Jan. 19, 1926. 1,569,911

F. W. BOLD

RELEASE LEVER

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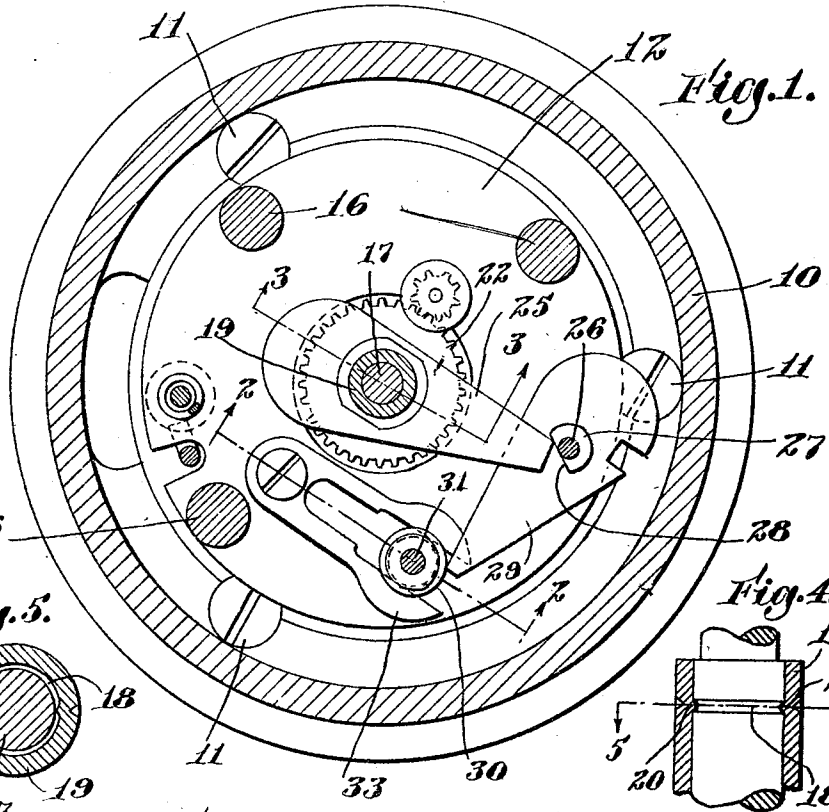


Fig. 1.

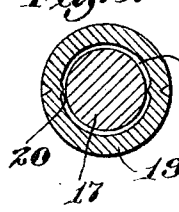


Fig. 5.

Fig. 4.

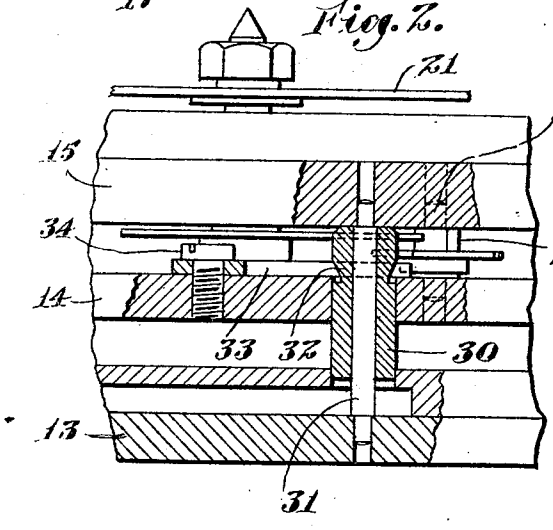


Fig. 2.

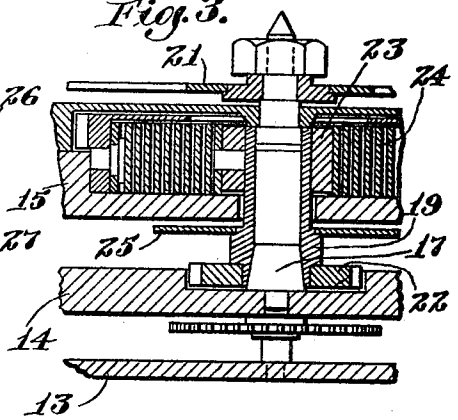


Fig. 3.

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Fig. 6.

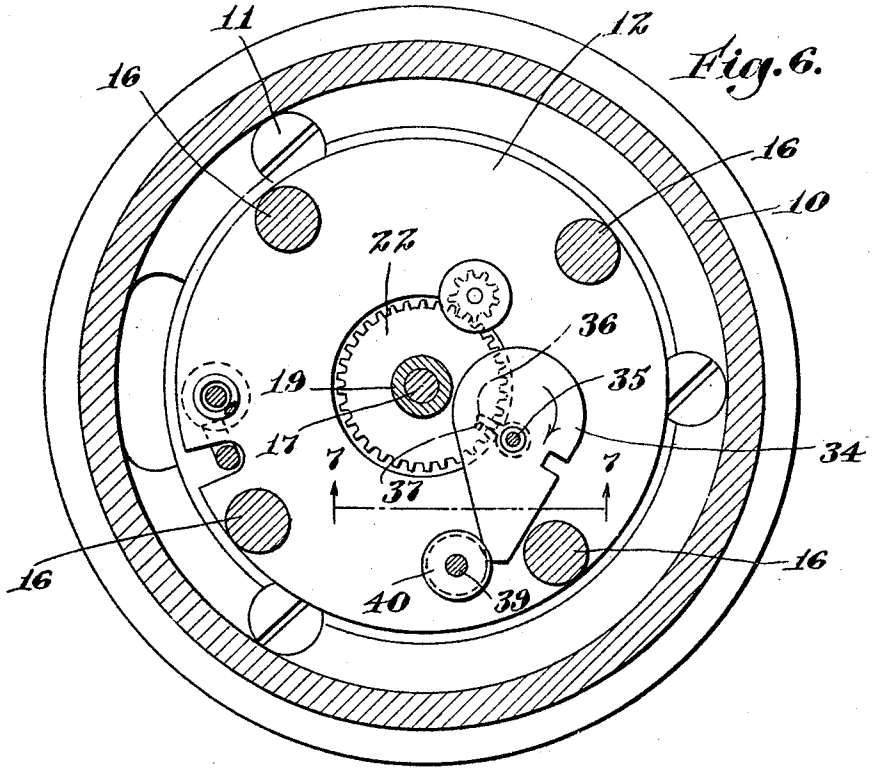


Fig. 8.

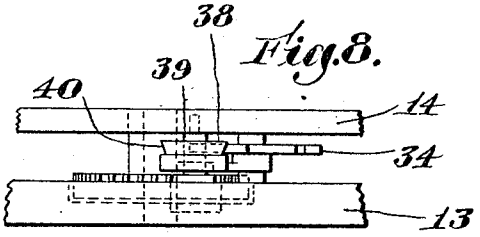
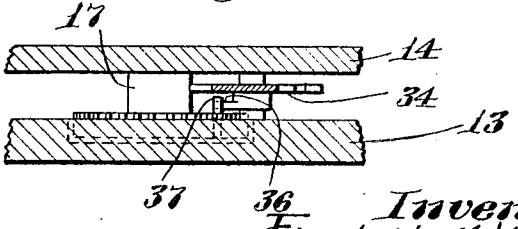


Fig. 7.



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Patented Jan. 19, 1926. 1,569,911

UNITED STATES PATENT OFFICE.

FREDERICK W. BOLD, OF CHELSEA, MASSACHUSETTS, ASSIGNOR TO CHARLES H. PEARSON, OF BROOKLINE, MASSACHUSETTS.

RELEASE LEVER.

Application filed January 2, 1925. Serial No. 285.

To all whom it may concern:

Be it known that I, FREDERICK W. BOLD, a citizen of the United States, and a resident of Chelsea, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Release Levers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention relates to mechanical time fuses, and more particularly to an improved releasing means for the timing train of mechanical time fuses.

In mechanical time fuses there is employed a timing train which, when started in motion, controls the time of release of the firing pin to detonate the fuse. Until it is desired to start the timing train in motion, means is provided for preventing the connection of the timing train with the setting mechanism and this means is usually associated with a longitudinally sliding pin or sleeve, such pin or sleeve being movable on the shock of firing to allow the connection of the timing train with the setting mechanism. A serious defect has been found to exist in prior structures of this sort in that the longitudinally sliding sleeve is extremely apt to be progressively moved by slight jars or blows so that the heretofore unaccountable premature explosions of the fuse have been traced to this source. This progressive movement of the sliding sleeve or pin will take place regardless of the pressure of the returning spring thereof because of the fact that the means for preventing the rotation of the timing train staff, and associated with the sliding pin, exerts enough pressure on the sliding pin or sleeve to retain it in the position to which it may have been moved by even a slight jar or blow.

In my present invention I am able to overcome such prior defects and have devised a structure in which the staff of the timing train is positively prevented from rotating until it is desired to release same, and also the starting in motion of the timing train is controlled by the longitudinally moving pin or sleeve.

In carrying out my invention, I associate with the timing train staff a lever which is rotatably mounted, and the rotative movement thereof is controlled by its engagement with the sliding sleeve and yet such lever will exert such a small amount of force on the sliding sleeve as to positively allow the retaining spring for such sliding sleeve to return it to normal position on any blow to which the fuse may be subjected short of the blow occasioned by the shock of firing. In one form of my invention I may employ a lever secured to a sleeve surrounding the center staff of the timing train, which lever is operatively associated with a second pivoted lever and the second lever is, in turn, operatively associated with, and controls, the longitudinally sliding pin or sleeve and by means of which the starting of the timing train is controlled. In another form of my invention I may employ but a single pivotally mounted lever having means thereon for engaging with a tooth in a gear attached to the sleeve surrounding the center staff of the timing train or with a pin on such gear or with an entirely separate gear from the driving gear, and this lever is also operatively associated with a longitudinally sliding pin or sleeve. In either form of my invention, the pressure exerted on the longitudinally moving sleeve or pin is extremely small as compared with the pressure exerted on such longitudinally sliding pin or sleeve by its retaining spring. As my improved devices for releasing the timing train of a timing fuse and preventing accidental setting in motion thereof is new, I desire to claim the same broadly.

The principal object of my invention, therefore, is an improved means for releasing the timing train of a mechanical time fuse only on the shock of firing.

Another object of my invention is an improved means for operatively connecting the timing train and the setting disc of a mechanical time fuse.

In the accompanying drawings illustrating preferred embodiments of my invention,

Fig. 1 is a sectional plan view of a time fuse and timing train therefor with parts of my device in operative position;

Fig. 2 is a fragmentary sectional elevation on the line 2—2 of Fig. 1;

Fig. 3 is a detail sectional elevation on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged sectional elevation of a portion of Fig. 3;

Fig. 5 is a sectional plan view on the line 5—5 of Fig. 4;

Fig. 6 is a sectional plan view similar to Fig. 1 and showing a modification of my invention;

Fig. 7 is a sectional elevation on the line 7—7 of Fig. 6, and

Fig. 8 is a fragmentary elevation of Fig. 6.

Referring to the drawings, 10 designates the base of the fuse in a recess in the top of which is secured by screws 11 a timing train 12. The timing train consists of various mechanisms mounted in the bottom plate 13, middle plate 14, and top plate 15, these plates being spaced apart from each other and secured in operative position on posts 16. In Fig. 1 the top plate 15 is shown removed and the posts 16 are shown in cross section. Rotatively mounted in the middle plate 14 and top plate 15 is a center staff 17 which is provided intermediate its ends with a circumferential groove 18. The lower end of the staff 17 is wedge-shaped, as clearly shown in Fig. 3, and rotatably mounted on the center staff 17 is a sleeve 19. While the sleeve 19 is rotatably mounted on the staff 17, it is prevented from longitudinal movement thereon, under ordinary conditions, by the projections 20 extending into the circumferential groove 18 and formed in such sleeve by prick punching or in any other suitable manner. These projections 20 are sufficient to prevent longitudinal movement of the sleeve 19 on the staff 17, under ordinary conditions, but on the shock of firing the sleeve 19 will drift and wedge onto the wedge-shaped portion at the lower end of the center staff 17, thereby rigidly locking the sleeve 19 and center staff 17 together. Secured to the upper end of the staff 17 is a setting plate 21 and by means of which the relative position of the setting disc 21 and gear 22 on the lower end of the sleeve 19 is varied. The sleeve 19 is slidably mounted in the sleeve 23, but is non-rotatable with respect thereto. Attached to the outer surface of the sleeve 23 is the inner end of the driving spring 24 of the timing train. As thus far described, it is obvious that the setting disc 21 may be employed to rotate the staff 17 with respect to the sleeve 19, as may be desired.

Secured to the sleeve 19 beneath the upper plate 15 and extending radially outward therefrom is a lever 25. Rotatably mounted in the middle and top plates 14 and 15 respectively is a shaft 26 and secured to the shaft is a hub 27 which is faced off, as indicated by the numeral 28. This faced off portion of the hub 27 is so proportioned as to engage with the end of the lever 25, as clearly shown in Fig. 1, and which, when the face 28 is moved parallel to the end of the lever 25, allows such lever to swing in the direction of the arrow shown in Fig. 1 which it will naturally do under the influence of the driving spring 24. Secured to the shaft 26 and hub 27 in any convenient manner, as by staking, is a lever 29, the end of which engages with a slidably mounted sleeve 30, which sleeve is mounted on a shaft 31 mounted in the bottom and top plates 13 and 15 respectively. As will be obvious from an inspection of Fig. 1, the sleeve 30, engaging with the end of the lever 29, prevents the rotation of the shaft 26 and, therefore, the rotation of the hub 27. The face 28, therefore, on the hub 27 will, by engaging with the end of the lever 25, prevent rotation thereof and therefore prevent the action of the driving spring 24.

Referring now particularly to Fig. 2, it will be noted that the sleeve 30 is provided adjacent to its upper end with a bevelled portion 32, and a forked spring 33 secured to the middle plate 14 by screw 34 engages with the bevelled portion 32 on either side thereof. The bevel 32 is so positioned as to allow the forked spring 33 to ride down on said bevel and move the sleeve 32 upwardly, as viewed in Fig. 2. This action will take place between the sleeve 30 and the forked spring 33 if the force exerted on the upper part of the sleeve 30 by the lever 29 is less than the upward thrust of the forked spring 33. From an inspection of Fig. 1 it will be apparent that the leverage on the lever 29 by the end of the lever 25 engaging with the facing 28 is markedly less than the leverage exerted on the sleeve 30 by the lever 29. Putting this another way, it will be obvious that the force exerted on the sleeve 30 by the lever 29 is considerably less than the leverage exerted on the face 28 or hub 27 by the lever 25. There is, therefore, no disturbing force of any appreciable amount tending to hold the sleeve 30 in any position into which it may be forced or jarred by a slight, or by any, blow less than the blow or jar due to the shock of firing. I have found that this form of my invention that, while a longitudinal movement in a downward direction, as viewed in Fig. 2, will be imparted by slight blows or jars delivered to the timing train, the force exerted by the spring 33 is amply sufficient to return said sleeve 30 into its normal position or, as shown in Fig. 2, with the upper end thereof in engagement with the lower face of the top plate 15.

Referring now to Figs. 6, 7, and 8, where the base of the fuse is designated by 10 and the screw 11 that hold the timing train 12 in position thereon, the center staff 17 is surrounded by the sleeve 19 while the gear 22 is secured to the lower end of the sleeve 19, all as above described with reference to Figs. 1–5 inclusive. In this modification of my invention, however, I dispense with the lever 25 that is secured to the sleeve 19, as described above with respect to Fig. 1, and in place thereof employ but a single lever

34 rotatably mounted on a shaft 35 in the middle and top plates 14 and 15 respectively, and on the shaft 35 adjacent to the lever 34, but above the gear 22, is a radially extending arm 36. This arm 36 is adapted to engage with a pin 37 that is secured to the gear 22 and extends upwardly therefrom. The lever 34 is ordinarily prevented from rotating, and in the direction of the arrow shown in Fig. 6, by the sleeve 38 that is slidably mounted on the shaft 39 in the bottom and center plates 13 and 14 respectively. In this form of my invention I have shown the sleeve 38 as being provided with a bevelled portion 40 for engaging with the lever 34 and no provision is made for returning the said sleeve to its normal position other than the resiliency of the lever 34 itself. This, however, is for convenience of illustration only and I may employ, in connection with such form of my invention, the spring returned sleeve similar to the sleeve 30 above described with respect to Figs. 1–5 inclusive. In this form of my invention the exerting force is to be measured by the distance from the pin 37 to the center of the shaft 35 while the exerted force is to be measured by the distance from the center of the shaft 35 to the contacting end of the lever 34 and it will be obvious that the exerted force on the lever 34 is considerably greater than the force exerted by the said lever. It is obvious, therefore, that there is no appreciable force tending to hold the sleeve 40 into any position into which it may have been moved or jarred by a blow, which blow is, of necessity, less than the blow occasioned by the shock of firing.

It is obvious from the above that, with my improved invention, the serious danger heretofore inherent in all forms of mechanical time fuses of premature explosions is positively prevented. While I have necessarily shown and described the preferred embodiment of my invention somewhat in detail, it is to be understood that I may vary the size, shape, and arrangements of parts within wide limits without departing from the spirit of the invention.

Having thus described my invention, what I claim as new is:

In a time fuse, the combination of a longitudinally mounted plunger, a spring associated therewith and normally tending to hold the plunger in its normal position, a rotatably mounted shaft, a lever secured thereto and engaging with the plunger, a non-circular hub secured to said shaft, a rotatably mounted sleeve, and a lever secured thereto and engaging with the non-circular hub whereby rotation of the sleeve is prevented and the force exerted on the plunger by the engaging end of the lever is less than the restoring force exerted on the plunger by its engaging spring.

In testimony whereof, I have signed my name to this specification.

FREDERICK W. BOLD.