Sept. 30, 1952 V. CHMELAŘ 2,611,896

FEEDING MECHANISM FOR NAILING MACHINES

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FIG. 1

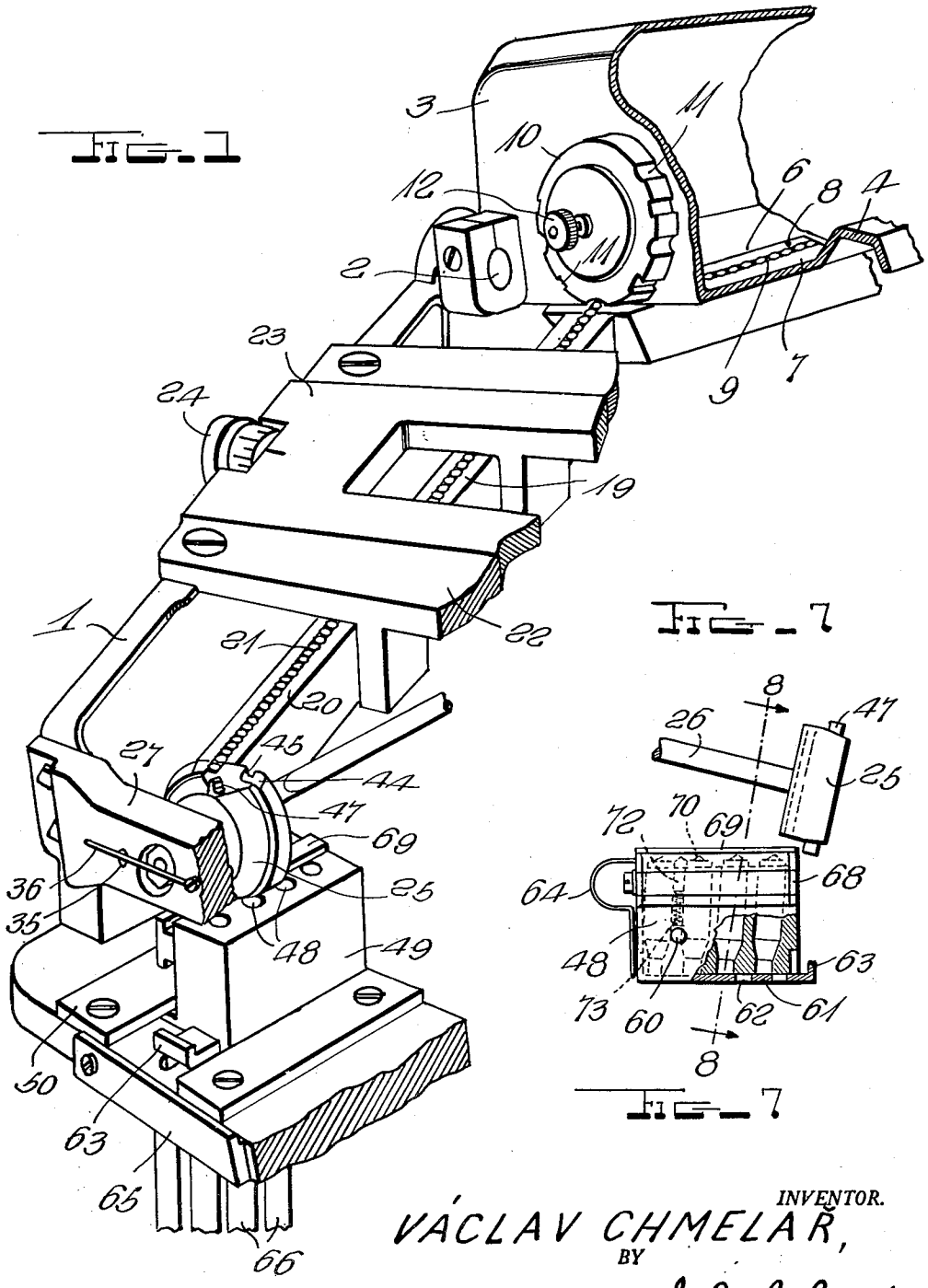


FIG. 7

FIG. 7

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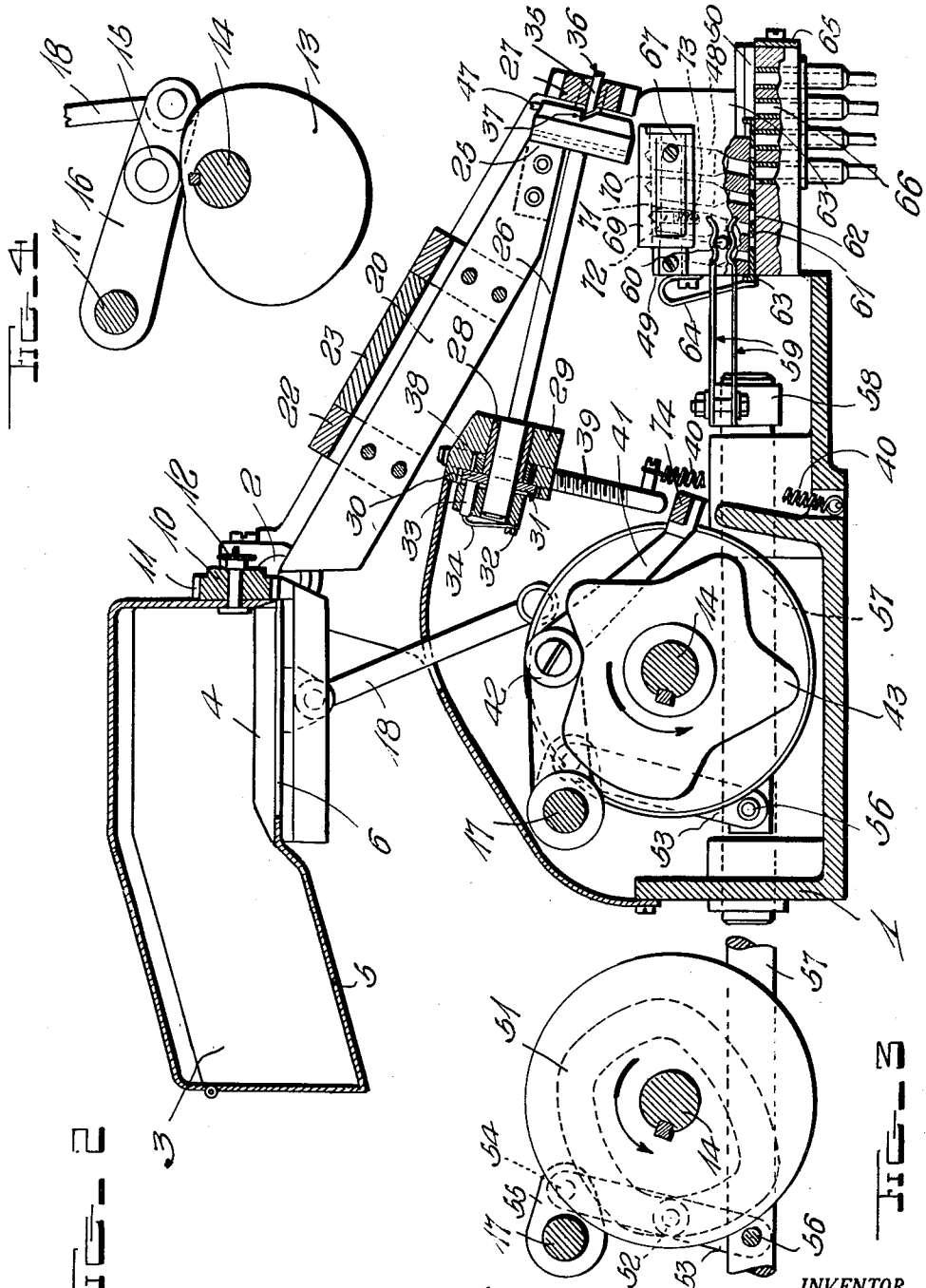


FIG. 4

FIG. 2

FIG. 3

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FIG. 5

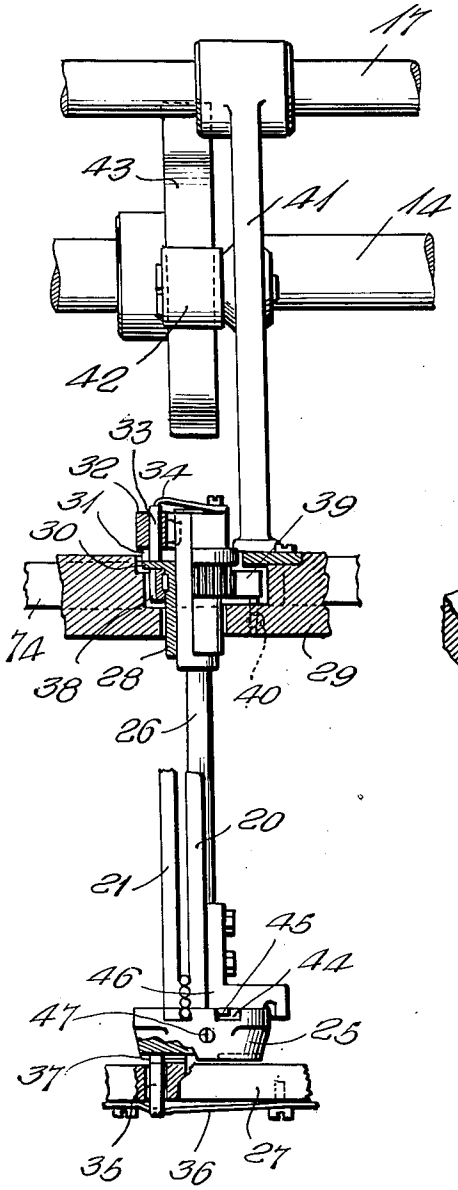
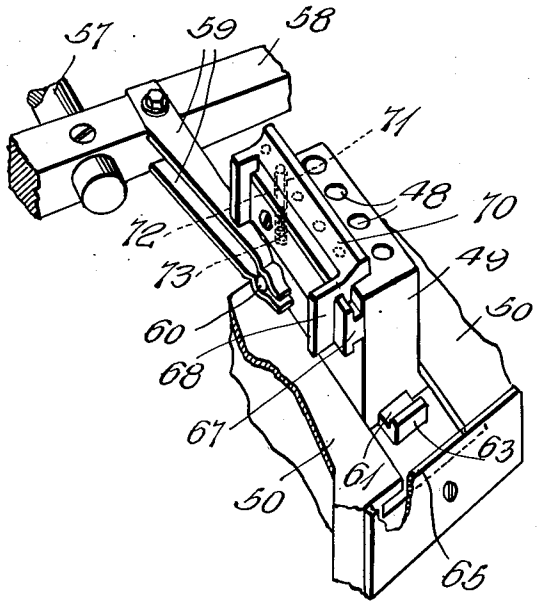


FIG. 6



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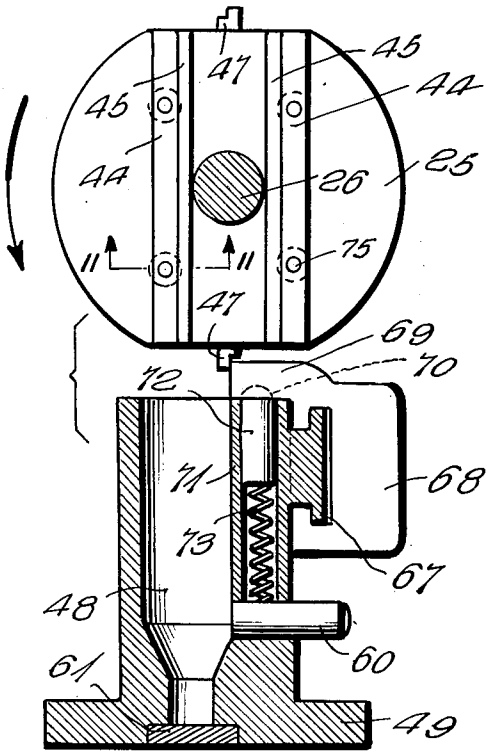


FIG. 8

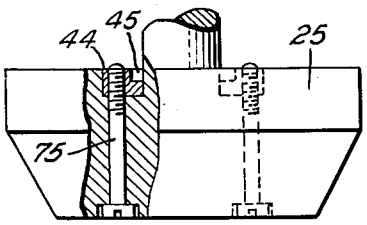


FIG. 11

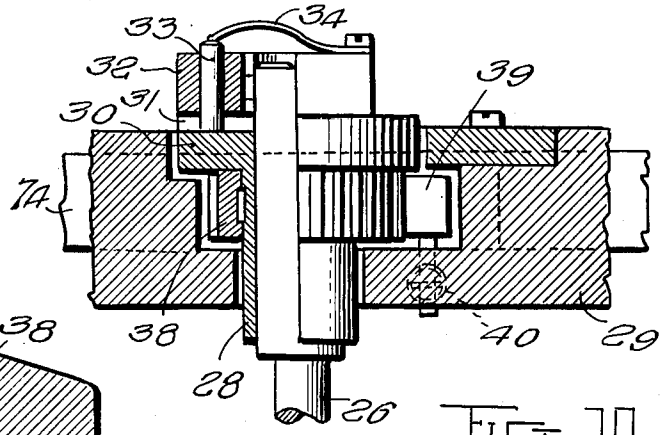
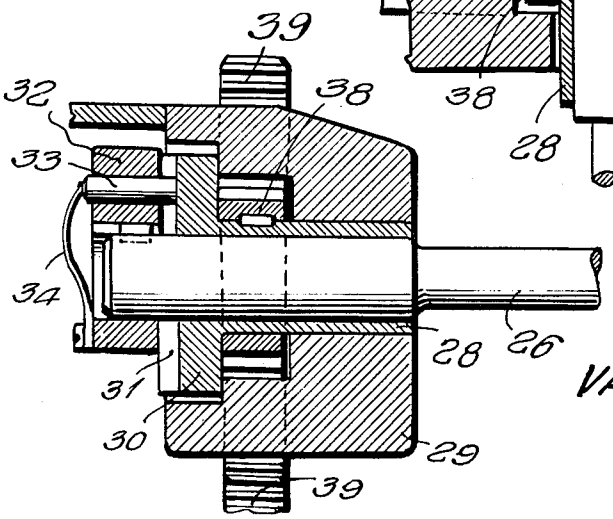


FIG. 10

FIG. 9



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UNITED STATES PATENT OFFICE

2,611,896

FEEDING MECHANISM FOR NAILING MACHINES

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Application July 8, 1947, Serial No. 759,608
In Germany October 30, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires October 30, 1963

6 Claims. (Cl. 1—39.1)

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This invention relates to a device for distributing nails to nailing machines, particularly for the manufacture of footwear, of the kind in which the nails are guided with the tips pointing downwards from a storage container via nail ramps, to rotatable reversing discs which reverse individual separated nails before passing them to their places of application.

An object of the invention is to provide improvements in devices of this kind, particularly in respect of increased reliability in the operation of the elements for distributing and guiding the nails while maintaining simple controllability of the number of nails fed (from zero to a maximum corresponding to the number of guide tubes) and simple adjustment of the individual components when changing over from one sort or size of nails to another.

According to the invention the elements serving for separating and reversing individual nails, usually rotatable discs, are no longer provided with a series of nail pockets running through the centre of each disc as hitherto, but have two parallel nail pockets extending across the entire front surface of the said disc, both said pockets being displaced from the axis of rotation of the disc.

A convenient arrangement is to have two nail pockets symmetrically arranged with respect to the axis of rotation of each reversing disc, which pockets come to lie alternatively in front of the pertaining nail ramp and above a distributor. The main advantage of this arrangement is that the reversing disc can be designed much smaller than can one with nail pockets that cross one another since nearly the whole diameter of the reversing disc is then available for receiving the longest nails.

With the reversing discs as hitherto used the diameter of each disc had to be slightly bigger than twice the length of the longest nail because each nail pocket running through the centre of the disc had to receive a nail in one end while discharging the previously received nail at the other end, the receiving and discharging of the nails taking place in a single vertical plane. As opposed to that, the eccentric disposition of the nail pockets according to the invention offers the advantage that the receiving of the nails takes place in a plane different from that in which the nails are discharged.

Further, the said novel arrangement of two nail pockets of the reversing disc offers the additional advantage of a very simple adjustability of the width of the nail pockets for various thicknesses of nails, by exchanging inserted pieces containing

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said pockets, whereas hitherto the entire reversing disc had to be changed for that purpose.

As further developments of the inventive idea, all of the other nail guide channels, including the nail ramps, are arranged so as to be adjustable in width in a simple manner, an independent regulation of each reversing disc with respect to the number of nails supplied is made possible; and the whole device is made safe against damage caused by defective or non-fitting nails or other causes of obstruction.

The foregoing and other features of the invention will be clearly understood from the following description of one embodiment which is illustrated by way of example on the accompanying drawings, whereon:

Fig. 1 is a perspective view of a nail-distributing station;

Fig. 2 represents a corresponding cross section;

Fig. 3 represents a partial cross section similar to the view shown in Fig. 2, but taken along another parallel plane and showing a detail of the driver of the distributing slide;

Fig. 4 represents a further partial cross sectional view similar to the view of Fig. 3, but taken along still another parallel plane and showing a detail of the driver of the storage container;

Fig. 5 is a plan, partly in section, of the drive of one of the reversing discs;

Fig. 6 shows the disposition of a distributor for the nails;

Fig. 7 is a lateral view, partly in section, of the distributor and the reversing discs;

Fig. 8 represents a cross section on an enlarged scale, taken substantially on line 8—8 of Fig. 7 through the distributor and the shaft of the reversing disc;

Fig. 9 shows on an enlarged scale a detail of the journaling means for the upper end of the shaft that controls the nail feed mechanism shown in Fig. 2;

Fig. 10 shows a detail on an enlarged scale of the upper end of the shaft that controls the nail feed mechanism shown in Fig. 5; and

Fig. 11 is a fragmentary cross sectional view taken on line 11—11 of Fig. 8.

The nail-distributing mechanism may consist of any number of individual stations arranged side by side and all designed in the same way, five such stations coming into consideration for the usual requirements, each of which is capable of feeding at each operational stroke of the nailing machine, that is at each revolution of its cam shaft a predetermined maximum number of nails which for example amounts to four in the

device now to be described. This device, therefore yields, with five working stations, a maximum number of 20 nails. However, the maximum number of nails available at each working stroke is not limited since by a further increase of working stations a further increase is possible without any difficulty.

In the drawings one working station only is shown for the sake of clarity, but it is to be understood that all the stations are arranged on a common frame 1 which is carried by a support (not shown) of the nailing machine. On pivots 2 (Figs. 1 and 2) of the frame 1 a storage container 3 for the nails is pivoted for oscillation. The bottom of the container has the shape shown, i. e. the part 4 thereof that is nearer to the pivot 2 is corrugated whereas the part 5 thereof is bent downwards with respect to the part 4. In the troughs of the corrugations of the bottom part 4 there are recesses 6 the number of which corresponds to the number of working stations so that one recess corresponds to one each of the working stations. In each of these recesses 6 there are two ledges 7 and 8 of which for example the ledge 7 is stationary whereas the ledge 8 is transversely shiftable. Between the ledges 7 and 8 there is a gap 9 the width of which can be adjusted by the transverse shifting of the ledge 8. The nails drop into the said gap 9, with their tips pointing downwards and so that they cling by their heads on the ledges. The sloping side walls of the corrugated bottom part 4 assist the fall of the nails into the gap 9. From the storage container 3 the nails emerge past a disc 10 which has in its circumference a series of recesses 11 corresponding to various shapes of nail heads. These recesses prevent nails with too big a head from leaving the container. The disc 10 is rotatably attached to the front wall of the container 3 and can be fixed with any selected recess 11 in the operative position immediately above the aforesaid gap 9 by means of a knurled nut 12.

Rocking movement of the storage container 3 about the pivots 2 is derived from a cam 13 the shape of which is shown in Fig. 4. This cam is keyed on a cam shaft 14 and controls the movement of the storage container through a follower roller 15, a lever 16 pivoted about a pivot 17, and a pull rod 18. During each rotation of the shaft 14 the storage container accordingly performs one complete to-and-fro rocking movement, the upward stroke however not being effected uniformly due to the shape of the cam disc 13, as was the case with devices of this kind hitherto. At the beginning of the upward stroke there is an acceleration up to a position in which the gaps 9 approximate the gradient of the nail ramp 19, and from here up to the highest position attained by the container a retardation takes place. In the first phase of the said stroke the nails previously engaged into the gap 9 begin to slide and reach the nail ramp past the disc 10 while the nails heaped up during this first phase in the part 5 still remain at rest. In the subsequent retarded phase of the upward stroke of the storage container 3, nails are tumbled from the part 5 into the corrugated part 4 where by reason of the sloping walls of this part they drop into the gap 9 and hang by their heads. For the most part these nails do not glide out of the storage container because now they have heaped up in the corrugated part 4, which prevents them from gliding freely. However sufficiently numerous nails will have engaged themselves in the gap 9,

and at the return stroke of the storage container, which is carried out uniformly, all of the supernumerary nails fall back into the part 5, whereas the nails that remain hanging in the gap 9 are ready to glide out freely at the upward stroke of the next rocking movement and before nails tumbled again from the part 5 can obstruct their path.

Each nail ramp 19 is formed by two ledges 20 and 21 of which for example the ledge 20 is stationary whereas the ledge 21 is transversely shiftable. The stationary ledge 20 of each ramp is attached to a carrier 22 which is rigidly connected with the frame 1 whereas the adjustable ledge 21 of each ramp is attached to a slide rail 23 which is slidable in the said stationary carrier 22 by means of a hand dial 24 provided with a scale of nail diameters. Thus, by turning the hand dial 24 all of the nail ramps 19 are simultaneously adjusted in width. In a similar way the adjustability of all of the gaps 9 in the storage container 3 can be simultaneously effected.

At the lower end of each nail ramp 19 there is the reversing disc 25 which is carried by a shaft 26. One end of this shaft is journalled in a transverse piece 27 (see Figs. 1, 2 and 5) of the frame 1, and its other end passes through a sleeve 28 (Figs. 2, 5, 9 and 10) which is rotatably mounted in a transverse piece 29 of the frame 1 on a sleeve 28 equipped with a flange 30. The outwardly facing front surface of the flange 30 has two recesses 31 diametrically disposed each to the other into which a bolt 33 loaded by a spring 34 drops at each half turn of the flange. The end of the shaft 26 that projects beyond the flange carries a fixed ring 32 into which the said bolt 33 is inserted. This bolt drops with its chamfered end into the correspondingly shaped recesses 31 of the flange 30 in such manner that the bolt turns with the flange 30 in one direction, but slides off the oblique side flanks of the recesses 31 upon rotation in the opposite direction; it thus acts as a one-way clutch. As a precaution against rotation in the opposite sense, the shaft 26 with the reversing disc 25 is held fast by a bolt 35 (see Figs. 2 and 5) which is loaded by a spring 36 and which is inserted into a transverse portion 27 and is capable of dropping into chamfered grooves 37 on the front surface of the reversing disc 25 in the same way as the bolt 33 into the recesses 31 of the flange 30. The grooves 37 on the reversing disc 25, are diametrically disposed each to the other so that the bolt 35 can drop into the opposite groove after each turning of the disc 25 through 180°. The locking of the disc 25 by the bolt 35 prevents rotation of disc 25 and shaft 26 on which the disc is carried.

Rigid on the sleeve 28 is a toothed segment 38 which receives a to-and-fro rotational movement from the rack 39. The rack 39 is shiftably arranged in the aforesaid transverse piece 29 and is drawn downward by a spring 40 which is attached to the frame 1. Upward movement of the rack 39 is effected by a rail 74 which is moved up and down by a lever 41 pivoted at 17. The rocking movements of the lever are controlled with the intermediary of a follower roller 42 by a cam disc 43 arranged on the cam shaft 14. The rail 74 operates conveniently the racks of all of the individual working stations.

Upon movement of the rack 39 upwards the sleeve 28 turns in an anti-clockwise direction (viewed from the right hand side in Figs. 2 and 9) but without carrying therewith the bolt 33; and

during this movement the reversing disc 25 is secured against rotation by the bolt 35 engaging the notch 37 (see Fig. 2). Thus, the upward movement of the rack 39 imparts no turning motion to the shaft 26 and the reversing disc 25 but causes only a pre-tensioning of the spring 40. As the lever 41 returns to its lower position, the rack 39 sinks under the influence of the spring 40 and imparts a rotational movement in a clockwise sense to the sleeve 28. During this rotational movement the bolt 33 with the ring 32, the shaft 26 and the reversing disc 25 are carried therewith. It follows that intermittent drive of the reversing disc 25 is effected only by the pull of the spring 40 in coaction with rack 39 and toothed segment 38, so that if any sort of jamming occurs, as might be caused by a bent nail or intentionally by an abutment, the disc can stop without any damage being caused to the driving mechanism constituted by the coacting spring 40, rack 39 and toothed segment 38, the rack 39 remaining in its raised position and completing its downward movement only after removal of the obstacle whereupon the reversing disc completes a working stroke amounting to half a turn.

The reversing disc 25 is equipped on its front surface facing the nail ramp 19 with two exchangeable inserted sleeves or inserts 44 (see particularly Fig. 8) which are provided with nail pockets 45. In the embodiment shown two parallel nail pockets 45 are displaced from the axis of rotation of the reversing disc 25 and run across its entire front surface. The said inserts are inserted into the respective grooves in the front disc 25 (see Figure 11) and are then held by screws 75. The distances of the nail pockets from the axis of rotation of the disc are chosen so that in the state of rest of the disc one nail pocket 45 registers with the nail ramp 19, each nail pocket having such a shape that just a single nail can drop into it where it hangs by its head. When nails of a different size are to be used, the width of the gap 9 in the ramp 19 is conveniently adjusted by means of the hand dial 24, and the inserted sleeves 44 which are retained in the body of the reversing disc 24 by means of bolts 75, as shown in Figs. 8 and 11, are replaced by other sleeves 44 having appropriately dimensioned nail pockets 45. This can be done by loosening of the said screws, whereupon the one insertion 44 can be taken out of the respective groove and the other insertion can be then inserted there. In order to prevent the nail hanging down by its head from falling out at the subsequent turn of the disc 25, a cover 46 is provided on one side (Fig. 5) which is for example carried by the stationary ledge 20 of the nail ramp. A bolt 47 is passed through the center of the disc parallel to the inserted sleeves 44 (Fig. 7). This bolt projects at both sides from the disc and its purpose will be explained hereinafter.

As already mentioned, the reversing disc 25 performs its working movements by turning about 180° each time, so that each nail which has been received from the nail ramp 19 into the corresponding nail pocket 45 with the tip pointing down, comes into a position with the tip pointing upwards after a half turn of the disc. In this position the nail drops out of the nail pocket 45 into the opening 48 of a distributing slide 49 therebelow (see particularly Figs. 7 and 8). This slide is a prismatic body having a number of through openings 48 and is guided in a dovetailed guide 50 (Figs. 1, 2, 6–8) in the lower part of the frame 1. Movement of the distributing slide is controlled by a cam 51 through a follower roller 52 (Fig. 3), a lever 53 and a rod 57, the latter being slidable in the lower part of the frame 1. The lever 53 is conveniently connected through a pin 54 with a lever 55 turnable about the pivot 17. For the common control of all the working stations, the projecting end of the rod 57 (Fig. 6) operates a transverse bar 58 (Fig. 6) which is provided with resilient clamps 59 one for each of the distributing slides 49. Each clamp embraces a pin 60 attached to the pertaining slide. Such resilient clamping has the object of preventing damage to the driving mechanism in the event of an obstacle being encountered, for example if a nail jams between the reversing disc 25 and the distributing slide. This is effected simply by the slide being stopped, the clamping jaws 59 opening and releasing the pin 60.

The aforesaid openings 48 in the distributing slide 49 are covered from below by a plate 61 having a corresponding number of openings 62 of the same diameter and also the same pitch as the said openings 48. The plate 61 is longer by half the pitch of its openings than the body of the slide 49 itself and is equipped both ends with projections 63. The plate is under the influence of a spring 64 which is attached to the slide (Figs. 2 and 7). This spring presses the plate constantly towards the right and tends to hold it in the position shown in Fig. 2. In this position the openings 62 of the plate do not register with the openings 48 in the slide 49, so that the openings 48 are closed from below and the nails which have fallen into them from above cannot pass. However, when the slide 49 reaches its right end position, the protruding end 63 of the plate 61 hits a ledge 65 at the end of the guide 54 so that the plate 61 is stopped while the slide itself is shifted further by another half of the pitch of the holes 62. Then the openings 48 of the slide 49 register with the openings 62 of the plate 61, and the nails contained in the former pass through the latter into guide tubes 66 whence they go to a receiver (not shown) and are then brought in known manner into the nailing mechanism proper.

On one of the side faces of the slide 49 there is a T-guide 67 (Figs. 6 and 8) whereon an adjusting body 68 is arranged to slide, this body having a projection 69 extending along the upper surface of the slide. On the lower side of this projection there are recesses 70 which have the same pitch as the openings 48 but their number exceeds the number of the said openings by one.

A selected recess is engaged by the spring actuated detent 72 which is yieldably projected by coil spring 73 as shown more clearly in Fig. 8. The adjusting body 68 when engaged by detent 72 may be maintained in a selected position. The body 68 is readily accessible from the outside and can be adjusted by the operator by hand at will. The adjustment of body 68 on the slide 49 determines the number of nails that the reversing disc 25 feeds into the openings 48 during one revolution of the cam shaft 14. The body 68, by reason of its projection 69, obstructs the rotation of the reversing disc 25 as soon as the projection 69 is contacted by one of the linearly projecting ends of the bolt 47 during the step-by-step feed of the slide 49, as illustrated in Fig. 8. The contact between the projecting end of bolt 47 and the slide 49 constitutes an intervening obstacle or abutment that prevents the reversing disc 25 with its shaft 26 from performing its working cycle, and accordingly a nail is not fed. Under these conditions the rack 39 remains in its upper posi-

tion while subject to the tension of spring 40. If the body 68 is now so adjusted that the spring loaded detent 72 engages the extreme right hand recess 70 (Fig. 6), the projection 69 is restrained from contact with bolt 47 so that reversing disc 25 is not obstructed and can perform its entire working cycle during each revolution of the cam shaft 14 until all of the openings 48 have been filled with nails. If, however, the detent 72 engages the extreme left hand recess 70 as indicated in Figs. 2 and 6, the projection 69 is maintained in a position obstructing the turning of reversing disc 25 because bolt 47 contacts with projection 69. This same obstruction is maintained in all of the subsequent step-by-step movements of the distributor slide 49 toward the right so that a tensioning of the reversing disc 25 cannot take place at all, and none of the openings 48 are filled with nails. By adjusting the body 68 to a selected intermediate position the number of nails desired to be furnished during each revolution of the cam shaft 14 at any time can be selectively determined.

Thus it will be seen that the number of the nails to be furnished can be selectively determined for each revolution of the cam shaft 14 by adjustment of the body 68 at one operating position independently of other operating positions. Accordingly, with five operating positions, each including a four-opening distributor slide 49, it is possible to regulate in a very simple manner the number of nails to be furnished within limits of zero to twenty for each revolution of the cam shaft 14.

The operation of the described mechanism for each station is as follows:

The storage container 3 is, in its downwardly bent part 5, filled with nails, and the cam shaft 14 is set into motion. (At the first filling it is convenient to rock the storage container by hand several times in order that a number of nails be caught in the gap 9.) As the storage container 3 rises the nails slide out of the gap 9 past the disc 10 to the nail ramp 19; the number of nails which pass from the storage container to the nail ramp, or could pass thereto, is always greater than the maximum number of nails that can be consumed by the nailing machine proper so that after a few working strokes of the container the nail ramp 19 is filled with nails from top to bottom. The lowermost nail in the nail ramp 19 drops into the associated nail pockets 45, i. e., into the right hand one in Fig. 8 of the reversing disc 25 where it hangs by its head. Then, when the reversing disc 25 performs a half turn in the direction of the arrows in Fig. 8, this nail pocket 45 with the nail therein head-down comes to rest above the distributing slide 49, i. e., into the position of the left-hand pocket 45 on Fig. 8, and the reversed nail drops head first into the corresponding opening 48 of the slide. At the same time the second nail pocket 45 now the right-hand one in Fig. 8 which lies in front of the nail ramp 19, receives another nail. At the next half-turn of the reversing disc 25 the distributing slide 49 performs a feed movement towards the right (Fig. 2) viz. a sliding movement by one pitch of the openings 48 so that at the end of this half-turn of the disc 25 the next separated and reversed nail drops into the next adjacent opening 48 of the distributing slide 49. This process repeats itself at each rotation of the cam shaft 14, i. e. at each working stroke of the entire distributor mechanism, the number of repetitions of this process being equal to the maximum number of nails which can be delivered by one of the distributor stations at each said rotation, i. e., four in the described case.

It follows clearly that the feed movement of the distributing slide 49 does not depend upon whether the reversing disc 25 turns, i. e. whether nails are being furnished or not. Until the distributing slide 49 reaches its extreme right position the openings 48 remain closed from below by the plate 61, and the nails which have been introduced into these openings cannot leave. The slide 49 upon approaching its right end position the plate 61 is shifted when its projection 63 is arrested by the ledge 65 causing the openings in the plate to register with the openings in the slide 49 and thus permitting the nails to drop into the tubes 66.

The regulation of the number of nails to be delivered during each revolution of the cam shaft 14 is effected, as described hereabove, by adjusting the body 68. The latter influence only the rotation of the reversing discs 25 without changing the manner of operation of the distributing slides 49.

The disposition of the described mechanism for the purpose of allowing the use of nails of varying thickness is based on the simple adjustment of the gaps 9 and the nail ramps 19 and on the exchange of the inserted sleeves 44 in the reversing discs 25. If it is desired to work at the same time with nails of two different lengths, it is sufficient for that distributor station or for those stations which are intended to deliver nails of different size, to separate the respective gap or gaps in the storage container 3 from the other gaps by a partition wall which then divides the container 3 into separate spaces each of which can be filled with different nails.

Throughout the claims I have referred to the ramp heretofore described in the specification as a raceway in order to more specifically define the invention. Also, while I have described the association of but a single disc, ramp and distributor slide, it will be understood that my invention is applicable as heretofore explained to a multiple arrangement of these components.

Thus, according to the invention all requirements of a nail distributing device of the kind referred to are fulfilled in the simplest way. To those skilled in the art it will now be evident that according to particular purposes of application various adaptations of the illustrated embodiment can be made within the scope of the invention.

I claim:

1. A device for distributing nails to a nailing machine, particularly for the manufacture of footwear, comprising a nail storage container, a raceway for guiding the nails with their tips depending downwardly in a linear path from said container, a rotatable nail reversing disc located at the discharge end of said raceway, the disc having two parallel nail-receiving pockets extending across the entire front surface of the disc, both of said pockets being displaced from the axis of rotation of the disc, a nail-receiving distributor located below the disc, a rack and pinion drive means for rotating said disc, and a spring for biasing the rack to a retracted position after each cycle of operation of said disc.

2. A device for distributing nails to a nailing machine, particularly for the manufacture of footwear, comprising a nail storage chamber, a raceway for guiding the nails with their tips depending downwardly from the storage con-

tainer, a rotatable nail reversing disc at the discharge end of the raceway, said disc having two exchangeable inserts, each insert including nail-receiving pockets extending in spaced parallel paths across the entire face of the disc and displaced from the axis of rotation of said disc for receiving nails in one plane and discharging the nails in a different plane, and wherein each pocket is adapted to receive various sizes of the nails to be distributed.

3. A device for distributing nails to a nailing machine, particularly for the manufacture of footwear, comprising a nail storage chamber, a raceway for guiding the nails with their tips depending downwardly from the storage container, a rotatable nail reversing disc at the discharge end of the raceway, said disc having two exchangeable inserts, each insert including nail-receiving pockets, and wherein each pocket is adapted to receive various sizes of the nails to be distributed, rack and pinion means for imparting increments of 180° rotation to said disc, and means for latching said disc in successive 180° positions.

4. A device for distributing nails to a nailing machine, particularly for the manufacture of footwear, comprising a nail storage chamber, a raceway for guiding the nails with their tips depending downwardly, a rotatable nail reversing disc at the discharge end of the raceway, the disc having nail-receiving pockets displaced from the axis thereof with respect to the axis of rotation of the disc, a distributing slide below the disc with openings therein for individual nails, means for advancing the slide step by step in increments equal to the pitch of the openings, cam drive means for the distributing slide and interposed resilient members operative to interrupt the movement of the slide automatically upon abutment with an obstacle.

5. A device for distributing nails to a nailing machine, particularly for the manufacture of footwear, comprising, a nail storage container, a raceway extending from said container, a rotatable nail reversing disc at the discharge end of the raceway, the disc having two parallel nail-receiving pockets extending across the entire front surface of the said disc and displaced from the axis of rotation of the disc, a distributing slide below the disc with openings for individual nails, means for advancing the slide step by step by amounts equal to the pitch of the openings, and an adjusting body for each distributing slide cooperating with the said reversing disc to prevent further turning of the latter when it reaches a predetermined position.

6. A device for distributing nails to a nailing machine, particularly for the manufacture of footwear, comprising a nail storage chamber, a raceway for said container, a rotatable nail reversing disc at the discharge end of the raceway, the disc having two parallel nail-receiving pockets extending across the entire front surface of the disc, said pockets being displaced from the axis of rotation of the disc, a distributing slide below the disc with openings therein for individual nails, means for advancing the slide step by step by amounts equal to the pitch of the openings therein, an adjusting body for said distributing slide cooperating with said reversing disc to prevent further turning of the latter when it reaches a predetermined position, a rotatable shaft extending from said rotatable nail reversing disc, a pinion carried by said shaft, a rack engaging said pinion, spring means for maintaining said rack in a predetermined position and means operating against the tension of said spring means for linearly moving said rack for operating said pinion and imparting rotation to said disc.

VÁCLAV CHMELAŘ.

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