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NAIL DRIVER

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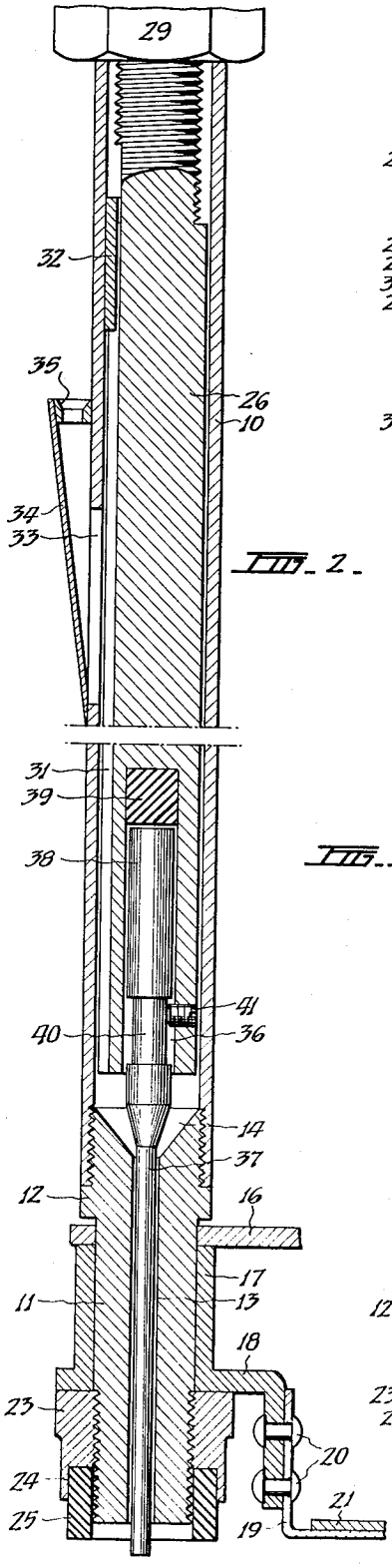


FIG. 2.

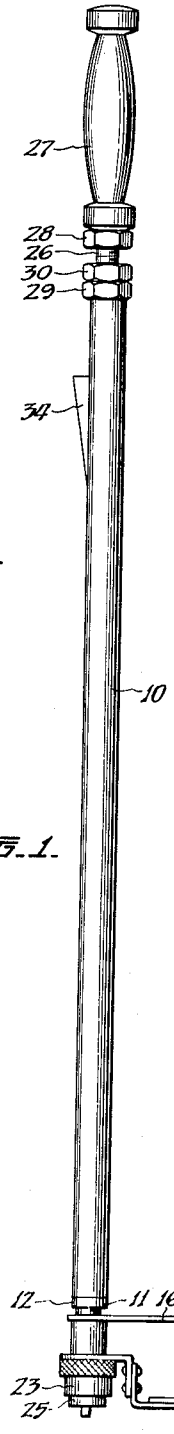


FIG. 1.

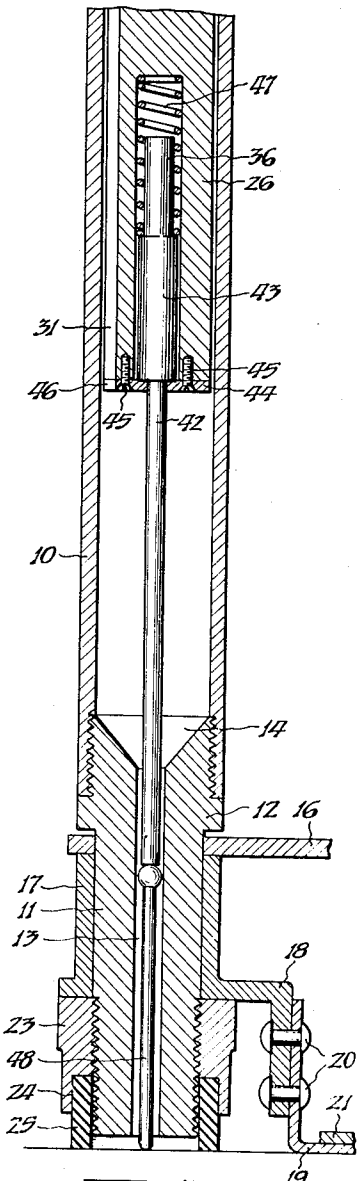


FIG. 3.

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NAIL DRIVER

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5 Claims. (Cl. 1—47)

This invention relates to improvements in nail drivers.

It is known to provide manually or mechanically operated nail drivers, such a device commonly including a tubular casing the lower end of which is adapted to be placed on timber to be nailed, and a plunger slidable in the casing, the plunger being weighted usually by a heavy handle at its upper end in the case of manually operable apparatus, the lower end of the plunger being provided with a co-axial striker. Nails fed into the casing, either individually or by means of a magazine, pass gravitationally to the lower part of the casing, and are driven into the timber when the connected plunger and striker are brought forcibly down so that the striker hits the nail head.

It has been found that nail drivers of this character have the disadvantage that after being used for some time, the end of the striker which impinges on the nail heads quickly becomes burred over, and consequently it is liable to jam in the part of the casing in which it is mounted, making the nail driver useless until repaired.

My present invention has been devised to overcome the said present disadvantages, and it has for its principal object the provision of a nail driver the striker of which is so made and arranged that its end which drives nails is not liable to become burred over, at least until it has been in use for a very long time.

Another object of the invention is to provide a nail driver the striker of which is of the improved character stated and which may be easily replaced whenever required.

Further objects of the invention are to provide a nail driver the striker of which is of the improved character set out, and which is simple and economical to manufacture, efficient in operation, and sturdy and durable in use.

According to my invention, I provide a nail driver which includes a weighted plunger reciprocally slidable in a plunger guide, preferably of tubular form and terminating at its lower end in a tubular nail guide, which may be positioned on the material to be nailed, a striker being connected to the plunger so that, when the plunger is raised, the striker is lifted from the nail guide to enable a nail to be fed thereinto from a communicating nail passage, and when the plunger is forcibly depressed, the striker is caused to drive the nail through its guide into the material on which the device has been placed, a resilient buffer being interposed between the weighted plunger and the striker such that the striker is maintained in extended position in relation to the plunger until the striker is brought to bear on the head of a nail in the striker guide. The striker, then, remains momentarily at rest on the nail until, after the buffer has been compressed longitudinally by the still descending plunger, the force of the plunger is transmitted to the striker which is caused to drive the nail.

I have found that, whereas a striker fixedly connected to the plunger becomes burred after a short period of use, the interposition of a resilient buffer between the

plunger and striker ensures that the end of the striker contacting the nail head does not become burred, at least until the device has been used for a very considerable period. In the preferred form of the invention, the buffer consists of a plug of rubber or like resilient material capable of being distorted, but more or less incompressible, enclosed in a cavity such that its lateral expansion, and therefore its longitudinal compression, is limited; and in this form of the invention, the striker is found to have a very considerable life, not being liable to burr at either end at least until the device has been used for a very long period.

I prefer that the nail passage be such that an operator may feed nails thereto at a convenient height while standing, the nails being carried gravitationally through the passage to the nail guide; and for ease of operation of the device, I prefer to provide a foot holder at the lower end of the nail driver which can be fastened to one foot of the operator to facilitate the correct positioning of the device on a floor, for example.

In order that my invention may be readily understood and put into practical effect, I now refer to the accompanying drawings, wherein:

Figure 1 is a side elevational view of a nail driver according to the invention;

Figure 2 is a broken away sectional view of the nail driver; and

Figure 3 is a broken away sectional view of a nail driver according to a modification of the invention.

The nail driver includes a casing **10** consisting of a length of metal tube. Screw-threadedly engaged in the lower end portion of the casing **10** is a metal nail guide member **11**, which is of substantially cylindrical shape with an integral peripheral flange **12**, the upper part of the nail guide member above the flange being threaded for engagement in the casing, the said flange **12** bearing against the bottom of the casing **10**. An axial boring **13**, the greater part of which is slightly greater in diameter than the heads of nails to be driven, is formed through the nail guide **11**, the upper end portion of the said axial bore being flared at **14** to form a lead-in to the remainder of the bore.

Engaged on the nail guide **11** is a foot holder **15**, which includes a strap **16** apertured at one end to fit closely about the nail guide below its flange **12**; a metal sleeve **17** fitted closely but rotatably on the nail guide and acting to retain the strap **16** in place; an angle bracket **18** secured to or formed integrally with the sleeve **17** and extending from the lower part thereof; a foot bracket **19** secured by rivets **20** to the said angle bracket; and a foot **21** riveted or otherwise secured to the foot bracket at one end, and having secured to its other end a buckle **22** adapted to engage the strap **16** in desired adjustment. The foot holder **15** is retained in place by means of a knurled nut **23** threadedly engaged on the lower end portion of the nail guide **11**. The lower part of the bore of the nut **23** is enlarged and plain to form an annular recess **24**, which houses portion of an annular resilient pad **25** of rubber, for example, which is fitted closely on the lower end of the nail guide, and extends downwardly for some distance below the said nail guide.

There is fitted slidably within the casing **10** a plunger **26**, consisting of a metal rod, the upper end portion of which is reduced in diameter, screw-threaded and engaged threadedly in the tapped bore of a fairly heavy metal handle **27**, which is restrained against accidental disengagement by a lock-nut **28** engaged on the threaded upper part of the said plunger. Also engaged on the threaded upper part of the plunger **26** is an adjustment nut **29** which is adapted to limit the downward movement of the plunger **26** in the casing **10**, and a lock-nut **30** adapted to retain the adjustment nut in desired adjusted position.

A nail passage 31 is formed longitudinally in the side of the plunger 26 from the bottom of the threaded upper portion to the bottom of the plunger. A key 32 secured to and extending inwardly from the upper end portion of the casing 10 engages in the said nail passage to prevent the plunger 26 from being rotated in relation to the said casing.

A longitudinal slot-like feed opening 33 is formed in the upper part of the casing 10, some distance below the key 32, and in register with the nail passage 31. A nail chute 34 is secured to the casing 10, leading to the said feed opening, and it has secured in its upper end a metal gauge ring 35, the bore of which is about equal to the bore 13 of the nail guide 11, so that a normal nail to be driven will pass freely therethrough into the chute 34 and through the feed opening 33 into the nail passage 31; but a nail the head of which is oversize or badly deformed will not be able to pass through the said gauge ring.

The lower end of the plunger 26 is axially bored at 36.

Referring now to Figure 2, there is provided a striker 37, the lower part of which is of such diameter that it will fit fairly closely but slidably in the boring 13 of the nail guide, the striker having an enlarged diameter head 38 which is adapted to engage slidably in the bore 36 of the plunger. There is fitted closely into the upper part of the said bore of the plunger a resilient cylindrical plug 39 made, for preference, of rubber, the head 38 of the striker 37 then being fitted into the said bore. An annular recess 40 is formed about the striker head, and a grub screw 41 engaged in a tapped radial aperture in the lower part of the plunger 26 engages in the said recess, as is clearly shown in the drawing.

In using the nail driver, if it is desired to punch as well as drive the nails, the adjustment nut 29 is so positioned that when it rests upon the top of the casing 10, the bottom of the striker 37 extends for some distance below the level of the bottom of the annular pad 25, the adjustment nut being retained in such position by the lock nut 30. A foot, usually the right foot, is engaged by the foot holder, the foot resting on the foot strap 21 and foot bracket 19, and the straps 16 and 21 being firmly buckled over the foot. The casing 10 is turned so that nails may conveniently be fed by one hand, usually the left hand, through the gauge ring 35 of the chute 34, and the handle 27 is grasped by the other hand. The engaged foot is used to position the resilient annular pad 25 over the position where a nail is to be driven, and a nail is fed, point first, through the said gauge ring, falling gravitationally through the chute 34, the feed opening 33, and the nail passage 31; and the handle 27 is raised to lift the plunger 26 and the associated striker 37 so that the said striker is brought clear of the nail guide 11, enabling the nail to fall through the boring 13 of the nail guide so that its point rests on the timber to be nailed. The handle 27 with associated plunger, are then brought forcibly down, and consequently the striker 37 is dropped onto the nail head and comes to rest momentarily. The plunger, continuing its downward stroke, causes the resilient plug 39 to be brought down onto the head 38 of the striker 37. The plug can yield slightly but, being substantially incompressible, it follows that the force of the descending plunger 26 is then transmitted to the striker 37 which drives the nail home and punches it below the surface of the timber. A floor, for example, may be nailed in place in this fashion and since a foot, positioning the tool, leaves a hand free for feeding nails to the device, the driving and punching of one nail after another may be carried out very rapidly. It will be found, moreover, that the striker is not liable to become burred over at its lower end which drives the nails, at least for a very considerable time; and the upper end of the striker, which is struck by the resilient pad 39, is also not liable to become burred.

I now refer to Figure 3, which shows a modified form of the invention, in which the striker 42 is, for the greater part of its length, of such diameter that it will fit slidably

in the axial boring 13 of the nail guide 11; but near to the top has an integral coaxial head 43, the lower part of which fits slidably in the bore 36 of the plunger 26, the upper part being of somewhat reduced diameter. The striker head 43 is restrained from leaving the plunger by means of a washer 44 secured to the bottom of the plunger 26 by screws 45, the central aperture of the washer being such that the lower part of the striker passes freely therethrough, but of less diameter than that of the lower part of the striker head 43. The washer 44 is notched at one side, as indicated at 46, the notch registering with the nail passage 31 in the plunger. The striker head 43 is of less length than the axial bore 36 in the lower part of the plunger; and the said head is normally maintained in lowermost position in the said bore by means of a helical compression spring 47, its upper end bearing against the top of the said bore, its lower end bearing on the peripheral shoulder formed at the change of diameter of the striker head.

The nail driver according to this modification of the invention is used in the same manner as before described. When the handle 27 is being forcibly brought down to drive and punch a nail, indicated at 48, the striker 42 is retained in extended position by the spring 47 until the striker contacts the head of the nail 48. Thereupon the striker comes momentarily to rest, until the further downward movement of the plunger 36, compressing the spring 47, causes the plunger to strike the top of the striker head 43 so that the nail 48 is driven and punched. It will be found that the lower end of the striker 42 will not become burred over for avery considerable period.

In either modification of the invention, the striker and the nail guide may be interchangeable with others of different diameter and bore respectively, to suit different sizes of nails, appropriate adjustment being made also to the adjustment nut 29. I may prefer to make the gauge ring 35 removable and interchangeable with others of different bores.

What I claim is:

1. A nail driver including a plunger guide; a plunger reciprocally slidable in the plunger guide; a nail guide connected to the plunger guide and adapted to be positioned adjacent to the material to be nailed; a striker reciprocally slidable through the guide and connected to the plunger; a stop limiting the sliding movement of the striker relative to the plunger; a nail passage adapted to conduct a nail gravitationally into the nail guide when the striker is at least partly withdrawn therefrom; and a resilient distortable buffer between the striker and the plunger adapted to maintain the striker in extended relationship to the plunger until on a working stroke of the plunger the striker is brought momentarily at rest on the head of the nail in the nail guide, further movement of the plunger causing the striker to drive the nail.

2. A nail driver including a plunger guide; a plunger reciprocally slidable in the plunger guide; a nail guide connected to the plunger guide and adapted to be positioned adjacent to the material to be nailed; a striker reciprocally slidable through the nail guide and connected to the plunger; a stop limiting the sliding movement of the striker relative to the plunger; a nail passage adapted to conduct a nail gravitationally into the nail guide when the striker is at least partly withdrawn therefrom; and a buffer of a resilient distortable but nearly incompressible material interposed between the striker and the plunger and contained in a recess adapted to permit a limited lateral expansion of the buffer.

3. A nail guide including a tubular plunger guide; a tubular nail guide secured co-axially to the lower end of the plunger guide; a plunger reciprocally slidable in the plunger guide; said plunger having a longitudinal hole in its lower end; a resilient buffer formed of distortable but nearly incompressible material in the innermost part of said hole; a striker reciprocally slidable through the nail guide, its upper end being housed in the said hole; a stop

limiting the sliding movement of the striker in the said hole away from the buffer; and a nail passage adapted to conduct a nail gravitationally from a position near to the top of the plunger guide into the nail guide when the striker has been at least partly withdrawn therefrom.

4. A nail driver including a plunger guide; a plunger reciprocally slidable in the plunger guide; a nail guide connected to the plunger guide and adapted to be positioned adjacent to the material to be nailed; a striker reciprocally slidable through the nail guide and connected to the plunger; a stop limiting the sliding movement of the striker to the plunger; a nail passage adapted to conduct a nail gravitationally into the nail guide when the striker is at least partly withdrawn therefrom; and a spring disposed between and in engagement with the striker and plunger for yieldably urging the striker in extended relationship to the plunger.

5. A nail guide including a tubular plunger guide; a tubular nail guide secured co-axially to the lower end of the plunger guide; a plunger reciprocally slidable in the plunger guide, said plunger having a hole; a boring in said tubular nail guide; a striker reciprocally slidable

through the nail guide, its upper end being housed and longitudinally movable in the said hole; means for retaining the upper end of the striker in the said hole with limited longitudinal movement relative to the plunger; a spring in the hole engageable with the plunger and striker to urge the striker to extended position relative to the plunger; and a nail passage adapted to conduct a nail gravitationally from a position near to the top of the plunger guide into the nail guide when the striker has been at least partly withdrawn therefrom.

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