April 15, 1947. R. H. WHITEHEAD 2,419,102

PROCESS OF SETTING TIME FUSES AND TOOL THEREFOR

Filed Oct. 21, 1939

Fig. 3.

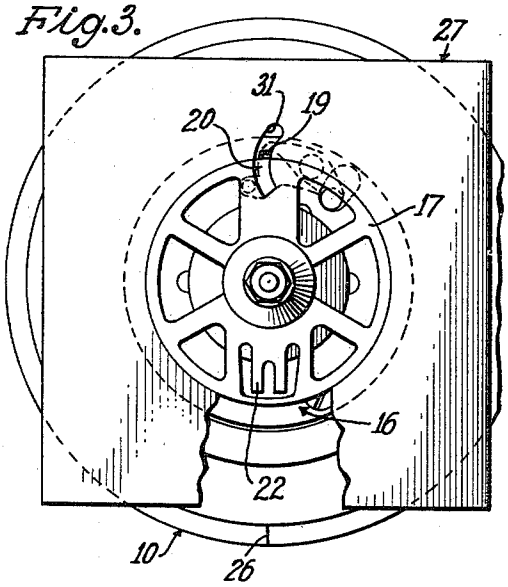


Fig. 2.

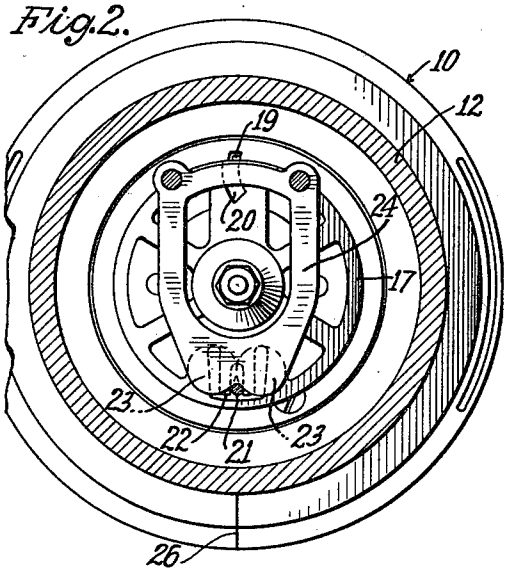


Fig. 4.

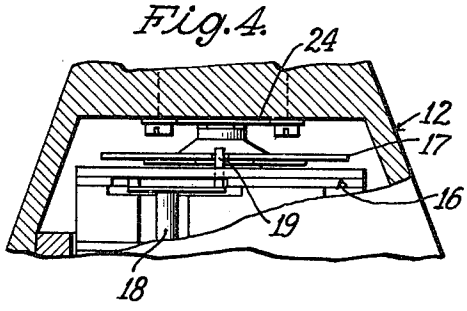


Fig. 1.

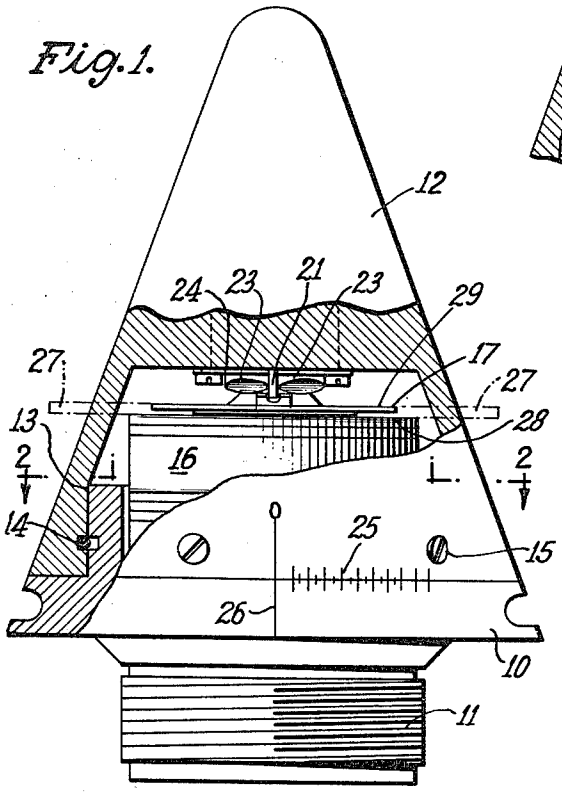
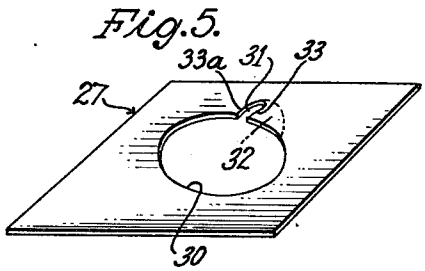


Fig. 5.



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PROCESS OF SETTING TIME FUSES AND TOOL THEREFOR

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1 Claim. (Cl. 86—23)

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This invention relates to process of setting time fuses and tool therefor.

In the modern time fuses there is provided a nose adapted to serve as the nose of a projectile, said nose being divided into severable parts and there is provided within the nose a time train adapted to be operated during the flight of the shell and to release a firing pin to set off the shell at a time predetermined by the timing mechanism.

In the type of fuse to which we refer, this timing is performed by a disc which is rotated by means of a motor within the fuse and a releasing mechanism having a finger engaging the periphery of said disc and at one point in the rotation thereof coming into registry with a recess in the periphery of the disc to release the firing pin.

In this form of fuse the disc is rotated by the timing train from a settable position to the position at which the finger falls into the recess. On the outside of the fuse there is provided a series of markings or graduations indicating seconds to register the amount by which the cap is rotated in setting and hence to indicate the number of seconds during which the disc will rotate before the finger falls into the recess in the periphery.

Fuses of this character are in common use. With such fuses difficulty is experienced in insuring that the graduations will correspond to the exact setting of the disc and more particularly that the graduations shall be set at zero precisely at the time when the finger is ready to fall into the recess in the periphery of the disc. The rotatable cap is connected to set the disc by means of a pin releasable as the shell leaves the gun and if the timing of the fuse is to be accurate the firing pin of the disc must correspond accurately to the setting of the graduations. In the actual manufacture of fuses, however, it is difficult to insure this accurate registration. To accomplish this, under existing practice, it is customary to divide the cap into two portions, not here illustrated, one of which carries the graduations and the mechanism for connecting the cap to the disc and for releasing it and the other comprising the nose of the cap provides access above the connecting means to permit setting of the cap. This causes considerable extra expense in manufacture but even under such circumstances the setting is difficult and apt to be inaccurate.

In accordance with this invention a process of setting is devised in which the disc may be accurately set with the entire cap removed and without the necessity of the cut-and-try methods that have heretofore been necessary.

The invention accordingly comprises the several steps and relation and order of one or more of such steps with respect to each of the others,

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and the article possessing the features, properties and the relation of elements, which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claim.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawing, in which:

In the drawings:

Fig. 1 is a side elevation of a fuse adapted to be set by this process.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a view of the base of the fuse with the timing element and setting tool in place.

Fig. 4 is a detail showing the operation of the releasing finger in the type of fuse involved.

Fig. 5 is a perspective view of the tool forming a part of this invention and used in the setting of the fuse.

The fuse comprises generally a base 10 as shown at 11 to screw into a projectile and having mounted thereon a cap 12 forming the nose of the projectile in the usual manner. This cap and base are rotatably mounted relative to each other by cylindrical bearings 13 and are held together by a spring element 14 and set screws 15 in the usual manner.

The cap and base are hollowed out to receive the timing element 16, which in general comprises a centrifugally driven time train not shown, held against operation until the projectile is fired from the gun and adapted thereafter to rotate a timing disc 17 about the vertical axis of the fuse.

Mounted within the fuse is a shaft 18 carrying a finger 19 in position to bear against the periphery of the disc 17 to prevent rotation of the shaft 18. The disc, however, is provided at one point with a recess or slot 20 into which the finger 19 may fall, thereby permitting partial rotation of the shaft 18 and the mechanism is so arranged that this partial rotation will release the firing pin to discharge the shell. The fuse is set by rotating the disc 17 to move the recess or slot 20 a predetermined distance away from the finger 19, so that when the disc itself is rotated in the reverse direction by the timing train the finger 19 will be released when it reaches the slot 20. This initial rotation or setting of the disc 17 is performed by a pin 21 extending downwardly from the interior of the cap 12 and engaging lugs 22 upon the disc 17. These lugs fit closely against the pin so that there is no lost motion between the pin and the disc. In a fuse of this type some means are provided for releasing the connection between the cap and the disc when the shell leaves the gun so that while the disc is being operated by the timing train it does not need to rotate the cap. This is normally accomplished

by a plurality of weights 23 carried by spring fingers 24 mounted upon the underside of the cap 12 so that during the force exerted by the propulsive charge the weights 23 hammer against the lugs 22 and bend them out of engagement with the pin 21 freeing the disc from connection with the top.

Markings or graduations are provided upon the lower edge of the cap 12 as shown at 25 corresponding to the angular displacement of the disc 17 per second under the influence of the time train and a corresponding index 26 is provided upon the face to cooperate with these markings. The graduations 25 will be indicated with the numbers 1, 2, 3, etc., up to the maximum time involved for which the fuse is adapted to be set and the index 26 is so placed that it will be in registry with the zero position of the graduations at precisely the time when the finger 19 is in position to fall off the edge of the periphery of the disc 17.

The mechanism above described represents a time fuse of the general type heretofore constructed but particularly adapted for use in this invention.

In accordance with this invention there is provided a flat plate 27 of a thickness to rest upon the periphery of the timing element 16 as shown at 28 and to have its upper surface substantially flush with the upper surface of the disc 17 as shown at 29. This plate has an opening 30 of the same diameter as the outer periphery of the disc 17 and it has in its inner periphery a slot 31 so designed as to be an accurate continuation of the slot 20 in the disc 17 when in proper registry therewith. This slot 31 has an inner edge 33 and an outer edge 33a which may be brought simultaneously into accurate alignment with the inner edges of the slot 20 in the disc 17.

As will be seen from the above description the plate 27 is of greater thickness than the disc 17 by the amount of clearance between the disc 17 and the frame of the timing element at 28. The plate is therefore cut out on its lower face as shown at 32 so that the edge 33 of the slot 31 is of precisely the same thickness as the disc 17 so that as the finger 19 moves above the axis of the shaft 18 it may slide freely from the edge 33 of the slot 31 to the corresponding edge of the slot 20 when the two slots are in accurate registry.

To set a fuse, in accordance with this invention, with this tool the entire cap is placed over the base with the pin 21 in engagement between the lugs 22. This fact can be readily determined because it is only in this position that the operator can feel the drag of the friction of the disc 17 while rotating the cap. While, therefore, the cap is in this position and engaging the disc between the lugs the cap is rotated until the zero of the graduations 25 comes in accurate registry with the index 26. Thereupon without dislodging the disc 17 the cap is carefully removed. At this time, because of the construction of the device, the finger 19 will be in approximate but not necessary accurate registry with the slot 20. Partly because of the curved nature of this slot and partly because of the difficulty of projecting it beyond its edge it is difficult to determine by eye whether or not the finger 19 is just ready to fall off the edge of the slot 20 or whether it is a little to one side thereof.

In accordance with this invention, therefore, at this point the plate 27 is superposed upon the timing element with the recess 30 surrounding the disc 17 and with the finger 19 within the slot 31 and with the edge 33 of the slot 31 in firm but not pressing contact with the finger 19.

At once it will be clear whether the finger is properly set or not by the relationship of the edge of the slot 31 with the corresponding edge of the slot 20. If when the parts are thus in engagement the slot 31 is slightly clockwise from its proper position relative to the slot 20 the plate 27 may be readily twisted so as slightly to bend the finger 19 against the edge 33 until the slots are in accurate registry while the edge 33 engages the pin. All this may be accomplished by the plate 27 without disturbing the position of the disc 17.

If, on the other hand, the slot 31 is slightly counterclockwise compared to the slot 20, again the correction may be made by the plate 27, using the other edge 33a of the slot 31 to bend the finger 19 in a clockwise direction, always checking the amount of bending by bringing the edge 33 again into contact with the finger.

In this manner the accurate positioning of the finger 19 may be determined without in any manner disturbing the disc 17 and with such accuracy that the setting may be counted within a very small fraction of a second.

Moreover it will be clear that by reason of the cutout 32 the same portion of the finger 19 is engaging the edge 33 of the plate 27 as will engage the releasing point of the periphery of the disc 17. That is, the pin 19 may not have its edge exactly vertical. If, therefore, the plate 27 at the edge 33 were not of the same thickness and in the same plane as the disc 17, a portion of the pin 19 might ride on the edge 33, which was below disc 17 so that the accurate registry of the slots would not accurately insure that the pin 19 would pass into the slot 20 at precisely the instant indicated by the position of the plate 27.

This invention reduces the cut-and-try methods heretofore employed to simplicity and accuracy and reduces the cost of manufacture and insures greater reliability of the fuse.

Since certain changes in carrying out the above process and certain modifications in the composition which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claim is intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

A tool for setting time fuses having a timing disc with a slot therein and a finger cooperating with said slot, said tool comprising a plate having an opening of the same diameter as the timing disc and a slot extending outwardly from said opening and having its edges adapted to form a continuation of the edges of said slot in said disc.

RICHARD H. WHITEHEAD.