockwise it will rotate the time ring 36 through an angle which is dependent upon the longitudinal position of the spindle 26. The segment 35 moves idly through a small angle before it engages the time ring and the amount of idle movement depends upon the position of the spindle 26. 39 is a jaw adapted to grip the rim 40 of the cartridge case and to prevent the latter from rotating while the fuse is being set. This jaw is turned upon its pivot 41 by means of an arm 42 fast with it and engaging an inclined groove 43 in a sleeve 44 upon the shaft 23.

To provide for differences in dimensions of cartridge cases the sleeve is provided with a spring 45 which will give slightly should any abnormal end load come on to the sleeve.

It is necessary also to disengage the fuse from the teeth of segment 35 before the round moves down toward the gun, otherwise its movement would alter the fuse setting. For this purpose we pivot to the magazine a small lever 46 which is provided with a jaw to engage the rim 40 of the cartridge and also with a toe engaged by a cam 47 upon the spindle 18; 48 is a spring plunger adapted to keep the toe up to the cam.

In order to hold the cartridge more securely the rim 40 and the corresponding parts of 39 and 46 are serrated. To prevent the rear end of the cartridge from falling into the loading position two ledges or shoulders 49 are provided on the cradle so that the cartridge cannot fall until it has been pushed a short distance.

The sequence of operations is as follows, the letters referring to the lines in Fig. 1 which show the position of the front face of the breech block at the various stages of its forward movement:—

a to *b*, 39 turned to grip case.

a to *c*, 35 turned down to set fuse.

c to *d*, cam 47 acts to push around slightly forward so that teeth on 36 are disengaged from teeth on 35.

c to *e*, feed cams 19 turned down.

f to *g*, 35 turned up.

g to *h*, feed cams 19 turned up.

What we claim is:—

1. In a gun, the combination of a longitudinally reciprocating breech block, a groove therein, a plunger entering the groove, means for feeding cartridges to the gun and a fuse setter actuated by the plunger.

2. In a gun, the combination of a longitudinally reciprocating breech block, a groove therein, a plunger entering the groove, means for feeding cartridges to the gun, a fuse setter actuated by the plunger and means for adjusting the fuse setter.

3. In a gun, the combination of a longitudinally reciprocating breech block, a groove cut in the side thereof, a plunger entering the groove and capable of vertical movement, a longitudinal shaft capable of being rocked by the plunger and a fuse setter actuated by the shaft.

4. In a gun, the combination of a longitudinally reciprocating breech block, a groove cut in the side thereof, a plunger entering the groove and capable of vertical movement, a longitudinal shaft capable of being rocked by the plunger, a spindle geared to the shaft, and a toothed segment adapted to engage the toothed time ring of the fuse.

5. In a gun, the combination of a longitudinally reciprocating breech block, a groove cut in the side thereof, a plunger entering the groove and capable of vertical movement, a longitudinal shaft capable of being rocked by the plunger, a longitudinal spindle geared to the shaft and capable of axial movement, a helical groove in the spindle, a segment mounted on the spindle, a key upon the segment meshing with the groove and teeth upon the segment adapted to engage the toothed time ring of the fuse.

6. In a gun, the combination of a longitudinally reciprocating breech block, a groove cut in the side thereof, a plunger entering the groove and capable of vertical movement, a longitudinal shaft capable of being rocked by the plunger, a longitudinal spindle geared to the shaft and capable of axial movement, a helical groove in the spindle, a segment mounted on the spindle, a key upon the segment meshing with the groove, teeth upon the segment adapted to engage the toothed time ring of the fuse and means for adjusting the shaft longitudinally.

7. In a gun, the combination of a longitudinally reciprocating breech block, means for feeding cartridges down to the gun, a fuse setter adapted to engage and turn the time rings of the fuses and means for moving the cartridges forward to free the time rings from engagement with the fuse setter.

8. In a gun, the combination of a longitudinally reciprocating breech block, a magazine, a pair of feed cams pivoted to the magazine and adapted to feed cartridges one by one from the magazine to the gun, means actuated by the movement of the breech block for rocking the cams and a fuse setter actuated by the movement of the breech block and adapted to turn the time rings of the fuses.

9. In a gun, the combination of a longitudinally reciprocating breech block, a groove cut in the side thereof, a magazine, a

pair of feed cams pivoted to the magazine, a plunger capable of vertical movement and entering the groove, means whereby the movement of the plunger rocks the cams, a second plunger also capable of vertical movement and entering the groove and a fuse setter operated by this second plunger and adapted to turn the time rings of the fuses.

In testimony that we claim the foregoing as our invention we have signed our names this fourteenth day of January, 1918.

ROBERT REDPATH.
HELGE HELLBERG.