

June 21, 1932.

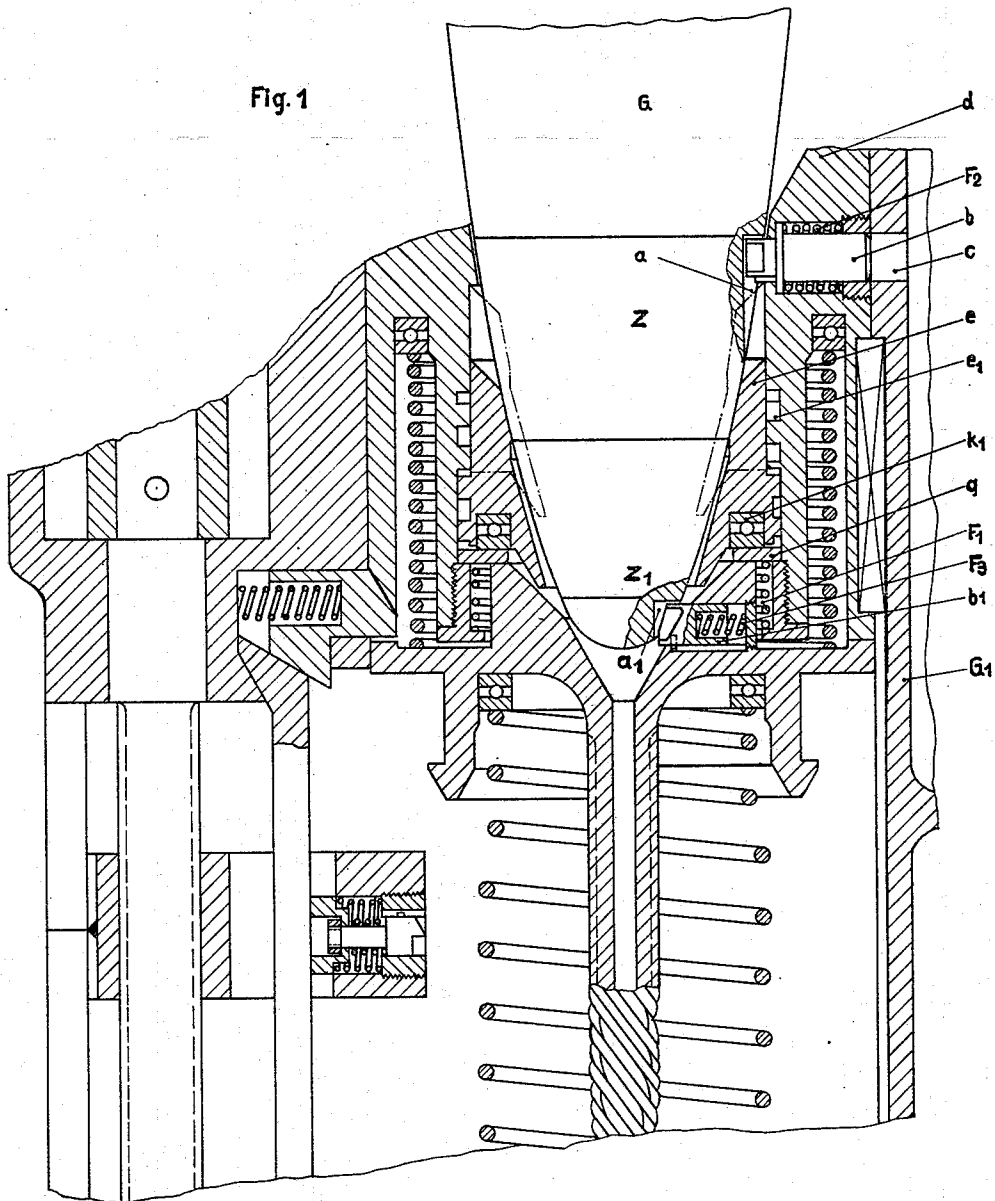
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MACHINE ADJUSTING THE TIMING OF A FUSE FOR A PROJECTILE

Filed Feb. 19, 1930

4 Sheets-Sheet 1



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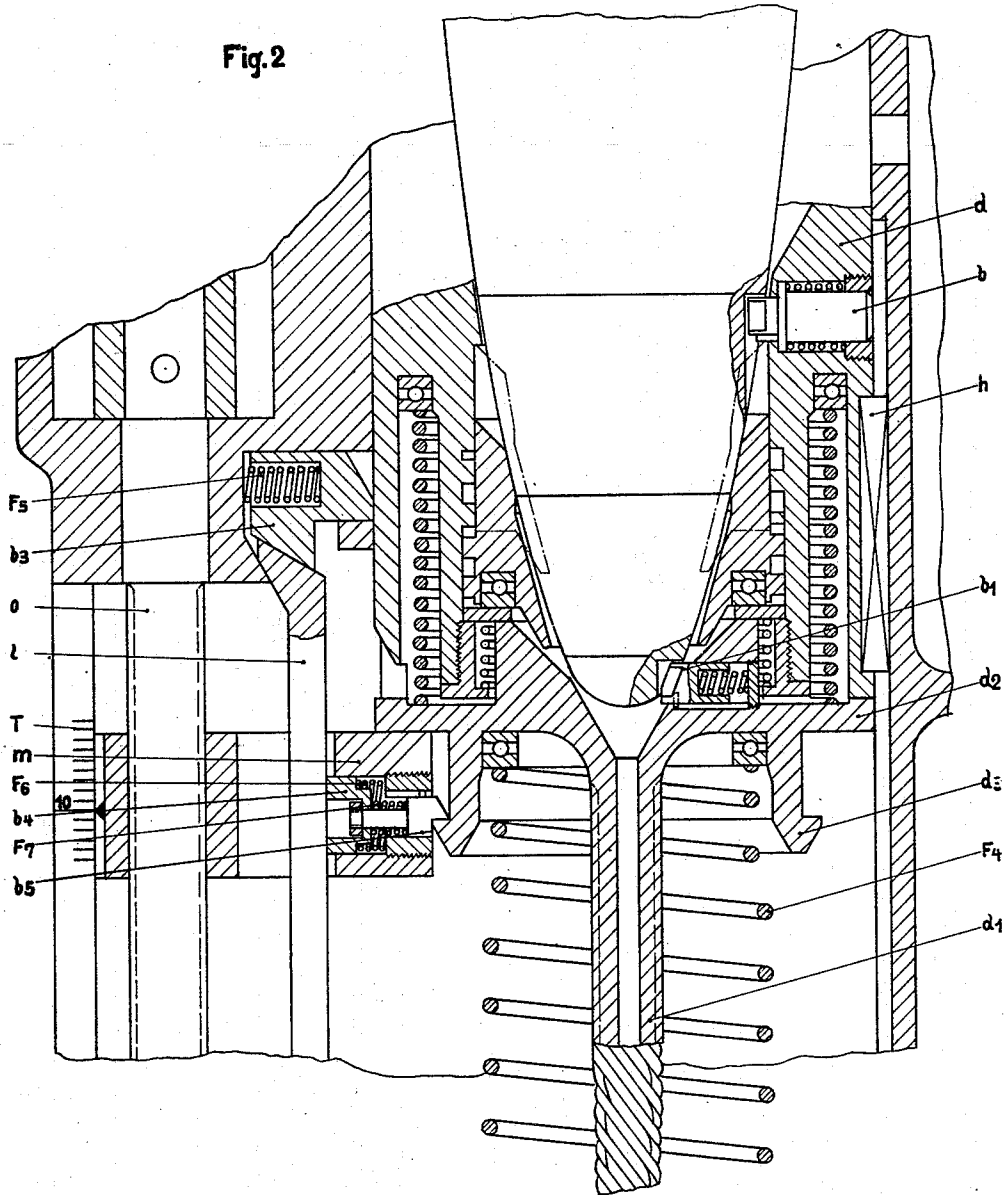
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Fig.2



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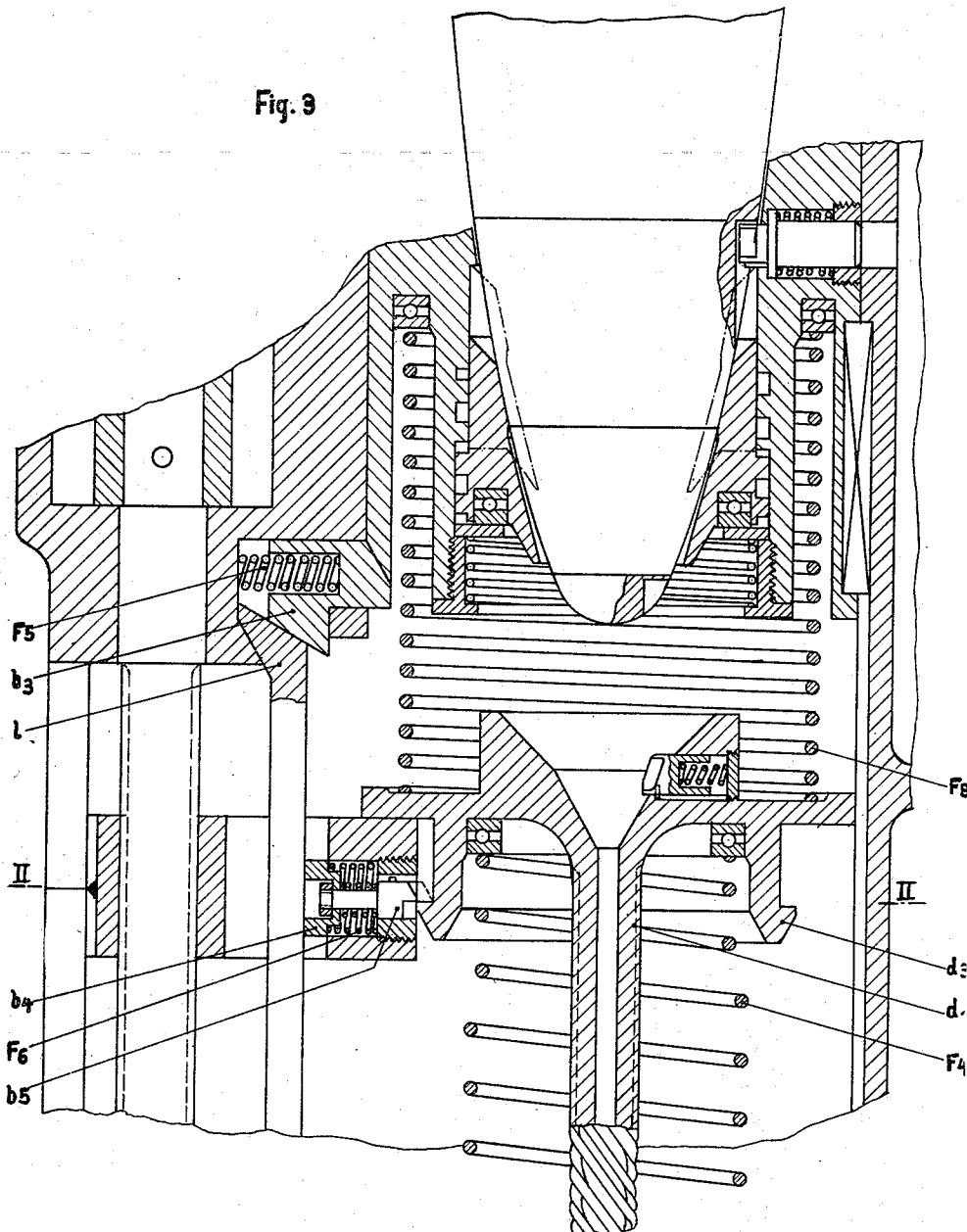
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Fig. 3



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Fig. 6

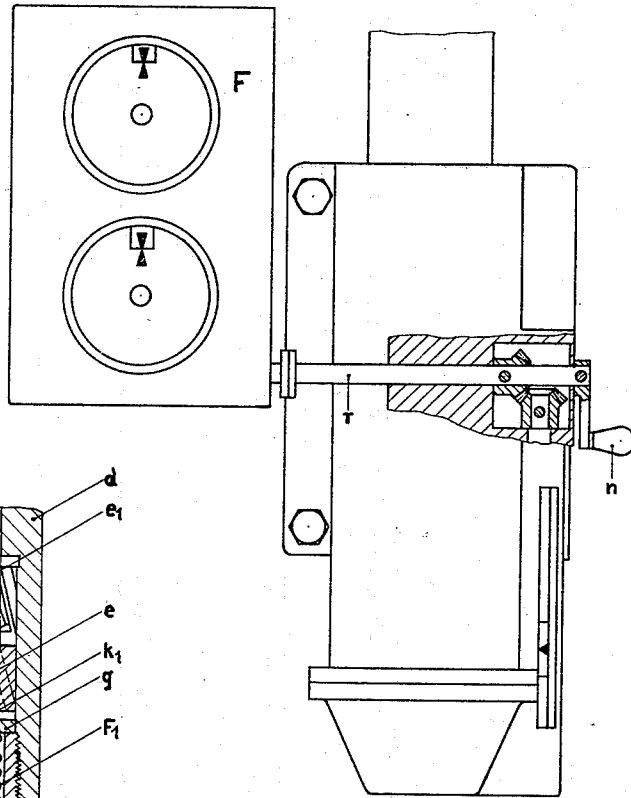


Fig. 4

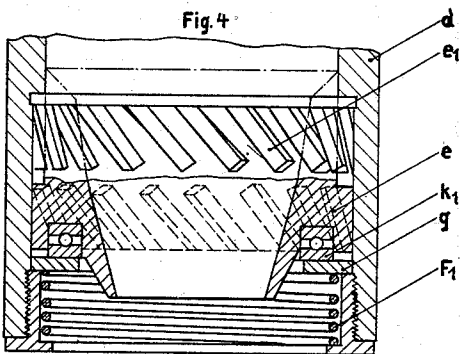


Fig. 7

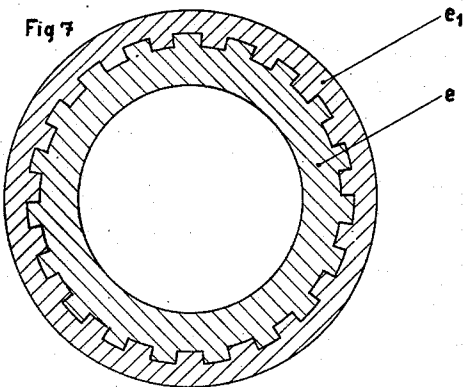
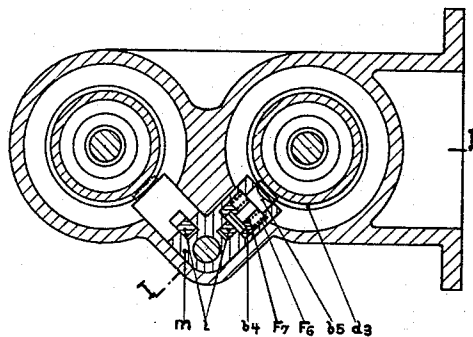


Fig. 5



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UNITED STATES PATENT OFFICE

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MACHINE ADJUSTING THE TIMING OF A FUSE FOR A PROJECTILE

Application filed February 19, 1930, Serial No. 429,641, and in the Netherlands and Germany
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Machines for adjusting the timing of a fuse in which this adjusting takes place by the aid of a handle or by using the recoil of the gun, are already known.

According to the invention the timing is adjusted automatically by using the own weight of the projectile itself (or of the cartridge) placed in the machine.

In order that the invention may be more readily understood and easily carried into effect it will now be further described with the aid of the accompanying drawings, in which

Fig. 1 is a longitudinal section of the machine according to the line I—I in Fig. 5 with a projectile placed in the machine at the beginning of the automatic adjustment of the timing.

Fig. 2 is a section corresponding to that of Fig. 1 with a projectile with timed tube sunk down in the adjustment socket.

Fig. 3 is a corresponding longitudinal section at the moment of taking the projectile out of the machine.

Fig. 4 shows a sectional view of the device for exactly arranging the projectile.

Fig. 5 is a cross section along the line II—II of Fig. 3.

Fig. 6 shows the device for adjusting the timing mechanism.

Fig. 7 is a perpendicular section to the view of Fig. 4.

For timing the fuse in the machine it is necessary to provide a notch a in the body of the fuse Z and a notch a_1 in the rotatable fuse cap Z . In the zero position of the fuse these two notches a and a_1 (Fig. 1) must both lie in a plane including the axis of the projectile. The two studs b and b_1 are arranged in the timing machine to correspond with the notches a and a_1 . If now the projectile is put into the adjustment socket d of the machine, the two studs b and b_1 are pushed backward by the projectile against the action of the stud springs f_2 and f_3 . In this way the stud b is pushed into the bore c of the casing G_1 and thus fixes the adjustment socket d in that casing. The projectile therefore first falls on the adjustment case e and with the fuse body is clamped in the conical bore of that case.

The case e is then still in the position drawn in dot-and-dash lines in Fig. 1 and is kept by its outer screwthreading in the corresponding inner screwthreading of the adjustment socket d . The screwthreading has a pitch of 45° (vide Fig. 4). The adjustment case e now sinks under the influence of the weight of the projectile, and moreover is brought into rotation by the screwthreading e_1 . If now the projectile has sunk so far that the disc g which is below the adjustment case is arrested, the adjustment case e has left the threading of the adjustment socket d and now continues its way on the ballbearing k_1 carrying the projectile G until the studs b and b_1 spring into the notches a and a_1 due to the action of the springs f_2 and f_3 . The stud b now leaves the bore c of the casing G_1 so that the projectile further falls down by its own weight (Fig. 2). The adjustment socket d with the stud b is guided along a straight path by the keygroove h , the adjustment member d_2 with the stud d_3 being rotated while sinking by means of the screwthread of a nut fixed in the casing. By this the fuse cap is adjusted and at the same time the spring f_4 is tensioned.

Furthermore the stud b_3 is pushed outwardly by the adjustment socket d when the projectile begins to sink down, the spring f_5 thus becoming tensioned. The stud b_3 in its turn pushes down the carrying rod 1. Both ends of this rod are wedge-shaped and therefore when moving downwardly this rod is at the same time displaced centrally i. e. towards the axis of the projectile (Figs. 2-5) and tensions the spring f_6 of the stud b_4 . Now the projectile falls so far that the dish-shaped extension d_2 of the adjustment device d_1 reaches the stop m , and the stud b_5 , the spring f_7 being tensioned, will catch on the angular shoulder d_3 of the dish-shaped extension d_2 of the adjustment device d_1 . The fuse is now adjusted at the desired timing. This adjustment therefore is dependent upon the position of the stop m , which must correspond with the time of flight of the projectile or with the duration of combustion of the composition in the fuse. If the time of flight is further corrected after the timing of the fuse

(e. g. by the aid of the handle n) the stop m will move upwardly or downwardly along the rod o (Fig. 2). The adjustment device d_1 , and therefore also the fuse Z , are carried on until the projectile is taken out of the machine. It is therefore recommended to leave the projectile in the adjustment machine until the gun is ready for firing. When the projectile is taken out of the machine (Fig. 3) the adjustment device d_1 is being held provisionally by the stud b_3 , the adjustment socket d returning upwardly into the zero position by the release of the spring f_3 and the spring f_1 returning the adjustment case e into the screwthreading of the adjustment socket d (Figs. 3 and 4). As soon as this has taken place (Fig. 3) the spring f_3 will push the stud b_3 again into its original position just as the spring f_3 will do with the carrying rod 1 and the spring f_3 with the stud b_4 , also carrying on the stud b_5 .

The angular shoulder d_3 has now become free so that the adjustment device d_1 is also brought back into the zero position by the releasing spring f_4 , at which however the tension of the spring f_3 increases so that this spring acts as a buffer for the adjustment device d_1 , which is moving backwardly. The power of the spring f_4 therefore in tensioned position must be greater than that of the spring f_3 in tensioned position.

Now if it is desired to determine a certain range of time from the moment of taking out the projectile until firing the gun, it is possible without any difficulty to arrange a clockwork of known construction in the way indicated in Fig. 3 and to have it tensioned by the lever p as soon as the adjustment socket d goes up. After the desired time the clockwork will close a discharge contact by which the shot will be fired, or the hand i of the running clockwork will indicate the exact moment for firing when its position will correspond with the firing mark k .

For adjusting the timing mechanism the handle n may be used and may be timed according to the scale T shown in Figs. 1-3 and indicating seconds or distances. If the fire is controlled centrally, the timing may be indicated in the way shown in Fig. 6 on a dial apparatus, from which it may be transmitted into the adjustment machine by adjusting the hand and the handle n . Furthermore the machine may be adjusted directly on the desired timing by mechanically or electrically causing the shaft r to rotate from the central fire control station.

The embodiment shown in the drawings possesses two adjustment sockets so that two projectiles may be dealt with simultaneously but independently of each other. It is of course possible to provide the machine with more adjustment sockets.

I claim:

1. A machine for adjusting the timing of

a fuse, comprising in combination a housing with one or more adjusting bores adapted to receive the projectiles which are to be timed; an adjusting cup in each bore; each cup being shiftably arranged by means of a key and groove; a spring-pressed stud in each cup; said cup serving to maintain the inserted projectiles in vertical position; an adjusting socket in each cup; a rotatably and shiftably mounted adjusting element having a spring actuated stud, arranged beneath each cup and provided with a screw of steep pitch; a stationary nut cooperating with said screw, whereby the weight of the projectile will cause the cup and projectile to descend and rotate about its longitudinal axis; said last named stud springing into the fuse cap of the projectile when in the engaged position and thus causing the latter to rotate when the projectile descends, and a stop to limit the descent of the said projectile in correspondence with the desired timing of the fuse.

2. A machine for adjusting the timing of a fuse, comprising in combination a housing with one or more adjusting bores adapted to receive the projectiles which are to be timed; an adjusting cup in each bore; each cup being shiftably arranged by means of a key and groove; a spring-pressed stud in each cup; said cup serving to maintain the inserted projectiles in vertical position; an adjusting socket in each cup; a rotatably and shiftably mounted adjusting element having a spring actuated stud, arranged beneath each cup and provided with a screw of steep pitch, a stationary nut cooperating with said screw, whereby the weight of the projectile will cause the cup and projectile to descend and rotate about its longitudinal axis; said last named stud springing into the fuse cap of the projectile when in the engaged position and thus causing the latter to rotate when the projectile descends, a stop to limit the descent of the said projectile in correspondence with the desired timing of the fuse, and springs for restoring the various setting means to their initial positions when the timed projectile is removed from the machine.

3. A machine for adjusting the timing of a fuse comprising in combination, a housing having a number of adjusting bores; an adjusting cup in each bore; each cup having a spring-actuated stud to lock the said cup against longitudinal displacement; an adjusting socket in each cup which rotates the projectile about its longitudinal axis into the engaging position, at which position the spring stud of the cup springs into the fuse and thereby releases the said cup, previously locked in the bore, so that it may undergo the longitudinal displacement requisite for timing the fuse.

4. A machine for adjusting the timing of a fuse comprising in combination, a housing having a number of adjusting bores; an ad-

justing cup in each bore; an adjusting socket in each cup; an adjusting element below each socket; an adjustable stop to limit the descent of the projectile and comprising a
5 spring-actuated stud cooperating with the said element; said stud causing the element to engage with the stop and remain so engaged until the projectile is removed from the machine; means for guiding the spring-
10 actuated stud into the adjustable stop and means for adjusting the stop to correspond to the desired timing of the fuse.

5. A machine for adjusting the timing of a fuse comprising in combination, a housing
15 having a number of adjusting bores; an adjusting cup in each bore; an adjusting socket in each cup; an adjusting element below each socket; an adjustable stop to limit the descent of the projectile and comprising a spring-
20 actuated stud cooperating with the said element; said stud causing the element to engage with the stop and remain so engaged until the projectile is removed from the machine; means for guiding the spring-actuated
25 stud into the adjustable stop; means for adjusting the stop to correspond to the desired timing of the fuse; means for restoring the moving parts to their initial position upon removal of the timed projectile; a clock mechanism; and means whereby the adjusting cup
30 starts the clock when it returns to its initial position upon removal of the projectile, said clock serving to indicate the time of firing.

6. A machine for adjusting the timing of
35 a fuse comprising in combination, a housing having a number of adjusting bores; an adjusting cup in each bore; an adjusting socket in each cup; an adjusting element below each socket; an adjustable stop to limit the descent
40 of the projectile and comprising a spring-actuated stud cooperating with the said element; said stud causing the element to engage with the stop and remain so engaged until the projectile is removed from the machine; means for guiding the spring-actuated
45 stud into the adjustable stop; means for adjusting the stop to correspond to the desired timing of the fuse; means for restoring the movable parts to their initial position upon
50 removal of the timed projectile; a clock mechanism; and means whereby the adjusting cup starts the clock when it returns to its initial position upon removal of the projectile, said clock serving to control the closing
55 of the firing circuit of the projectile.

In testimony whereof I affix my signature.
FRANZ JOHENNING.