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SETTING DEVICES FOR USE IN THE DRIVING
OF NAILS OR OTHER PINS
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Fig. 1.

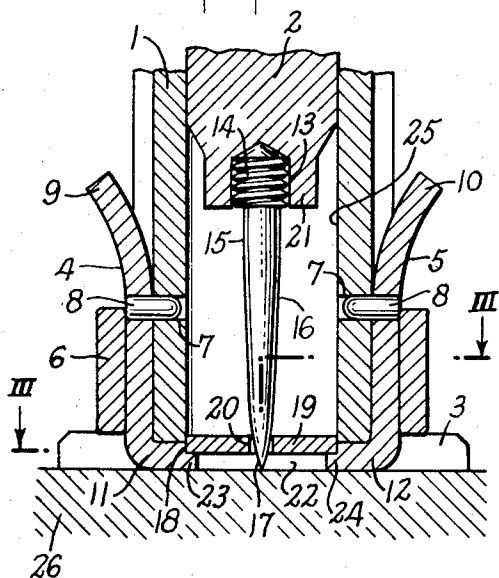


Fig. 2.

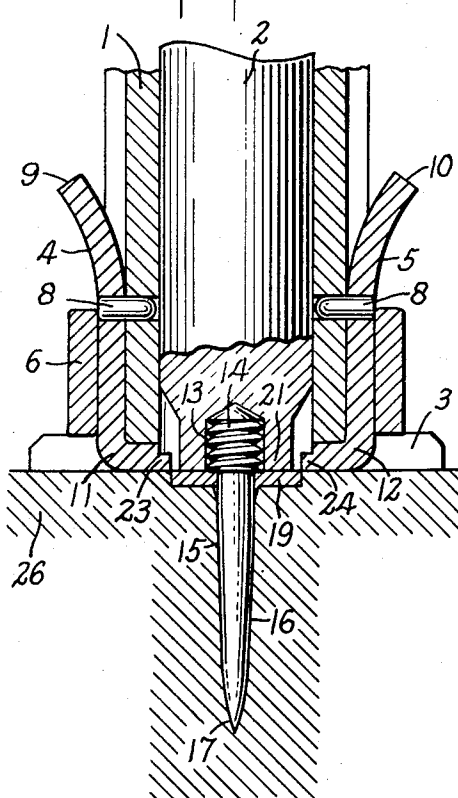
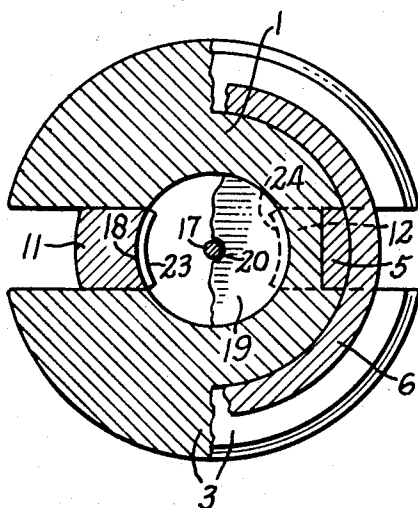


Fig. 3.



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SETTING DEVICES FOR USE IN THE DRIVING OF NAILS OR OTHER PINS

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5 Claims. (Cl. 1—47)

This invention relates to a hand-operated stud-driving device comprising a tubular sleeve and a ram slidably guided in it for impacting the studs into various materials, hereinafter referred to for convenience as "receiving material(s)." The device is herein referred to for convenience as a "setting device," and is adapted to drive nails or other pins even into hard receiving materials, such as cement or concrete, masonry, constructional iron-work, or iron sections, by assuring that the forces exerted on the ram by the blows of the hammer are transmitted with considerable accuracy in the direction of entry axially to the pin which is to be driven into the receiving material. A condition for this is that the setting device has a foot which, when applied to the receiving material, prevents tipping of the device, that it has two guides for the anchoring pin which at the beginning of the driving operation are spaced from one another as far as practicable and that the rear end of the anchoring pin is guided during the driving operation by centering surfaces of the setting device.

The supporting foot of such a device usually consists of a plate-like lateral extension or enlargement at the lower end of the tubular guide sleeve. Its purpose is to maintain the setting device steady during the driving of the pin without becoming displaced and without tipping on the surface of the receiving material. For this purpose the tubular sleeve is grasped by the hand and held against the surface of the receiving material, while the other hand wields the hammer with which the ram is struck.

An object of the invention is to hold the setting device securely on the surface of the receiving material even if the strength of the hand does not suffice for this; or if, for reasons of space, it is not possible to employ a setting device which has a sufficiently wide foot.

According to the invention, in order to hold the setting device on the surface of the receiving material during the operation of driving the pin, there is provided at the end of the tubular sleeve a holding device for a perforated member, hereinafter referred to as a "disc," consisting of deformable material, such as iron, the perforation of which is somewhat smaller than the shaft diameter of the pin to be driven. The holding device for the perforated disc is preferably formed by a recess or opening, the diameter of which only slightly exceeds the outer diameter of the perforated disc, so that the disc can first be inserted loosely in the recess, but on penetration of the pin into its hole, becomes deformed by spreading outwards with its edge firmly against the wall of the recess.

The operation of the device therefore includes the feature that on the driving-in of the anchoring pin, the perforated disc is so deformed, that the latter, as a result of its resistance to the change in shape, is on the one hand firmly connected to the pin which is sliding through it, and on the other hand its widening edge presses against the setting device, so that the latter is firmly connected to the receiving material by way of the disc and the pin. In this way the setting device is, as it were, nailed to the

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receiving material during the whole operation of driving the pin. In this way there results a secure positioning of the setting device from the instant at which the point of the pin which is to be driven passes through and widens the perforated disc under the action of the first hammer blow on the ram. On this first blow there arise no substantial transversely directed forces, because the first blow as a rule serves for the purpose of accurately fixing or locating at the desired point the pin which is to be driven.

The recess, which forms the holding device for the perforated disc, may be formed directly by the lower margin or brim of the cylindrical inner wall of the tubular guide sleeve or by an annular groove provided at that point. According to a further feature of the invention, radially-movably jaws are provided at the lower part of this tubular sleeve, which support the perforated disc underneath during its deformation. These jaws may each have an annular or arcuate recess conforming to the edge of the perforated disc, these recesses forming continuations of the annular recess receiving the perforated disc or of the inner wall of the tubular sleeve and having projections which pass under the edge of the disc.

At the end of the operation of driving the pin, the end face of the ram comes against the perforated disc, so that the latter is driven, if necessary, with slight deformation of its edge, out of the holding device or out of the jaws. If it is desired to facilitate the end of the knocking-in operation, the jaws may also be removed from the range of the disc, so that no deformation of the disc at its edge is necessary.

It is known in itself, to secure perforated discs or plates by means of pins as collars or washers. However, the perforated disc is guided only loosely in the setting device. In order to be able to knock the perforated disc easily out of its holder and to drive it into the receiving material, the lower end of the punch has, according to a further feature of the invention, a diameter which is reduced compared with the guiding portion of the punch. In this way the forcing of the perforated disc through the opening in the holder device is facilitated.

One form of a setting device made in accordance with the invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a sectional elevation through the lower end part of the setting device with a perforated disc inserted therein, and shows the positions of the pin and of the ram before the first blow on the ram is struck.

Fig. 2 is a sectional elevation similar to Fig. 1 but showing the positions of the parts after the pin has been completely driven into the receiving material.

Fig. 3 is a section taken along lines III—III of Fig. 1.

The setting device comprises a cylindrical tubular guide sleeve 1, which is shown broken off, and a ram 2 which is slidable and guided therein, the upper end of the ram (which is not shown) projecting from the upper end of the sleeve 1 so that the end face of the projecting end of the ram can be struck by a hammer. A divided supporting plate or foot 3 is secured to the lower end of the tubular guide sleeve 1. In addition, two jaws 4 and 5 are mounted diametrically opposite one another at the lower part of the sleeve 1. They have pins 8 entering radial holes 7 in the sleeve 1 so that they can move radially towards and away from one another. A ring 6 is disposed around the lower straight limbs of the jaws 4 and 5, the ring being movable in the vertical direction. The lower bent-round ends 11 and 12 of the jaws are moved away from one another when the ring 6 is slid up on to the upper outwardly-bent end portions 9 and 10. In the position shown in Figs. 1 and 2, the bent-round lower ends 11 and 12 are secured against radial movement outwards by the ring 6.

The ram 2 has an opening or recess 13 in its lower end face which receives the screw-threaded head 14 of the pin 15. The rear end of this pin is conical and centers the pin in the bottom of the recess 13 which is made of a corresponding conical form. The portion 16 of the shaft of the pin 15 which adjoins the cylindrical shaft portion is slightly conical and ends in a point 17. The conicity of the portion 16 is shown exaggerated in the drawing. In practice the angle at the point of the conical surface of the portion 16 amounts only to about 1.5 to 3°.

The bent-over ends 11 and 12 of the jaws have an arcuate groove or recess 18, in which the perforated disc 19 can be inserted. These recesses form continuations of the inner wall of the sleeve 1, as shown in Fig. 2. The projections 23 and 24 of the jaws (i.e. the parts of the jaws below the recesses 18) then pass under the edge of the disc 19 (see Fig. 1). The diameter of the hole 20 in the disc 19 is made such that, before the pin 15 is driven, it is about equal to or smaller than the smallest diameter of the conical portion 16 of the shaft of the pin. The lower end 21 of the ram has a diameter which is less than that of the guiding portion 2 of the ram, so that the end 21 is able to pass through the opening 22 in the lower end of the sleeve 1 or between the ends of the projections 23, 24.

The device illustrated in the drawings operates as follows:

By sliding up the movable ring 6, the jaws 4, 5 are opened so that the projections 23, 24 come out of the hollow cylinder 25 of the sleeve 1. The anchoring pin 15 is inserted with its head 14 in the recess 13 in the lower end face of the ram 2. The inserted perforated disc 19 forms a second guide for the pin, the point 17 of the pin entering the hole 20 of the disc 19. The movable ring 6 is now moved down, so that the turned ends 11, 12 of the jaws 4, 5 approach one another, the disc 19 being received in the arcuate recesses 18 in such a way that the projections 23, 24 become effective as abutment for the disc in the direction in which the pin 15 is driven, while the point 17 of the pin 15 rests against the surface of the material which is to receive the pin.

The first hammer blow on the upper end of the ram 2 leads on the one hand to the fixing or locating of the point 17 of the pin in the material which is to receive the pin, while on the other hand the disc 19 is so deformed that it bears under pressure against the cylinder 25 and against the parts 11, 12 of the jaws 4, 5 which bound the arcuate recesses 18. From the first blow the pin is given a tight guide at the forward end by the disc 19. The nailing of the device to the reception material has the effect of practically relieving the hand holding the device, but nevertheless a secure positioning of the device is ensured.

Before the final blows are struck, the lower projection or reduced end 21 of the ram comes into contact with the disc 19. There are then two possibilities. Either the movable ring 6 is moved up and opens in this way the jaw-projections 11, 12 so that the abutments 23, 24 are moved away from the disc 19. A final blow then suffices in order to bring the washer 19 on to the surface 26. Or one refrains from a displacement of the ring 6 and, as a result of a powerful blow, causes the disc 19 to be deformed at the edge in such a manner that it enters the space 22 (Fig. 1). By further powerful blows the washer or disc 19 can then be caused to take up the position shown in Fig. 2, in which it is sunk in the receiving material.

The form of construction illustrated may be varied without departing from the scope of the invention. It is not necessary to make the disc circular. But there are cases, in which other spreading members, e.g. bushes, can be advantageous. Slit or slotted rings or bushes may also be used. Instead of iron, other deformable

materials may be employed for the disc, e.g. resilient masses possibly in the form of annular rubber rolls, rings, or the like.

I claim:

1. In a hand-held tool adapted to drive a stud of the type including an elongated shaft having a pointed tip at one end and a driving head at the other end, with said shaft carrying a tightly-fitted deformable guide disc near the tip end thereof, the combination of means including a tubular member forming a guide chamber, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a stud striking end, an opening in the bottom of said guide chamber communicating with the striking end of said ram, stop member means adapted to protrude inwardly into the interior of said guide chamber adjacent said bottom opening for engaging said disc and preventing longitudinal movement of said disc during the initial stages of a driving operation, and manually-operated means for adjusting the lateral positioning of said stop member means into first and second end positions, said stop member means in said first position being clear of the interior of said guide chamber so as to permit said disc to pass freely thereby, said stop member means in said second position protruding slightly into said guide chamber opening and defining an aperture therein larger than the stud-striking end of said ram, whereby said ram is enabled to drive the stud completely into said material with said stop member means in said second position, the interior surface of said guide chamber above said stop member means serving to engage the peripheral edges of said guide disc to maintain said disc and the shaft of said stud laterally fixed in position relative to said tubular member during a driving operation.

2. In a hand-held tool adapted to drive a stud of the type including an elongated shaft having a pointed tip at one end and a driving head at the other end, with said shaft carrying a tightly-fitted deformable guide disc near the tip end thereof, the combination of a tubular member forming a guide chamber, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a stud-striking end, an opening in the bottom of said guide chamber communicating with the stud-striking end of said ram, and stop member means protruding inwardly a small distance into the interior of said guide chamber adjacent said bottom opening for engaging said disc and preventing longitudinal movement of said disc during the initial stages of a driving operation, said stop member means being formed with an annularly-shaped recess adapted to receive said disc, the side walls of said recess being aligned with the interior surface of said tubular member, said stop member means being arranged to define an aperture larger than the stud-striking end of said ram and larger than the driving head of said stud, whereby said ram is enabled to drive the stud completely into said material without requiring the removal of said stop member means from the interior of said guide chamber opening.

3. In a hand-held tool adapted to drive a stud of the type including an elongated shaft having a pointed tip at one end and a driving head at the other end, with said shaft being slightly tapered in one portion thereof and carrying a tightly-fitted deformable guide disc near the end of said tapered portion that is adjacent the tip of said stud, the combination of wall means including a tubular member forming a guide chamber, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a stud striking end, an opening in the bottom of said guide chamber communicating with the striking end of said ram, guide means adjacent the stud-striking end of said ram for centering the driving head of said stud within said guide chamber, stop member means adapted to pro-

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trude inwardly into the interior of said guide chamber adjacent said bottom opening for engaging said disc and preventing longitudinal movement of said disc during the initial stages of a driving operation, said stop member means protruding only a small distance into said guide chamber opening and defining an aperture therein larger than the stud-striking end of said ram and larger than the driving head of said stud so that said ram is enabled to drive the stud completely into said material without removal of said stop member means, said guide chamber wall means immediately above said stop member means being slightly larger in lateral dimension than said disc so that said disc initially is loosely fitted therein, whereby during a driving operation the penetration of the tapered portion of said stud shaft into said disc serves to expand said disc radially into pressure engagement with said wall means and thereby assure that the shaft of said stud is laterally fixed in position relative to said tubular member during a driving operation.

4. In a hand-held tool adapted to drive a stud of the type including an elongated shaft having a pointed tip at one end and a driving head at the other end, with said shaft carrying a tightly-fitted deformable guide disc near the tip end thereof, the combination of means including a tubular member forming a guide chamber, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a stud-striking end, guide means adjacent the stud-striking end of said ram for centering the driving head of said stud within said guide chamber, an opening in the bottom of said guide chamber communicating with the stud-striking end of said ram, and radially-movable annularly-recessed jaws arranged at the bottom of said tubular member and having first and second end positions in the first one of which said jaws are withdrawn from the inner wall of said tubular member and in the second one of which said jaws project inwardly of said tubular member, the sides of the jaw recesses facing said ram forming continuations of the inner wall of said tubular member so

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that a disc of corresponding diameter may be positioned in said jaw recesses and supported by the latter.

5. In a hand-held tool adapted to drive a stud of the type including an elongated shaft having a pointed tip at one end and a driving head at the other end, with said shaft carrying a tightly-fitted deformable guide disc near the tip end thereof, the combination of means including a tubular member forming a guide chamber, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a stud-striking end, guide means adjacent the stud-striking end of said ram for centering the driving head of said stud within said guide chamber, an opening in the bottom of said guide chamber communicating with the stud-striking end of said ram, a plurality of jaws radially projectable a short distance into said opening and adapted to support said disc, each jaw including an integral leg extending lengthwise of said tubular member on the outside thereof and being attached thereto so as to be swingable in a radial plane between a first position in which said jaws are retracted from and a second position in which said jaws are projected into the interior of said tubular member, and means engaging said legs of said jaws to adjust and hold the latter selectively in said first or second position, said jaws in said second position defining an aperture larger than the stud-striking end of said ram, whereby said ram is enabled to drive the stud completely into said material with said jaws in said second position.

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