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(54) Machine for lasting heel end portions of shoes.

(57) The machine is intended to operate using tacks or like fasteners and comprises individual tackers (300) mounted for movement with the wiper plates (174') of the machine which serve to position the tackers in relation to the shoe bottom. The tackers (300) are actuated progressively, starting at the so-called "back tacks" (i.e. the tacks inserted in the backseam region of the heel seat of the shoe) and progressively therefrom in pairs, one at each side of a longitudinal centre line of a wiper assembly (172'). Electronic control means are provided for controlling the sequence of operation of the tackers (300) and in addition said control means can be used to de-actuate selected tackers, according to the number of tacks desired for insertion. The wiper assembly (172') is positioned in relation to the shoe, and thus determines the "back tack" position, by engagement of a V-block (330) associated with the wiper assembly with a rearward face of the heel band (152), while the tack pattern is determined by the amount of radial movement of the wiper plates (174'), which can take place independently of any forward movement thereof. The electronic control of the machine is effected in accordance with a programmed instruction selected according to the style and/or size of the shoe to be operated upon.

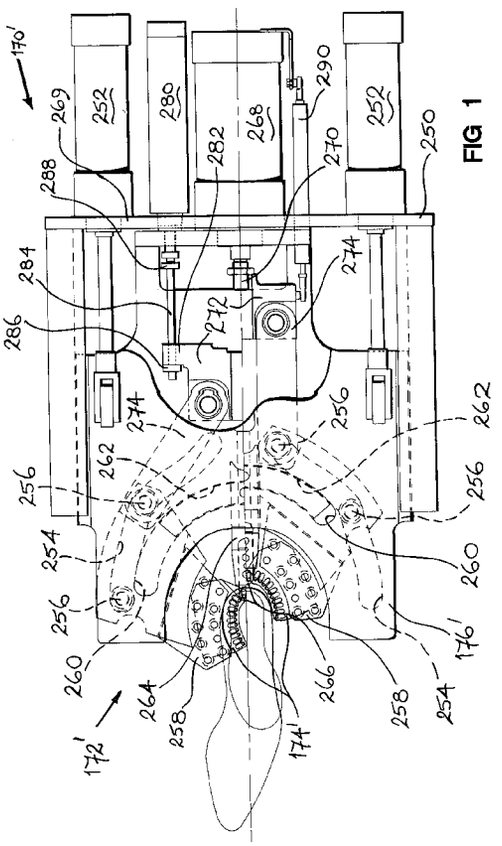

FIG 1

EP 0 601 772 A1

This invention is concerned with machines for lasting heel end portions of shoes, more particularly so-called "tack heel seat lasting machines", i.e. machines for lasting heel end portions of shoes using fasteners, e.g. tacks.

One such tack heel seat lasting machine is described in EP-A-0 091 299 and comprises a shoe support for supporting a shoe comprising an upper on a last and an insole on the last bottom, a wiper assembly comprising two wiper plates mounted for inwiping movement whereby lasting marginal portions of the upper of a shoe supported by the shoe support can be wiped over and pressed against corresponding marginal portions of the insole of such shoe, and fastener-inserting means, comprising a plurality of fastener-inserting units mounted for movement with the wiper plates and arranged to drive fasteners through apertures in said wiper plates, after the inwiping movement of the latter, thus to secure the over-wiped lasting marginal portions of the upper to the marginal portions of the insole, said units comprising at least one unit arranged to operate at a backseam region of the shoe and two sets of units each comprising a plurality of units, arranged to operate along opposite sides of the heel seat portion of the shoe.

For actuating the fastener-inserting units in said machine, a single hammer or impact plate is provided, which is operated by pressure fluid to drive all the fasteners, i.e. tacks, into the shoe bottom simultaneously. It will be appreciated, however, that by so driving all the tacks simultaneously, a significant force must be generated and furthermore the machine and the fastener-inserting means in general must be constructed in a sufficiently robust way in order to withstand such force when applied. In general it has been found necessary, therefore, to use a hydraulic fluid and essentially to effect a pressing action rather than an impact action on the tacks to be inserted.

Because a single hammer or impact plate is used to drive all the tacks simultaneously, moreover, it is not possible to avoid operating all the fastener-inserting units in each operating stroke. It is of course possible, and indeed conventionally practised, where a smaller so-called "tack pattern" is desired, to prevent the supply of a tack to any fastener-inserting unit which is not required for the tack pattern, but in practice it has been found that, because the driver of the unrequired unit is nevertheless actuated by the hammer plate, the driver is driven against the shoe bottom and may well puncture the lasting margin, despite the absence of a tack to be driven. It will be appreciated that such an arrangement may thus be detrimental in the finished shoe, quite apart from the unnecessary use of energy.

It is thus the object of the present invention to provide an improved machine for lasting heel seat portions of shoes wherein the foregoing disadvantages are avoided and generally whereby the need for an excessively robust construction can be avoided while the versatility of the machine is enhanced.

This object is resolved in accordance with the present invention, in a machine of a type as referred to by way of example in the second paragraph above, in that the fastener-inserting units are individually actuatable under the control of electronic control means by which the units may selectively be actuated and rendered inactive and sequencing of the actuation of the units selected to be actuated may be controlled, in accordance with a programmed instruction selected according to the style and/or size of the shoe to be operated upon.

It will thus be appreciated that, using the machine in accordance with the invention, firstly only those fastener-inserting units which are required to insert tacks need be actuated and the others may remain inactive, and furthermore by the sequential actuation of these selected fastener-inserting units, giving rise to a less heavy force being applied to the shoe at any given time, the construction of the machine can be rendered less robust than was previously the case without any detriment to its performance or indeed durability.

In accordance with the invention preferably in selecting fastener-inserting units forming part of said sets of units for actuation or being rendered inactive corresponding units of the two sets are selected as pairs. In a preferred embodiment, furthermore, for varying the size of the pattern of fasteners inserted as aforesaid the pairs of fastener-inserting units most remote from the backseam region of the shoe or one or more pairs starting with said most remote pair and then such further pairs progressively therefrom, according to the desired pattern size, are rendered inactive. It is in fact conventional in shoe making to insert fourteen, eighteen or twenty-two tacks according to the size of the shoe. Preferably in a machine in accordance with the present invention each fastener-inserting unit comprises two drivers and serves to insert two tack simultaneously, so that in order to reduce the number of tacks by four, it is necessary to render one pair of fastener-inserting units inactive. In the machine in accordance with the invention, furthermore, it would of course be possible to reduce still further the number of tacks to be inserted, if a lower number were to be required, and indeed although in the aforementioned embodiment the most remote pair of units and adjacent pairs are selectively rendered inactive, it is possible in the machine according to the present invention to render any selected pair inactive according to the appropriate programmed instruction.

Also in accordance with the invention, preferably in controlling the sequencing of the actuation of the fastener-inserting units each unit of one of said sets is operated simultaneously or substantially so with the corresponding unit of the other of said sets, i.e. again as a pair, under the control of the control means. Moreover,

in a preferred embodiment of the invention the fastener-inserting units are actuated sequentially starting with the unit(s) arranged to operate at the backseam region of the shoe and followed by the pairs of units progressively away from said backseam region. By this "cascading" effect the applied force progressively travels along the heel seat portion of the shoe bottom starting from the backseam region thereof, according to the number of units which have been selected for actuation.

Although the fastener-inserting units of the machine in accordance with the invention may be hydraulically actuated, the construction and arrangement of the machine renders it suitable for use with fastener-inserting units which are pneumatically actuated, that is to say each unit comprises one or more fastener drivers operable by a pneumatic cylinder. To this end, furthermore, conveniently the fastener-inserting means comprises a pressurised air reservoir with which each pneumatic cylinder is connected via a valve operable under the control of the electronic control means. In one embodiment of the invention, furthermore, the reservoir is supplied with pressurised air from an intensifier. It will be appreciated that by the provision of the reservoir, which is of course of adequate proportions for the task, there is sufficient pressurised air to drive the various units sequentially as described above. It should be pointed out that it has been found advantageous, when using a pneumatic system as aforesaid, to initiate the sequence of actuation at the backseam region, where the lasting marginal portions of the shoe upper tend to be bunched or pleated, because of the configuration of the backseam region, and consequently the force required for driving the tacks through the lasting marginal portions into the insole may be found to be higher than in the more toeward regions of the heel seat portion of the shoe.

In order to ensure that the impact force acting on the driver(s) of each unit is maintained throughout the stroke of the driver, the cylinder is desirably provided with ports of adequate size to allow the appropriate air flow to and from the cylinder respectively at the inlet and exhaust sides.

There now follows a detailed description, to be read with reference to the accompanying drawings, of one machine in accordance with the invention. It will be appreciated that this machine has been selected for description merely by way of exemplification of the invention and not by way of limitation thereof.

In the accompanying drawings:-

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

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

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

Figures 4 and 5 together constitute a flowchart setting out details of the electronic control means of the machine; and

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

The machine now to be described is a heel seat and side lasting machine and is generally similar, except as hereinafter described, to the machine described in EP-A-O 511 811, which is a heel seat and side lasting machine wherein both the heel seat and side portions of the shoe are lasted using adhesive. 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 the aforementioned EP-A) 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 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) is 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 the aforementioned EP-A 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 por-

tion 250 (Figure 1) of the machine is a heel seat 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 assembly 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 assembly 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 assembly 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 assembly, 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 assembly 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 assembly 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 assembly, 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 assembly. 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 assembly, 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 assembly 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 assembly therebetween.

As already mentioned, the machine in accordance with the present invention is adapted for securing overwiped lasting marginal portions of the heel seat portion of the shoe 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 assembly, 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 Figure 3.

The tacker shown in Figure 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 (Figure 6). The pressure of compressed air thus contained is achieved from a factory source (which is usually in the order of 5.516 bar (80psi) but intensified by an intensifier I to a pressure of 6.895 bar (100psi). 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.

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 assembly 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 assembly 172' as a whole in relation to the shoe. In the machine described in EP-A-0 511 811, the position of the wiper assembly 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 assembly. 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 assembly 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 assembly 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 assembly, so that the position of the wiper assembly 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, and moreover such control is effected in two distinct ways: firstly, 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 assembly, away from the stud toewardly. In the circuitry shown in Figure 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. Figures 4 and 5 are a flow diagram representing the tack insertion sequence. At step 350 a signal is generated when the wipers have completed their inwiping movement and bedding pressure is applied through the shoe support 20, as described in the aforementioned EP-A-0 511 811. Following a short pause (step 352) the electronic control means is then interrogated (step 354) as to whether the style of shoe requires tacks; it will of course be appreciated, as has already been mentioned, that this machine may be run using adhesive either in combination with tacks or without tacks, as well of course as being run with tacks without adhesive. In the event of no tacks being selected, then the tack insertion sequence (steps 356 to 386) is omitted and the software control follows an "adhesive" operation not involved in the operation of the drivers 302. In the event that the style of shoe requires the insertion of tacks, a further interrogation (step 356) tacks place to examine the status of a selector switch (not shown) in the machine by which tack insertion can be selected or not selected. It may, for example, be the case that although the style requires tacks, ideally the machine should be processed once on a particular style of shoe in order to ensure that the wipers are correctly positioned in relation to the shoe, in which case a "no tack" sequence would be selected. In the event of selecting a "no tack" sequence, the control runs from step 356 to step 386 so that, following a pause (appropriate where tacks have been driven), the "driver return" sequence is implemented (steps 388 to 392), as described hereinafter. In the event that tacks are selected for the cycle of operation, then firstly the intensifier is brought into operation (step 358) by actuation of valve SV87 (Figure 6) and thereafter by switching solenoid valve SV80 the back tacks are inserted (step 360) and, following a short pause (step 362), in sequence the pairs of solenoid valves SV81,81A and SV82,82A are actuated, with pauses therebetween (steps 364 to 370) to operate the first and second pairs of tackers 300 located progressively away from the stud 266. Similarly, thereafter the pair of solenoid valves SV83,83A is actuated to insert the next four tacks, bringing the total of tacks so far inserted to fourteen. At this stage the programmed instruction is interrogated as to the number of tacks to be inserted in total (step 374) and if the required number is fourteen then steps 376 to 384 are omitted and, following a short pause (step 386), the driver return sequence is implemented as described below. In the event that a number of tacks other than fourteen has been selected, then following a short pause (step 376) a further four tacks are inserted (step 378) and again at step 380 the programme is questioned as to whether the pre-set number is eighteen. If so, then steps 382 and 384 are avoided and the driver return sequence is initiated. If the number pre-set is not eighteen, then following a further short pause (step 382) the last four tacks are inserted (step 384) bringing the total number to twenty-two, whereafter the driver return sequence is implemented as now to be described with reference to Figure 6.

From this Figure it will be apparent that air is supplied under normal factory pressure from a source S via a solenoid valve SV87 to an intensifier generally designated I from which the intensified air is supplied to the two reservoir containers R1,R2 one (R1) of which is associated with the tacker 300 mounted on the stud 266 together with the five tackers forming one set of tackers arranged at one side of the longitudinal centre line of the wiper assembly while the other reservoir container R2 is associated with the five tackers forming the set of tackers at the other side of said longitudinal centre line. When the machine is in a rest condition the drivers 302 are held in a retracted position (as shown in Figure 4) under a high pressure, preferably in the order of 3.103 bar (45psi), supplied to the cylinders 308 via a regulator valve RV1, solenoid valve SV86 and the individual solenoid valves SV80 to SV85A. In the rest condition of the machine the intensifier maintains the pres-

sure of the air in the system, but in any event the intensifier is actuated upon initiation of a cycle of operation of the machine by actuation of solenoid valve SV87 step 358). At the same time, i.e. when the machine cycle is initiated, solenoid valve SV86 is actuated (also step 358), switching the air supplied to the cylinders 308 to a low pressure, preferably in the order of 0.345 bar (5psi), as regulated by regulator valve RV2. The various tackers are now actuated in sequence, starting with the tacker associated with the stud 266 and then operating in pairs progressively away from the stud, as already described with reference to Figures 4 and 5. When the last tacks have been driven into the shoe bottom, the driver return sequence is initiated, involving, following a short pause (step 386), de-actuating solenoid valves SV80 to SV85A (step 388) and at the same time de-actuated solenoid valve SV86 (step 390) thus to allow air under high pressure as regulated by regulator valve RV1 to be supplied to the exhaust side of each of the piston-and-cylinder arrangements 308 thus to return the drivers 302 to their retracted position. Thereafter, the actuation signal to the intensifier is discontinued (step 392) until the next cycle of operation is initiated.

One of the advantages of the tack insertion sequence control of the present invention 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.

The supply of tacks to the various tackers 300 may be effected in any conventional manner, e.g. using a pneumatically operated tack pot and a tack bar separator of conventional design. Further details are not relevant to the present invention and are not therefore discussed further in this specification.

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.

Appendix (for use with Figures 4 and 5)

350 Signal bedding pressure applied to shoe bottom by wiper plates 174' (i.e. after over-wiping)

352 Pause of 0.1 sec to allow for compression of materials under bedding pressure

354 Does the programme (i.e. shoe style) selected require insertion of tacks?

356 Has selector switch been set to "no tacks" position?

358 Actuate intensifier I (by actuating solenoid valve SV87) and actuate solenoid valve SV86 to switch supply of air to "exhaust" side of cylinders 308 to low pressure (regulator valve RV2)

360 Actuate "back tack" (stud 266) tacker 300 (by actuating solenoid valve SV80, which serves also to exhaust "exhaust" side of cylinder 308)

362 Pause of 0.05 sec to complete step 360

364 Actuate first pair of tackers 300 (i.e. those adjacent the stud 266) (by actuating solenoid valves SV81,81A)

366 Pause of 0.05 sec to complete step 364

368 Actuate next pair of tackers 300 (i.e. those most closely adjacent the stud 266) (by actuating solenoid valves SV82, 82A)

370 Pause of 0.05 sec to complete step 368

372 Actuate next pair of tackers 300 (by actuating solenoid valves SV83, 83A)

374 Does the pre-set number of tacks = fourteen?

376 Pause of 0.05 sec to complete step 372

378 Actuate next pair of tackers 300 (by actuating solenoid valves SV84, 84A)

380 Does the pre-set number of tacks = eighteen?

382 Pause of 0.05 sec to complete step 378

384 Actuate last pair of tackers 300 (i.e. those most remote from the stud 266) (by actuating solenoid valves SV85, 85A)

386 Pause of 0.1 sec to complete tacking

388 Return drivers to retracted position (by de-actuating solenoid valves SV80-85A)

390 Supply high pressure air as regulated by regulator valve RV1 to return side of cylinders 308 (by de-actuating solenoid valve SV86)

392 Discontinue "actuation" signal to intensifier I (by de-actuating solenoid valve SV87).

Claims

1. Machine for lasting heel end portions of shoes comprising

a shoe support ((20)) for supporting a shoe comprising an upper on a last and an insole on the last bottom,

a wiper assembly (172') comprising two wiper plates (174') mounted for inwiping movement whereby lasting marginal portions of the upper of a shoe supported by the shoe support can be wiped over and pressed against corresponding marginal portions of the insole of such shoe, and

fastener-inserting means (300), comprising a plurality of fastener-inserting units (300) mounted for movement with the wiper plates (174') and arranged to drive fasteners through apertures in said wiper plates, after the inwiping movement of the latter, thus to secure the over-wiped lasting marginal portions of the upper to the marginal portions of the insole, said units (300) comprising at least one unit arranged

to operate at a backseam region of the shoe and two sets of units each comprising a plurality of units, arranged to operate along opposite sides of the heel seat portion of the shoe,
characterised in that the fastener-inserting units (300) are individually actuatable under the control of electronic control means by which

- the units (300) may selectively be actuated and rendered inactive, and
- sequencing of the actuation of the units (300) selected to be actuated may be controlled,

in accordance with a programmed instruction selected according to the style and/or size of the shoe to be operated upon.

2. Machine according to Claim 1 characterised in that in selecting fastener-inserting units (300) forming part of said sets of units for actuation or being rendered inactive corresponding units of the two sets are selected as pairs.

3. Machine according to Claim 2 characterised in that for varying the size of the pattern of fasteners inserted as aforesaid the pair of fastener-inserting units (300) most remote from the backseam region of the shoe or said most remote pair together with one or more adjacent pairs, according to the desired pattern size, are rendered inactive.

4. Machine according to any one of Claims 1 to 3 characterised in that in controlling the sequencing of the actuation of the fastener-inserting units (300) each unit of one of said sets is operated simultaneously or substantially so with the corresponding unit of the other of said sets under the control of the control means.

5. A machine according to Claim 4 characterised in that the fastener-inserting units (300) are actuated sequentially starting with the unit(s) arranged to operate at the backseam region of the shoe and then the units of said sets progressively away from said backseam region.

6. Machine according to any one of the preceding Claims characterised in that each fastener-inserting unit (300) is pneumatically actuated and comprises a fastener driver (302) operated by a pneumatic cylinder (308), and in that the fastener-inserting means (300) comprises a pressurised air reservoir (R1,R2) with which each pneumatic cylinder (308) is connected via a valve (SV80, 81,81A ... 85A) operable under the control of the electronic control means.

7. Machine according to Claim 6 characterised in that the reservoir (R1,R2) is supplied with pressurised air via an intensifier (I).

8. Machine according to any one of the preceding Claims Characterised in that each fastener-inserting unit (300) comprises two drivers (302) and serves to insert two tacks simultaneously.

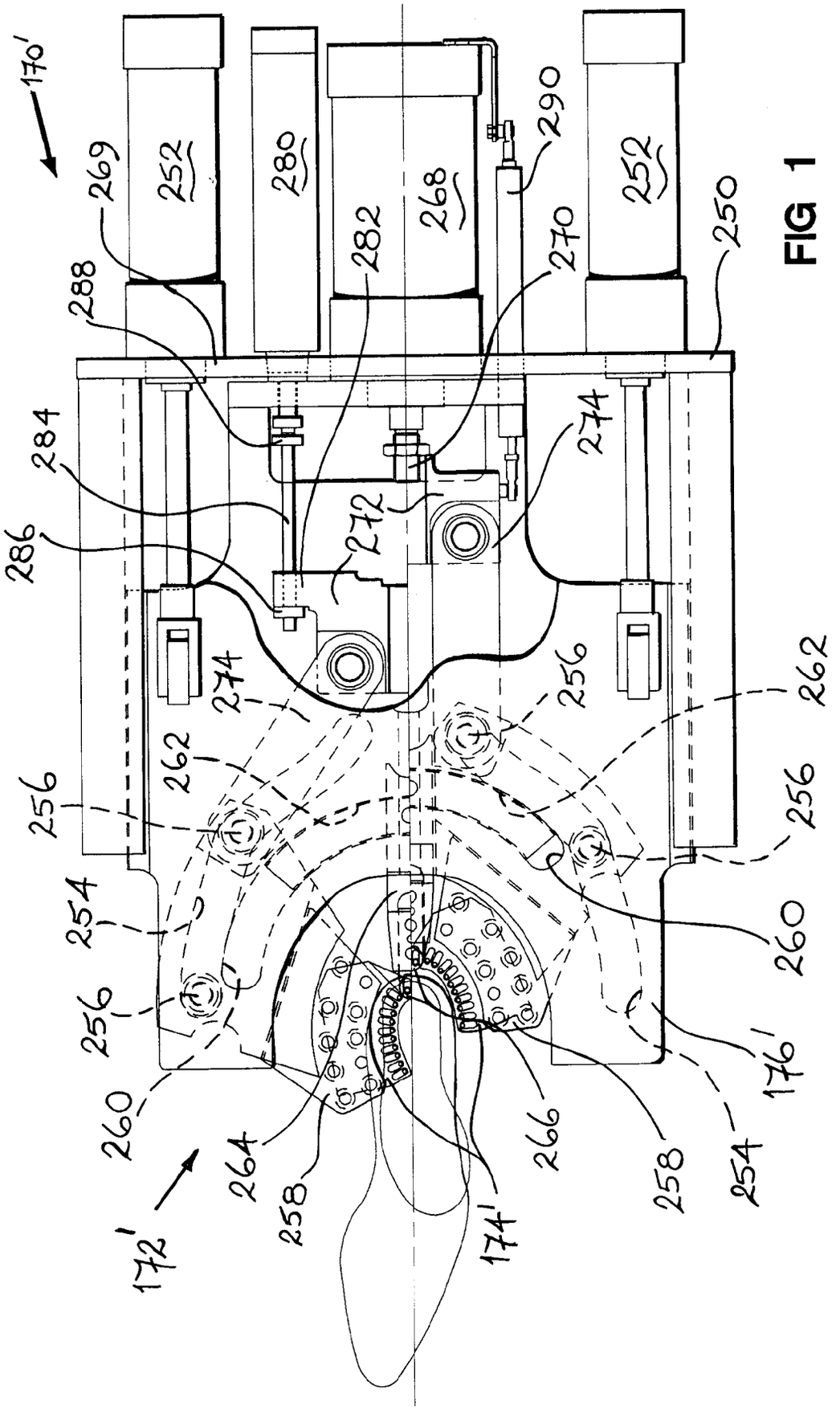
170'
269
252
280
282
268
290
252
250
288
270
284
274
272
286
274
256
262
256
262
256
254
260
256
260
264
258
172'
174'
266
258
254
176'

FIG 1

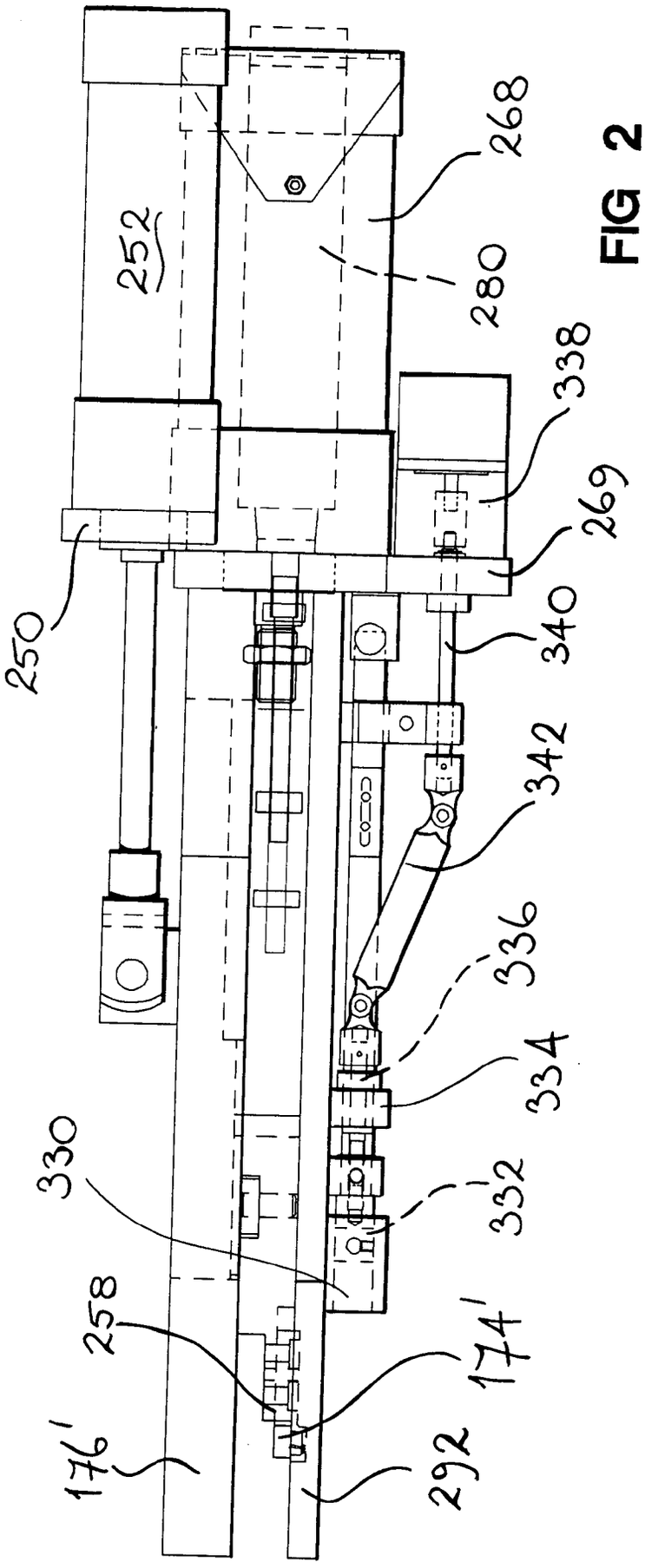

FIG 2

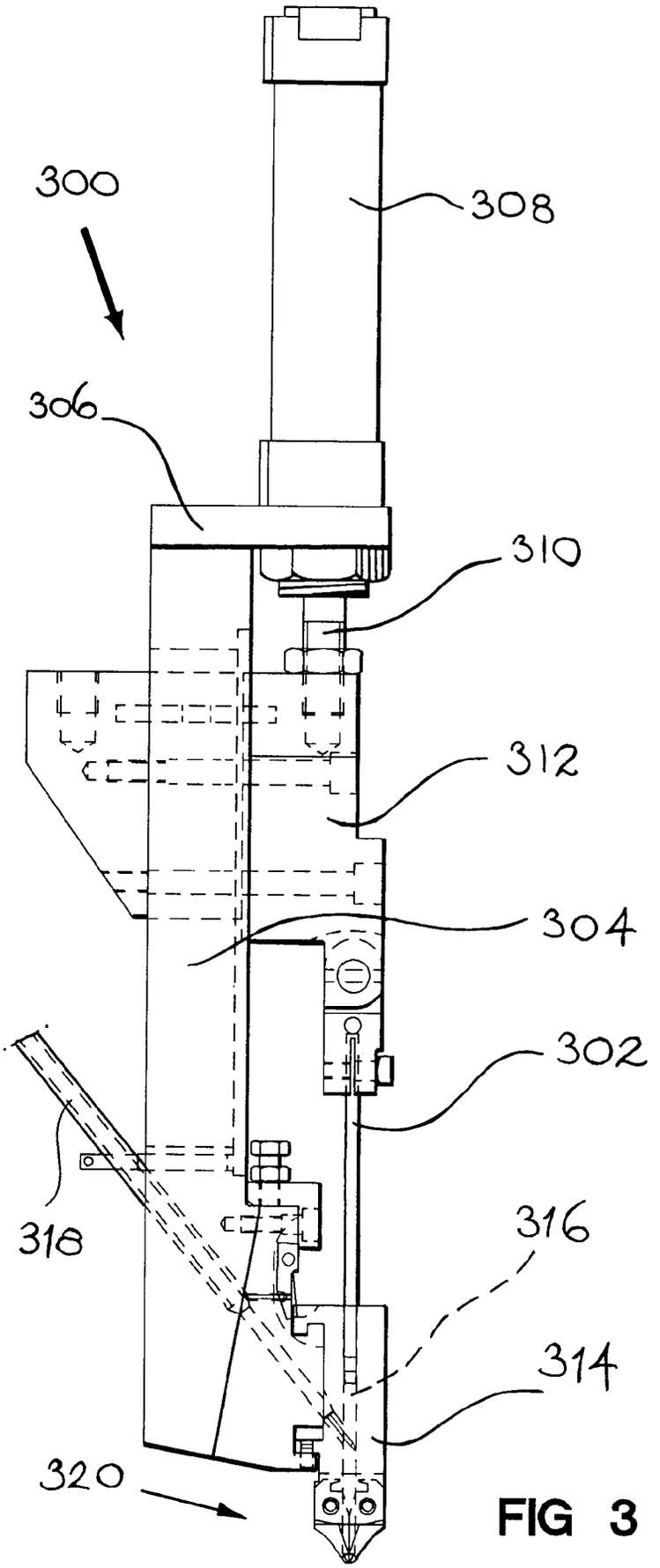

FIG 3

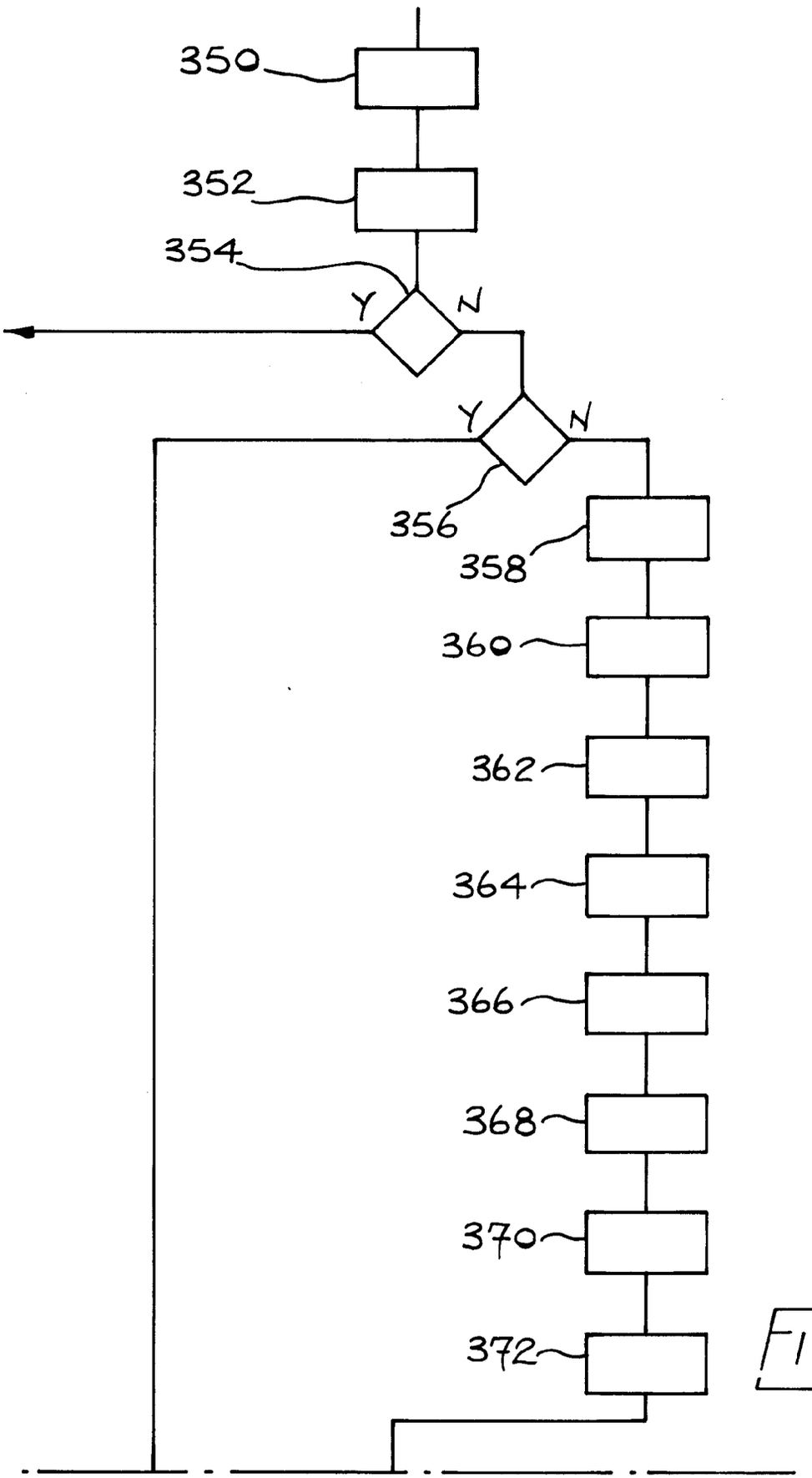

Fig. 4

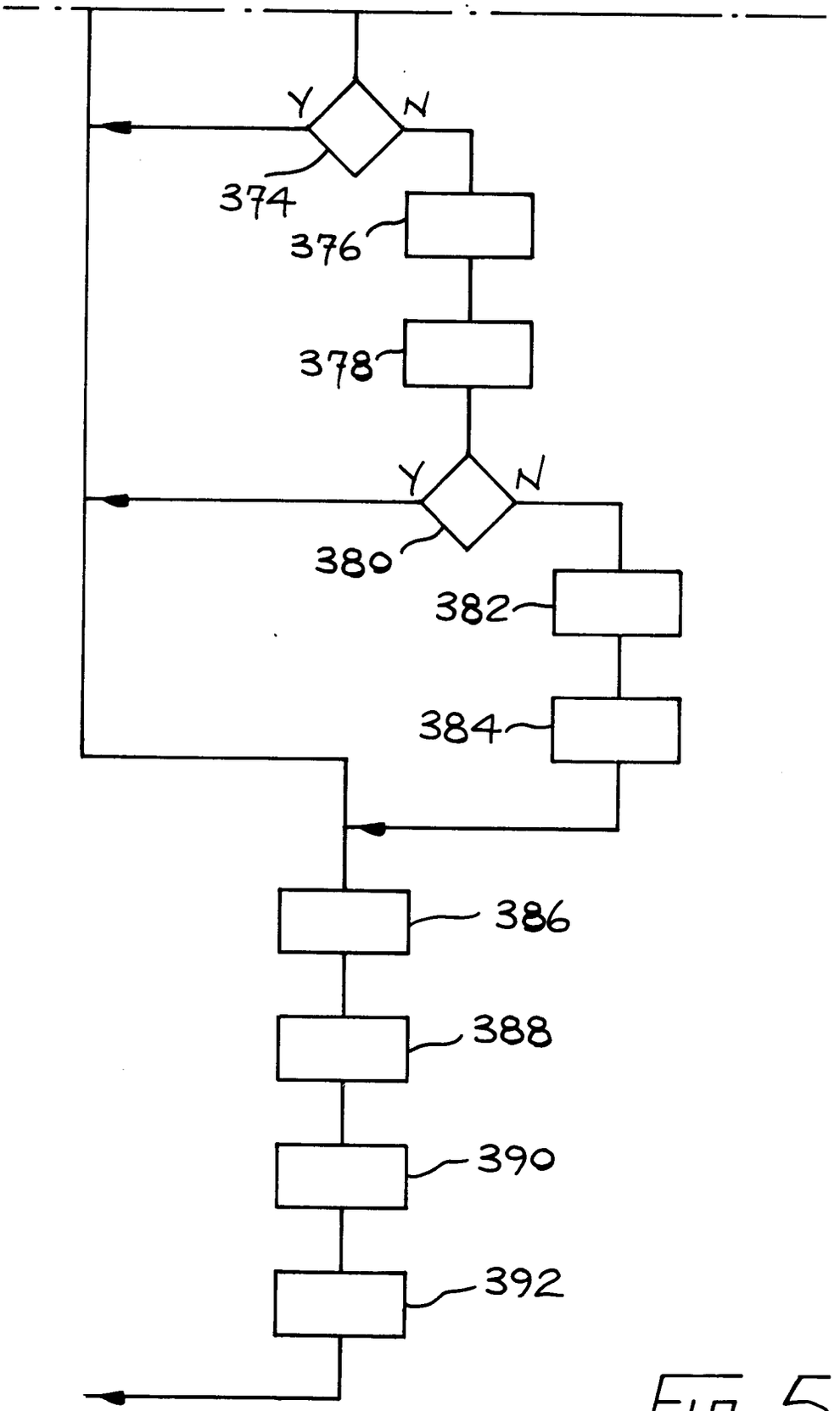

Fig_5

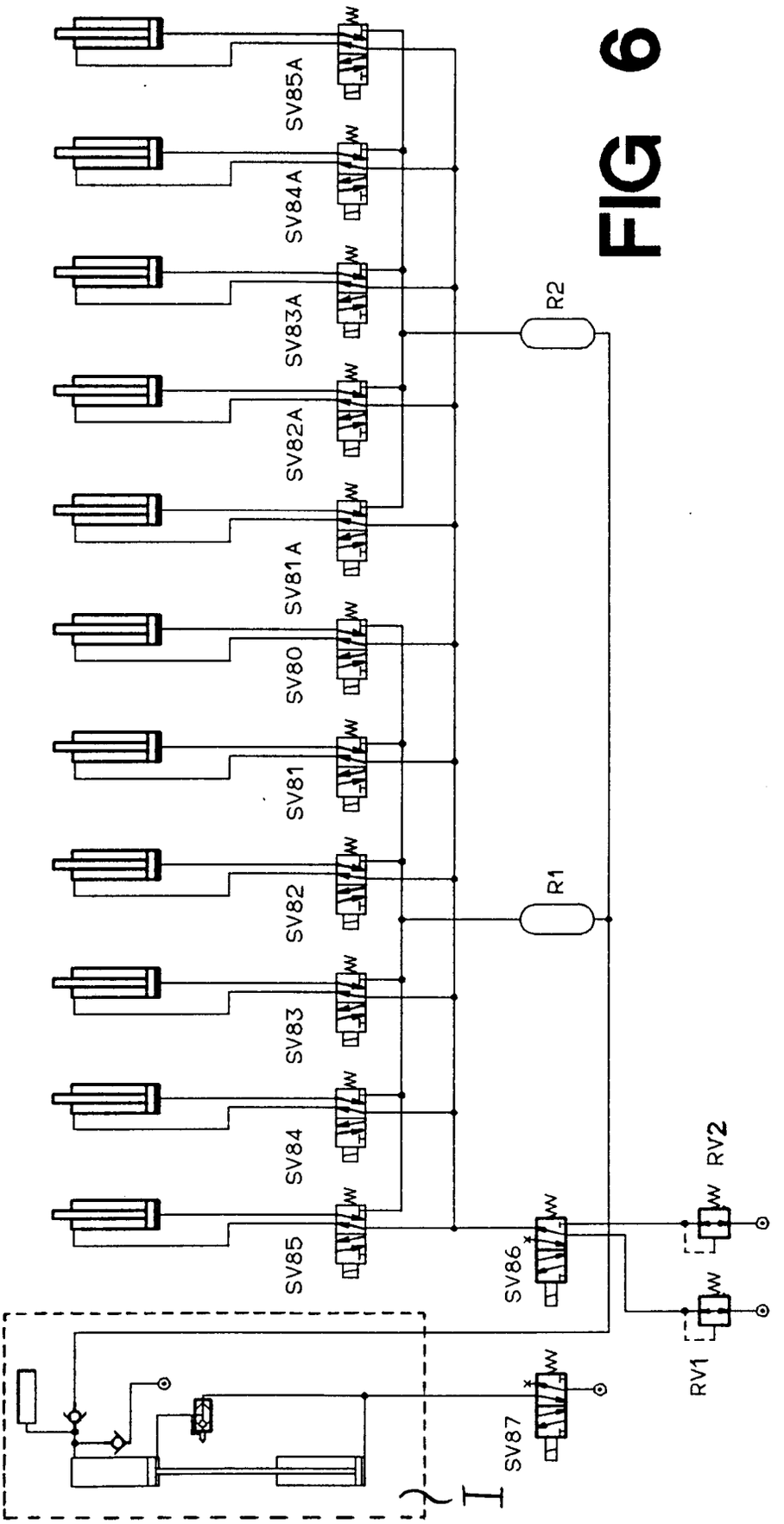
SV85A
SV84A
SV83A
SV82A
SV81A
SV80
SV81
SV82
SV83
SV84
SV85
SV86
SV87
R1
R2
RV1
RV2
I

FIG 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 9565

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)
A	EP-A-0 384 970 (SCHÖN & CIE GMBH) * abstract * * page 2, column 2, line 54 - page 3, column 3, line 7; claims; figure 1 * ---	1-8	A43D75/00 A43D21/14 A43D119/00
A	EP-A-0 511 811 (BRITSH UNITED SHOE MACHINERY LTD.) ---		
A	EP-A-0 046 858 (MASCHINENFABRIK MOENUS GMBH) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.5) A43D B27F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 January 1994	Soederberg, J

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