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(54) Automatic machine with multiple interchangeable heads, for mass footwear production of manufacturing.

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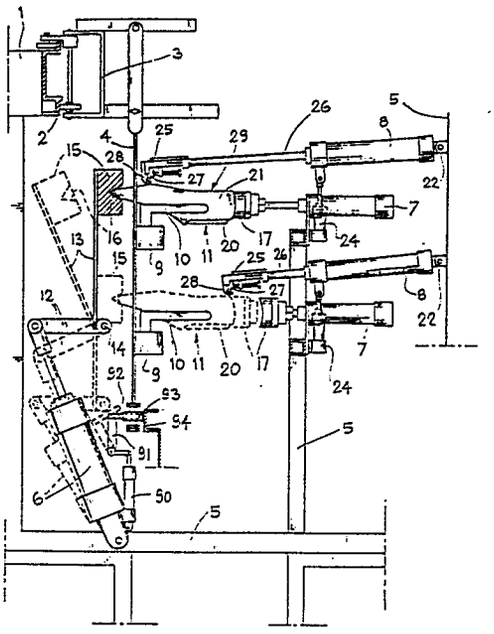
To a fixed frame (5) are secured, on one or more levels, one or more mobile devices, moving with a reciprocating motion (6), (7), (8), on which stopper plugs (15), (15′), (15″), and (17), (17′), (17″), (17‴), and operative elements (25), (43), (54), (68) are mounted.

Said stopper plugs and operative elements are all interchangeable and, depending on how thay are matched, the machine is set up to perform automatically a predetermined operation included in the footwear (11) automatic manufacturing cycle.

Such manufacturing operations include: pulling out nails (18) holding insoles (19) to lasts (20), rough shaping, tuft removal (48), pre-roughing edges (47) of uppers (21) secured to insoles (19), levelling bottom parts (29) of footwear (11), its roughing and cementing operations required for the ensuring attaching of soles.



EP 0 244 547 A1

"AUTOMATIC MACHINE WITH MULTIPLE INTERCHANGEABLE HEADS, FOR MASS FOOTWEAR PRODUCTION OF MANUFACTURING"

This invention concerns an automatic machine with multiple interchangeable heads for footwear mass production including a fixed frame to which are fastened on one or more levels, moving devices having a reciprocating motion, on which are fastened stopper plugs and interchangeable operative members, each of them being conceived for carrying out a precise function within a specific processing phase of footwear, preparation, these processing phases including, in particular, pulling out nails holding insoles to lasts, rough shaping, tuft removal, preroughing edges of uppers held to insoles, rubbing, roughing and cementing prior to sole application.

It is well known that, at present state of the art, many of the sequential operations required in the shoe manufacturing cycle are done manually, or with a series of different machines, each of them conceived for carrying out only one predetermined operation.

It is also known that the sequence relative to pulling out nails holding insoles to lasts during the operations for cementing edges to uppers at present is performed manually with an evident waste of time and labor. A further drawback, seen in the full footwear manufacturing cycle, is that many of the operations following the above mentioned nail pull-out, even if performed automatically on special machinery, require the constant attendance of operators for

loading, positioning, controlling and then unloading and transferring the processed item.

The presence of said operators and the time required for performing all the above mentioned operations have a negative influence both on manufacturing costs and on assembly line productivity.

The scope of present invention is the elimination of the above mentioned drawbacks.

The invention, as defined by the claims, solves these problems by utilizing an automatic machine with multiple interchangeable heads for the mass production of footwear. By the use of a machine of this type, the following results are obtained: the machine is composed by a single base frame with moving devices having a reciprocating motion to which are fastened, depending on requirements and/or on its sequential position in the manufacturing cycle, stopper plugs and specific operative components; every machine can support several operating stations, placed on one or more levels and/or on one or more positions set side by side, each stations being equipped with equal or different stopper plugs and operative components, each depending on its position on the assembly line; the machine can be coupled to assembly lines, with stops in correspondence of workstations and/or with timed automatic feed.

The advantages obtained throught this invention consist mainly in making every machine operation completely automatic regardless of its type and cycle sequence, so that they do not require any type

of manual operator intervention; the automation of the sequential operations contemplates that the items in process be kept on the same mobile supports used for transfer from one work station to the other; stopper plugs and operative components are laid out according to the type and sequence of operations and can be substituted and changed as required by the manufacturing process; the machine structure, comprehensive of a base frame equipped with universal type mobile devices and a series of stopper plugs and operative components or fixtures conceived for performing different operations, allows its rational exploitation and a tangible equipment installation cost reduction as well as of the costs of the footwear thus produced.

The invention will be outlined in greater detail further below, referring to the attached drawings, where:

- Figure 1, is a schematic view of the machine equipped with means fo pulling out nails,
- Figure 2, is a schematic plan view of the head for pulling put nails,
- Figure 3, is a schematic view of the machine set up with means preset for rough shaping, tuft removal and pre-roughing operations,
- Figure 4, is a schematic view of the machine equipped with means preset for rubbing or levelling operations,
- Figure 5; is a schematic plan view of the additional back heel wrapping stopper plug to be used in rubbing or levelling

operations,

- Figure 6, is a schematic plan view of the motor driven carriage for the support of roughing or levelling rollers,
- Figure 7, is a schematic front view of a roughing roller,
- Figure 8, is a schematic view of the machine set up with means preset for the application of cement,
- Figure 9, is a partial schematic front view of a cement spreader roller.

The figures represent an interchangeable multiple heads automatic machine, for the mass production of footwear, that can be set up and matched to any footwear manufacturing assembly line (1), on whose tracks (2) the conveyor carriages (3) are moving, with suspended supporting frames (4), preferably of the type shown, described and claimed in the Italian industrial invention patent application No. 20771A/83, filed on April 22, 1983, in the name of Giuseppe Anzani and in the utility model patent application N° 21557B/86 filed on April 16, 1986, in the name of Lanfranco Anzani and Onorio Anzani.

The machine is composed essentially of a fixed supporting frame (5) to which are secured front (6) and back (7) pistons controlling the stopper plugs and back (8) pistons controlling the operative components.

Taking into account that each suspended supporting frame (4) of the conveyor carriages (3) can be equipped with one more cross members (9) and that on each cross member can be set one or more

couples of brackets (10) for supporting footwear (11) during the manufacturing process, also that machine object of this patent can be set up with many groups of pistons (6), (7) and (8), lined up on each cross member (9) and for each couple of brackets (10).

With reference to figure 1, each time a conveyor carriage (3) comes to a stop, lined up with a workstation, a small piston (90) causes an arm (91) to rotate. Said arm (91) is provided with v-notches (92) that contact and block tha guide wheels (93), installed in the lower end of the suspended supporting frames (4), against a lower fixed guide rail (94).

When the carriages (3) are blocked and centered in the wanted position, the front pistons (6) through arms (12) and (13), solidly assembled together and rotating around a pivoting point (14), control the front plugs (15), which have a substantially conical front recess (16) suited to contain and hold fast the tip of the shoe (11). The rear pistons (7) are equipped instead with a rear plug (17) that wraps around the heel of the shoe (11).

The action developed contemporaneously by stopper plugs (15) and (17) allows shoes (11) to be blocked in the exact position, where, kept alined by brackets (10), on which they are held also during transfer operations, they can remain perfectly still and in alinement during the manufacturing operation, that in this specific case, consists in pulling out the nails (18) used to keep insoles (19) fastened to the lasts (20), during upper (21) cementing operations.

Each piston (8) pivots at (22) on the machine fixed supporting

frame (5) being connected at the front end to a transverse piston (24), whose duty is to raise and lower said piston (8) during transfer and/or working operations of the heads (25).

Through timed devices, each piston (8) is lifted up and its piston rod (26) is brought forward, until heads (25) are near the tip of the shoe (11), and in any event past the first nail (18).

Subsequently, movable pliers (27) is opened, while fixed pliers (28) is brought in contact with the bottom surface (29) of the shoe (11); piston rod (26) starts its return stroke until fixed pliers (28) meets on its path the head of the first nail (18) and engages it while the movable pliers (27) closes on it while transverse piston (24) lifts piston (8), until nail (18) is pulled out completely.

Following this, movable pliers (27) opens again, first nail (18) is allowed to drop down, fixed pliers is lowered again against the bottom surface (29) and piston rod (26) continues its return stroke until it meets the following nail (18).

The above mentioned devices are programmed to perform as many extraction cycles as there are nails implanted in the bottom (29) of the shoes (11); as said nails are not in alinement with each other, each piston (8) is equipped with a side control arm (30), suitably shaped and guided by rollers (31) pivoted on the fixed frame (5).

While piston rod (26) and piston (8) are in motion, control lever (30) is moved along, being guided at the same time by rollers (31), so shape makes it swing side way making the first head (25) rotating

that its around its pivot (33), in one direction or in the opposite direction as shown by arrows (32). A second lever (34), pivoted at its two ends on centers (35) and (35'), makes the second head (25) swing in a direction opposite to the first, and for the same distance.

As shown in fig. 2, every piston (8) controls two heads (25), coupled together as specified above and their action is developed simultaneously on one pair of shoes (11), aligned on adjacent couples of brackets (10) placed at the same level.

Control lever (30) is so shaped that the heads (25) swing in a way corresponding to the misalignment of the nails (18), in respect of an immaginary straight axis, parallel to the motion of the piston rod (26).

Figure 3 shows the machine equipped instead with clamping devices and operative elements suited for rough turning and tuft removal.

In this version, the functional operating principles of the major components, if not otherwise mentioned, are understood to remain the same as those already described for the first nail pulling machine. The front stopper plugs (15') are fitted with an upper holding clamp (36) against which are set the shoes toe-ends held in position by a small auxiliary plug (37) pushed by a piston (38).

In the rear part also the plugs (17') are equipped with an upper clamp (39) against which the heels of the shoes (11) are held, through a lever (40) pivoting at (41) and operated by a piston (42).

On piston rods (26) of rear pistons (8) are mounted motor driven

heads (43), that through rollers (44), drive an abrasive belt (45) held in tension by means of a tension rod (46).

The action of the abrasive belt on the bottom parts (29) of the shoes (11) operates a first rough turning of folded edges (47), of uppers and of front and rear tufts (48).

Holding action on the shoe, held between upper clamps (36) and (39) is proportionate to abrasive belt (45) action in such a way that its action is developed only on the most central area of the bottom surface (29), without damaging the peripheral areas but still exerting a preroughing action along all the edges.

Figures 4, 5 and 6 show the machine equipped with clamping devices and operative elements suited for performing levelling operations on shoes bottom parts (29).

Unlike the preceding device, rear pistons (17") in addition to being coupled to lever arms (40) driven by piston (42), are helped in their holding action by a couple of pistons (49) and (50). Said pistons operate respectively the flexible brackets (51) that envelope and adhere to the lower part of the heels, and the pressure plates (52) which draw the leather of uppers, turned on the seat of the last, toward the center of the bottom surface (29).

To perform said drawing action, pressure plates (52) pushed by pistons (50) are held in position by fixed guides (53) secured to the main frame (5).

On rods (26) of rear pistons (8) are mounted and fastened motor driven heads (54) that, through pulleys (55) and belts (56), rotate

metal rollers (57) on which are machined, in relief, two counter rotating spirals (58) meeting in the center section.

Rollers (57) have an outer surface substantially concave toward the center.

Rollers (57) direction of rotation is such that the counter rotating spirals (58) exert a pressure on the bottom parts (29) of the footwear (11) directed toward the center which tends to draw, and levell the folded edges to make them adhere perfectly to the insoles (19).

Pistons (49) are provided with a cone shaped end (59) which exert a closing action on brackets (51) made out of flexible material.

Optionally, pressure plates (52) with the relative control pistons (50) can be omitted and the levelling action on the heels can be developed by the rollers (57).

By substituting rollers (57) with rollers (60), shaped similarly but structured in a substantially different way, the machine can be utilized for roughing operations.

Rollers (60) to be utilized for this operation, also with a concave outer surface sloping toward the center, are made out of soft materials, such as rubber, teflon, plastic or other like material, while the two counter rotating spirals (61) are formed by metal bristles.

The action of rollers (60) on the levelled surfaces of uppers folded edges assures a perfect, regular and uniform roughing operation.

Figures 8 and 9 show the machine equipped with clamping devices and operative elements suited for cementing the footwear bottom parts (23). In this case, as the whole surface (29) of the shoe (11) has to be free to receive a uniform layer of cement, forward stopper plugs (15") have to be levelled with the toe end of the shoe and the holding action is performed by additional plugs (62) having their surfaces equipped with a number of suction cups connected through suitable ducting (63) to a suction system not shown. Plugs (67) are secured to arms (64), levered at pivot (65) and operated by pistons (66).

Rear stopper plugs (17"') are equipped instead with a lower retainer plate (67) on which lasts (20) are set, while the heel edges protrudes over the stopper plug itself.

On the rear piston rods (26) are mounted the heads (68) made up by cement reservoirs (69) and a number of rollers (70) that, friction driven, pick up cement from the mentioned reservoirs and transmit it by adhesion to cementing rolls (71) in contact with the footwear (11) bottom surface (29).

Outer surface of cementing rollers (71) is covered by a plaited wire net (72) thus creating a number of pits (73) in which cement is uniformly distributed before being spread, just as uniformly, on the footwear (11) bottom parts (29).

All controls shown and described as used in the different embodiments and for various specific purposes are preferably, accomplished with double acting pneumatic pistons, not excluding the

possibility that they may also be double acting hydraulic pistons or of any other type.

CLAIMS

1) An automatic machine with multiple interchangeable heads for footwear mass production characterized by including a fixed frame (5) to which are fastened on the front and on the rear, and on one or more levels and/or side by side, moving devices having a reciprocating motion (6), (7), (8), and to which are fastened stopper plugs (15), (17) and operative elements (25), (43), (54), (68), all interchangeable, each one of them conceived for carrying out a different function in an area concerning a specific shoe manufacturing operation; such as: pulling out nails from lasts, rough shaping, tuft removal, pre-roughing, rulling, roughing, levelling and cementing footwear (11) bottom surface parts (29).

2) An automatic machine according to claim 1, characterizedby being attached to assembly lines (1), on whose rails (2) the conveyor carriages (3) slide, these carriages being equipped with a suspended supporting frame (4) to which are fastened a number of pairs of brackets (10), set side by side and/or at different levels.

3) An automatic machine according to claims 1 and 2, characterized by having stopper plugs (15), (15'), 15") which engage the toe end of the shoe (11), while stopper plugs (17), (17'), (17"), (17"') engage whit the heel end of the same shoe, said stopper plugs being aided, as required by the specific manufacturing operation, by additional front plugs (37), (62)

and/or additional rear plugs (51).

4) An automatic machine according to claims 1 to 3, characterized by the fact that together with said rear stopper plugs (17'''), some wrapping brackets (51) made of flexible materials and drawing ironing plates (52) are used.

5) An automatic machine according to claim 1 to 4, characterized by the fact that said front and rear, main and/or additional plugs, are equipped with direct or indirect controls, these being hydraulic or pneumatic double acting pistons.

6) An automatic machine according to claims 1 and 2, characterized by the fact that mobile devices (8) supporting and controlling the operative elements (25), (43), (54), (68) are double acting pneumatic or hydraulic pistons hinged in their rear end (22) and equipped with transverse translating piston (24).

7) An automatic machine according to claims 1, 2, and 5 characterized by the fact that the operative elements substantially are: nail pull out heads (25) with fixed pliers (28) and movable pliers (27); motor driven heads (43) equipped with rollers (44) for supporting and driving the abrasive belts (45); motor driven heads (54) with pulleys (55) and belts (56) to rotate the metallic rollers (57) having a double counterrotating spiral and an outer convex surface, or to rotate soft material rollers (60) having metallic bristles set in double counter rotating spiral (61) laid on the outer convex surface; heads (68)

consisting of cement reservoirs (69) and a number of rollers (70) friction driven and adhering to the spreader rollers (71), whose surfaces are covered by plaited wire nets (72), forming a great number of pits (73).

8) An automatic machine according to the preceding claims, characterized by the fact that all the sequential operations of a production cycle are timed and automatic.

9) An automatic machine according to claims 1, 2, 6 and 7 characterized by the fact that the nail pull out heads (25) are mounted in couples on each piston rod (26) of pistons (8), and that they have an oscillating motion in a plane parallel to that of the piston itself; said oscillating motion being created by a side shaped lever arm (30), constrained to slide between two rollers (31) engaged on the fixed frame (5), of the machine, said oscillating motion corresponding to the displacement required by heads (25) to remain lined up with the position occupied by the nails (18) on the insoles (19) of a pair of shoes (11) mounted on two adjacent pairs of brackets (10) set on a hanging supporting frame (4) of a conveyor carriage (3).

10) An automatic machine according to the preceding claims, characterized by being composed by one or more shoes (11) blocking units and by operative elements alined with each cross member (9) available on the hanging support frames (4) of the conveyor carriages (3), and with each pair of support brackets (10).

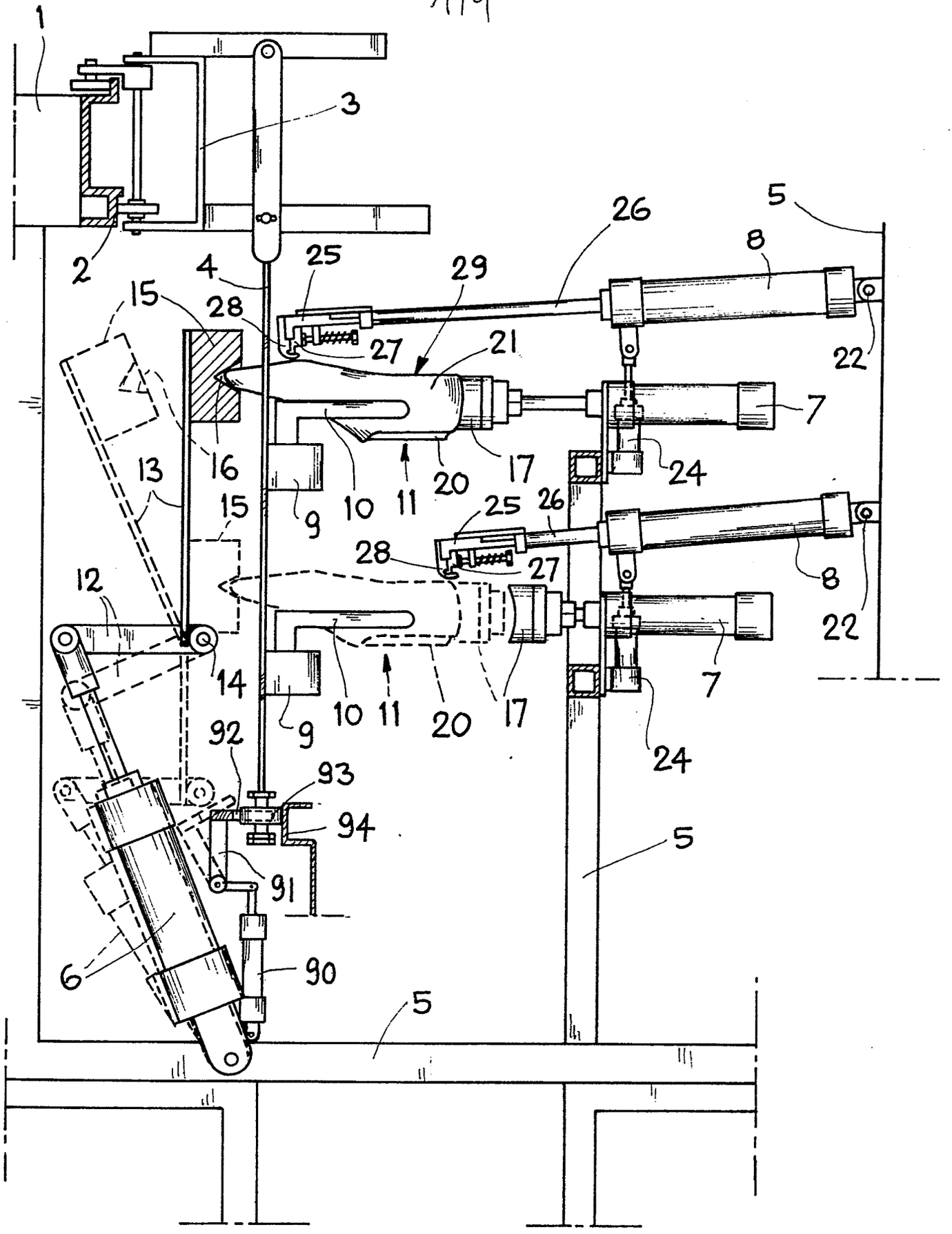

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Fig.1

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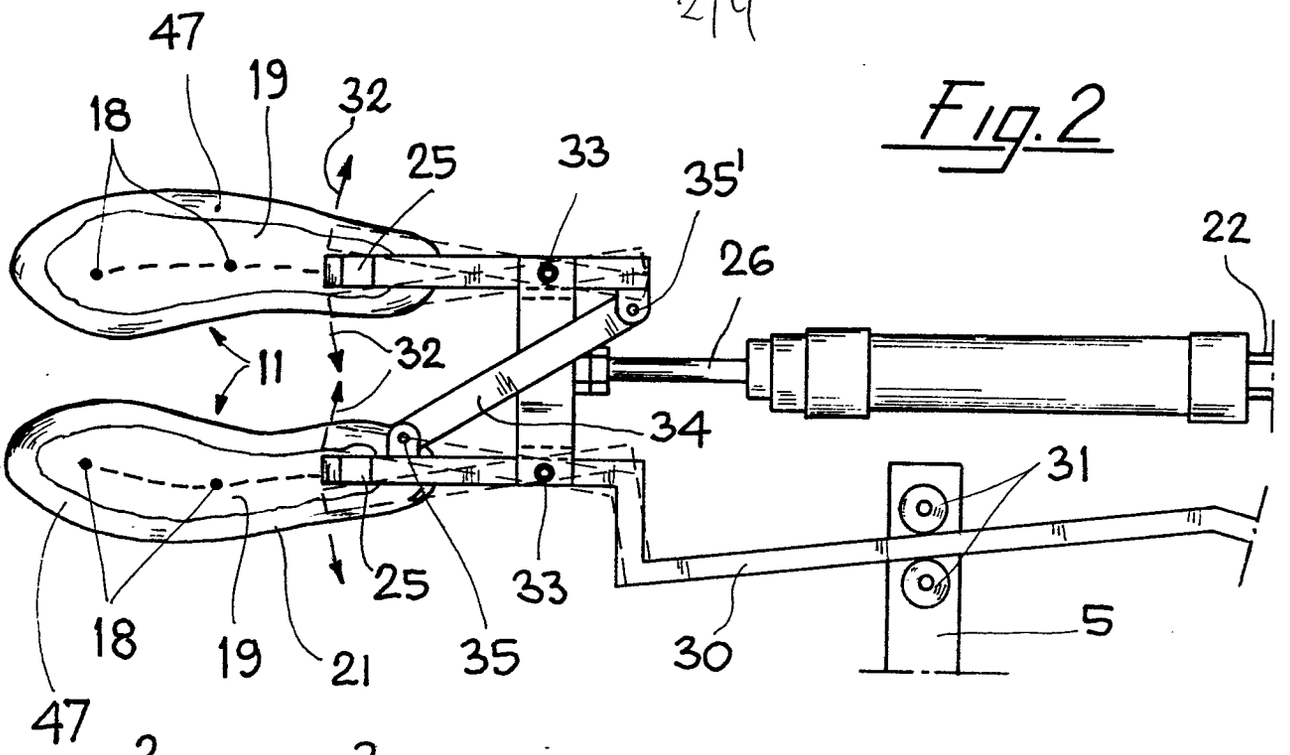
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Fig. 2

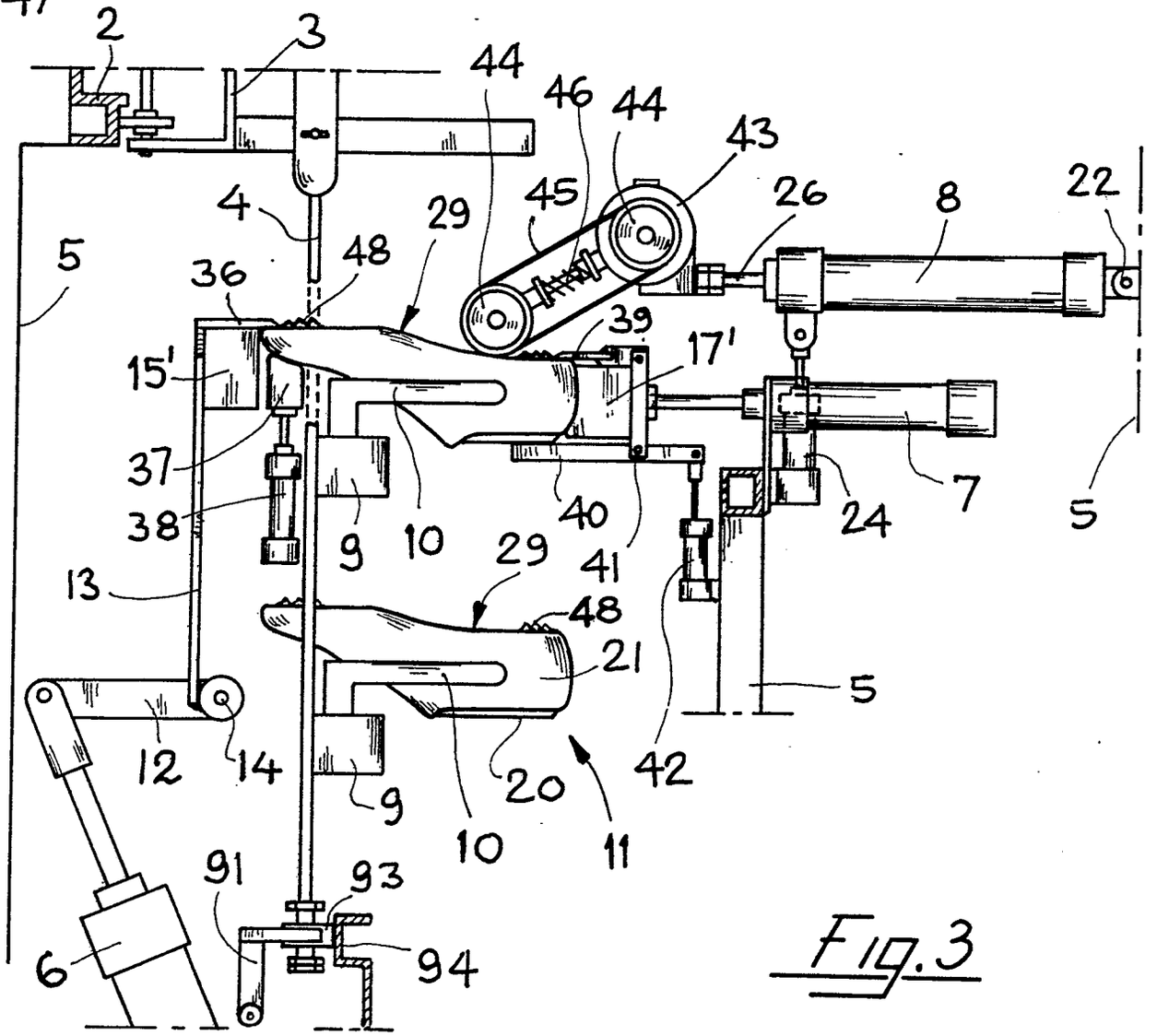
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Fig. 3

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Fig.4

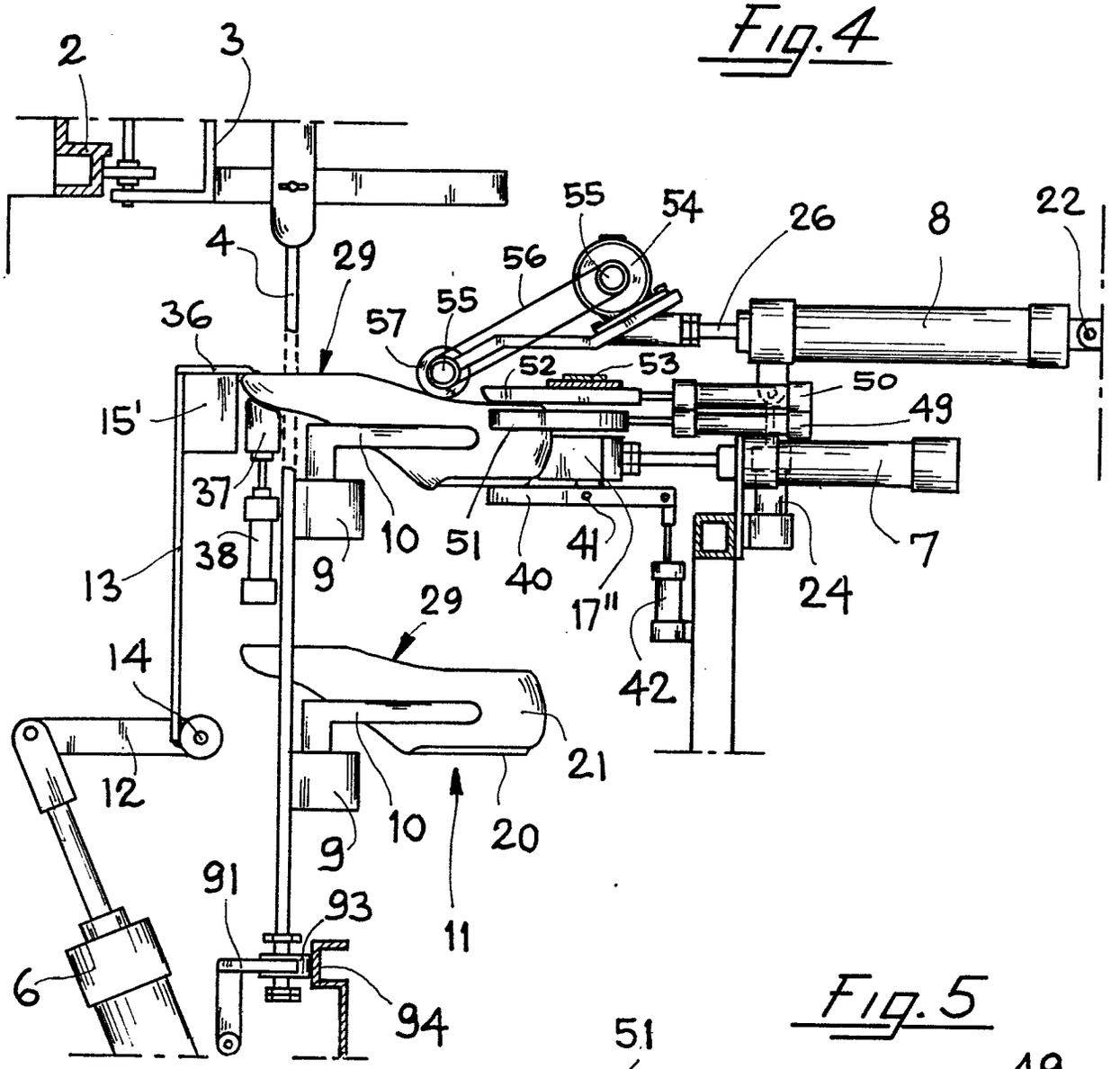


Fig.5

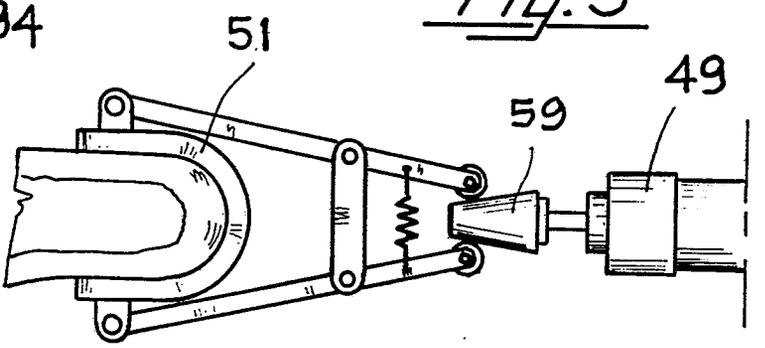
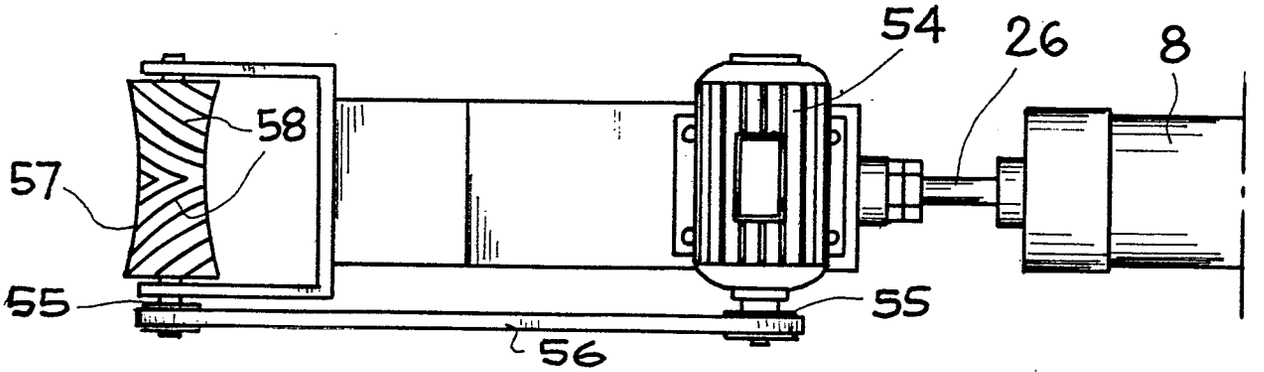


Fig.6



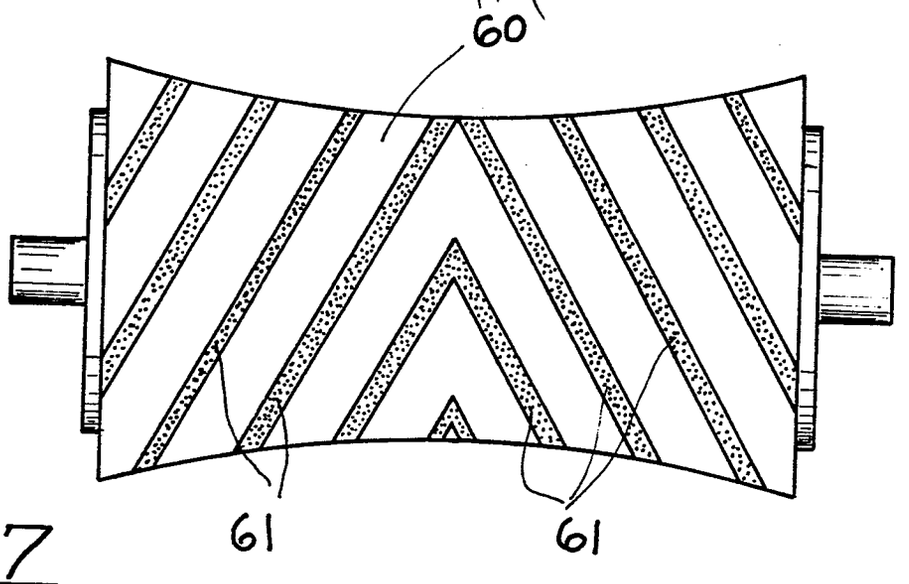


Fig. 7

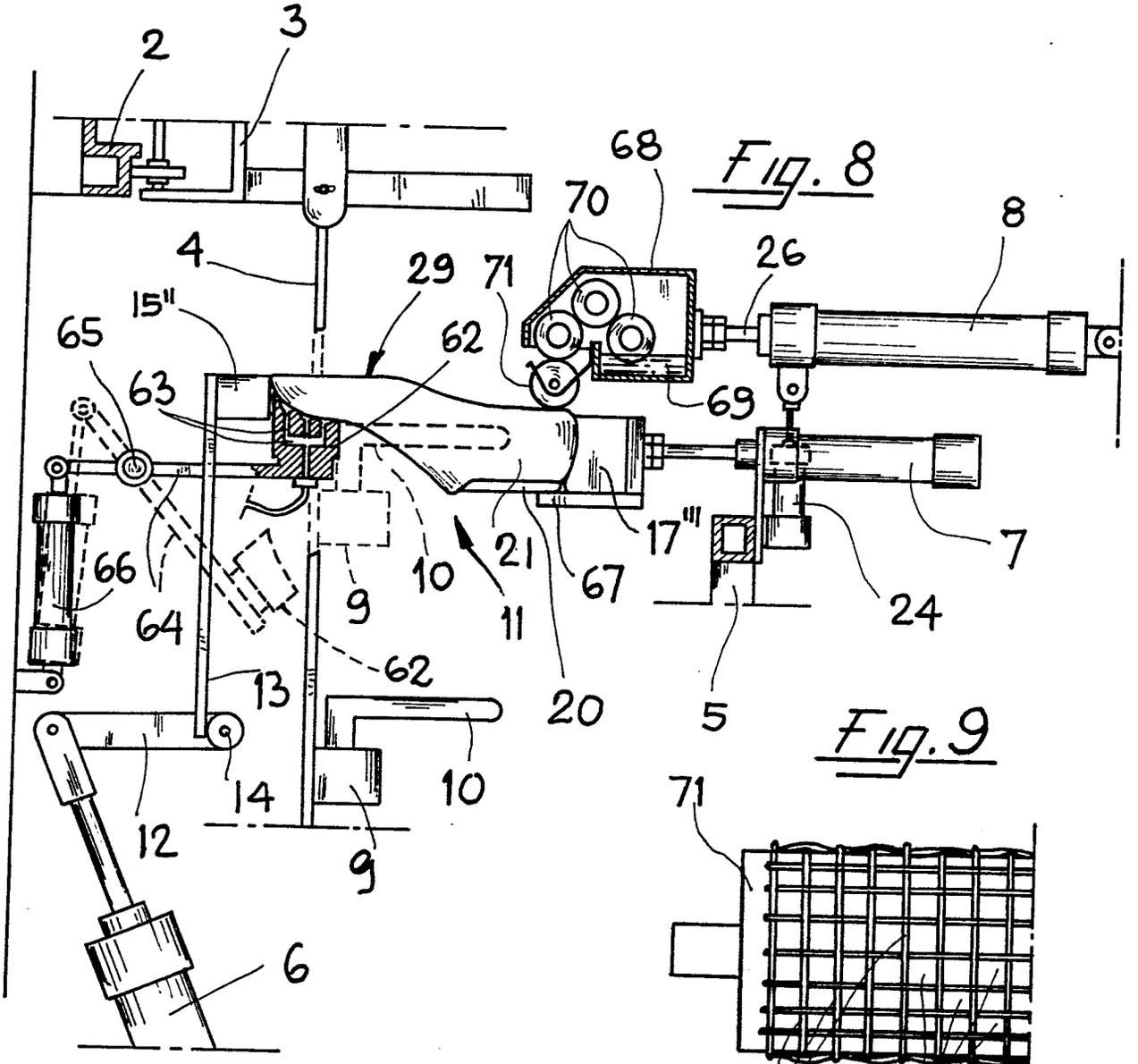
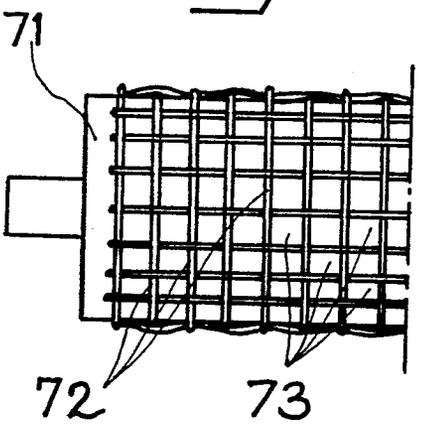


Fig. 8

Fig. 9



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European Patent Office

Application number

EP 86 83 0111

EUROPEAN SEARCH REPORT

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.4)
A	FR-A-2 296 379 (LATTARD) * Page 1, lines 3-5; page 4, line 16 *	1	A 43 D 111/00 A 43 D 61/00 A 43 D 37/00 A 43 D 25/18 A 43 D 21/00
A	GB-A-1 439 101 (VIGES) * Figures *	1	
A	DE-A-1 485 921 (GIERSE) * Figure 3 *	1	
A	FR-A-2 198 362 (ETABLISSEMENTS HUBER) * Page 5 *	1	
A	EP-A-0 123 173 (ANZANI) & IT-A-20 771 (1983) (Cat. D)		TECHNICAL FIELDS SEARCHED (Int. Cl.4) A 43 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-01-1987	LOKERE H.P.

CATEGORY OF CITED DOCUMENTS

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