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(54) Apparatus for polishing footwear.

(57) An apparatus for polishing footwear (c) comprises a pair of brushes (16, 18) placed near one another and being turned with a reversible rotating motion, having their axes lying in a vertical plane. A footwear moving device causes the footwear to pass between the brushes.

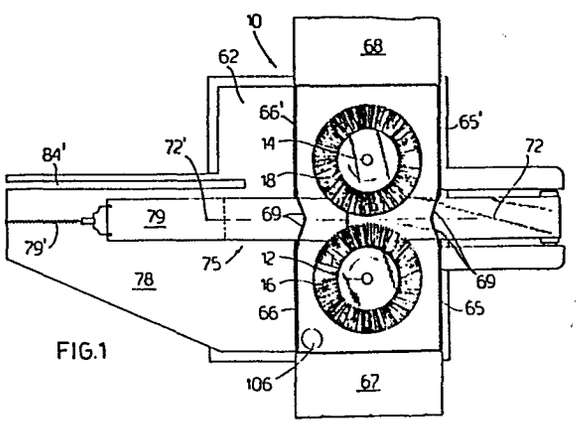

FIG.1

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"APPARATUS FOR POLISHING FOOTWEAR"

This application relates to the field of equipment for producing footwear.

At present finished footwear are subjected to a process of polishing, which will be explained below. A brush is fitted to a horizontal rotating shaft which is part of a machine. The operator applies a wax polish to the brush and then causes the footwear article to approach said brush, while turning it in

such a way that the whole surface thereof is evenly polished. In general the operator engaged in polishing also carries out retouching, that is, the correcting of any defects in the footwear. As a consequence, the machine must be stopped at intervals so that the operator can see to retouching the footwear.

A first drawback with the prior art is that the polishing operation takes up all of the operator's attention. Therefore, when the operator is engaged in polishing, he cannot carry out retouching and when engaged in the latter operation, he must stop the polishing machine.

A second drawback is that with known machines the polishing operation generates dust, much of which is inhaled by the operator.

The objects of this present invention are to make the operation of polishing easier and simpler, reduce the amount of pollution in the working environment and cut production times.

The above-said objects have been realised with a machine or apparatus for polishing, comprising two brush-bearing hubs spaced apart near one another and suitable for holding and rotating a brush, conveyor means for moving a footwear article along a path running between the brushes on the hubs and driving means for turning said hubs, preferably with a

reversible rotary motion.

According to further characteristics of the apparatus, the brushes are enclosed in a protective casing, fitted with a suction device. Provision is made for enabling the brushes to be displaced between a position near to one another and a position at a distance from one another. The conveyor means for the footwear comprises a device composed of a rod with one end for engaging the footwear, means for moving said rod between a lowered position engaging said footwear and a nonengaging raised position and means for moving said rod along a path between the brushes. The footwear is displaced while lying on a sliding belt or mat. A part of the path for the footwear slants or is inclinable with respect to the horizontal plane, such that the footwear can be placed against the brushes in a tilted position. According to a further characteristic, the apparatus also comprises a means for applying polish made up of a polish-holding rod, on which is fitted a stick of polish, and a support for the rod, the support being movable between a working condition in which the stick is placed between the rotating brushes and a rest condition in which the stick is removed from the brushes; or the apparatus comprises a spray device for spraying abrasive finishing liquid onto the surface of the brushes.

According to a further characteristic, a counter-rotating motion is provided for the brushes, in one direction along a

section of the footwear article and in the opposite direction along a further section thereof, such that the parts of the brushes in contact with the surface of the footwear are always moving towards the centre thereof.

Although the brush bristles may have an outline basically circular in shape, seen in plan view, the two circular shapes being basically tangential to a longitudinal centre line in the footwear article (or a longitudinal centre line in the path therefor), according to a further preferred characteristic of the invention brushes are provided which are oblong in shape, seen in plan view, the main radius of the oblong shape being longer than the distance between the brush's axis of rotation and said longitudinal centre line in the path and the minor radius of the oblong shape being shorter than said distance. Said brushes are arranged to be staggered in rotation, that is to say, their main axes are staggered by 90° with respect of one another.

The new apparatus allows footwear to be polished automatically with a saving in time, in as much as all the operator has to do is position the footwear article and this being done, he is able to carry out retouching another footwear article. In addition, the footwear are polished more uniformly and working conditions are more healthy.

An embodiment of the invention is described below, by way of a

nonbinding example, with reference to the accompanying drawings, in which:

Fig. 1 is a plan view of the machine, drawn with the brush covers open. The footwear-moving device has been removed to make the illustration clear;

Fig. 1A is a view similar to that of Fig. 1, but only partially drawn, which shows a variation of the brushes preferred at present;

Fig. 2 is a front view of the apparatus from below Fig. 1, with the covers closed. The protective casing has been removed at the front of the housing. In addition, the footwear-moving device has been removed;

Fig. 3 is a view along section 3-3 in Fig. 2;

Fig. 4 is basically a view along section 4-4 in Fig. 2, with some parts removed, to show the footwear-moving device;

Fig. 5 shows a variation of a detail in Fig. 4.

The polishing machine, indicated globally by 10 in the Figs., comprises a pair of brush-bearing hubs placed near to one another, 12 and 14 respectively. It is preferable for the hub axes to lie in a vertical plane. Each of the hubs is shown with its respective brush 16, 18, which is attached to the hub so as to revolve therewith, but also so as to be easily removed therefrom along the axis. The brushes 16, 18 shown in Fig. 1 are of the traditional type with a central body and a set of radially arranged bristles. The outline of the set of bristles is circular in shape, seen in plane view. By the word "bristles" are meant hairs of animal origin, cotton or wool

threads or even cloth disks placed on top of one another. The radius of each circular brush is about half the distance I between the brushes' centres, such that the brushes are basically tangential to one another and both tangential to a theoretical line 72' along which the footwear article C to be polished travels, as explained below.

According to another, at present preferred, shape of embodiment, each brush 16a, 18a is oblong, the major radius R being basically longer than half the distance I between the brushes' centres and the minor one r being basically less than half this distance, with R+r = I. In this way, when the brushes rotate in opposite directions to one another, the theoretical line 72' is brushed alternately by both brushes.

Each hub is integral with its respective first shaft 20, 22 and each first shaft 20, 22 is integral with a second shaft 28, 30 by means of an articulated joint, 24 and 26 respectively.

The shafts 28, 30 are held vertical by means of supports 32, 34 and brackets 36, 38 fitted with ball bearings, such that shafts 28, 30 can each rotate on its own basically vertical longitudinal axis.

On each shaft 28, 30 (Fig. 3) is fitted a gearwheel, 40 and 42 respectively. A toothed belt 43, or other similar drive means, links the gearwheels 40 and 42 to one another in such a way

that they rotate in opposite directions. Said toothed belt is made taut by a tightener 44. A motor 45 drives the belt 43 in the direction of the arrow F_1 or that of the arrow F_2, and in this way a counter-rotating motion, both in one and the opposite direction, is imparted to the brushes.

To the first shafts 20, 22 is fixed an approaching device 52, generally composed of a cylinder-piston unit 53, having the end of the cylinder fixed to shaft 22 and the end of the rod fixed to shaft 20. In this way a movement can be obtained which brings them close together and moves them apart. The position of maximum approach of the brushes can be regulated by means of the device 55, which includes limit stops, 56, extending orthogonally in the plane of Fig. 2 to act as an abutment for shafts 20, 22. Each stop is fitted on a threaded sleeve, for example 57, operated by a supported screw rod 58 rotating on a fixed frame 60.

A protective casing 62 enclosing the machine is fixed to supports 32, 34 by means of brackets 63 and bears the above-said frame 60. A handwheel 64 is for adjusting the stops 56. The casing 62 extends upwards to form front 65, 65' and back 66, 66' walls protecting the brushes (Fig. 1).

Covers 67, 68 pivoted on hinges are fitted onto the upper part of the casing 62. When in a closed position, the walls 65, 66, 65', 66' and covers combine to enclose each brush in a box, such that only the side facing the opposite brush is left

open. Flexible closing flaps, 69, are placed between walls 65 and 65' and walls 66 and 66'. In this way the brushes are enclosed within a chamber, from which harmful dust cannot escape. A suction outlet 106 is connected to a suction-filtering device of a known type, not shown.

The footwear-moving device 70 and the method of making them move forward will now be explained with reference to Fig. 4. A footwear article lies on a belt 72 extending along the path indicated by 72' and passing around idle rollers 74. It is preferable for the upper path of the belt to be supported by a plate 73 covered with a frictionless material. The belt 72 basically extends horizontally to a position near the brushes' axes. A fixed surface covered by a mat made of frictionless material may be provided in place of the moving belt 72. The footwear article is moved along the mat (or together with the belt) using means explained below. The following part of the footwear article's path is composed of an upward slanting section, 75, achieved by fitting a swinging board 76, hinged at 76' and moved by means of a cylinder-piston 77 between a lowered position, in which said board is coplanar with plane 78 of the machine, and a raised position, slanting at about 30° with respect to said plane. A belt or mat 79 is placed on board 76 with one end fastened near hinge 76' and the other end to a return spring 79'.

In addition, the device comprises a rod 80 for moving the footwear forward having at its end a means 81 for engaging the

footwear, said rod moving between a raised position, not engaging the footwear (chain in Fig. 4), and a lowered position engaging the footwear (continuous line in the same Fig.). It also moves along the means 72 and between the brushes, thereby causing the footwear to move forward.

The footwear-engaging means 81, not shown in detail, may be formed by a point (as in Fig. 4) for engaging a notch in a shape inside the footwear, where polishing is preferred with the footwear fitted around a shape, or it may comprise a foot (not shown) for engaging the bottom of the footwear, made to advance without a shape; or lastly (Fig. 5), it may comprise an element 81a pivoted to the rod.

The rod 80 is held in a clamp 82, held in turn by a bar 83 in such a way as to be adjustable lengthwise. Said bar is held pivoted to a vertical column 84, which is integral with a sleeve 85 sliding on a horizontal rail 86, supported by the machine's casing or housing. A longitudinal opening 84' in the surface 78 allows the column 84 to slide. A cylinder-piston unit 87 acts between a bracket 88, integral with the vertical column 84, and an extension 83' of bar 83 in order to move said bar 83 between a lowered position (continuous line in Fig. 4) and a raised position (chain in Fig. 4). A horizontal longitudinal motion is imparted to column 84 by a cylinder-piston unit 90 fixed to the machine housing through a crank 91, pivoted at a fixed point 92, on which a rod hinged to sleeve 85 slides in contact with sleeve 93. The limit

positions of device 80 are indicated by broken lines and continuous lines respectively in Fig. 4. Therefore, rod 80 can carry out a forward horizontal movement and a movement of raising and lowering. In addition, a horizontal arm 96 is fixed to the vertical column and holds a throw 97, with which a rod 98 holding a stick of polish 100 is made integral. A cylinder-piston unit 102 provides for displacing the stick of polish between a raised (continuous line in Fig. 4) and a lowered condition (broken line in the same Fig.).

In fig. 4 a control panel 104 for the machine is indicated by a thin line.

The following is a description of how the machine operates.

When the machine is at rest, the brushes are positioned apart. On starting operating the brushes approach one another.

A footwear article C to be polished is placed on means 72 with its back facing in the forward-moving direction and the rod 80 is lowered to engage the footwear article. The cylinder-piston 77 actuates raising of the board 76. At the start of the cycle rod 80, which has hooked the footwear, advances slowly bringing it towards the moving brushes. At the same time the cylinder-piston 102 lowers the stick of polish between the brushes before the footwear arrives, such that the work surfaces thereof are covered with polish. When the footwear article comes into contact with the brushes, the stick of

polish has been raised from the brushes into the rest position.

Then rod 80 is moved forward slowly by means of the cylinder-piston 90 and brings the footwear, sliding with the belt 72 on the frictionless surface 73, between the brushes. The brushes covered in polish rotate in opposite directions with regard to one another and change their direction of rotation, when they reach the approx. halfway point of the footwear article; that is to say, the surfaces of the brushes always act on the footwear with a movement towards a line crossing the center of the footwear article. In this way the back and sides of the footwear are fully polished. However, other ways of rotating the brushes are possible within the field of the invention, for example alternate rotation. Having reached the slanting section 75, the footwear presents the top of its upper to the brushes and this is also polished. Continuing along the path of device 70, a suitable stop ensures that cylinder-piston 77 lowers or causes board 76 to be lowered.

The forward movement of rod 80 (and the footwear article C) ends at the position shown by a broken line in Fig. 4, where the rod is raised and the operator removes the footwear article. In the raised position the rod travels back as far as the position shown by a continuous line in Fig. 4, being lowered automatically to hook another footwear article to be polished, which has been positioned by the operator.

It will be noted that during the entire polishing operation the operator only intervenes to position the footwear on the belt or mat 72, insert the point 81 and remove the footwear as it leaves the brushes. Thus, the operator has more time at his disposal for carrying out retouching of other footwear or other operations and the machine which is the subject of the invention thereby achieves an overall reduction in production times.

It is clear that with this machine other operations can be carried out than that of brushing for a polishing effect; for example, so-called "abrasive finishing" using a wax polish containing a solid abrasive or in the form of a liquid spray.

Obviously all the variations normally accessible to an engineer in this field can be made to that mentioned above, without thereby going beyond the area of protection intended for this present invention.

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C L A I M S

1. An apparatus for polishing shoes, characterized in that it comprises:
- two brush-bearing hubs (12, 14) spaced apart near one another, suitable for holding and rotating a brush (16, 18; 16a, 18a),
- means (80) for moving footwear along a path running between the brushes fitted on the hubs;
- drive means (43; 28, 30, 20, 22) for turning said hubs with a rotary motion.

2. An apparatus according to claim 1, characterized in that said hubs (12, 14) are held on shafts (20, 22) moving to and fro in a vertical plane between a position near to one another and a position apart from one another, said apparatus also comprising means for moving the hubs near to one another or apart.

3. An apparatus according to claim 1, characterized in that the brushes (16, 18; 16a, 18a) are enclosed in a casing fitted with removable covers (67, 68) and with a dust-suction system (106).

4. An apparatus according to claim 1, characterized in that said footwear-moving means (70) comprise a rod (80) with an end element (81; 81a) for engaging the footwear (c), means (87) for moving said rod between a lowered position engaging the footwear and a nonengaging raised position and means (85, 86) for moving said rod along said path.

5. An apparatus according to claim 1, comprising in addition a means for applying polish to the brushes, said means comprising a polish-holding rod (98) on which is fitted a stick of polish (100) and a support (96, 97) therefor, said support being movable between a working condition, where the stick is placed between the rotating brushes and a rest condition, where the stick is removed from the brushes.

6. An apparatus according to claim 1, characterized in that it comprises a path (72') for the footwear composed of a first section (72) extending horizontally substantially to the axes of the brushes and a second section (75) slanting upwards.

7. An apparatus according to claim 6, characterized in that said horizontal section comprises a surface for sliding on, covered with a frictionless material, and said second section comprises a board (76) swinging between a slanting and a horizontal position.

8. An apparatus according to claim 1, comprising in addition brushes (16a, 18a) with radial bristles for fitting on said hubs, said brushes having their bristles arranged in an oblong shape, seen in plan view, with the main radius being longer than half the distance between the brushes' centres and the minor radius shorter than half thereof, said brushes being fitted with their main axes staggered with respect of one another.

9. A process for polishing footwear, characterized in that the footwear article (C), resting on its lower surface, is made to move forward between two brushes (16, 18; 16a, 18a) with their axes basically transversal to the surface on which the footwear is resting, said brushes rotating in contrary directions to one another.

10. A process according to claim 9, characterized in that said footwear is made to move forward along a path which comprises a horizontal section and a following slanting section, so as to make the top, back and sides of the footwear come into contact with the brushes.

11. A process according to claim 10, characterized in that said brushes counter-rotating in opposite directions change their direction of rotation, when they substantially pass a line crossing the centre in the footwear article, such that the part of the bristles acting thereon is always moving basically towards the said line thereof.

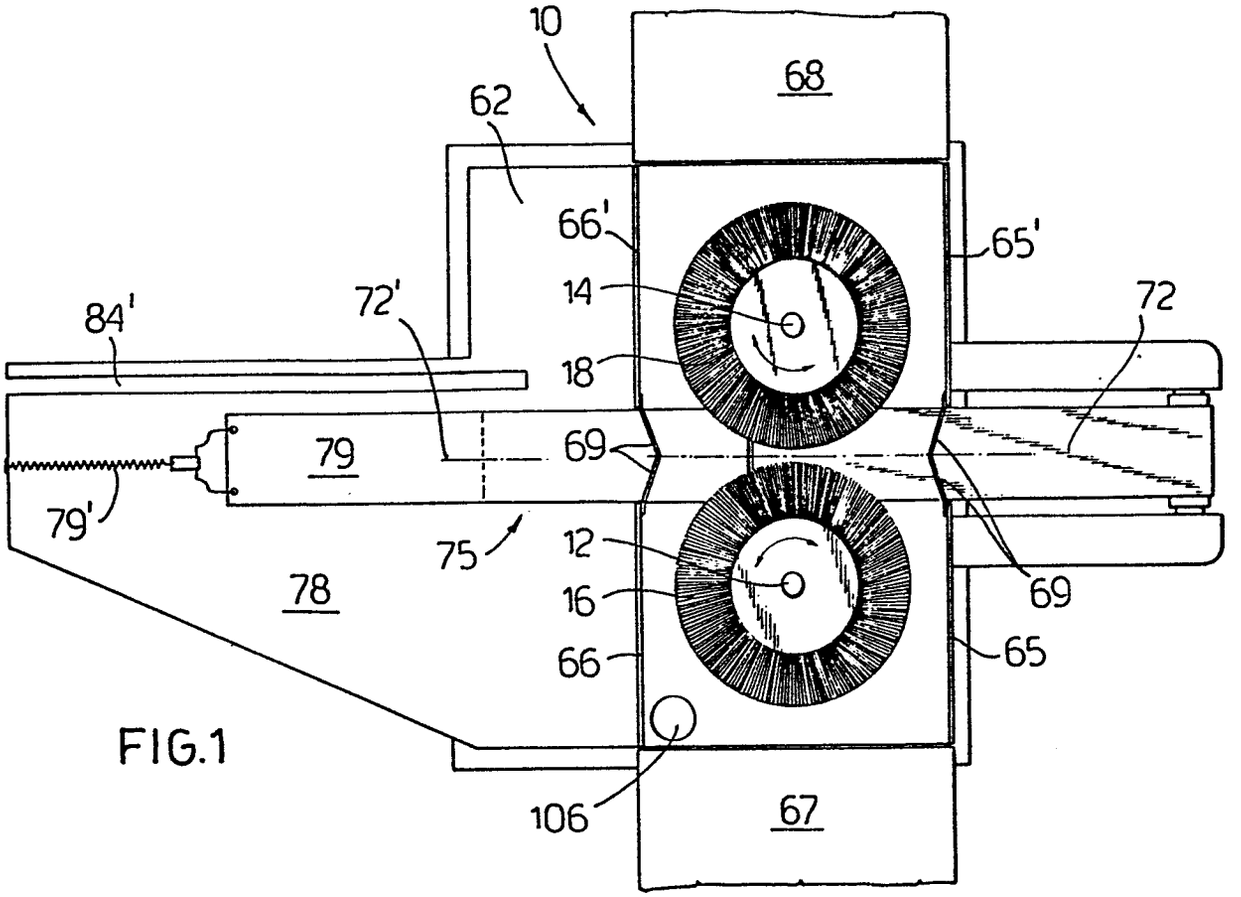

FIG.1

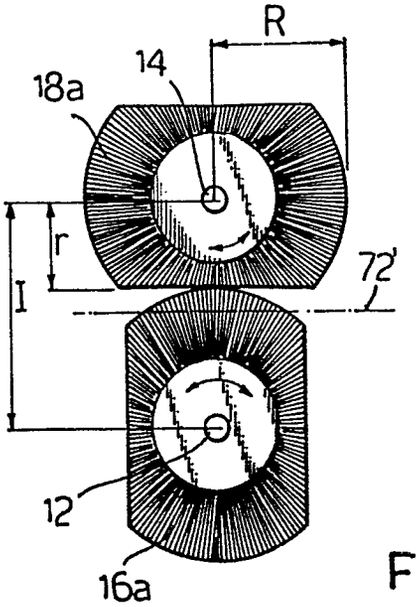

FIG.1A

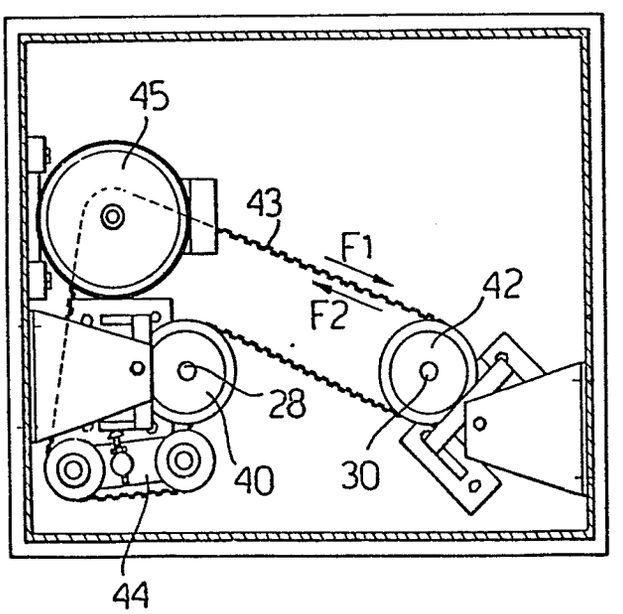

FIG.3

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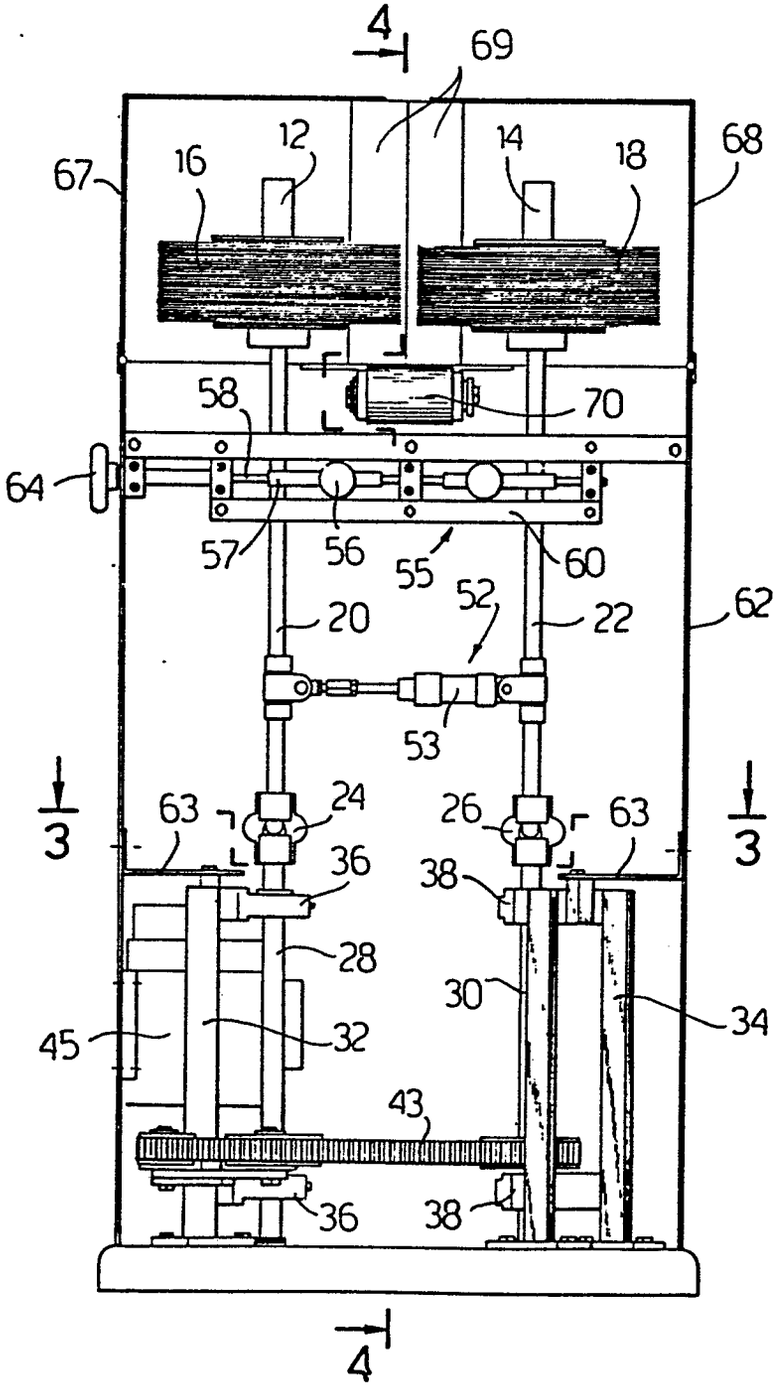

FIG.2

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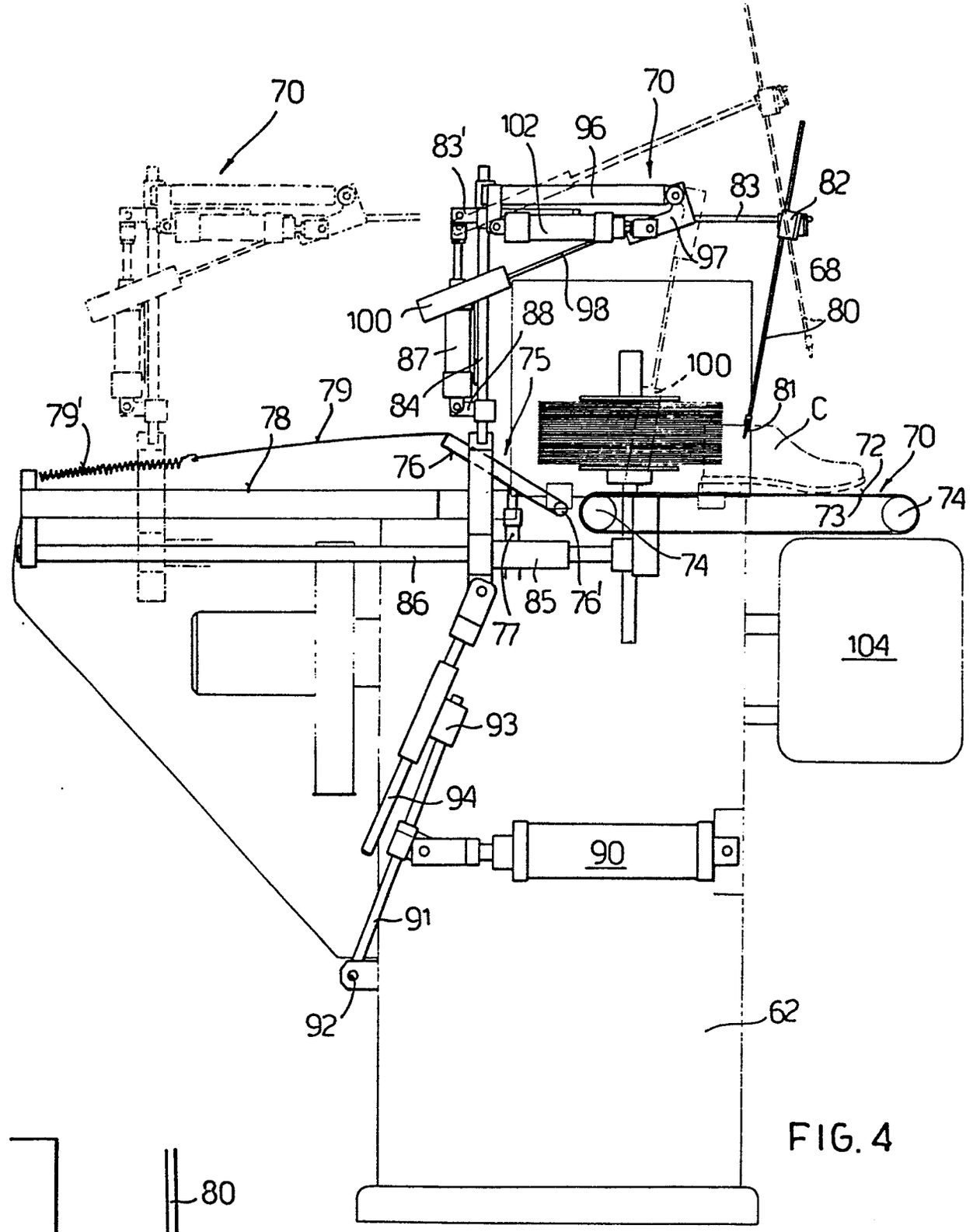

FIG. 4

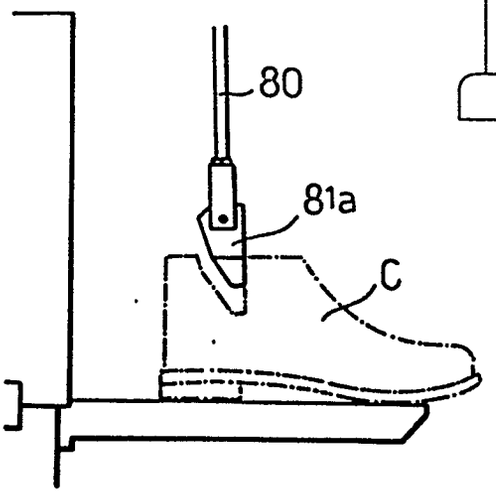

FIG. 5