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(54) Feed device for headed fasteners.

(57) A feed device for headed fasteners, e.g. tacks, nails and the like, comprises a plurality of raceways (406), a separator device (408) comprising a separator bar arrangement movable transversely of the outlet ends of the raceways (406), and a collector arrangement (422) disposed beneath the separator device (408) and having a plurality of openings for receiving transferred fasteners. For facilitating variation of the number of fasteners to be separated and fed, the bar arrangement comprises two cooperating but independently operated slide bars (410,412) for picking off leading fasteners from outlet ends of the raceways (406) and supplying the thus picked off fasteners to apertures (420) for onward supply to a desired location, e.g. tacker units (300) of a heel seat and side lasting machine for use in the manufacture of shoes. By reason of the independent operation of the slide bars (410,412), the number of fasteners supplied can thus be varied. If desired, the control of the operation of the slide bars can be by electronic control means.

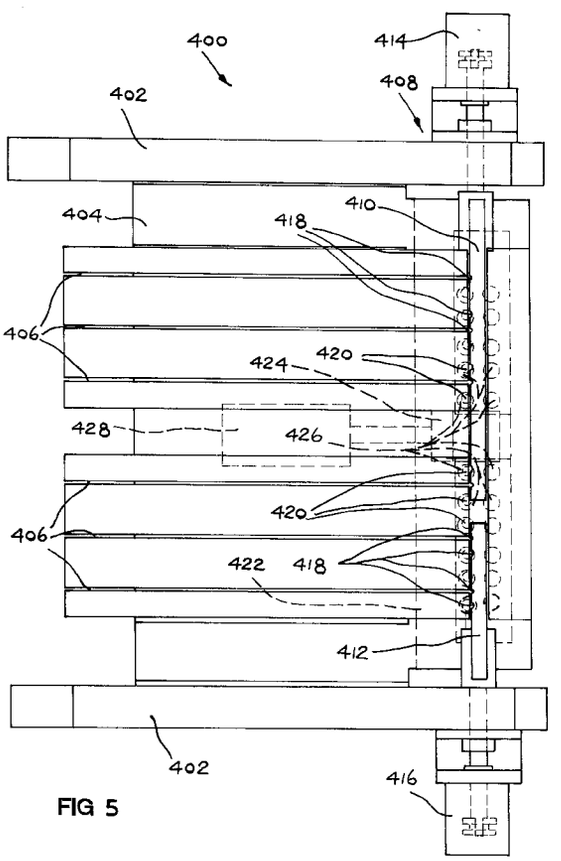

FIG 5

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This invention is concerned with a feed device for headed fasteners, e.g. tacks, nails and the like, especially, but not exclusively, for use in a heel seat lasting machine, and also with heel seat lasting machines incorporating a feed device for headed fasteners.

One feed device for headed fasteners is currently supplied on commercially available heel seat and side and heel seat lasting machines supplied by the Applicants and comprises a feed device for headed fasteners, e.g. tacks, nails and the like, comprising a plurality of raceways along each of which headed fasteners can pass, supported by the heads thereof, from a supply to an outlet end, a separator device comprising a bar arrangement movable between first and second positions transversely of the outlet ends of the raceways and provided with a plurality of recesses, each associated with one of the raceways, for receiving a headed fastener, the arrangement being such that by moving the bar arrangement between its first and second positions each recess is moved past the outlet end of its associated raceway and the leading headed fastener at said outlet end is transferred to the recess, together with drive means for effecting movement of the bar arrangement between said positions, and a collector arrangement disposed beneath the separator device and having a plurality of openings, one associated with each recess, for receiving the transferred fastener from its associated recess, when the bar arrangement is moved as aforesaid, from which opening the fastener can then be supplied to a desired location. More particularly, in the commercially available device a maximum number of headed fasteners which can be supplied in a cycle of operation of the machine is twenty-two, and in cases where less than twenty-two are required (and conventionally in some instances, according to the style and/or size of the shoe to be lasted, eighteen or indeed fourteen fasteners are required), it is necessary for the operator to cause certain of the raceways to be blocked off, thus to prevent the supply of fasteners where they are not required.

Whereas when a lasting machine using such a feed device has a dedicated operator, the operation of blocking of the raceways, even though time-consuming, can be readily accommodated as part of the work of the operator. In cases where a more automated process is being utilised, e.g. which will dispense completely with an operator for the lasting machine, or indeed where the operator looks after not only the heel seat lasting machine (or side and heel seat lasting machine) but also the pulling over and forepart lasting machine and has time only to load the shoe on the shoe support of the heel seat lasting machine, reliance on the operator to block off the raceways would be significantly disruptive to the work flow.

It is thus one of the various objects of the present invention to provide an improved feed device for headed fasteners wherein variations in the number of fasteners required to be fed can be more readily accommodated.

It is another of the various objects of the present invention to provide an improved machine for lasting heel seat portions of shoes wherein the control of the number of fasteners to be driven into the shoe bottom is enhanced.

The first of the above objects is resolved in accordance with the invention, in a feed device as set out in the second paragraph above, in that the bar arrangement comprises a plurality of sections, each having a plurality of recesses, and the drive means comprises a plurality of motors, one associated with each of the sections, and further in that control means is provided for selectively controlling the operation of said motors, and thus the movement of the sections of the bar arrangement, according to the number of headed fasteners required to be fed.

It will be appreciated that, by effectively "splitting" the bar arrangement into a plurality of sections, it is thus now possible, by selecting only certain of the sections, to vary the number of headed fasteners to be fed. Although, moreover, it may be desirable in some instances to use more than two sections, it has been found satisfactory in fact for the bar arrangement to comprise two sections and indeed for the two sections to be movable along a rectilinear path past the outlet ends of the raceways, the arrangement being such that one of said sections has a plurality of recesses determined according to a minimum number of headed fasteners required to be fed, and the other of said sections has a plurality of recesses which, in combination with those of said one of said sections, provide for a maximum number of headed fasteners required to be fed.

In the commercially available feed device referred to above the collector arrangement comprises a fastener-receiving element having a plurality of sets of openings and movable relative to the bar arrangement between a plurality of positions to bring a selected set of openings into alignment with the recesses of the bar arrangement thus to receive the transferred fasteners therefrom into the selected openings when the bar arrangement is moved as aforesaid. In this way it is possible effectively to increase the number of fasteners which can be fed using the same number of raceways and recesses. In the feed device in accordance with the invention the collector arrangement conveniently also comprises a fastener-receiving element as described above. In this case, moreover, the control means controls the operation of the motors of the drive means, and thus the movement of the sections of the bar arrangement, selectively for each position of the fastener-receiving element, according to the number of headed fasteners required to be fed. More particularly, for a minimum number of headed fasteners required to be fed the control

means causes movement of said one of said sections of the bar arrangement between its first and second positions to be effected for each position of the fastener-receiving element without any such movement of said other of said sections being effected, for a maximum required number both of said sections are so moved for each position of the fastener-receiving element, and for an intermediate required number said one of said sections is moved as aforesaid while said other of said sections is so moved for a selected one of the two positions of the fastener-receiving element only.

Conveniently, and as in the commercially available feed device, the fastener-receiving element of the collector arrangement has two positions and the operation of the feed device is such that for a minimum required number of headed fasteners to be fed the control means causes movement of said one of said sections between its first and second positions to be effected for each position of the fastener-receiving element without any such movement of said other of said sections being effected, for a maximum required number both of said sections are so moved for each position of the fastener-receiving element, and for an intermediate required number said one of said sections is moved as aforesaid while said other of said sections is so moved for a selected one of the two positions of the fastener-receiving element only.

If desired, for further reducing the space requirements of the feed device, furthermore, each raceway or one or more selected raceways may have associated therewith two recesses in the associated section of the bar arrangement, each recess having associated therewith an opening in the fastener-receiving element. In such a case, as either of the bar arrangement sections is moved from its first to its second position one of the recesses picks off the leading tack from the end of its associated raceway and deposits it in its associated opening and then on the return movement from the second to the first position of the bar arrangement the other recess picks of the leading tack from the raceway and deposits it in its own associated opening.

It will thus be appreciated that using the feed device in accordance with the invention, it is now possible automatically to control the number of fasteners to be supplied by the feed device, and indeed such an arrangement lends itself to preprogramming, especially, but not exclusively, when used in a machine for lasting heel seat portions of shoes where firstly the shoe may be presented automatically to such machine and secondly the number of fasteners required will vary according to the style and/or size of the shoe, which information may also be pre-programmed into the machine control.

The invention also provides, in another of its several aspects, a machine for lasting heel seat portions of shoes comprising a shoe support for supporting a shoe, comprising a shoe upper on a last and an insole on the last bottom, a wiper assembly for wiping lasting marginal portions of the shoe upper in the heel seat region thereof over and pressing them against corresponding marginal portions of the insole of such shoe, fastener-inserting means associated with the wiper assembly for driving headed fasteners through the wiped-over lasting marginal portions and thus securing them to the corresponding marginal portions of the insole while thus pressed thereagainst, and a feed device as set out above for feeding headed fasteners individually to the fastener-inserting means according to the number of fasteners required to be inserted.

More particularly, there is described in our copending UK Patent Application No. 9225487.9 a machine for lasting heel seat portions of shoes generally as referred to above, wherein the fastener-inserting units are individually actuatable under the control of electronic control means by which, inter alia, the units may selectively be actuated and rendered inactive, in accordance with a programmed instruction selected according to the style and/or size of the shoe to be lasted. In said machine, however, it was necessary for the operator to block off the supply of fasteners to such units in the manner previously referred to.

To overcome this problem, and with the second object as set out above in mind, the invention more particularly provides a machine for lasting heel seat portions of shoes comprising a shoe support for supporting a shoe, comprising a shoe upper on a last and an insole on the last bottom, a wiper assembly for wiping lasting marginal portions of the shoe upper in the heel seat region thereof over and pressing them against corresponding marginal portions of the insole of such shoe, and fastener-inserting means, comprising a plurality of fastener-inserting units, associated with the wiper assembly for driving headed fasteners through the wiped-over lasting marginal portions and thus securing them to the corresponding marginal portions of the insole while thus pressed thereagainst, wherein the fastener-inserting units are individually actuatable under the control of electronic control means by which, inter alia, the units may selectively be actuated and rendered inactive, in accordance with a programmed instruction selected according to the style and/or size of the shoe to be lasted, said machine further comprising a feed device for supplying headed fasteners to the fastener-inserting means, said device comprising a plurality of raceways along each of which headed fasteners can pass, supported by the heads thereof, from a supply to an outlet and, a separator device comprising a bar arrangement movable between first and second positions transversely of the outlet ends of the raceways and provided with a plurality of recesses, each associated with one of the raceways, for receiving a headed fastener, the arrangement being such that by moving the

bar arrangement between its first and second positions each recess is moved past the outlet end of its associated raceway and the leading headed fastener at said outlet end is transferred to the recess, together with drive means for effecting movement of the bar arrangement between said positions, and a collector arrangement disposed beneath the separator device and having a plurality of openings, one associated with each recess, for receiving the transferred fastener from its associated recess, when the bar arrangement is moved as aforesaid, from which opening the fastener can then be supplied to a desired location, said machine being characterised in that the bar arrangement of the feed device comprises a plurality of sections, each having a plurality of recesses, and the drive means thereof comprises a plurality of motors, one associated with each of the sections, and further in that the electronic control means also controls the operation of the motors of the drive means of the feed device, and thus the movement of the sections of the bar arrangement thereof, whereby headed fasteners are supplied only to those fastener-inserting units selected for actuation prevented, according to the number of fasteners required to be driven into the shoe bottom, as determined by the style of shoe to be lasted, and further whereby those units to which no fasteners are to be supplied can be rendered inoperable.

It will thus be appreciated that using such a machine the number of fasteners to be supplied can be set and the number of units to be operated can be accordingly adjusted by the same control, with consequent benefits, in addition to those of the feed device per se, in terms of more efficient operation of the machine and its programming. Moreover, such an arrangement lends itself to the use of control means comprising computer control means including a memory for storing data sets relating to each style of shoe the heel seat of which is to be lasted using the machine, and to the number of fasteners to be supplied by the feed device for insertion as aforesaid.

There now follows a detailed description, to be read with reference to the accompanying drawings, of one feed device in accordance with the invention and a machine for lasting heel seat portions of shoes incorporating such a device, said machine also being illustrative of the invention in its machine aspects. It will of course be appreciated that this device and this machine have been selected for description merely by way of non-limiting example of the invention.

In the accompanying drawings:-

Fig. 1 is a plan view, partly in section, of a wiper head of the machine in accordance with the invention, showing opposite halves (taken along a longitudinal centre line of the wiper head) in a retracted, rest, condition and an advanced, operative, condition;

Fig. 2 is a view in side elevation of parts of the machine shown in Fig. 1;

Fig. 3 is a view in side elevation of a fastener-inserting unit of said machine;

Fig. 4 is an end view, partly in section, of the feed device for headed fasteners in accordance with the invention;

Fig. 5 is a plan view taken along the arrow V of Fig. 4; and

Fig. 6 is a circuit diagram illustrating a pneumatic circuit of fastener-inserting means of the machine.

The feed device shown in Figs. 4 and 5 forms part of a so-called heel seat and side lasting machine in the operation of which heel seat and side portions of a shoe upper, which is carried on a last having an insole on the last bottom and which has already been lasted in the toe region thereof, are lasted. More particularly, the feed device is especially, but not exclusively, for use in a machine as described in EP-A-0 511 811 (which is a machine by which lasted marginal portions of the upper which have been wiped over and pressed against corresponding marginal portions of the insole of a shoe in the heel seat and side regions thereof are secured by adhesive), but modified as described in our co-pending European Patent Application No. 93309565.5 (which describes a modification of said machine whereby the lasting marginal portions in the heel seat region are secured to corresponding marginal portions of the insole by means of headed fasteners, more particularly small fasteners known as tacks). Thus, in the machine in accordance with the present invention while the general arrangement of the machine and also the specific construction of the shoe support, side lasting instrumentalities and heel band mechanism (respectively designated 20,230 and 150 in EP-A-0 511 811) are the same as in the machine described in said EP-A, the wiper assembly is generally similar to that described in EP-A-0 091 299, as is also the manner in which over-wiped lasting marginal portions of the shoe upper are secured to corresponding portions of the insole in the heel seat region, viz. by means of tacks rather than by adhesive. It should however be noted that, bearing in mind that the adhesive-applying means (designated 190 in EP-A-0 511 811) are retained in the machine of the present invention in order to apply adhesive along the side portions of the shoe, if desired adhesive can also still be applied to the heel seat portion of the shoe, as described in EP-A-0 511 811, and prior to the insertion of tacks. The application of adhesive in this manner serves not only to consolidate the fixing of the lasting marginal portions of the upper to corresponding marginal portions of the insole, but also provides a seal therebetween, which may be desirable for certain applications, e.g. in the case of shoes on to the lasted bottoms of which a sole-and-heel unit is to be injection moulded.

Reliance is therefore placed upon the disclosure of EP-A-0 511 811 for details of the various parts of

the machine of the present invention which are common, and only those parts which are different will now be described in detail. (Where reference is made to a part which is common to both machines but not shown in the drawings of the present case, reference numerals taken from EP-A-0 511 811 are used, but in brackets.)

The machine in accordance with the invention thus comprises a shoe support (20) for supporting, bottom uppermost, a shoe comprising an upper on a last and an insole on the last bottom. In general it would be expected that the shoe will already have been toe-lasted and the machine of the present invention is then effective to last the remaining portions of the shoe, i.e. the heel seat and side portions. Mounted in a frame portion 250 (Fig. 1) of the machine is a wiper mechanism generally designated 170', which, as already mentioned, is generally similar except as hereinafter described to the wiper mechanism described in EP-A-0 091 299, and comprises a wiper head 172' mounted for movement towards and away from the shoe support 20 under the action of a double piston-and-cylinder arrangement 252 mounted on the frame portion 250. The wiper head supports a pair of wiper plates 174' which, under the action of a cam plate 176', effect a forward and inward wiping movement over the heel seat portion of the shoe bottom. The wiper head 172' is bodily movable into an operative position determined according to the desired position in which fasteners are to be driven into the backseam region of the heel seat of the shoe, as will be discussed later. More particularly, for effecting forward and inward wiping movement of the wiper plates 174' the cam plate 176' is formed with two cam grooves, one arranged at each side of a longitudinal centre line of the wiper head, in each of which run a pair of cam rolls 256, each pair being carried by a wiper carrier 258, and the two wiper carriers each supporting a wiper plate 174'. In addition, each wiper carrier 258 is provided with a part-circular groove 260 in which is accommodated a part-circular slide member 262, relative to which the wiper carriers, and thus the wipers 174', can slide about an axis at the centre of curvature of the member 262 and grooves 260. The slide member 262 is fixedly secured, in its central region, to a longitudinal slide member 264 which extends along the longitudinal centre line of the wiper head and carries a so-called stud 266 which is located at the centre of curvature of the slide member 262 and grooves 260, and about which the two wipers 174' thus can be caused to pivot under the action of the cam plate. For operating the wiper head to effect forward and inward wiping movement of the wiper plates 174', a piston-and-cylinder arrangement 268 is provided, mounted on an end plate of the wiper head, a piston rod 270 of said device supporting a block 272 to which are pivotally secured two links 274, one at each side of the longitudinal centre line of the wiper head. Each link 274 is pivotally connected in turn to a wiper carrier 258 on an axis coincident with that of the rearward (viewed from the shoe support) cam roll 256. In the operation of the wiper head, after it has been moved to its operative position under the action of the double cylinders 252, actuation of piston-and-cylinder arrangement 268 causes movement of the block 272 in a direction towards the shoe support and thus, through the links 274, corresponding movement also of the wipers 174'. The cam tracks 254 are so configured that in an initial portion of the movement both forward and inward wiping movement of the wipers 174' is achieved, namely by causing some movement of the wiper carriers relative to the member 262 but also causing said member to move forwardly, taking with it also the two slide members 262,264 and thus also the stud 266. For the second portion of the movement of the block 272, each cam track 254 has part-circular sections centred on the stud 266 and consequently in said second part of the movement the wiper carriers effect only radial movement of the wiper carriers, and thus of the wipers 174', about the stud 266. It will be appreciated that, using such an arrangement, the stud 266 is always brought under the action of the piston-and-cylinder arrangement 268 to the same position, hereinafter referred to as the "back tack" position, viz. the position at which tacks are driven into the backseam region of the heel seat portion of the shoe, regardless of the extent of the further movement of the wipers, which takes place radially only.

It will of course be appreciated that the degree of radial movement of the wipers 174' will be determined according to the size of the shoe being operated upon, and thus the desired tack pattern. To this end, there is associated with the piston-and-cylinder arrangement 268 a so-called "Hydrocheck" device 280, by which the speed of movement of the wiper head under the action of the piston-and-cylinder arrangement 268 can be controlled, the piston rod 270 of the latter arrangement carrying a lug 282 connected to a piston rod 284 of the Hydrocheck device 280 for this purpose. More particularly, the piston rod 284 carries two end stops 286, 288 which allow relative sliding movement to take place between the piston rod 284 and the lug 282 over a distance corresponding to the "forward and radial" movement of the wiper plates in an operating stroke of the arrangement 268. Thereafter, the lug 282 engages end stop 286 and, by moving the piston rod 284 with the piston rod 270, control the speed of approach of the wipers 174' over their "radial only" movement. The end stop 288 has a similar action on the return stroke. Also associated with the Hydrocheck device 280 is a linear potentiometer 290 which constantly monitors the position of the block 272, to which it is operatively connected, and thus monitors the amount of movement of the wiper plates, as will be discussed hereinafter.

The wiper assembly also comprises a base plate 292, spaced from the cam plate 176' for containing the various elements of the wiper head therebetween.

As already mentioned, the machine in accordance with the present invention is adapted for securing over-wiped lasting marginal portions of the heel seat portion of the upper to corresponding marginal portions of the insole by means of fasteners, more specifically in the present case tacks. To this end, the machine also comprises a plurality of fastener-inserting units, or tackers 300, each of which comprises two drivers 302. One of the tackers 300 is associated with the stud 266 and is mounted on the slide member 264 for movement with the stud while the remaining tackers 300 are arranged in two sets, one at each side of the longitudinal centre line of the wiper head, and each set of tackers is fixedly mounted on and thus for movement with the corresponding wiper carrier, in such a manner that in each case the driver is aligned with a corresponding aperture provided adjacent the leading edge portion of the stud 266 or of the appropriate wiper plate 174', as the case may be. The tackers 300 are all essentially of similar construction, and one only will now be described in detail with reference to Fig. 3.

The tacker shown in Fig. 3 comprises a mounting 304 having at its upper end a bracket 306 carrying a piston-and-cylinder arrangement 308. Secured to a piston rod 310 of said arrangement 308 is a hammer block 312, which is provided essentially for affording to the tacker a sufficient mass to be able to drive a tack under the action of the arrangement 308. Secured to the lower portion of the block 312 are the two drivers 302 arranged side-by-side. Carried at the lower end of the mounting 304, furthermore, is a block 314 having two longitudinal (i.e. heightwise) passages 316 along each of which a driver 302 can pass and into each of which a tack supply tube 318 opens. At the bottom of each block 314, furthermore, one aligned with each of the passages 316, are two tack-retaining devices generally designated 320, each comprising two jaws by which a tack supplied along the appropriate tack supply tube can be held in position until driven by the drivers 302 into the shoe bottom, the jaws of the device 320 opening to allow passage therebetween of both the tacks and the drivers. Such tack-retaining devices are of conventional construction.

The piston-and-cylinder arrangement 308 is pneumatically operated and, in order to supply pressurised air thereto, the machine in accordance with the invention comprises a pneumatic circuit incorporating a reservoir capacity for compressed air of six litres, said capacity being provided in the present case by two containers R1,R2 (Fig. 6). The pressure of compressed air thus contained is achieved from a factory source (which is usually in the order of 80psi (5.516 bar) but intensified by an intensifier I to a pressure of 100psi (6.895 bar). Associated with the arrangement 308, furthermore, is a solenoid valve SV80, SV81, SV81A ... SV85A, the operation of which is controlled in a manner to be described hereinafter, and the port sizes on both the inlet and exhaust sides of the arrangement 308 are such as to allow a sufficient quantity of air into the inlet side so as to maintain the applied pressure over the whole of the stroke of the drivers 302. In practice, it has been found that this can be achieved using essentially standard cylinders but with end caps having enlarged bores for both inlet and exhaust.

Since each tacker 300 is mounted for movement with its associated wiper plate 174' or, in the case of the "back tack" tackers, is mounted for movement with the stud 266, the positioning of the wiper plates 174' according to shoe size will ensure that the tackers are correctly located in relation to the portions of the shoe bottom into which they are to drive tacks. For controlling, inter alia, the end position of the wiper plates 174', therefore, the machine in accordance with the invention comprises electronic control means operable, in accordance with a programmed instruction, to control all the various functions of the machine according to the style and/or size of the shoe to be operated upon. Thus, the machine is provided with facilities (not shown, but conventional in machine control) for inputting the various data relating to shoe style and size. This may be by keyboard or, especially in the case of shoe size, by a measuring device (not shown) forming part of the shoe support (20). So far as concerns the end position of the wiper plates 174', moreover, from the data input a comparison value is calculated, being representative of the end position of the wiper plates, and this comparison value is then compared by the electronic control means with the output signal from the potentiometer 290, as the wiper plates are advanced under the action of piston-and-cylinder arrangement 268. When the two values being compared match, actuation of said arrangement 268 is discontinued, and thus the wiper plates are positioned in the correct position according to the style and size of the shoe. As already mentioned, furthermore, the "back tack" position of the stud 266 is not varied in this way, and thus the amount of forward movement of the wipers remains the same, but the amount of radial movement, and thus the tack pattern, is varied under the control of the potentiometer 290 in cooperation with the electronic control means.

It may of course be desirable from time to time to vary the "back tack" position lengthwise of the shoe bottom, e.g. according to the width of the lasting margin or for any other shoe-making consideration. Bearing in mind that the stud 266 is always moved to the same position in relation to the wiper head 172', however, it is thus necessary, in order to vary the position of the stud in relation to the shoe bottom, to vary the

position of the wiper head 172' as a whole in relation to the shoe. In the machine described in EP-A-0 511 811, the position of the wiper head is determined by the engagement of a block (178) engaging a rearward surface of the heel band (152), thus setting the relationship between the heel seat portion of a shoe gripped by the heel band and the wiper head. Moreover, provision is made in said machine for varying this relationship by means of a variably positionable stop pin 182, but such adjustment of the position of the stop pin is relatively difficult to achieve and in any event is intended for use only essentially in initially setting up the machine (since in the case of cement seat lasting the end position of the wiper plates is in any event not critical). In the machine in accordance with the invention, on the other hand, since the end position of the wiper plates 174' determines the tack pattern, provision is now made for the setting of the relationship between the rearward surface of the heel band and the wiper head 172' according to the style and/or size of the shoe to be operated upon under programmed control. To this end, in place of the heel band-engaging block (178) of the previous machine, there is now provided, for the same purpose, a V-block 330 pivotally mounted on a slide 332 supported for sliding movement in a slideway 334 on the underside of the base plate 292 of the wiper head 172'. Connected to a rearward end of the slide 332 is a lead screw 336 in such a manner that rotation of the lead screw effects sliding movement of the slide 332. For rotating the lead screw 336 an n.c. motor 338, more particularly a stepping motor, is carried on the frame portion 250 of the machine, an output shaft 340 of said motor being connected via a universal link 342 to the lead screw. Thus, operation of the stepping motor 338 is effective to cause sliding movement of the block 334 to take place relative to the wiper head, so that the position of the wiper head in relation to the heel band mechanism when the rearward face of the heel band is engaged by the block 330 will be varied accordingly. It will of course be appreciated that the electronic control means of the machine in accordance with the present invention utilises data supplied to it concerning the style and/or size of the shoe to be operated on in order to supply control signals to the stepping motor 338 in order to position the V-block 330 appropriately.

The electronic control means is also effective to control the operation of the tackers 300, more particularly the solenoid valves SV80, SV81, SV81A ... SV85A, whereby the insertion of tacks takes place in a sequential manner starting with the operation of the tacker 300 associated with the stud 266 and thereafter continuing with each pair of tackers 300, one at each side of the longitudinal centre line of the wiper head, away from the stud toewardly. In the circuitry shown in Fig. 6, solenoid valve SV80 is associated with the "back tack" tacker and operates the piston-and-cylinder arrangement 308 of said tacker when switched under the control of the electronic control means. With regard to the remaining solenoid valves SV81, SV81A ... SV85A, there are associated with each pair of solenoid valves SV81,81A, SV82,82A ... a pair of tackers 300, one tacker at each side of said longitudinal centre line, so that they are actuated simultaneously and under substantially the same pressure upon actuation of their associated pair of solenoid valves.

For supplying tacks to the tackers 300 the machine in accordance with the invention comprises the feed device, generally designated 400, which is illustrative of the invention in its feed device aspects and will now be described with reference to Figs. 4 and 5. Thus, the feed device in accordance with the invention comprises two brackets 402 mounted on the machine frame and supporting therebetween a casting 404 by which a plurality of (in this case six) raceways 406 are supported; the raceways are inclined so that tacks entering from a supply (e.g. a hopper (not shown)) at the upper end can pass along the raceway to a lower, outlet, end thereof. Mounted for sliding movement transversely of the outlet ends of the raceways 406 is a separator device generally designated 408, comprising first and second slide bars 410 and 412 (see Fig. 5). The slide bars have first and second drive motors 414,416 respectively, each for moving its associated slide bar transversely of the outlet ends of the raceways 406. More particularly, the first slide bar 410 has four raceways 406 associated therewith, while the second slide bar 412 has the remaining two raceways 406 associated therewith. Furthermore, arranged in the face of each slide bar 410 (or 412) facing the outlet ends of the raceways 406 and opening into an upper surface of the bar are a plurality of V-formed recesses 418 for receiving a tack therein. The first slide bar 410 has seven such recesses, one being associated with the most outwardly disposed raceway (uppermost in Fig. 5) associated with the first slide bar, and a pair of such recesses 418 being associated with each of the remaining raceways. The second slide bar 412 has four such recesses 418 arranged in pairs. The slide bars are each movable, independently of the other, under the operation of their respective motors 414,416 between first and second positions; in the first position of each slide bar (shown in Fig. 5) one of each pair of recesses 418 is aligned with its associated raceway 406 and in the case of the most outwardly disposed raceway its associated recess is aligned therewith, while in the second position the other of each pair of recesses is aligned with its associated raceway and in the case of the most outwardly disposed raceway no recess is in opposed relationship therewith. In the operation of the feed device, therefore, when the slide bars are in a first position a leading tack from each raceway is transferred into each of the aligned recesses 418, while when the

slide bars are moved to their second position, again a leading tack from each raceway (other than in this case the most outwardly disposed raceway) is transferred to the other recess now aligned therewith.

For transferring onward each thus separated tack from its recess, furthermore, there is arranged in a forwardly extending portion of the casting 404 a plurality of (in this case, eleven) apertures 420 which are disposed beneath the ends of the raceways and through which tacks can pass. One such aperture 420 (also forming part of the separator device 408) is associated with the most outwardly disposed raceway 406, while in the case of each other raceway two such apertures are associated therewith, one at either side; in each case, furthermore, the aperture is spaced from the outlet end of its associated raceway by a distance equal to the distance moved by the slide bars 410,412 from their first to their second positions. It will thus be appreciated that in this way as the slide bars 410,412 are moved from their first to their second position in each case the tacks accommodated in the recesses therein are transferred to the corresponding aperture 420, and further upon the slide bars moving from their second to their first positions, again the tacks received in the other recesses of each pair are transferred to their corresponding apertures 420. It will thus be appreciated that by moving the first slide bar 410 from its first to its second position and back, fourteen tacks can be supplied through the apertures 420 associated therewith, while by moving the second slide bar from its first to its second position and back eight tacks can be transferred, while if the second slide bar is moved only either from its first to its second position or from its second to its first, four tacks will be transferred. In this way, therefore, it will be apparent, either fourteen, eighteen or twenty-two tacks can be transferred in a single operation of the separator device 408.

The feed device in accordance with the invention further comprises a collector arrangement generally designated 422, which is disposed beneath the separator device 408 and comprises a fastener-receiving element 424 having a plurality of (in this case, two) rows of openings 426, each row having a plurality of (in this case, eleven) openings. The element 424 is movable fore-and-aft, i.e. parallel to the direction the direction of movement of tacks along the raceways 404, thus selectively to bring one of the rows of openings 426 into alignment with the underside of the apertures 420 formed in the casting 404; to this end, the device comprises a motor 428. In the operation of the machine, therefore, between the movement of the slide bars from their first to their second positions and the movement thereof back from their second to their first positions, the motor 428 is operable to move the element 424 to bring the other (or another) row of openings 426 into alignment with the apertures 420 to receive the second quantity of tacks. The openings 426, further, open into the supply tubes 318 (Fig. 3) associated with the various tackers 300.

It will thus be appreciated that using the feed device in accordance with the invention it is now possible, by reason of the independent control of the motors 414,416 and the consequent facility of varying the number of tacks being separated by the feed device, reliably to control the number of tacks supplied to the tackers 300. Moreover, by controlling the operation of the motors 414,416 through the electronic control means of the machine, the same data by which the operation of the motors 414,416 is controlled can be used for controlling the operation of the tackers 300. One of the advantages of this arrangement is that in the event that, say, fourteen tacks have been selected, then the last two pairs of tackers 300 are not actuated. The effect of this is that the drivers of those tackers are therefore not actuated and consequently there is no risk of damage being caused to the over-wiped lasting marginal portion and/or to the insole by any impact from the driver head itself, which often occurs where, instead of de-actuating the drivers, the supply of tacks to the drivers is merely prevented. This may be especially important in cases where, following the lasting operation, the shoe is completed by injection moulding a sole-and-heel unit onto the bottom of the lasted shoe, since there is a tendency for the injection moulded material to find its way through any orifices left in the shoe bottom and appear on the inside of the shoe, leading to an unsightly, if not indeed an unacceptable, appearance in the finished shoe.

In determining the tack pattern for a given shoe, it is only necessary using the machine in accordance with the invention to determine the pattern for a model size. Thereafter, for different sizes of shoe in the same style it is possible to effect a grading operation using the electronic control means in a manner which is generally well known in shoe-making practice. The comparison signal produced by the electronic control means for comparison with the signal from the potentiometer 290 will in fact be determined by "grading" rules from the data obtained using the model size for the style of shoe.

Claims

1. A feed device for headed fasteners, e.g. tacks, nails and the like, comprising

   a plurality of raceways along each of which headed fasteners can pass, supported by the heads thereof, from a supply to an outlet end,

   a separator device comprising a bar arrangement movable between first and second positions transversely of the outlet ends of the raceways and provided with a plurality of recesses, each associated with one of the raceways, for re-

ceiving a headed fastener, the arrangement being such that by moving the bar arrangement between its first and second positions each recess is moved past the outlet end of its associated raceway and the leading headed fastener at said outlet end is transferred to the recess, together with drive means for effecting movement of the bar arrangement between said positions, and

a collector arrangement disposed beneath the separator device and having a plurality of openings, one associated with each recess, for receiving the transferred fastener from its associated recess, when the bar arrangement is moved as aforesaid, from which opening the fastener can then be supplied to a desired location, characterised in that the bar arrangement comprises a plurality of sections, each having a plurality of recesses, and the drive means comprises a plurality of motors, one associated with each of the sections,

and further in that control means is provided for selectively controlling the operation of said motors, and thus the movement of the sections of the bar arrangement, according to the number of headed fasteners required to be fed.

2. A feed device according to Claim 1 wherein the collector arrangement comprises a fastener-receiving element having a plurality of sets of openings and movable relative to the bar arrangement between a plurality of positions to bring a selected set of openings into alignment with the recesses of the bar arrangement thus to receive the transferred fasteners therefrom into the selected openings when the bar arrangement is moved as aforesaid,

characterised in that the control means controls the operation of the motors of the drive means, and thus the movement of the sections of the bar arrangement, selectively for each position of the fastener-receiving element, according to the number of headed fasteners required to be fed.

3. A feed device according to Claim 1 or Claim 2 characterised in that the bar arrangement comprises two sections movable along a rectilinear path past the outlet ends of the raceways,

and in that one of said sections has a plurality of recesses determined according to a minimum number of headed fasteners required to be fed, and the other of said sections has a plurality of recesses which, in combination with those of said one of said sections, provide for a maximum number of headed fasteners required to be fed.

4. A feed device according to Claim 3 when tied to Claim 2 wherein the fastener-receiving element of the collector arrangement has two positions, characterised in that for a minimum required number of headed fasteners to be fed the control means causes movement of said one of said sections between its first and second positions to be effected for each position of the fastener-receiving element without any such movement of said other of said sections being effected, for a maximum required number both of said sections are so moved for each position of the fastener-receiving element, and for an intermediate required number said one of said sections is moved as aforesaid while said other of said sections is so moved for a selected one of the two positions of the fastener-receiving element only.

5. A machine for lasting heel seat portions of shoes comprising

a shoe support for supporting a shoe, comprising a shoe upper on a last and an insole on the last bottom,

a wiper assembly for wiping lasting marginal portions of the shoe upper in the heel seat region thereof over and pressing them against corresponding marginal portions of the insole of such shoe,

fastener-inserting means associated with the wiper assembly for driving headed fasteners through the wiped-over lasting marginal portions and thus securing them to the corresponding marginal portions of the insole while thus pressed thereagainst, and

a feed device according to any one of the preceding Claims for feeding headed fasteners individually to the fastener-inserting means according to the number of fasteners required to be inserted.

6. A machine for lasting heel seat portions of shoes comprising

a shoe support for supporting a shoe, comprising a shoe upper on a last and an insole on the last bottom,

a wiper assembly for wiping lasting marginal portions of the shoe upper in the heel seat region thereof over and pressing them against corresponding marginal portions of the insole of such shoe, and

fastener-inserting means, comprising a plurality of fastener-inserting units, associated with the wiper assembly for driving headed fasteners through the wiped-over lasting marginal portions and thus securing them to the corresponding marginal portions of the insole while thus pressed thereagainst,

wherein the fastener-inserting units are individually actuatable under the control of electronic control means by which, inter alia, the units may selectively be actuated and rendered inactive, in

accordance with a programmed instruction selected according to the style and/or size of the shoe to be lasted,
said machine further comprising

a feed device for supplying headed fasteners to the fastener-inserting means, said device comprising

a plurality of raceways along each of which headed fasteners can pass, supported by the heads thereof, from a supply to an outlet and,

a separator device comprising a bar arrangement movable between first and second positions transversely of the outlet ends of the raceways and provided with a plurality of recesses, each associated with one of the raceways, for receiving a headed fastener, the arrangement being such that by moving the bar arrangement between its first and second positions each recess is moved past the outlet end of its associated raceway and the leading headed fastener at said outlet end is transferred to the recess, together with drive means for effecting movement of the bar arrangement between said positions, and

a collector arrangement disposed beneath the separator device and having a plurality of openings, one associated with each recess, for receiving the transferred fastener from its associated recess, when the bar arrangement is moved as aforesaid, from which opening the fastener can then be supplied to a desired location, said machine being characterised in that the bar arrangement of the feed device comprises a plurality of sections, each having a plurality of recesses, and the drive means thereof comprises a plurality of motors, one associated with each of the sections,
and further in that the electronic control means also controls the operation of the motors of the drive means of the feed device, and thus the movement of the sections of the bar arrangement thereof, whereby headed fasteners are supplied only to those fastener-inserting units selected for actuation prevented, according to the number of fasteners required to be driven into the shoe bottom, as determined by the style of shoe to be lasted, and further whereby those units to which no fasteners are to be supplied can be rendered inoperable.

7. A machine according to Claim 6 characterised in that the control means comprises computer control means including a memory for storing data sets relating to each style of shoe the heel seat of which is to be lasted using the machine, and to the number of fasteners to be supplied by the feed device for insertion as aforesaid.

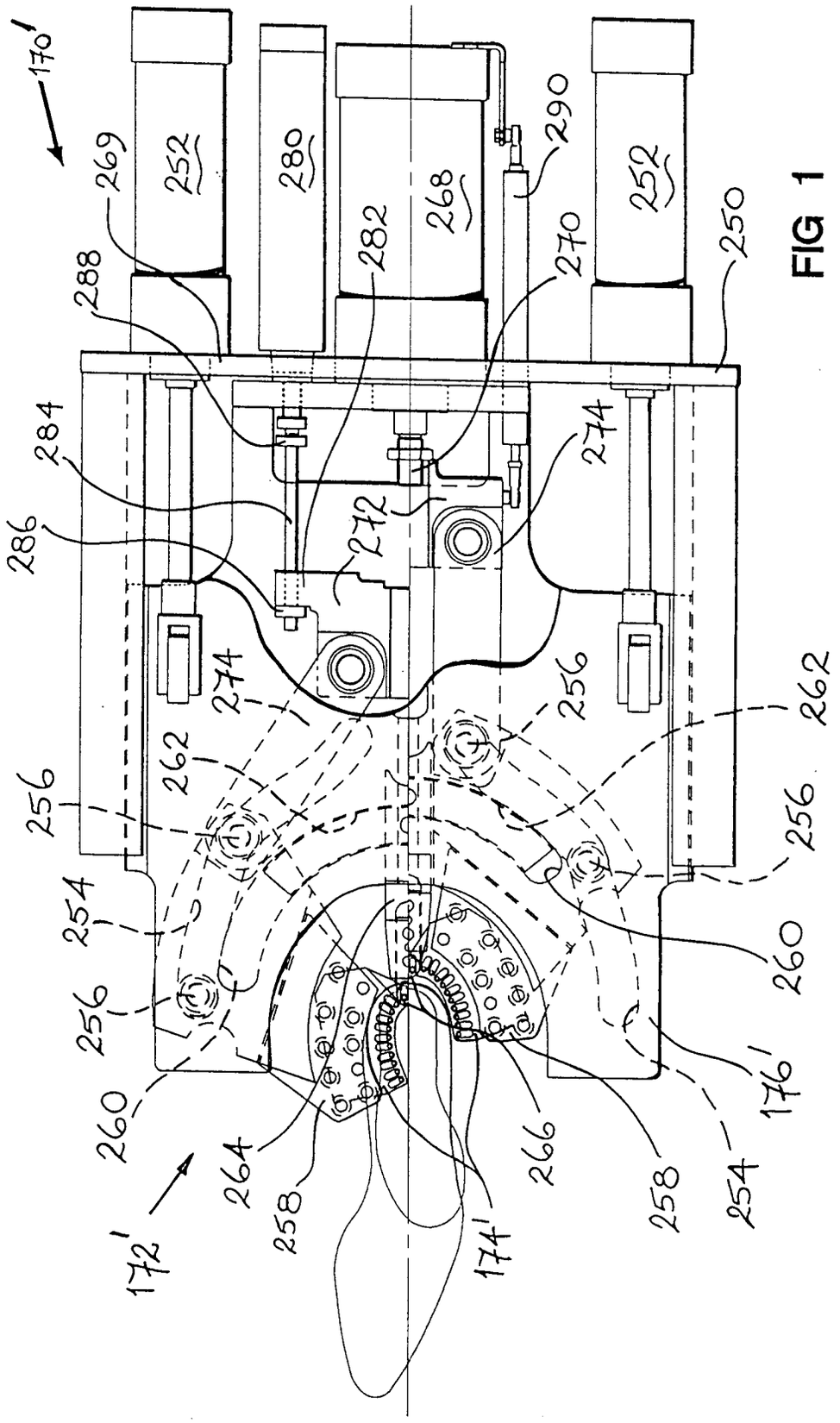
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FIG 1

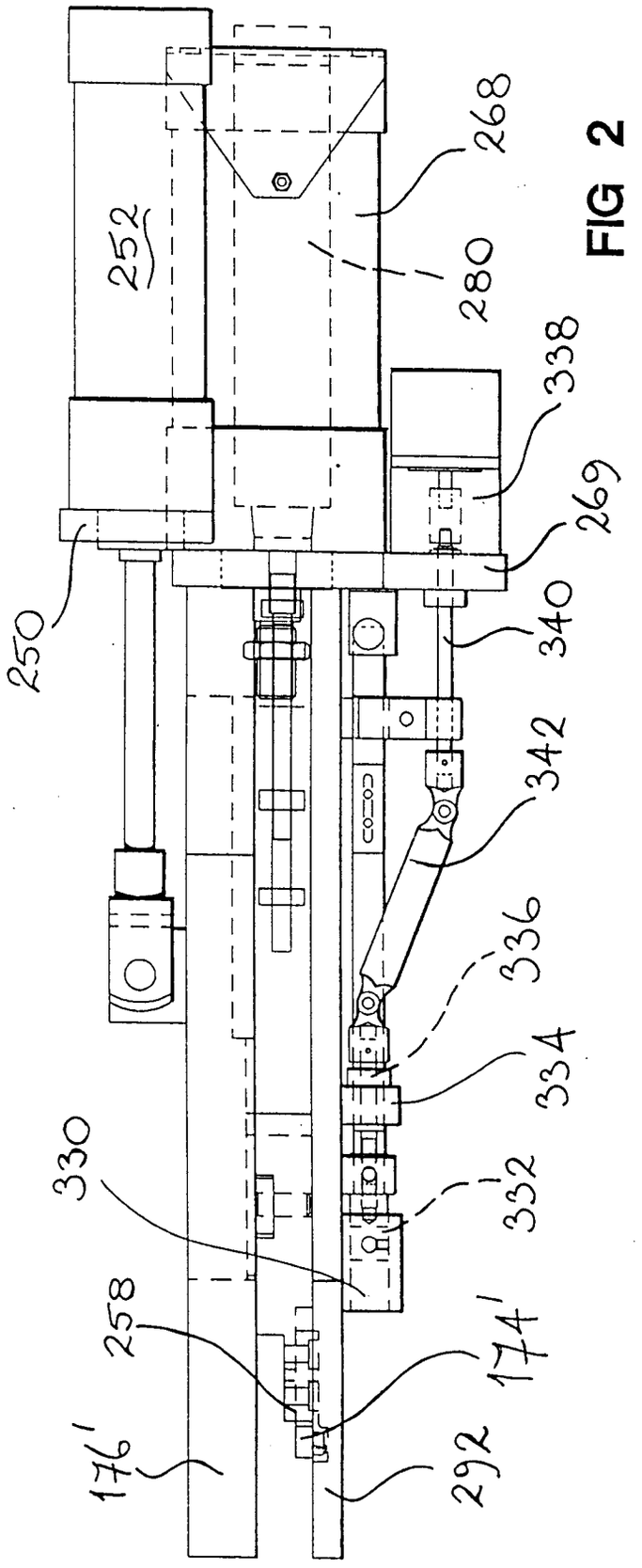

FIG 2

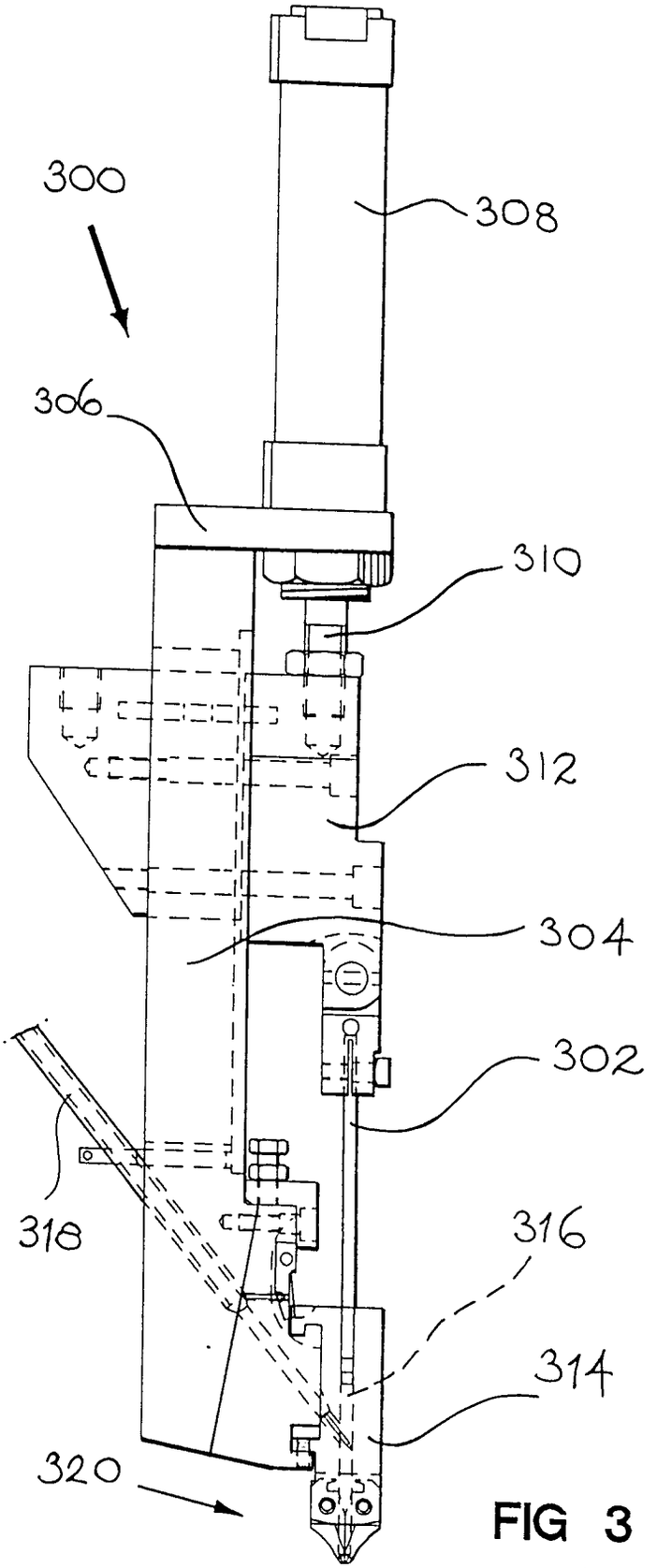

FIG 3

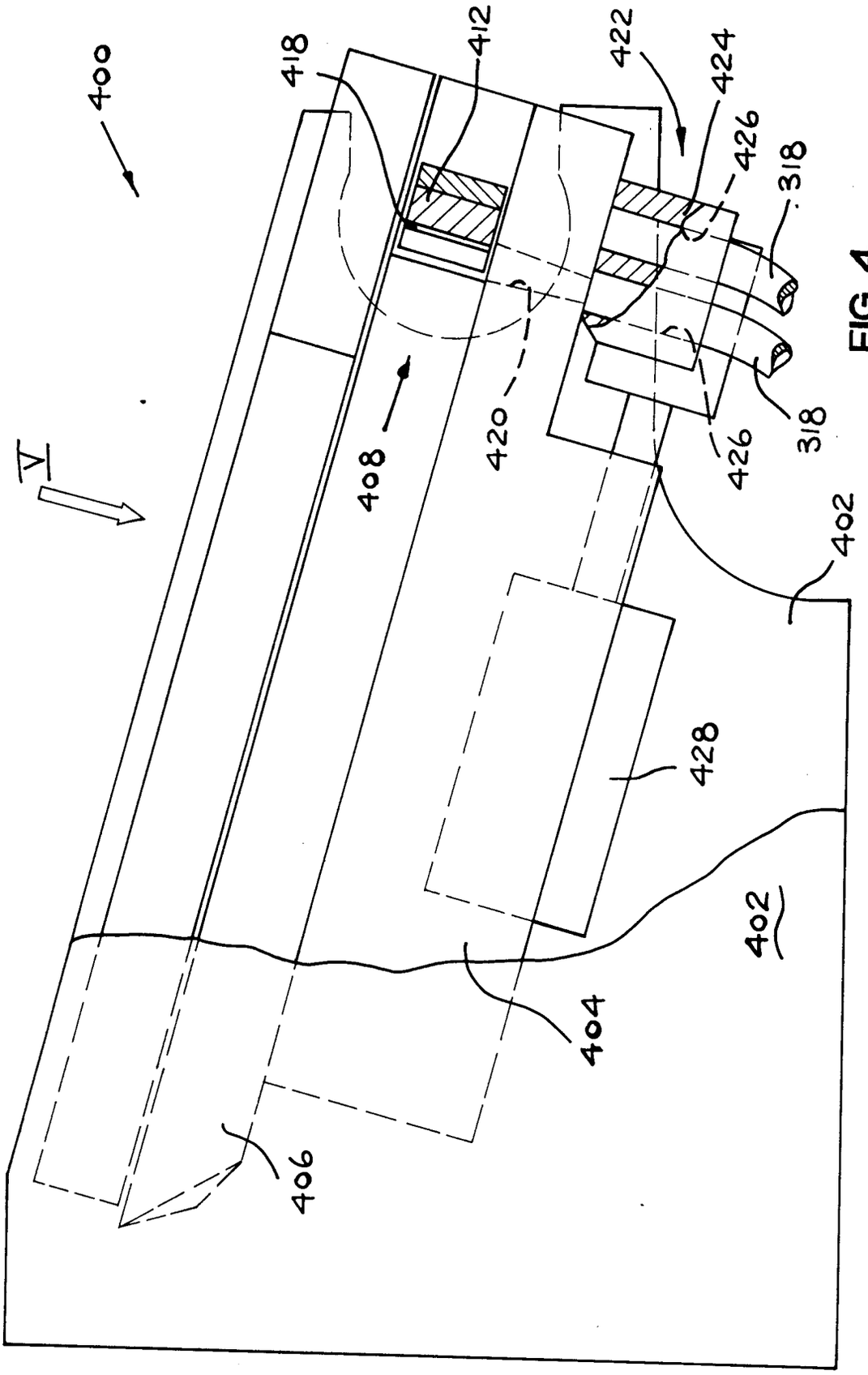

FIG 4

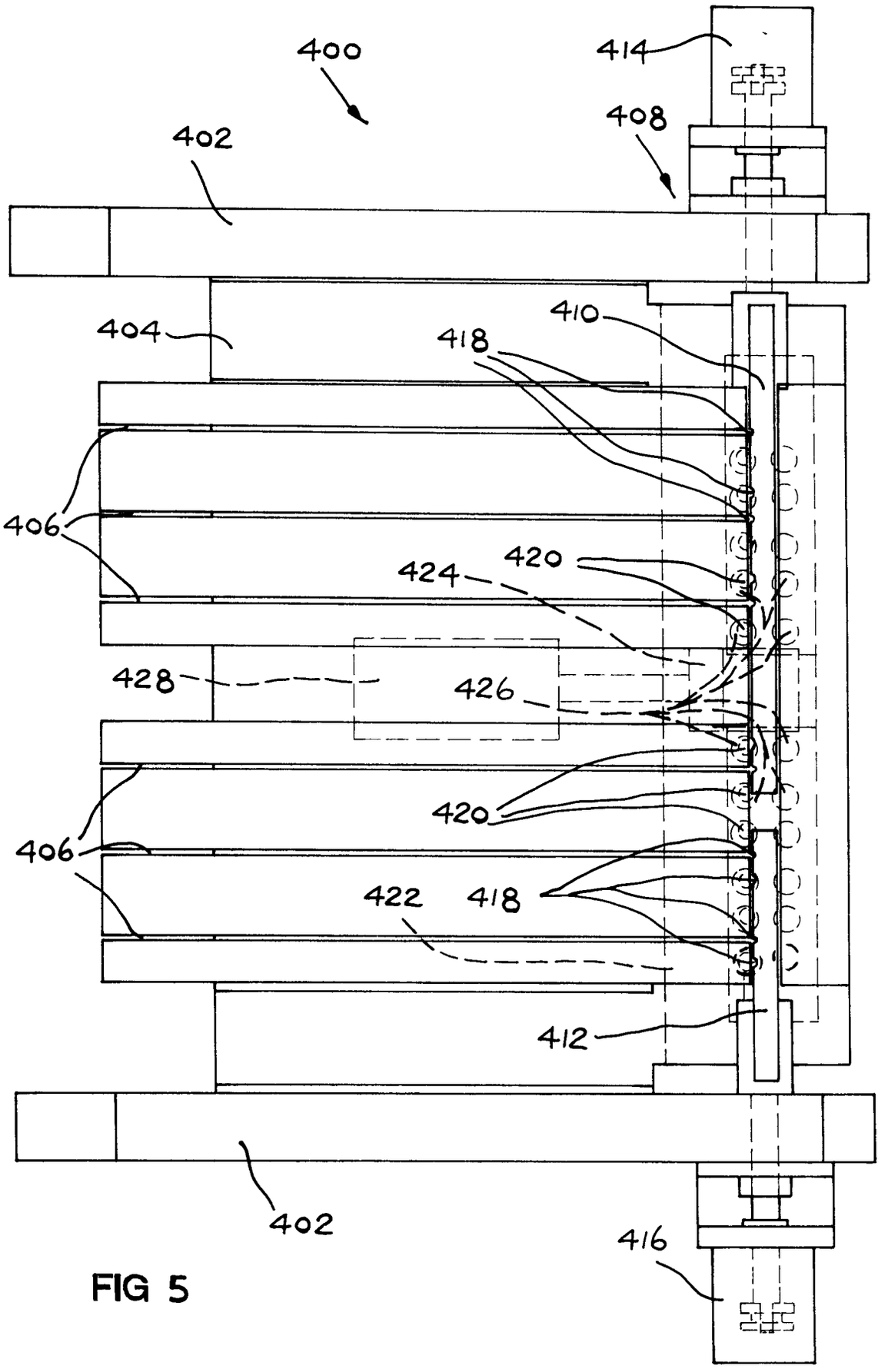
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FIG 5

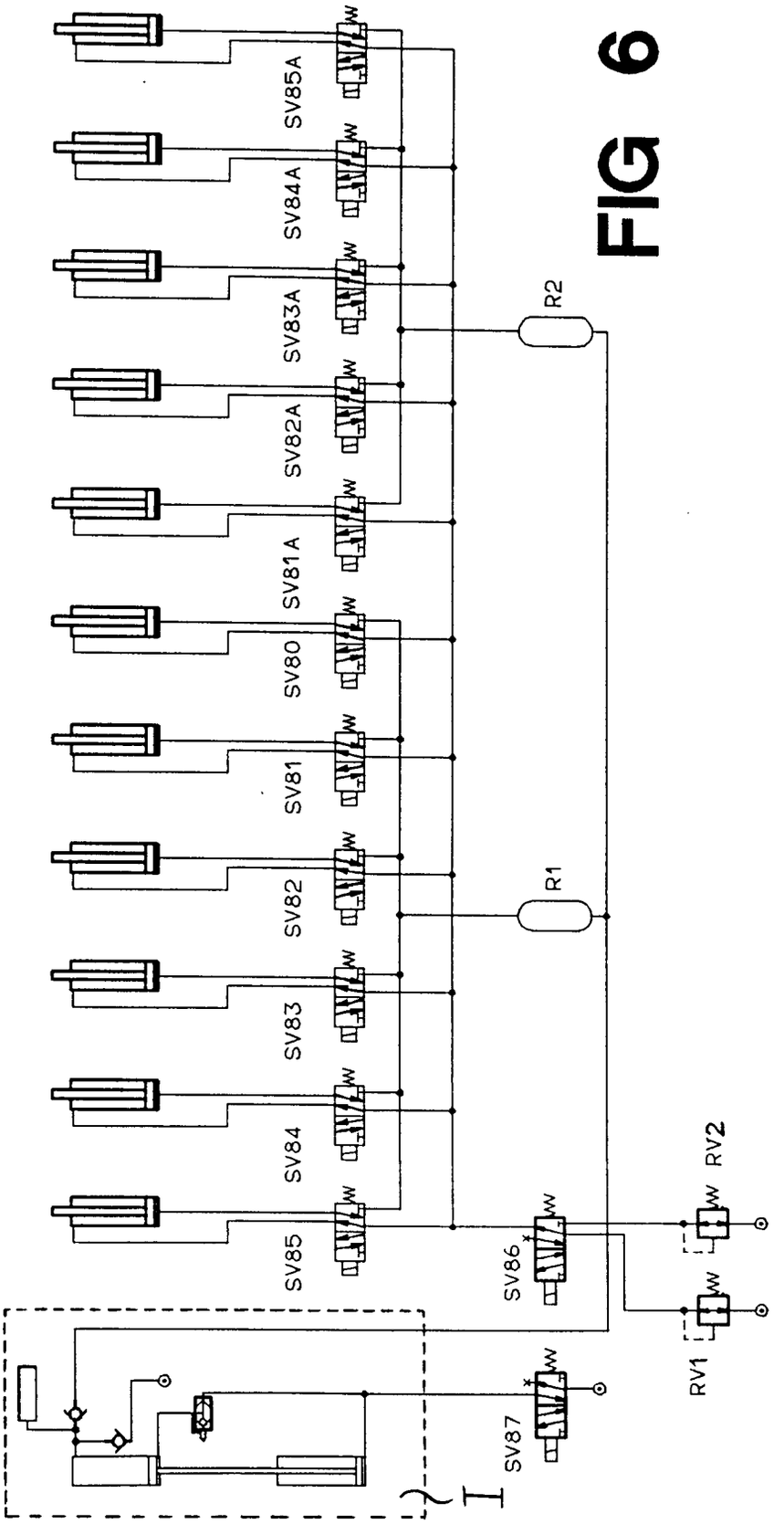
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FIG 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 2744

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X Y	FR-A-1 189 111 (SOCIÉTÉ F.E.R.E.) * page 3, left column, line 23 - right column, line 7; figure 14 *	1 5	B27F7/13 A43D71/00
D,Y	EP-A-0 511 811 (BRITISH UNITED SHOE MACHINERY LIMITED) * the whole document *	5	
A	GB-A-2 060 464 (CAMOGA S.A.S. DI MASCETTI ATTILIO & C.) * page 2, line 103 - line 115; figures 1,5 *	1,2,5	
A	EP-A-0 492 037 (SCHÖN & CIE. AG) * column 4, line 15 - line 23; figure 2 *	1,5	
A	EP-A-0 318 877 (HACOBA TEXTILMASCHINEN GMBH & CO KG) * column 2, line 5 - line 8 * * column 6, line 31 - line 37 *	1,5	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
A	GB-A-346 796 (WURSTER ET AL) * the whole document *	1	B27F A43D B25C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 July 1994	Carmichael, Guy

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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