Feb. 8, 1955 E. M. ASBURY 2,701,359

HAND TOOL

Filed Feb. 29, 1952 3 Sheets-Sheet 1

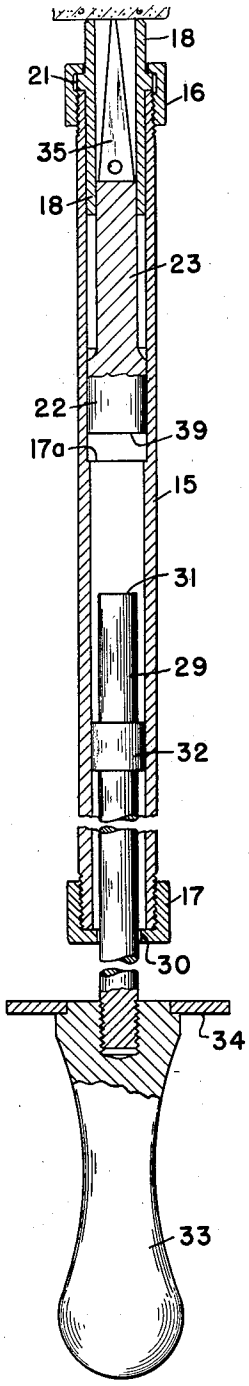


Fig. 1

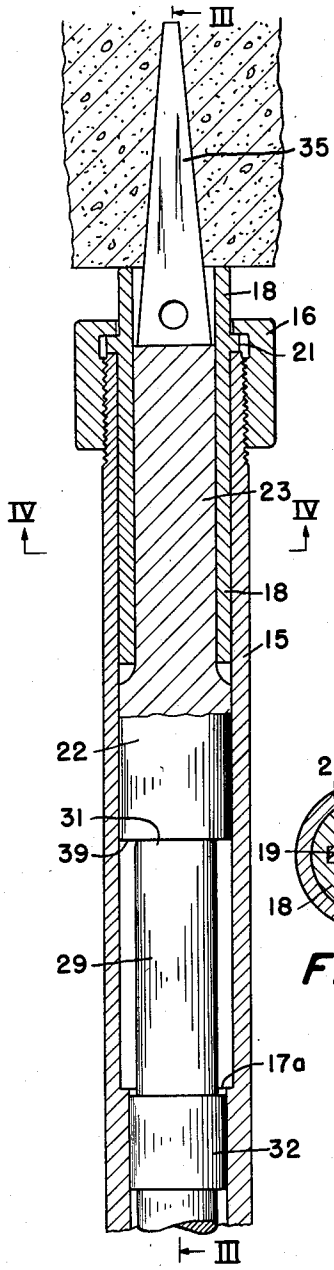


Fig. 2

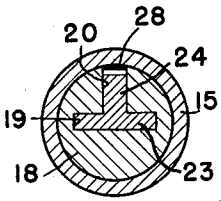


Fig. 4

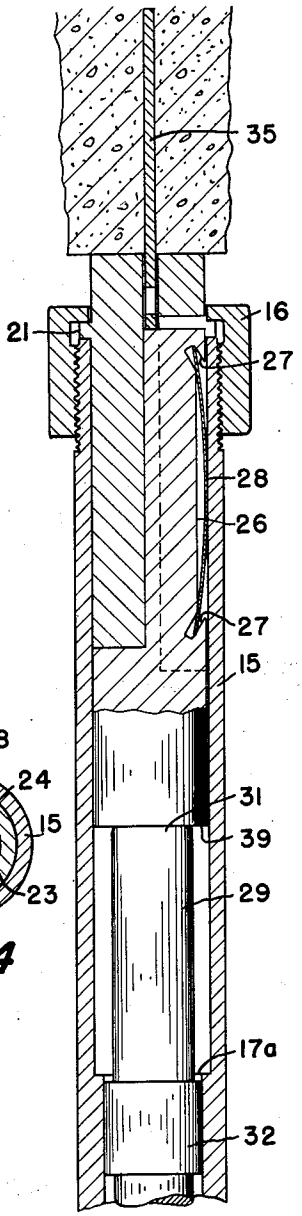


Fig. 3

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Feb. 8, 1955 E. M. ASBURY 2,701,359

HAND TOOL

Filed Feb. 29, 1952 3 Sheets-Sheet 2

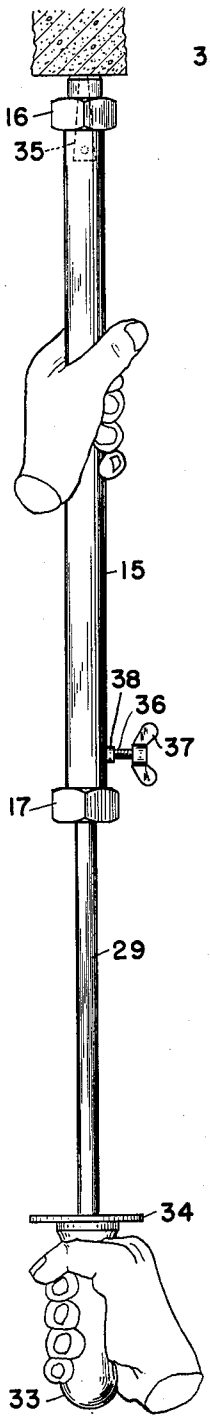


Fig. 5

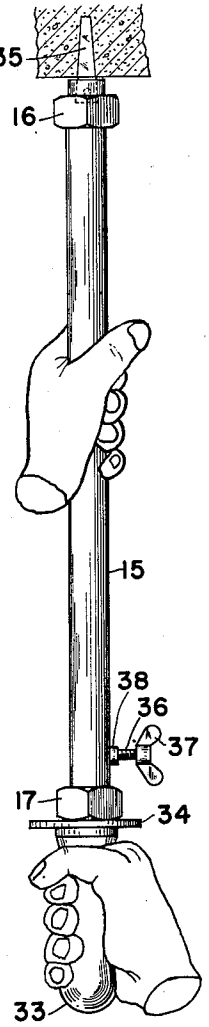


Fig. 6

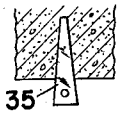


Fig. 7

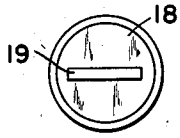


Fig. 10

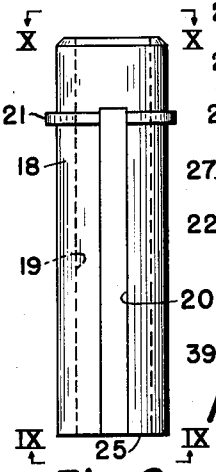


Fig. 8

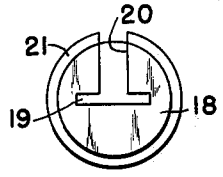


Fig. 9

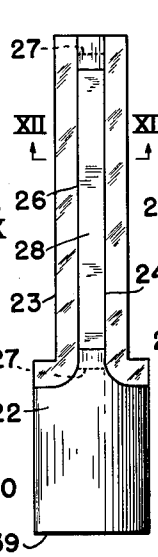


Fig. 11

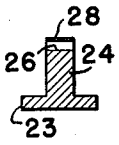


Fig. 12

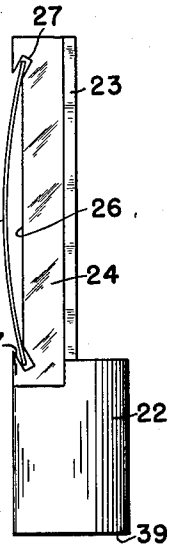


Fig. 13

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Feb. 8, 1955 E. M. ASBURY 2,701,359

HAND TOOL

Filed Feb. 29, 1952 3 Sheets-Sheet 3

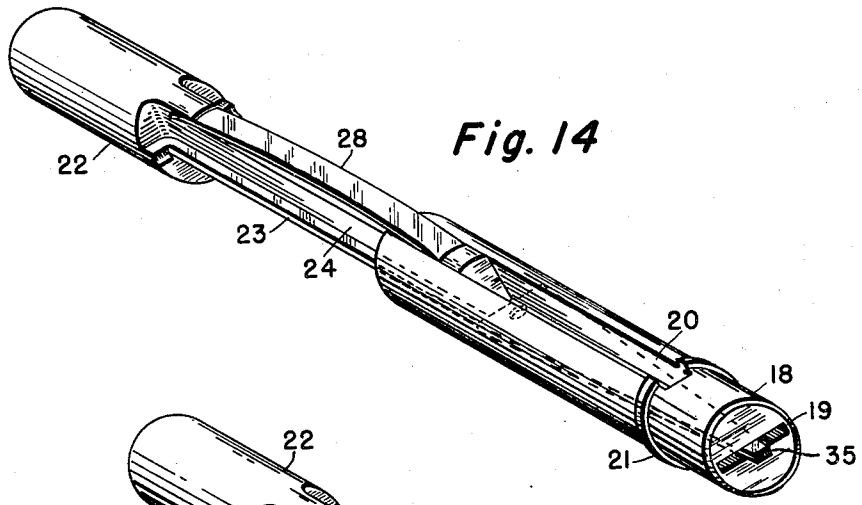


Fig. 14

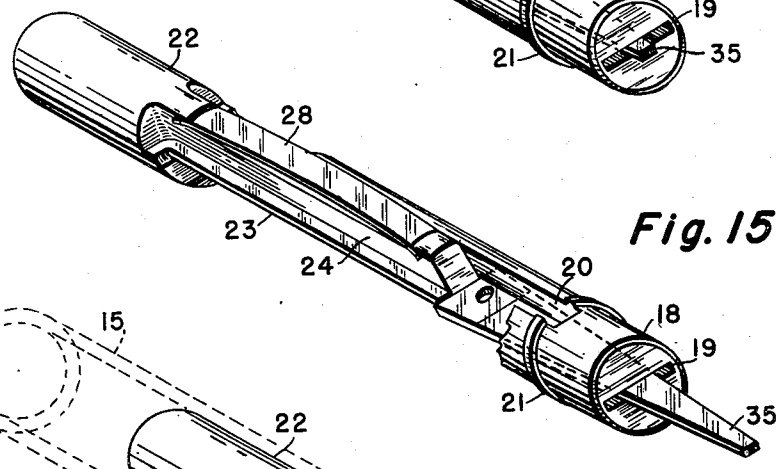


Fig. 15

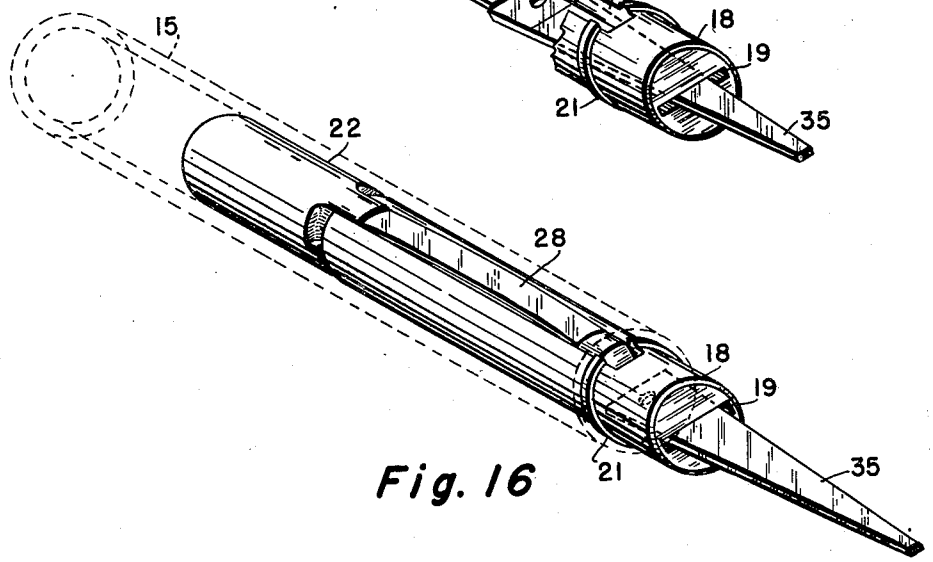


Fig. 16

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United States Patent Office

2,701,359

Patented Feb. 8, 1955

2,701,359

HAND TOOL

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Application February 29, 1952, Serial No. 274,161

5 Claims. (Cl. 1—47)

This invention relates to hand tools and more particularly to hand tools for driving slender metal articles into relatively hard, dense material such as encountered in the roof of a coal mine.

U. S. Patent 2,395,689 of February 26, 1946, in its Figures 1 to 4 inclusive, discloses one form of slender metal articles such as here contemplated. Metal articles such as shown in these figures are now being used in securing brattice cloth in place in coal mines. These articles or members are stamped from suitable sheet steel and then hardened and are now known as sprads.

One object of this invention is to produce a hand tool by means of which these sprads and other suitable slender metal articles can be driven into the roof of coal mines, into concrete or into slate or other hard, dense materials or substances.

This and other objects, which will readily appear to those skilled in this particular art, I attain by means of the hand tool described in this specification and illustrated in the drawings accompanying and forming part of this application.

In the drawings:

Fig. 1 is a longitudinal sectional view of a hand tool embodying this invention. This view discloses a sprad as the slender metal article in place within the tool and with the front end of the tool in contact with the roof of a mine;

Fig. 2 is an enlarged sectional view of part of the tool of Fig. 1 and shows the sprad as it would appear when driven into the roof of a mine;

Fig. 3 is a sectional view taken on line III—III of Fig. 2;

Fig. 4 is a sectional view taken on line IV—IV, Fig. 2;

Figs. 5 and 6 illustrate the manner of using the tool of Fig. 1;

Fig. 7 is a view illustrating a sprad in place in the roof of a coal mine or in place in other hard, dense material;

Fig. 8 is a side elevational view of a contact member entering into the make-up of the tool of this invention;

Fig. 9 is an end view of the member of Fig. 8 and is taken on line IX—IX, Fig. 8;

Fig. 10 is an end view taken on line X—X, Fig. 8;

Fig. 11 is an elevational view of one of the movable members or elements that slidingly fits within the member of Fig. 8 as disclosed in Fig. 1;

Fig. 12 is a sectional view taken on line XII—XII of ig. 11;

Fig. 13 is an elevational view looking toward either side of Fig. 11;

Fig. 14 is an isometric perspective view of an assembly of two of the elements entering into the make-up of the tool of this invention and shows a sprad holding member in place;

Fig. 15 is a view similar to Fig. 14 with part of the sprad holding member broken away, for the sake of illustration, and with the sprad partially projecting from its holding member; and

Fig. 16 is a view similar to views 14 and 15, and discloses the two elements in collapsed position with the sprad forced to the limit of its travel within its holding member.

The tool embodying this invention is illustrated as comprising a cylindrical tubular casing having a contact member removably secured to one end thereof and provided with a slot which extends longitudinally therethrough and which is dimensioned to receive and guide an article such as a sprad, to be driven into a hard surface. As shown,

the contact member projects beyond the wall of the casing and is adapted to be held into contact with the surface of the hard material into which an article, such as a sprad, is to be driven. A manually operable, weighted plunger is shown as projecting into the end of the casing opposite to that to which the contact member is secured. The plunger is adapted to be reciprocated longitudinally of the casing during the driving of an article into hard material.

A driver is slidably mounted within the casing between said plunger and said contact member and is adapted to receive blows imparted by the reciprocatory movement of the plunger. The driver is provided with a cylindrical portion which provides a sliding fit between it and the inner face of the casing. It is also provided with an extension adapted to enter the article-receiving slot of the contact member, to engage the rear end of an article located within such slot and to impart the driving force of the plunger to such article during the operation of driving the article into hard material, the surface of which is contacted by said contact member. A dampening member shown as an arched leaf spring is secured to the driver so that it engages the inner face of the casing for the purpose of dampening movements of the driver, i. e., preventing or limiting the free movement of the driver, i. e., movement out of engagement with the contact member during an article driving operation. The driver is formed of hard material such as hardenable steel or alloy steel. The friction producing means mentioned, is adapted to hold the driver in engagement with the contact member while a sprad is being driven into the roof of a mine and the tool is held in a vertical position.

Referring to the drawings, a tubular casing 15 constitutes a support for a contact member 18 which is removably secured thereto, and also for a driver 22 which is located within the casing and is arranged to transmit the force of blows delivered by a reciprocating plunger 29 to a sprad 35 or similar article, which is engaged and supported by the member 18 during the operation of driving it into a hard material such, for example, as concrete or the roof of a mine. The casing is preferably formed of steel seamless tubing. As shown, its opposite ends are threaded to receive cap nuts 16 and 17. The nut 16 engages a collar 21 formed on and adjacent one end of the member 18, and clamps the collar in position between the reentrant flange of nut 16 and the adjacent end of the casing 15. The forward end or nose of member 18 projects beyond the casing 15 and, consequently, projects through the nut 16, the reentrant flange of which surrounds the nose.

The member 18 is illustrated in detail in Figs. 8, 9 and 10 of the drawings. The nose portion thereof is located forwardly of the collar 21, is cylindrical and is provided with a sprad-receiving aperture 19 which extends axially of the member 18 from end to end thereof, is located substantially centrally thereof with its lateral surfaces parallel to a diameter of the nose portion.

As disclosed by Fig. 9, the portion of the member 18 located between the inner end 25 thereof and the collar 21 is also substantially cylindrical. As disclosed in Figs. 8, 9, 14 and 15, an axially extending slot 20 is formed in the member 18 and extends from the end 25 thereof to a point slightly forward of the collar 21. The slot 20 communicates at its inner end with the aperture 19, thus forming a T-shaped slot in the member 18. As shown in Fig. 9, the combined T-shaped slot 19—20 also extends from the inner end 25 of the member 18 to a point slightly forward of the collar 21 and then terminates in the transverse aperture 19 shown in Fig. 10.

The member 18 is located in a portion of the casing 15, the bore of which is of greater diameter than the bore of the remainder of the casing. As a result, a shoulder 17*a* is formed on the inner surface of the casing intermediate the ends thereof. The shoulder extends transversely of the axis of the casing and the large and smaller bores of the casing are axially aligned. The larger bore is substantially longer than the member 18, the peripheral face of which engages and snugly fits the inner face of the larger bore. The shoulder 17 is so positioned that it is spaced from the inner end 25 of member 18.

The enlarged bore of the casing also receives and en-

closes a striker clearly illustrated in Figs. 11, 12 and 13 of the drawings. The striker consists essentially of a cylindrical portion 22 and a rectangular axial extension thereof which is T-shaped in cross section. The T-shaped extension is integral with portion 22 and includes a cross flange 23 and a web portion or stem 24 which, like the cross flange 23, is substantially rectangular and extends at right angles to the flange 23. As shown in Figs. 1, 2, 3, 4 and 16, the striker is located within the enlarged bore of the casing 15 and the cylindrical portion thereof is in sliding engagement with the inner face of that bore. The T-shaped extension projects into the combined T slot 19—20 of the member 18 and slidably engages the walls of that slot.

The function of the striker is to transmit the force of the blows of the plunger 29 to the sprad or other article which is engaged by the member 18 and is to be driven into a surface such as the roof of a mine. As shown in Figs. 1, 5 and 6, plunger 29 projects into the casing 15 and is shown extending through an aperture formed in the nut 17, secured to the rear end of the casing. The plunger 29 is provided intermediate its ends with a collar 32 so dimensioned that it has a sliding fit with the inner surface of the smaller bore of casing 15. The collar may be separately formed and may, for example, be secured to the main portion of the plunger by welding. The plunger is also provided with a weighted hand hold 33 which is shown secured to the outer end thereof and which carried a hand guard 34.

As shown in Figs. 1, 2, 3, 14, 15 and 16 of the drawings, member 18 is adapted to receive the sprad 35 or similar article to be driven into a surface, and to guide the same during the driving operation. The rear end of the sprad 35 is shown in the drawings as fitted into the aperture 19 which forms a part of the combined T-shaped slot 19—20. Thus it is apparent that when the T-shaped extension of the striker is located within the combined slot 19—20 of member 18, the forward end of the cross flange 23 is capable of moving into engagement with the inner end of the sprad 35, as shown in Figs. 1, 2 and 3. With such an arrangement the plunger 29 is reciprocated to impart blows to the inner end 39 of the striker and the striker transmits the force of the blows to the sprad.

In order to prevent free movement of the striker relatively to the member 18 and the sprad engaged thereby, the striker is provided with a dampening member shown in the form of a leaf spring 28 which is arched and sprung into angularly disposed, spaced slots 27 formed in the part 26 of the T-shaped extension of the striker. One slot is located adjacent the forward end of part 26 and the other is located adjacent the rear end thereof, as shown in Figs. 3 and 13. The slots are oppositely positioned and each extends at an angle to the axis of the striker and are inclined toward each other. As shown in Figs. 3, 12 and 13, the portion of the outer face of the stem 24 is cut away between the slots 27, thus providing an offset surface 26 which accommodates the positioning of the spring 28. The spring 28 slidingly and yieldingly engages the adjacent portion of the inner face of the casing and, in this way, dampens or resists free movement of the striker longitudinally of the casing. The spring also tends to hold the striker against the sprad throughout the sprad-driving operation and independently of the position of the tool.

Preliminary to driving a sprad into the roof of a mine or other hard surface, the rear end of the sprad is placed in the slot 19 and the sprad is so positioned that the forward end thereof is flush with the forward end of the member 18. The tool is then so positioned that the nose of member 18 is located against the surface to be penetrated by the sprad. While the tool is in this position (see Figs. 1, 2, 3, 5 and 6), the plunger 29 is reciprocated so as to deliver blows to the inner end 39 of the striker. Figs. 14, 15 and 16 illustrate positions of the sprad, with relation to member 18, during the sprad-driving operation. It will be apparent that the final position of the sprad during the driving operation, is controlled by the position of the forward end of the slot 20 formed in the member 18. This position of the sprad is shown in Figs. 2 and 3.

The striker including the cylindrical portion 22 and the T-shaped extension thereof will be preferably formed of hardenable steel or a steel alloy capable of resisting distortion or breakage under impact strains. The plunger 29 will also preferably be formed of such material. The reciprocations of the plunger are guided by the collar 32 and the edge of the apertured reentrant flange of the nut 17 through which the plunger 29 extends.

Due to the fact that the contacting parts of the tool are enclosed within the casing 15 it is unnecessary to form the tool or parts thereof of non-sparking metal since any sparks that are formed during a sprad-driving operation, are within the casing and, therefore, will not occasion damage even in a gassy coal mine.

In Figs. 5 and 6 a set screw 36 provided with a wing head 37 is shown for engaging the plunger 29 and locking it stationary with relation to the casing when the tool is not in use or is to be shipped. The set screw is adapted to extend through the casing 15 and a tapped and threaded lug 38 which may be welded or otherwise secured to the casing for the purpose of forming an adequate support for the screw 36.

What I claim is:

1. In a hand tool for separately driving slender metal articles into relatively hard material, a tubular casing; a manually operable plunger projecting into and movable longitudinally of said casing; a contact member removably secured to said casing projecting from one end thereof opposite the plunger-receiving end and having a slot formed therein and extending longitudinally therethrough adapted to receive and guide an article driven by said tool; a driver slidably mounted in said casing between said plunger and said contact member and having an extension formed thereon for entering said slot and engaging an article to be driven located therein; and means secured to said driver and frictionally engaging the inner surface of said casing, for checking free movement of said driver.

2. A structure as defined in claim 1 in which the tubular casing is cylindrical throughout with the forward end thereof of enlarged internal diameter, and having a shoulder of lesser internal diameter located intermediate its ends and constituting a stop for limiting the relative movement between said driver and said casing.

3. A structure as defined in claim 1 in which said means is a spring secured to said driver and engaging the inner surface of said casing.

4. A hand tool for driving a slender metal article into relatively hard material; a cylindrical tubular casing; a plunger projecting into and slidably mounted within said casing and having a relatively heavy hand hold secured to the outwardly projecting end thereof; a generally cylindrical contact member located within said casing secured thereto and projecting from the end thereof remote from the projecting end of said plunger; said contact member having a slot extending longitudinally therethrough for separately receiving and guiding metal articles to be driven; a second longitudinally extending slot formed in said member communicating with such first slot, extending at an angle thereto and open to the bore of said casing throughout the major portion of the length of said contact member; a driver slidably mounted within said casing between said plunger and said contact member having a cylindrical bearing portion and a generally T-shaped extension slidingly fitting within said communicating slots in said member, and an arched spring secured within slots formed in the exposed surface of the T-shaped extension of said driver and bearing against the inner surface of said casing.

5. A structure as defined in claim 4 in which the inner surface of said casing is provided with a stop for limiting the movement of said driver longitudinally of said casing.

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