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STAKING TOOL

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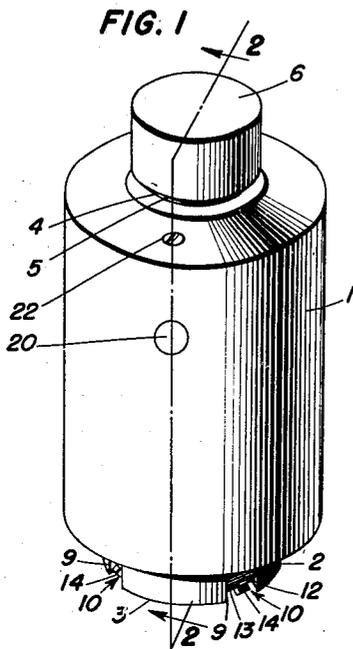


FIG. 2

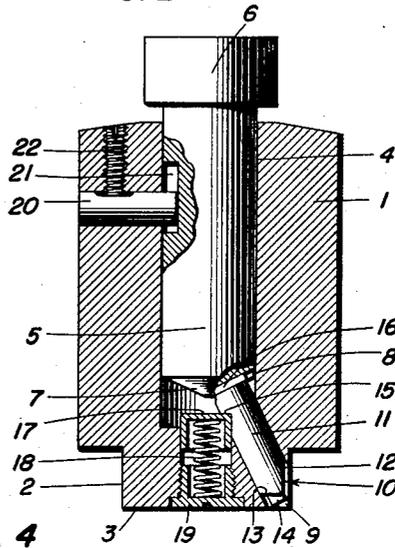


FIG. 4

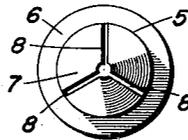


FIG. 3

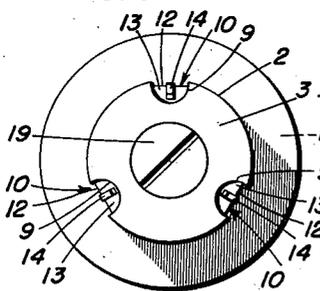


FIG. 5

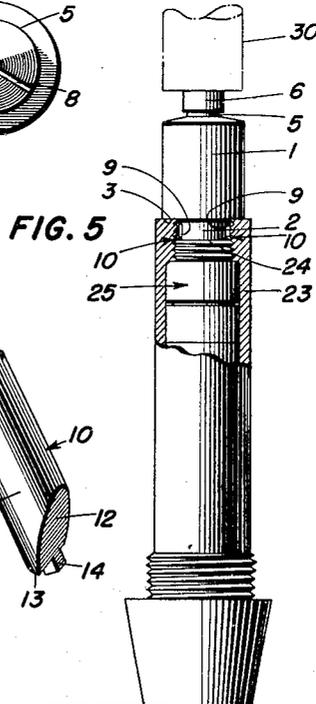


FIG. 7

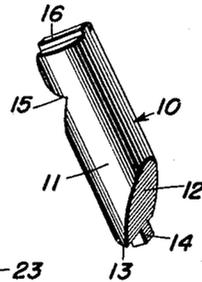
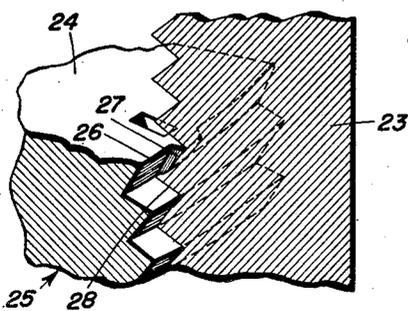


FIG. 6



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STAKING TOOL

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8 Claims. (Cl. 78—1)

1

This invention relates to an improved staking tool.

It has been found that when assembling the parts of an electrically detonated projectile, it is extremely difficult to lock such parts against rotation with respect to the projectile can. That is to say, when placing time delay clocks in projectiles, the mechanisms of the clocks are often injured due to the fact that, in order to lock them in place, it has been necessary to carry out three or more separate staking operations. Inasmuch as a staking operation requires that a sharp blow be struck in order to drive a portion of the rim of the clock into engagement with the threads of the projectile can, injuries to the clock mechanism are not infrequent.

One of the objects of the invention, therefore, is to provide a staking tool which will be operative for locking a clock work mechanism or other devices within the can of an electrically detonated projectile, the locking being done uniformly about the can and in one operation without the liability of injuring the clock work.

Another object of the invention is to provide a staking tool which is extremely simple in construction.

A further object of the invention is to provide a staking tool which may be made in various sizes to fit in the cans of projectiles of different calibers.

Still another object of the invention is to provide a tool of this character wherein means is employed for returning the staking elements to inoperative position after a staking operation.

Yet another object of the invention is to provide a staking tool embodying means for making a plurality of staking operations simultaneously, with the result that there will be no possibility of loosening one stake by subsequent staking operations, as would be the case if the staking operations were effected one at a time.

Further and more specific objects will become apparent in the course of the following description, accompanied by the drawing, in which:

Fig. 1 is a perspective view of the staking tool of this invention,

Fig. 2 is a longitudinal sectional view on line 2—2 of Fig. 1,

Fig. 3 is a bottom plan view,

Fig. 4 is a bottom end view of the plunger,

Fig. 5 is a partly sectional view showing the tool in operation,

Fig. 6 is a fragmentary sectional perspective view showing the result produced by the use of this invention, and

Fig. 7 is a perspective view of the staking jaw. The numeral 1 indicates the body of this improved staking tool. The tool body 1 is preferably of cylindrical shape and is formed of heavy metal. The lower end of the body 1 is reduced in diameter to define a boss or turret 2 having a flat bottom

2

wall 3. Formed in the body 1 axially thereof is a bore 4 and slidably retractable in the bore 4 is a plunger 5 having an enlarged head 6 and a substantially frusto-conical lower end 7 which, as best seen in Fig. 4, is formed with radially disposed key slots 8.

Formed in the tool body 1 and communicating at an angle between the lower end of the bore 4 and the intersection of the bottom wall 3 of the turret 2 and the side wall thereof are annularly spaced openings 9 extending obliquely at about 30° to the bore axis and slidably mounted in said openings are staking jaws 10. As best seen in Fig. 3, the body is provided with three of these openings 9 but it should be understood that a greater or less number of such openings may be provided, if desired.

A typical staking jaw 10 is shown in Fig. 7, and by referring to this view, it will be observed that the jaw 10 includes a cylindrical shank 11 which is formed with an angular wall 12 at its lower end, this wall 12 being at an angle of 30° to the jaw axis. This angular wall 12 forms a right angle with a beveled wall 13 medially of the width of the jaw and extending from the wall 13 is a staking tooth 14 which is of substantially rectangular shape. Near its inner end, one side edge of the jaw 10 is cut away to define a right angle shaped notch 15, the walls of notch 15 being parallel to walls 12 and 13. At its inner end the jaw 10 is formed with a diametrically extending key 16, such key being at right angles to the intersection lines of walls 12 and 13 and of the walls of the notch 15.

As will be best seen in Fig. 2, the staking jaws 10 are mounted in the openings 9 and are disposed obliquely at about 30° with respect to the axis of the body 1, with the keys 16 in engagement in the key slots 8 in the plunger 5 and preventing relative rotary movement between the jaws and the plunger. The upper wall of the notch 15 is disposed in a plane transverse to the axis.

In order normally to retain the staking jaws in their retracted inoperative positions, a spring pressed follower 17 is mounted beneath the plunger 5 axially of the turret 2. The follower 17 is engageable with the flat upper walls of the notches 15 in the jaws 10 and the follower 17 is caused to urge said jaws toward retracted position by a spring 18. The lower end of the spring is based in a threaded cap 19.

In order to retain the plunger 5 against upward displacement from the body 1, a detent 20 is mounted in the side wall of the body and projects into an axially extending slot 21 in the plunger 5. The slot 21 is of sufficient length to permit downward movement of the plunger to an extent sufficient to allow the teeth 14 on the jaws 10 to stake a clock, or other device, in place. As will also be observed, the detent 20 also serves to prevent rotation of the plunger in the

3

body. In order to retain the detent 20 in place, a set screw 22 is threaded through the top wall of the tool body 1.

In operation it is only necessary to place the tool in a shell can 23 in engagement with the upper surface 24 of a clock work mechanism 25, unshorting device, or the like, which is to be staked in position. Then, pressure is applied to the head 6 of the plunger 5 by any suitable tool such as a press plunger 30. This pressure is preferably constant and not in the nature of a sharp blow, but is comparable to that obtained in an arbor press. When this is done, the plunger will be driven downwardly against the compression of the spring 18 for driving, or camming, the jaws 10 obliquely outwardly. When this occurs, the teeth 14 on the staking jaws 10 will engage portions 27 of the rim 26 of the unit 25 to be staked and will force said portions 27 into engagement with the thread 28 of the projectile can 23 for locking the unit 25 in place. As soon as pressure is released from the press plunger 30, the spring 18 and follower 17 will retract the staking jaws 10 and will, of course, urge the tool plunger 5 rearwardly to inoperative position. As will be seen, the follower 17 also functions to limit the staking jaws against too great movement in either direction.

Particular attention is directed to the fact that the force exerted on the staking jaws will depend not only upon the pressure applied to the head 6 of the plunger 5 but also upon the ratio of movement between the tool plunger and the staking jaws.

It is also pointed out that the walls 13 above the teeth 14 also serve as anvils for pressing down any uneven surface which might be produced by the entry of the teeth 14 into the upper wall of the unit 25 to be staked.

Other modifications and changes in the number and arrangement of the parts may be made by those skilled in the art without departing from the nature of the invention, within the scope of what is hereinafter claimed.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A staking tool including a body, a staking jaw carried by the body and having a tooth engageable with a portion of a device to be locked in position, said staking jaw being slidable angularly with respect to said body, and having an anvil wall about the tooth engageable with the surface adjacent the opening formed by said tooth for removing irregularities in said surface, a plunger movable in the body and slidably engageable with the staking element for camming the said staking jaw to accomplish a staking operation, and a follower for returning the staking jaw and plunger to inoperative position, said follower also limiting said staking jaw against excessive movement.

2. A staking tool comprising an axially bored cylindrical barrel, a staking jaw carried by said barrel, said jaw being angularly slidable with respect to said barrel, a plunger reciprocable within the bore of said barrel, a cam surface on said plunger slidably engaging said jaw and a staking tooth extending from a wall of said jaw adapted to accomplish a staking operation on a device to be locked in position, said wall from which said tooth extends providing an anvil to

4

smooth the surface of the device being staked about the staked area.

3. A staking tool comprising an axially bored cylindrical barrel, a staking jaw carried by said barrel, said jaw being angularly slidable with respect to said barrel, a plunger reciprocable within the bore of said barrel, a cam surface on said plunger slidably engaging said jaw and a staking tooth extending from a wall of said jaw adapted to accomplish a staking operation on a device to be locked in position, said wall from which said tooth extends providing an anvil to smooth the surface of the device being staked about the staked area, and jaw retracting means yieldably limiting the extension of said jaw.

4. In combination with a tool body, an axially aligned reciprocable plunger in said body, and an obliquely disposed reciprocable staking jaw mounted in said body in advance of and engaged by the plunger, said plunger having a cam surface to engage said jaw, said staking jaw having a notch in its side, a spring supported follower mounted for reciprocable movement in the tool body in advance of said plunger and with the inner end of said follower in engagement with the notch in the side of the staking jaw and contacting with the notched jaw to retract the plunger and jaw, said follower being mounted in axial alignment with said plunger.

5. Apparatus according to claim 4 including means limiting outward movement of the follower and thereby limiting outward movement of the staking jaw.

6. Apparatus according to claim 4 including a plurality of said obliquely disposed notched and reciprocable staking jaws radiating outwardly and each engaged by said follower and by said plunger.

7. Apparatus according to claim 4 in which said plunger has a frusto-conical lower end providing said cam surface, and a slidable key and slot connection between the jaw and the cam surface of the plunger, preventing relative rotary movement between the jaw and plunger, and extending substantially at right angles to the said notch.

8. Apparatus according to claim 4 in which said plunger has a frusto-conical lower end providing said cam surface, and a slidable key and slot connection between the jaw and the cam surface of the plunger, preventing relative rotary movement between the jaw and plunger, and extending substantially at right angles to the said notch, said jaw having at its lower end angular walls which are parallel to the walls of said notch and which intersect in an edge parallel to said notch.

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