April 7, 1925. 1,532,341

C. H. PEARSON

LOCKING DEVICE FOR FUSES AND THE LIKE

Original Filed Nov. 26, 1920

Fig. 1.

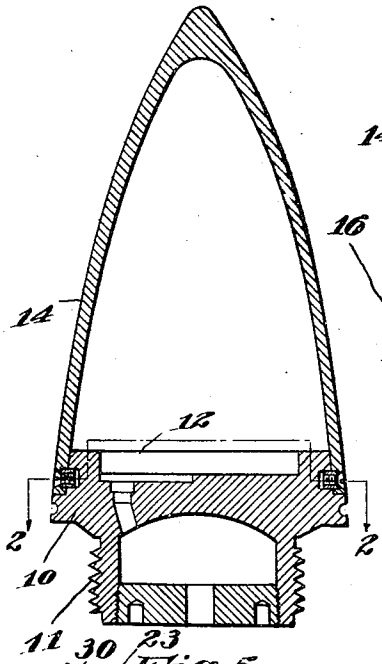


Fig. 3.

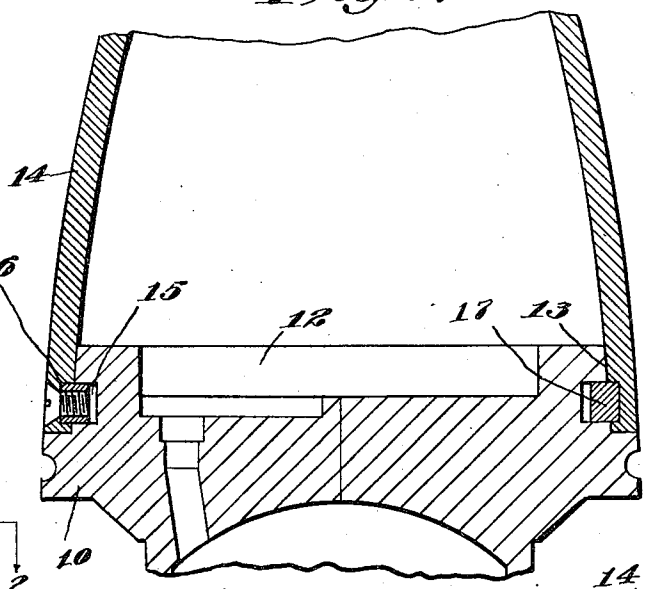


Fig. 5.

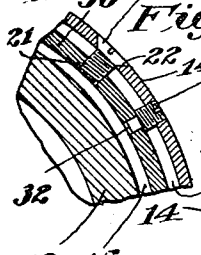


Fig. 2.

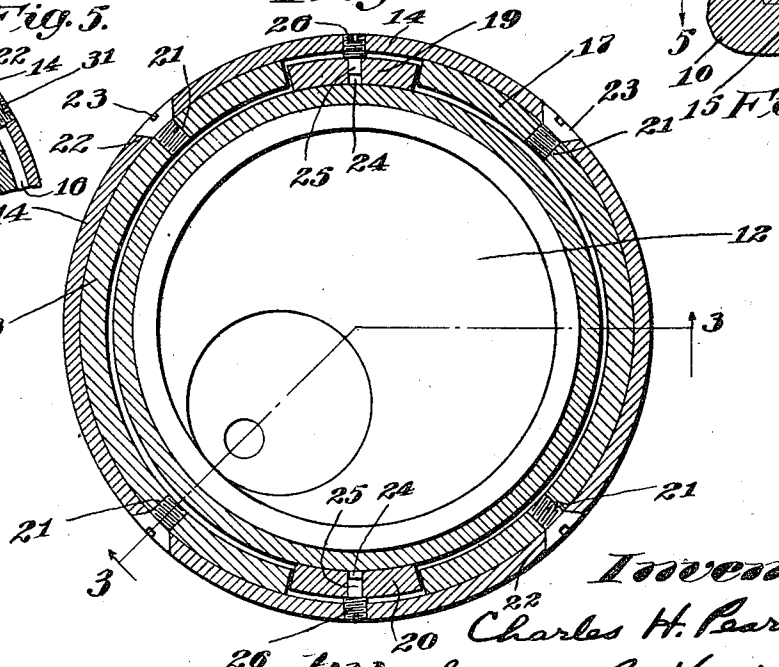
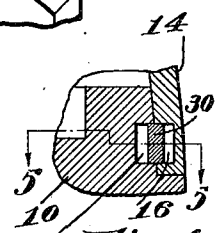


Fig. 4.



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UNITED STATES PATENT OFFICE.

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LOCKING DEVICE FOR FUSES AND THE LIKE.

Application filed November 26, 1920, Serial No. 426,406. Renewed July 1, 1924.

To all whom it may concern:

Be it known that I, CHARLES H. PEARSON, a citizen of the United States, and resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Locking Devices for Fuses and the like, 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 fuses, and more particularly to coupling or locking means between the setting cap and base of mechanical time fuses.

In mechanical time fuses of the type described and claimed in the application of Frederick W. Bold, Ser. No. 334,849, filed Oct. 31, 1919, and the application of Charles H. Pearson and Frederick W. Bold, Ser. No. 419,371, filed Oct. 25, 1920, there is shown and described coupling means for coupling or locking the setting cap to the base of the fuse, while permitting relative rotary movement of the setting cap with respect to the base, and such means permits the friction between the setting cap and base to be adjusted to suit the requirements of the operator. While such coupling means are, in the main, satisfactory, there still exists the possibility of disturbing the relative positions of the two members, and this is particularly true when the fuses are subjected to the extremely severe tests necessary before the fuses are considered satisfactory by the Government.

In certain types of mechanical fuses, the coupling means between the setting cap and base is sprung onto the base, while in other types the coupling means, after being positioned in the base, has the metal of the base swaged over the coupling to prevent removal. In both these types, when once the setting cap is placed in position on the base, it cannot be removed therefrom for any purpose without either destroying the base or setting cap or both. A number of things may happen to the mechanism, mounted on the base and enclosed by the setting cap, either before or after the fuse is tested, which it is desirable and important be studied in order to perfect the development of this art, and which it is impossible to do unless the setting cap is readily removable from the base. Again the thing that may happen to the interior mechanism is of a trivial character, and which, if corrected, places the fuse in perfect operative condition. It should be borne in mind that the modern time fuse is an instrument of precision, intricate in character and expensive to manufacture, and its wanton destruction by cutting to see what has happened to the interior mechanism, is uneconomical.

I have endeavored to overcome the defects noted above, and to this end have devised the subject matter of the present invention in which coupling means between the setting cap and fuse base securely holds the two members in operative relations under any and all conditions to which the fuse may be subjected and in which the friction between the said two members may be adjusted to suit the convenience of the operator.

I have provided against derangement of parts of the device due for example to losing any of the holding means for the coupling or lock, by arranging the coupling elements in such a manner as to utilize the centrifugal force, to which the fuse is subjected on firing from a gun, to hold the coupling members in operative position.

The principal object of my invention, therefore, is an improved coupling means for coupling a setting cap to a fuse base.

Another object is an improved adjusting means for coupling of the above character.

Still another object is an improved coupling means for mechanical time fuses permitting removal of the setting cap from the fuse base at any time, while preventing undesirable relative movement of such members when the parts are assembled in position.

Other objects and novel features of the construction and arrangement of parts constituting my invention will appear as the description of the invention progresses.

In the accompanying drawing illustrating the preferred embodiment of my invention,

Fig. 1 is a vertical sectional view;

Fig. 2 is a sectional plan view on the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary sectional elevation illustrating a modification; and

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

Referring to the drawing 10 designates a fuse base provided with threads 11 by means of which it may be secured to the nose of a shell and with a recess 12 in its top face in

which may be secured the timing mechanism (not shown). The fuse base 10 is cylindrical in form and its upper end is reduced in diameter at 13 to receive the lower end of a setting cap 14, the outer diameter of which is equal to the diameter of the fuse base. The portion 13 is provided, intermediate its ends, with a rectangular circumferential groove 15, of suitable width and depth, while the interior surface of the setting cap 14 is provided with a rectangular circumferential groove 16, of the same width as, but of less depth than, the groove 15. These two grooves 15 and 16 are in alinement with each other, when the setting cap 14 and the fuse base 10 are in operative position, and form a rectangular circumferential chamber in which is located my improved coupling means, to be described.

The coupling means comprises a pair of arcuate members 17 and 18, similar to and equal in cross section and preferably of equal length, and a pair of arcuate members 19 and 20, similar in cross section and also preferably of equal length. The total outside length of the members 17, 18, 19 and 20 is slightly less than the circumference of the bottom of the groove 16 in the setting cap 14, while the thickness is equal to or slightly less than the depth of the groove 15 in the fuse base 10. The members 17 and 18 are provided with a plurality of threaded holes 21 which register, when the parts are in position, with beveled holes 22 in the setting cap 14, flat headed screws 23 having their threaded portions passing through the holes 22 into the holes 21 drawing and holding said members 17 and 18 in position in engagement in the groove 16 of said setting cap.

The members 17 and 18 are diametrically assembled in the groove 15 of the base, leaving spaces between their ends slightly greater than the length of the members 19 and 20. Each of these members 19 and 20 is provided with a hole 24 to receive the reduced end 25 of a headless screw 26 threaded through the setting cap 14. The shoulder formed by the reduced end 25 and the body of the screw 26 bears against the outer surface of the members 19 and 20 to force said members into engagement with the bottom of the groove 15 in the fuse base 10, and thus varies the friction between the said fuse base and the setting cap to suit the convenience of the operator.

To assemble the parts above described in operative position and couple the fuse base and setting cap together, the members 17, 18, 19 and 20 are alternately arranged, as shown in Fig. 2, in the groove 15 in the fuse base 10. As the thickness of such members 17, 18, 19 and 20 is equal to or slightly less than the depth of the groove 15, it will be obvious that the setting cap may be slipped over the reduced portion 13 of the fuse base 10 and into the position shown in Figs. 1 and 3. The setting cap is now rotated if necessary until the holes 22 register with the threaded holes 21 in the members 17 and 18, when the flat headed screws 23 are inserted and screwed into the holes 21 to draw the members 17 and 18 into engagement with the bottom of the groove 16 in the setting cap 14, in which position they are partly within the groove 15 in the fuse base 10, thus firmly coupling or locking the setting cap and fuse base together. Headless screws 26 are now screwed through the setting cap 14, the reduced portion 25 entering the hole 24 in the members 19 and 20, until the shoulder formed by the reduced portion 25 and the body of the headless screw 26 engages with the outer surface of the members 19 and 20, and forces them into engagement with the bottom of the groove 15 in the fuse base 10, pressure enough being applied to the members 19 and 20 to suit the convenience of the operator. If it is desired to remove the setting cap 14 at any time for any reason, the screws 23 are removed and the screws 26 backed off to clear the surface 13 of the fuse base. The members 17 and 18 are forced into the groove 15 of the fuse base 10 by means of a suitable instrument inserted through the holes 22, when the setting cap may be readily removed from the fuse base.

The space between the ends of the members 17, 18, 19 and 20 is long enough to allow free movement of such members across such space.

It will be obvious from the above that by means of my improved coupling or locking means, I am enabled to removably couple or lock the setting cap to the fuse base, and that such coupling or locking means is rigid enough to prevent undesirable relative movement of such cap and base with respect to each other. Further, that in addition to providing an efficient coupling or locking means for this purpose, I have provided an independent means for adjusting the degree of freedom of relative rotative movement of said members. If any or all of the screws 23 should be accidentally removed from their position prior to or at the time of discharge of the fuse from a gun, such removal will be without effect on the coupling, as the centrifugal force to which the fuse is subjected, when fired from a gun, will be ample to ensure that the members 17 and 18 are held in engagement with the bottom of the groove 16 in the setting cap 14.

Referring to Figs. 4 and 5, the grooves 15 and 16 in the base 10 and setting cap 14 respectively, are made equal in depth, while the coupling or locking segments, of which but one, 30, is shown, may be less than, or equal in thickness to the depth of the said

grooves 15 or 16, and may, during the assembling process, be placed in either the base or setting cap groove. After the parts are assembled, a setting or locking screw 31 threaded through the setting cap 14, has its reduced end 32 entering a perforation in the segment 30, forcing the segment outwardly of the groove in the setting cap and into the groove in the base, until approximately one half the thickness of the segment is in each groove, as shown in Fig. 4. Screws 23 passing through holes 22 in the cap and entering the threaded holes 21 in the segment are utilized to firmly lock the segment 30 in its adjusted position. When it is desired to remove the setting cap 14 from the base 10, the screws 31 are backed out and screws 23 utilized to draw the segment 30 entirely within the groove 16 in said setting cap.

By means of my invention, above described, safe carrying of the loaded shells is possible, for, set at safety, the friction member or members can be so rigidly tight that no possible jolting or handling can disturb the relation of the setting cap and base. As the relative positions of the parts carried by the base is controlled by the setting cap, such relative positions cannot be disturbed by the jolting or handling to which the shell may be subjected. The relative positions of the setting cap and base with respect to each other can only be altered by the use of a special setting wrench or machine, whereby the setting cap can be positioned at any desired setting point to release the mechanism carried by the base to detonate the charge of the shell at the desired instant after firing.

While I have necessarily described the preferred embodiment of my invention somewhat in detail, it is to be understood that I may vary the size, shape, and arrangement of parts constituting my device without departing from the spirit of the invention. Further, that while I have described the segmental ring as being comprised of four members, two coupling members and two friction regulating members, it is to be understood that I may vary the number of such elements as desired within the scope of the invention.

My invention provides means for absolutely locking two associated separable members together against movement by friction and locking means, whereby displacement of said rotatable members in any direction is positively prevented.

My invention is further described and defined in the form of claims as follows:

1. An improved coupling for connecting a rotatable setting cap to a fuse base, comprising circumferential grooves in the setting cap and fuse base normally in alinement with each other, a plurality of segments normally located in the groove in the fuse base, and means for drawing such segments radially into the groove in the setting cap and partially out of the groove in the fuse base.

2. An improved coupling for connecting a rotatable setting cap to a fuse base, comprising a setting cap, a circumferential groove therein, a fuse base, a circumferential groove therein of greater depth than the groove in said setting cap and normally in alinement therewith, a segmental ring normally located in the groove in the fuse base, and means for drawing such segments radially into the groove in the setting cap and partially out of the groove in the fuse base, whereby the setting cap is coupled or locked to the fuse base.

3. An improved coupling for connecting a setting cap to a fuse base, comprising a circumferential groove in the interior thereof, a fuse base, a circumferential groove on the exterior thereof of greater depth than the groove in said setting cap and normally in alinement therewith, a plurality of segments normally located in the groove in the fuse base, means for drawing some of said segments into the groove in the setting cap and partially out of the groove in the fuse base to couple the setting cap to the fuse base, and means for forcing the remainder of the segments into the groove in the fuse base for adjusting the freedom for relative movement between the setting cap and fuse base.

4. An improved coupling for connecting a setting cap to a fuse base, comprising a fuse base, a circumferential groove on the exterior thereof, a setting cap adapted to be rotatably mounted on said fuse base, a circumferential groove in the interior of said setting cap of less depth than the groove in the fuse base and normally in alinement therewith, a combined coupling and friction ring comprising a plurality of segments, normally located in the groove in the fuse base, means for drawing some of said segments into the groove in the setting cap and partially out of the groove in the fuse base to couple the setting cap to the fuse base, and means for forcing the remainder of the segments into the groove in the fuse base for adjusting the freedom for relative movement between the setting cap and fuse base.

5. An improved coupling for connecting a setting cap to a fuse base, comprising a fuse base, a setting cap rotatably mounted thereon, circumferential grooves in said fuse base and setting cap normally in alinement with each other, one of said grooves being of greater depth than the other, a combined coupling and friction ring comprising a plurality of segments normally located in the deepest groove, means for drawing some of said segments into the groove of less depth and partially out of the groove of greatest

depth to couple the setting cap to the fuse base and means for moving the remainder of the segments into the groove of greater depth for adjusting the freedom for relative movement between the setting cap and fuse base.

6. An improved coupling for connecting a rotatable setting cap to a fuse base, comprising circumferential grooves in said cap and base at their overlapping portions and in alinement with each other, a member in one of said grooves composed of a plurality of segments in combination with means to move said member radially into cap and base locking position and means to remove said member for locking position.

7. An improved coupling for connecting a rotatable setting cap to a fuse base, comprising circumferential grooves in said cap and base at their overlapping portions, and in alinement with each other, a plurality of members in one of said grooves means to move predetermined members into cap and base locking engagement and means to move such members out of locking position.

8. An improved coupling for connecting a rotatable setting cap to a fuse base, comprising a radially movable segmental locking member, means cooperating on the base and cap whereby the entire thickness of the locking member is utilized to effect a locking engagement, and means permitting the movement of said locking member radially into or out of locking engagement.

9. An improved coupling for connecting a rotatable setting cap to a fuse base, comprising a plurality of locking members, means cooperating on the base and cap whereby the entire thickness of predetermined locking members is utilized to effect a locking engagement, and means permitting the movement of predetermined members into or out of locking position.

10. Mechanical locking and friction means for separable members rotatably mounted with respect to each other comprising cooperating recesses in said members, a slidable locking member composed of a plurality of segments housed in one of said recesses and means in the other member to move and to hold said member from one recess toward the other and retain the same in locking engagement with both members.

11. An improved coupling for connecting a rotatable setting cap to a fuse base, comprising a fuse base, a setting cap rotatably mounted thereon, circumferential grooves in said fuse base and setting cap normally in alinement with each other, one of said grooves being of greater depth than the other, a combined coupling and friction ring comprising a plurality of segments normally located in the deepest groove, and means for drawing predetermined ones of said segments into the groove of less depth and partially out of the groove of greater depth to couple the setting cap to the fuse base and means for returning the said predetermined segments to the groove of greater depth to separate the cap from the base of the fuse.

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

CHARLES H. PEARSON.

Witnesses:
WILLIAM H. NEAGLE,
FREDERICK W. BOLD.