

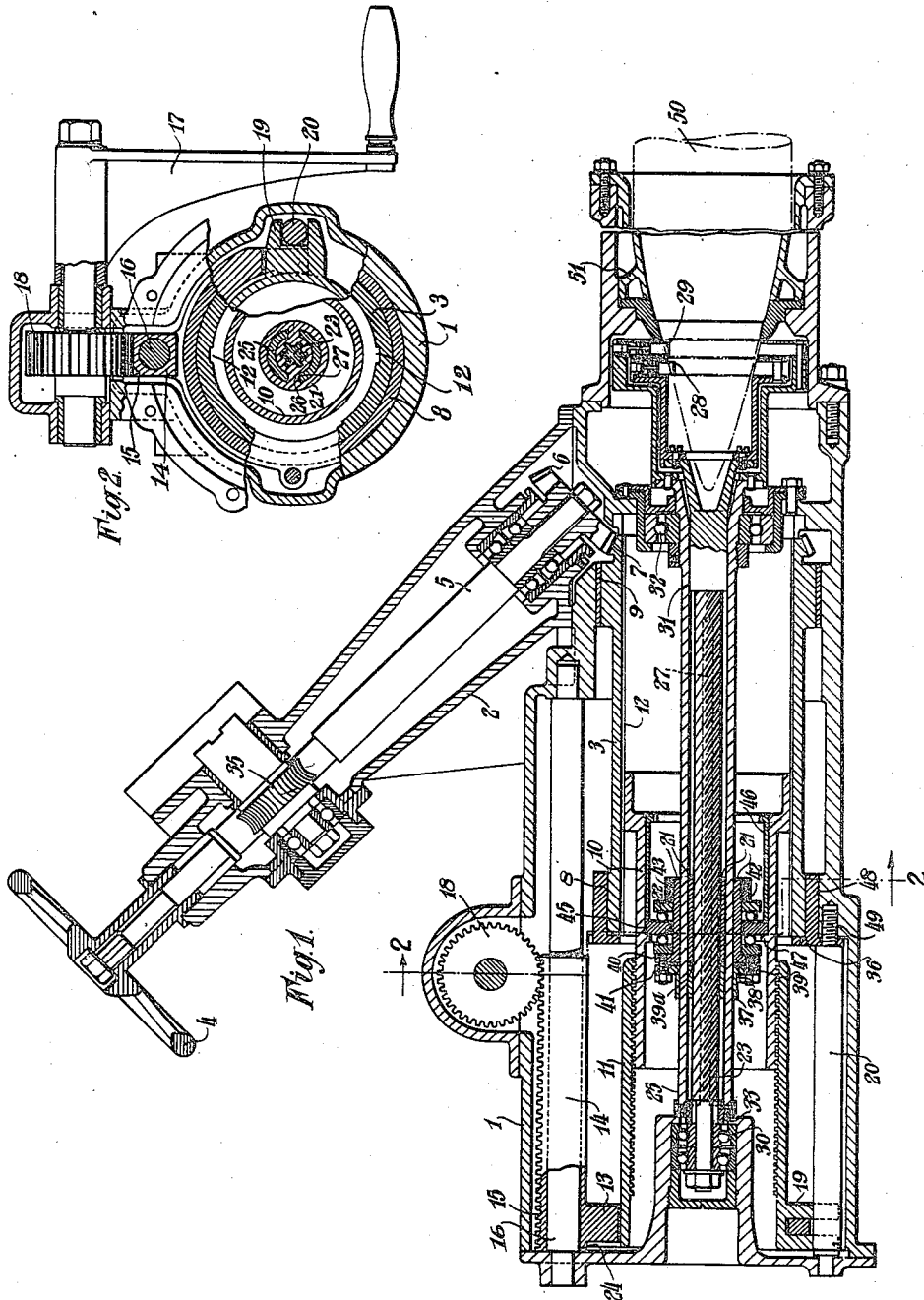
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APPARATUS FOR SETTING FUSES OF PROJECTILES

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APPARATUS FOR SETTING FUSES OF PROJECTILES

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This invention relates to improvements in apparatus for setting the time fuses of projectiles.

The invention is more particularly concerned with that type of fuse setting apparatus which is set in accordance with data supplied from a central control station.

The object of the present invention is to provide a simple form of setting apparatus of comparatively light weight and having the minimum of moving parts in order to avoid excessive slackness which would be detrimental to accurate fuse setting and to provide means to compensate for such slackness if any.

According to one form of the invention there is provided apparatus for setting fuses of projectiles comprising a pair of coaxial setting members each having a setting pawl for engagement with notches in the fuse rings, means for rotating either or both said setting members whereby their angular position relative to one another is controlled within 360° and means for additionally rotating said setting members two complete revolutions relative to each other to engage said notches and thereby to effect the setting of the fuse.

The invention in the present form consists of apparatus for imparting a primary setting movement to the setting members which is maintained and adjusted continuously in accordance with data supplied from the control station and a secondary setting movement to effect the setting of the fuse, the first movement giving the required angular displacement to the setting members and the second movement engaging the setting pawls with the usual notches on the projectile and fuse ring and imparting the necessary relative rotation to set the timing, such secondary movement being given after the projectile has been placed in the apparatus, that is to say, the primary movement may be completed or partially completed before the projectile is presented to the fuse setter, the actual setting of the fuse being effected by the secondary movement.

In the present form the relative angular movement of the setting members is obtained by the combination of a quick thread on an inner setting member mating with a correspondingly threaded intermediate traveller which has webs engaging longitudinal slots in an outer setting member.

In order that the invention may be clearly understood, reference is directed to the accompanying drawing, wherein:

Figure 1 is a longitudinal section of the apparatus in accordance with the invention, and

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

The apparatus comprises a main casing 1 having mounted therein the fuse setting mechanism and an extension casing 2 which houses the manually operable control means therefor. The fuse setting mechanism is operated through the medium of a rotary drive member 3 which is rotated by means of an exterior hand-wheel 4 through the intermediary of a shaft 5 and bevel gears 6 and 7. The drive member 3 is mounted in bearings 8 and 9 and upon rotation causes a traversing member 10 to rotate and to move longitudinally to and fro due to a screw threaded engagement with a sleeve 11 and connection with the drive member 3 by splines 12. The sleeve 11 is held from rotation but is movable longitudinally by means of a fork 13 with a tubular slide 14 having a rack 15, the slide being movable along a shaft 16 by means of a setting lever 17 (Figure 2) driving a pinion 18 in engagement with the aforesaid rack 15. One complete movement of the lever 17 will move the sleeve 11 together with the traversing member 10 for a definite and predetermined distance. The sleeve 11 is provided with extension bearings 19, two in number, which engage guide rods 20 fixedly supported in the casing 1, the engagement of the bearings or lugs 19 with the rods thus holding the sleeve from rotation.

The traversing member 10 which is actuated by the drive member 3 serves in turn to move a traveller 21 through the intermediary of ball thrust bearings 22 so that although a longitudinal movement is imparted to the traveller 21 the latter is, however, also capable of rotary movement. The traveller 21 is associated with an inner setting member 23 and an outer tubular setting member 25 which are coaxially disposed. The traveller 21 is in screw threaded engagement with the inner setting member 23 by means of a multiple quick thread of such pitch that two complete turns of the threads occur in a length of the member 23 equal to the maximum distance of linear movement of which the slide 14 is capable. The traveller 21 is in engagement with the outer setting member 25 by means of webs 26 (Figure 2) which extend through longitudinal slots 27 diametrically disposed in the said outer setting member 25. The inner and outer setting members are each provided with a setting pawl 28 and 29 respectively and the inner setting member is mounted in ball bearings 30 at one end and in a plain bearing 31 at the other end formed in the outer setting member 25, which in turn is mounted in ball bearings 32

at the forward end and a plain bearing 33 at the rear, the construction being such that the setting members are positioned relatively one to the other dependent upon the position of the traveller 21. The ball bearings 30 are of the type to prevent any endwise movement of the setting member 23. To further explain this relative positioning of the pawls 28 and 29 it is to be considered that the setting members are freely revoluble with respect to each other. It may now be assumed that the hand wheel 4 is rotated to move the traveller 21 to the right in Fig. 1. Considering first the relation between the traveller and the setting member 23. The traveller being in threaded engagement with the setting member 23 longitudinal movement of the traveller must effect relative rotative movement of the two. Either the traveller will rotate about the setting member, the setting member will rotate within the traveller or one will rotate in one direction while the other rotates in the opposite direction. In any case for any definite longitudinal movement of the traveller there will be a definite angle of one of the parts 21 and 23 relative to the other. Now, since the outer setting member 25 must rotate with the traveller because the webs 26 and slots 27 form a pin and slot connection between the two, the same angle of rotation that occurs between the setting member 23 and traveller 21 will exist between the setting members 23 and 25 and consequently one of the pawls will be displaced relative to the other over an arc of the same angular measurement as that of the relative angular displacement between the setting members.

The splined drive member 3, as previously described, is rotated by means of a hand-wheel 4 and in addition, a worm gear 35 is operated to control a pointer not shown, but which is intended to follow the pointer of a dial actuated from the control station in the known manner. The pawls may thus be set for any angular relation between 0° and 360°. Such setting of the pawls, as described above, ultimately determines the relative displacement of the fuse ring and the fuse body and it will be appreciated that the angular displacement of the pawls can be adjusted continuously in accordance with signals from the control station.

In order that the setting pawls may search for and pick up the cooperating notches on the fuse ring and shell body, a movement of two complete revolutions relatively to each other, i. e., 720°, (independently of any movement imparted by the setting of the pawls), is given to the setting members so that the setting pawls travel around the nose of the projectile searching for the notches in the fuse ring and fuse body respectively, until the pawls successively engage the fuse ring and fuse body notches, which will take place in the first 360° of the secondary rotation of the pawls and usually at a position of the traveller 21 at which the pawls have become relatively displaced from the initial setting displacement effected by the hand-wheel 4. The pawl which engages in the body notch of course ceases to rotate when so engaged but the pawl engaged in the ring notch continues to rotate and carries with it the fuse ring until one of the setting members has, during this secondary rotation, moved 720° relative to the other. Since the pawls had been displaced by the action of the wheel 4 at the start of the secondary movement the addition of 720° more of relative displacement will cause the pawls to be angularly spaced to

the same degree as set by the hand-wheel. This secondary rotation of the setting pawls is effected by movement of the sleeve 11 through the intermediary of the fork 13 and the setting lever 17 (Figure 2) associated therewith, the lever being thrown over in one complete movement to slide the sleeve 11 a predetermined distance along the guide rods 20. The distance is determined by contact of the part 19 of the sleeve 11 with the abutment 36 and the part 24 with the casing 1, such distance being additional to the distance travelled by the traveller 21 and effected by rotation of the hand-wheel 4.

The traveller 21 is in accordance with the invention formed in two parts 37 and 38 each of which is threaded to engage the setting member 23 with the object of taking up wear which might arise after excessive use of the apparatus between the traveller 21 and the inner setting member 23. It will be noted that the part 37 is connected to the part 38 by means of studs 39 which are secured to a flange 40 on the part 38 and extend through slots 41 on the part 37 so that the two parts can be drawn together and engage without any play the multiple thread of the inner setting member 37, thus permitting wear to be taken up.

Washers or shims 39a are interposed between the parts 37 and 38 to prevent the quick thread on the member 23 being seized upon tightening up the nuts of the studs 39. The traveller 21 is thus capable of easy adjustment to take up wear at the places, for example, between 26 and 27 and between the quick thread on the member 23 and the traveller, where it is likely to arise, so that the efficiency of the apparatus may be maintained. The roller bearing 22 can be adjusted by means of the screw threaded collar 42 and the lock nut 43. The central ball race 45 of the ball bearing is held in position within the traversing member 10 by means of a sleeve 46 which holds the ball race 45 against a shoulder 47. 48 is a flanged bush which holds the drive member 3 in position against endwise movement and at the same time acts as the bearing 8, the bush 48 being connected to the outer casing 1 by the screw portion 49 of the guide rods 20.

In operation of the apparatus the projectile indicated in dotted lines at 50 is placed in position within a bed 51 forming part of the main casing 1, the notches on the fuse body and ring being in any relative position; this part of the apparatus forms no part of the present invention. The first movement or primary setting is effected by rotation of the hand-wheel 4 to produce the angular displacement of the setting pawls 28 and 29 in accordance with the control data, the secondary movement is then made by causing the sleeve 11 to move through the medium of the setting lever 17, a distance equal to the full stroke of the lever and equivalent to two complete revolutions of the setting pawls.

What I claim and desire to secure by Letters Patent is:

1. In a fuse setting device, a casing, a pair of independently rotatable coaxial fuse setting members the inner of which is provided with a steeply pitched thread, a rotatable traveller having screw engagement with the inner member and a pin and slot connection with the outer member whereby the traveller may move longitudinally of the outer member and the outer member is held from revolution relative to the traveller, a setting pawl carried by each member, means for causing primary longitudinal

movement of the traveller along said members, and other means for causing secondary movement of the traveller along said members, said last means having a movement causing two complete revolutions of one member relative to the other.

2. The fuse setting device of claim 1 characterized by the first means including a sleeve held against rotative movement, a second sleeve having screw connection with the first sleeve, an operative connection between the second sleeve and traveller permitting rotation of the traveller in the sleeve and holding the traveller for longitudinal movement with the sleeve, a setting hand-wheel, and an operative connection between the wheel and second sleeve rotating the latter as the former is rotated.

3. The fuse setting device of claim 1 characterized by the first means including a sleeve held against rotative movement, a second sleeve having screw connection with the first sleeve, an operative connection between the second sleeve and traveller permitting rotation of the traveller in the sleeve and holding the traveller for longitudinal movement with the sleeve, a setting hand-wheel, and an operative connection between the wheel and second sleeve rotating the latter as the former is rotated, and further characterized by the second means including a crank and an op-

erative connection between the crank and first sleeve effecting longitudinal movement of the sleeves as the crank is rotated.

4. The device of claim 1 characterized by having the traveller formed in two longitudinally spaced parts each having threaded engagement with the inner member, and means to secure the parts in relatively adjusted position on the inner member.

5. The fuse setting device of claim 1 in which the first means includes a sleeve held against rotative movement, a second sleeve having screw connection with the first sleeve, a thrust bearing having one element carried by the second sleeve and a second element carried by the traveller and means to rotate the second sleeve.

6. The fuse setting device of claim 1 in which the first means includes a sleeve held against rotative movement, a second sleeve having screw connection with the first sleeve, a thrust bearing having one element carried by the second sleeve and a second element carried by the traveller, means to rotate the second sleeve, said last means comprising a third sleeve having splined connection with the second sleeve, a hand-wheel and shaft, and gearing connecting said shaft and third wheel.

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