In heel nailing machines the nails are generally introduced into the nail block or shoe support in which the nail drivers are situated by means of a swingable nail feeder which in the position into which it is swung back takes them up due to automatic or hand feeding and in the position into which it is swung forward gives them up to the nail block.

In this type of machines it is already known to produce the movement of the nail feeder from the machine drive due to the engagement of a coupling. This however brings the danger with it that the forwardly moving nail feeder meets the piece of work which is still in its track or the hand of the operator, and the nail head and thus causes injury to the operator and damage to the piece of work in the machine.

To avoid these defects, in the construction according to the invention for a heel nailing machine with rising and falling nail block the nail block is so arranged that at the end of the cycle of work it is lowered so far under a hand rest that a nail feeder can be moved into the nail delivery position between the nail block and the hand rest, whereby after the return of the nail feeder into the position in which it takes up nails, the nail block returns into a position above the hand rest in which a new piece of work can be put upon it. In this way it is attained that the charging of the nail block takes place well separated by the hand rest from the manipulation of the piece of work so that an undesired collision of the nail feeder with the hand of the operator, the piece of work and the shoe support is avoided completely. The hand rest can be easily so formed and arranged that it closely encompasses in a somewhat U-shape the shoe support in its nailing position so as to effect or facilitate the stripping off of the finished piece of work when the shoe support sinks, and to make it impossible to put on a piece of work as long as the shoe support is below the hand rest. In order to ensure an unobjectionable working of the machine with the simplest operation, it is preferable that the reciprocal movement of the nail block, the nail feeder and the counter pressure stamp should be actuated dependent upon the movement and automatically from the drive of the machine by hydraulic operation through several pistons which are put under pressure one after the other by a common change-over mechanism. Such a change-over mechanism may consist of a pedal which corresponding to its various positions enables the individual working parts of the machine to be actuated in the necessary sequence.

The object of the invention in an exemplary construction is illustrated in the appended drawings which show:

Figure 1 is a view in elevation, partly in section, of the improved heel nailing machine, the parts being shown in their initial positions.

Figure 2 is a similar view, the parts being shown in the heel locating position.

Figure 3 is a similar view with the parts shown in a position to permit the arrangement of the nail feeder for subsequent nailing operation.

Figure 4 is a plan of a detail showing the relation of the hand rest to the nail pillar.

Figure 5 is a side elevation, partly in section, of the same, the nail feeder being shown in operative position.

In the machine stand 1, the nail pillar 2 and the plunger 3 are movably arranged vertically opposite each other in special guides. The plunger 3 possesses a piston 3' which can be moved upwards or downwards by hydraulic pressure means conducted in the leads 39 and 38. A spring 39 is constrained to hold the plunger 3 in the upper position. The nail pillar 2 is carried by a casing 21 which with the object of adjustment, is arranged in a sliding guide 28 so as to be movable by means of the positioning spindle 29. The sliding guide 23 sits on the piston 7. A spring 41 is constrained to hold the piston 7 with the nail pillar 2 in the upper position. The piston 7 can be lowered or raised by means of a pressure medium led to both sides of the piston 7 by the leads 39' and 40. The guiding of the nail pillar 2 is of such a kind that it is in the upper end position during the nailing and in the lower end position during the introduction of the nails. The end positions of the nail pillar 2 are so fixed by automatically operated locking wedges 5 and 4 that on the one hand a collision with the likewise automatically operated nail feeder 6 cannot take place (Figure 3), and on the other hand, the nail pillar 2 during the pressure stroke of the plunger 3 cannot recede downwards (Figure 2). The locking wedges 4 and 5 and the nail feeder 6 are provided with pistons 4', 5', 6' in order that they may be likewise hydraulically moved. Even the nail driver could be hydraulically driven. However, in the exemplary construction, a purely mechanical drive for this has been chosen, which is taken by the toothed wheels 10 and 11 from the drive of the gear pump 12 which maintains the pressure medium in continuous circulation. The spur...
wheel 10 is arranged on the nail shaft 9 so that it can be coupled thereto. By a small downward movement of the draw bolt 13 against the relatively strong spring 64, it can be made to describe one revolution in the direction of the arrow X. The coupling itself is universally known and needs no description.

On the shaft 9 there is a crank disc 15 which is provided with a cam 15' and crank pin 15". The driving in of the attachment means is done by means of the crank pin 15". This moves the connecting link 24 downwards during the first half rotation of the shaft 9. The connecting link is pivoted to one end of a two armed lever 25 and moves the end of the lever on the driving side upwards; due to this the driver, which is arranged in the interior of nail pillar 2 in a known way, is also moved upwards, so that the attachment means are driven into the piece of work 26. During the second half rotation of the shaft 9 the spring arranged in the nail pillar 2 draws back the driver in a known way, so that the lever 25 returns to its initial position. After nailing the cam 15' breaks the connection between the catch links 16, 17 by means of the push rod 18. Due to this the upward movement of a ratchet 20 is caused by the influence of a tensioned pull spring 19, which moves the ratchet disc 21 on one ratchet space round in the direction of the arrow Y. The ratchet disc 21 is attached to a shaft 22, which is coupled to the change-over valve 23 and at the moment of the switching over reverses the direction of the oil flow. In the rest position the cam 15" again clears the push rod 18.

The ratchet disc 21 is worked not only by the ratchet 20 but also by ratchet 63 which, as described later, is moved through the rods 62, 61, 51 and 36 by the compression spring 60 so that the lever 51 swings out about the pin 58 which at this moment is immovable. This lever is rigidly connected with the pedal 43 and has no fixed pivot point. If the draw bolt 13, which has already been mentioned, and which is carried by the strong spring 64, is in engagement with the latch 14 which is pivoted at 59 to the lever 51, then the pin 58 forms the pivot point for the lever 51, when the pedal 43 is pressed downward. If, on the other hand, the latch 14 is out of engagement with the rod 13, then the spring 60 presses the lever 51 down at its right end so that the movement of the ratchet disc 21 proceeds. The left end of the lever 51 is carried by a spring 56 which engages the cramped arm 14' of the latch 14.

The lower part of the machine body is formed as an oil sump and carries directly above this the oil propulsion and control organs. The pressure fluid rises under vacuum through the suction lead 34 into the pump 15 and from here is led out first through a nonreturn valve 30 to an annulus 35. If, as a result of the spring 60 the piston 35 is in the lower position as in Figure 1, then the fluid returns via the leads 37 and 32 straight to the oil sump. If, on the other hand, the piston 35 due to the swinging out of the pedal 43 about the pin 58 is raised into a position as in Figure 2, then the fluid reaches the rising leads 38 or 39, Figures 2 and 3, according to the position of the change-over valve 23. In the position of the parts shown in Figure 2 the rising lead 39 is under pressure. By this pressure the piston 5' of the catch 5 and the piston 6' of the feeder 6 are held in their backward position, while the piston 3' moves contrary to the tension spring 8 and the plunger 3 approaches the heel 26 of the shoe 25. In the end position of the plunger 5' the lead 40 is left free so that the pressure fluid can come under the piston rod 7'.

Now as the weight of the piston 7 together with the parts 24 to 29 of the nail pillar 2 are lifted up easily by means of the spring 41 the piston 7 has already taken up the upper rest position beforehand, that is to say before the plunger 3 reaches the uppermost position. The springs 8 and 41 are so chosen in relation to one another that before the pressure fluid overcomes the spring 8 the piston 6' is returned and thus the piston surface 7' of the piston 7 receives pressure so that in any case the piston 7 reaches the upper rest position and is then held fast hydraulically in this position. At the same time the piston 4' of the locking wedge 4 likewise receives pressure and keeps on endeavoring with its front end to lock the guide way until it succeeds. Only then does the plunger 3 sink down on to the pin of the shoe 25 so that it has overcome the spring 8 which was previously tensioned.

Due to further movement of the pedal 43 the shaft 9 as described above is coupled to describe one revolution in the direction of the arrow X. This movement causes the oil fluid to be propelled to the outlet. As this movement propagates itself in the manner of a blow through the leads 38 and 40 which are under pressure and is intercepted by the non-return valve 30 which protects the gear pump at the moment of nailing against back pressure. During the overload the pressure regulating valve 31 opens so that the remaining part of the pressure fluid can flow away through the return leads 32 which is under low pressure. This condition is only an instantaneous phenomenon, because immediately afterwards the oil stream is reversed. It is much desired as end pressure and can be specially adjusted at 33. On rotation of the shaft the cam 15' temporarily dislocates the pair of catch links 16 and 17 so that the change-over valve 23 is turned by means of the rod 18. In this way the rising lead 38 is exhausted and the lead 39 is put under pressure. Pressure next reaches the return side of the pistons 3', 5' and 7 so that the piston 3' of the plunger 3 is first returned due to the action of the tension spring 8, and the piston 5' as intended the resistance is least here. Then the piston 6' moves positively and in the last place the piston 7 after overcoming the compression spring 41. The hydraulic return of the pistons 3' and 5 gives special importance in the interest of a quick and sure return stroke.

Shortly before the low position of the piston 7 is reached, the lead 44 also receives pressure and thus the piston 5'. As long as the low position of the piston 7 is attempting to reach has not been completely taken up, the locking part 5 cannot move forward and the lead 45 and the feeder piston 6' is not put under pressure. With this object a non-return valve 46 is provided in the base of the piston 5 which closes the lateral opening 5' of the piston 5' against a spring 65, but in the reverse movement as in Figure 2, it does not hinder the passage of pressure fluid from lead 45 to 44. If the locking part 5 has locked the piston 7 in the low position, the piston 6' begins to move forward. After it has moved a certain distance a projection 47 on the piston rod 48 with it and thus via the crank lever 49 moves the catch link 16 downwards. In this way...
way the catch link 17 which until now has been disengaged due to the action of the tension spring 19, is again coupled up. On raising the catch 16 the roller 55 of the rod 18 moves back into the track of the cam 19.

In the meantime the feeder 6 has approached the nail pillar 2 so closely that the shoulder 51 of the feeder plate 51 comes into contact with the heel end 2' of the nail pillar 2. After this the lever 57 moves a little further against the action of a spring 52 in a known way until the nail channels of the parts 6 and 51 come into agreement with those of the nail pillar 2. The track of the feeder 6 is now covered over from above by a hand protecting plate 63 so that an injury of the hand grasping the shoe heel and also the piece of work, is thus prevented.

If the nail feeder 6 has taken up its forward end position then the pressure in the lead 39 rises until it overcomes the spring 55 of the piston 54 which dislocates the catch link 14. This forms with 14 a crank lever supported by the spring 56 and at the same time pressed on the end of the piston shaft 54'. It is pivoted to the control lever 57 which can swing about the boss 58 just as it can about the boss 59. At the moment of release of the catch the control lever 57 as part of the move downward under the influence of the compression spring 60, and thus on the downflow side draws the ratchet 63 downwards by means of a coupling 61 and the guide rod 62. Thus in the way mentioned the change-over valve 23 again reaches the initial position, Figures 1 and 2. Now in this process however, the control piston 36 has sunk down and has thus freed the way for the oil flow via 37 to the oil sump, so that the working cycle is finished. The piston 54 is again unloaded and returns back towards the right so that on releasing the pedal 43 the connection between 13 and 14 is again made.

If it is desired to start the working cycle and to raise the nail pillar 2 the pedal 43 must be pressed down and at first only by a small amount. As a result of this the control lever 57 is turned about the boss 58 and the control piston 36 raised, so that the flow of the pressure oil via 37 can no longer take place. Now the wedge 5 and the nail feeder 6 are drawn back. As soon as the nail pillar in the pillar 2 begins, the pedal is released and the piston 7 automatically takes up the upper rest position under the action of the compression spring 41. Figure 1.

The piece of work is introduced in this position of the nail pillar. The pedal 43 can, as long as the spring 64 has not been overcome, be released again and moved downwards in order to repeat the location of the heel by unloading the plunger 3. The overcoming of the spring 64 is noticeable due to the difference in the resistance of the same in relation to the spring 60 and indicates to the operator the beginning of a nailing movement. During the overcoming of the spring 64 the boss 58 becomes the pivot axis of the control lever 57 instead of the boss 59. So that the ratchet 63 comes into engagement with the appropriate ratchet boss of the ratchet disc 21 due to the action of the tension spring 65.

During the nailing the heel of the shoe is grasped by the left hand so that the ball of the hand lies on the hand rest plate 53. After nailing the plunger 3 is returned and directly afterwards the nail pillar 2. Except for holding the piece of work firmly in the working position, as already mentioned at the beginning, the operator does not have to worry about removing the latter as to a certain extent the piece of work is freed by the machine itself, since it is stripped from the nail pillar 2 by the hand rest plate 53.

In the exemplary construction illustrated the machine is shown working on low shoes, but it can, however, work on high shoes in the same way. With this object the vertical stroke of the nail pillar 2 is correspondingly increased and the opening in the rest plate 53 is correspondingly increased and the downwardly cramped extension 53' corresponding to the increase in stroke, in accordance with Figure 5. The opening 53' in the rest plate 53 agrees approximately with the profile of the heel rest plate 2' of the nail pillar 2. Since in general the nail pattern and thus the reduced part alters with the size of the heel rest plate 2' the rest plate 53 is attached to the reduced part 70.

The operation of a machine in accordance with this invention can also follow completely automatically, and the nail head can, instead of pointing vertically downwards as it generally does in the nailing of heels from the inside, be driven laterally or from behind in order to take up the new nails. Such a movement would be easily possible in exterior machines, as also in rubber heel piece and patch nailing machines.

What I claim is:

1. In a heel nailing machine, a fixed hand rest for the hand of the operator in positioning the shoe and heel, a nail pillar, means for raising and lowering the nail pillar relative to the hand rest, a nail feeder designed to be moved to a position immediately above and in contact with the nail pillar, and means for operating the nail feeder to position the same relative to the nail pillar when the latter is in lowered position, the plane of movement of the nail feeder being below the hand rest and above the lowered nail pillar.

2. A construction as defined in claim 1, where-in the hand rest is of U-form in plan to permit the nail pillar to move between the legs of the U-form hand rest in the movement of the pillar to the upper operative position.

3. A construction as defined in claim 1, where-in the hand rest interrupts the work-piece from following the nail pillar in the movement of the latter, whereby to permit complete withdrawal of the nail pillar from the work-piece.

4. A construction as defined in claim 1, including a plunger to cooperate with the work-piece for holding the latter in position during the nailing operation.

5. A construction as defined in claim 1, including hydraulic means for operating the nail pillar and nail feeder in proper sequence.

6. In a heel nailing machine, a fixed hand rest, a nail pillar, means for reciprocating the pillar relative to the hand rest from an inoperative position below the hand rest to an operative position above the hand rest, a nail feeder 65 for delivering nails to the nail pillar, and means for operating the nail feeder toward and from the nail pillar when the latter is in a position below the hand rest, the path of movement of the nail feeder being below the hand rest to protect the work-piece and hand of the operator from contact with the nail feeder.

7. A construction as defined in claim 6, where-in the nail block has a piston support, together with hydraulic means cooperating with said pis-
ton support to move the nail pillar into respective positions relative to the hand rest.

8. A construction as defined in claim 6, wherein the nail feeder is provided with a piston operating in a conduit, together with hydraulic means for actuating the piston to move the nail feeder into operative and inoperative relations with respect to the nail pillar.

9. In a heel nailing machine, a hand rest, a nail pillar operating relative to the hand rest, a nail feeder movable into operative cooperation with the nail pillar, a plunger to cooperate with the heel on the shoe in position on the hand rest, pistons connected to the nail pillar, nail feeder and plunger, hydraulic means for operating said pistons in both directions, a control mechanism for such hydraulic means to thereby govern the pistons and the movement of the piston-connected parts, a compression spring to assist the operative movement of the nail pillar, and a tension spring for holding the plunger normally in a position of rest.

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