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(54) **POLISHING MACHINE.**

(57) A polishing machine is intended to carry out the polishing of marginal areas of a floor, close to the walls, where conventional machines have difficulty to reach those areas, as well as the plinth, which cannot be reached by conventional machines. The disclosed machine comprises a rolling platform (1) within is mounted on a frame (5) including the motor unit of the machine, consisting of a motor (6) which, through a set of gears (8 and 10), transmits the motion to a shaft (11) substantially lowered and connected to the polishing head (12) so that the tool associated to said head (12) is capable of contacting axially the plinth and radially the floor, the driving shaft (11) being also displaceable transversally to the machine.

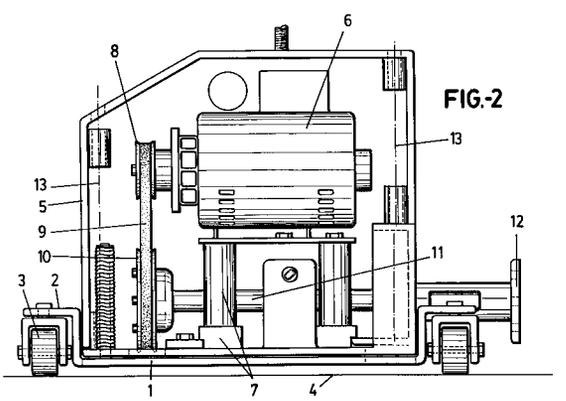

FIG.-2

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OBJECT OF THE INVENTION

The present invention relates to a polishing machine that is especially designed to polish floors, and in particular to polish the edges or marginal areas thereof, which machine can also be used for polishing or cleaning skirting boards and in any other like operation whatsoever.

BACKGROUND OF THE INVENTION

Machines that are normally used for polishing floors are known to have a vertical output shaft ending in an abrasive element or polishing element as such acting upon the horizontal plane, that is the floor, with a turning movement.

This type of machines, albeit duly capable of executing their polishing function on most of the floor surface are primarily problematic in that they are unable to adequately reach the edges thereof, viz. the areas closest to the walls, which means that such marginal areas are left with a sharp and considerable unevenness that is on the one hand unsightly and on the other impairs the placement of certain furniture, for instance bookshelves or other elements fitted to the walls.

Conventional polishing machines are moreover only capable of working on the floor and may not be used for cleaning skirting boards as well.

DESCRIPTION OF THE INVENTION

The polishing machine subject of the invention is designed to be a complement to any conventional floor polishing machine, such that once the latter has completed its task the edges of the floor may be suitably levelled in order to achieve an optimal surface homogenisation, and at the same time or complementarily clean the skirting boards.

More specifically and in order to achieve the above the polishing machine subject hereof comprises a small rolling platform having arms with a double bend for the establishment of wheels in order for the platform as such to be positioned as closely as possible to the floor, which platform supports a frame holding a driving element through the respective support, which drive shall by means of an adequate transmission provide a horizontal shaft relatively close to the rolling platform with movement, which shaft has its free end outside the frame fitted with a polishing head capable of working radially on the floor edges, causing the same to have a perfect finish, and of working axially or frontally on the skirting boards, to clean the same.

In accordance with another characteristic of the invention the said support for the operative elements is associated to the frame through height adjustment spindles that allow the position of the operative group and in particular the distance of the polishing shaft from the floor to be changed in order to adjust the same to the effective tool radius. In addition the polishing head can also be laterally displaced.

More specifically, and in accordance with another characteristic of the invention, the tool shaft receives a movement from the driving shaft through a belt having a mobile tensor that allows the spacing between the driving shaft and the tool shaft to be absorbed, the latter, viz. the tool shaft, being mounted upon cross guides and receiving movement by means of a suitable transmission from a small auxiliary motor that can be operated at will separately from the main motor.

It has also been provided that the output shaft for the tool be divided into two parts that are telescopically coupled to each other inserting a spring working under compression in order for this mechanism to allow the degree of pressure at which the machine works frontally on the skirting boards to be adjusted at will, and at the same time afford a retractable effects for the tool when it comes across any obstacle, preventing the same from being damaged.

It has also been provided for the shaft at output of the motor to be coupled with a transmission ending in a power supply to which a flexible transmission element of considerable length can be optionally and voluntarily coupled, ending in a head that is manually held, having a gripping device for the attachment of several supplementary tools, which allows special tasks to be executed in particular circumstances, for instance sanding or polishing floors and skirting boards behind or beneath heaters, or other places that are difficult to reach, almost impossible for a polishing machine, using the main tool. It has also been provided that this transmission element shall have its own switch to turn on the main motor in the machine, so that it can be switched on without having to go near the same.

In accordance with another characteristic of the invention, the polishing machine, that can be hauled directly, using a handle located on the bodywork, has an auxiliary detachable arm that allows the same to be moved in a more comfortable position, namely standing up, the free end of the said arm being fitted with the appropriate double grip, i.e. for both hands, moreover having a small head that also carries controls for the driving elements of the machine, in particular in respect of both the main motor acting on the tool and the auxiliary motor transversely moving the said tool.

Going back to the position of the tool shaft, it has moreover been provided that instead of the said shaft being transversely displaceable, the same be fixed in position, which hence consider-

ably simplifies the structure, albeit in a side or off-centre position, in order for the tool to project sufficiently from the frame or bodywork of the machine to one side, to be able to reach into a corner located in such area. In addition the drive shaft shall have to project at the other end of the machine and the latter end must be fitted with another operative end, so that in one position of the machine, it may be easy to reach into a corner at the right-hand end of a wall, whereas inverting the position it will be just as easy to reach the other corner.

Nevertheless and because this solution requires a frequent positional change of the tool, that may be inconvenient, an intermediate solution has been provided wherein the shaft is still transversely displaceable but instead of being so motorised, manually. To this end the tool shaft and in particular the body containing the same is assembled upon a carriage that is transversely displaceable along guides that are operatively established at the base of the machine, which carriage can be operated by means of a lever mounted to rotate on the motor support or any other suitable fixed element of the machine, acting at one of its ends on the body containing the tool-support shaft and which end projects to the outside as an operating handle, the said lever having a locking mechanism stabilising the same, and that hence also stabilises the tool-support shaft, at the two end working positions provided therefor, change from one position to another being extremely quick and easy.

Finally and in accordance with another characteristic of the invention, an extremely quick system of changing the tool is provided, so that whilst two tools may be used simultaneously coupled to both ends of the drive shaft it will also be possible to use one only, so that in the operation for positional reversal of the machine it is also simple to change tools.

In this sense, and more specifically, the drive shaft ends in a plate, having several slotted holes for the bayonet coupling of a number of rods with a head in turn associated to the tool, the said holes have end expansions for the passage of the said heads located facing the normal direction of rotation of the shaft, in order for there to be a natural tendency for coupling, an internal plate working with this plate, fitted with a spring and acting as a stabilising or braking means tending to hold the tool coupled to the shaft.

DESCRIPTION OF THE DRAWINGS

In order to provide a fuller description and contribute to the complete understanding of the characteristics of this invention, a set of drawings is attached to the specification which, while purely illustrative and not fully comprehensive, shows the following:

Figure 1.- Is a diagrammatic plan view of a polishing machine made in accordance with the object of the present invention.

Figure 2.- Is a side elevation view of the same machine.

Figure 3.- Is a side elevation diagrammatic view of a polishing machine similar to that of the above figures, but having the mechanism for transverse displacement of the operative head and a power supply to couple a flexible transmission element.

Figure 4.- Is also a diagrammatic plan view of the machine of the above figure, with the bodywork likewise cut-away.

Figure 5.- Is a cross-section close-view of the machine level with the mechanisms for transverse movement of the tool-support shaft, along line A.B of figure 3.

Figure 6.- Is a front elevation view of the machine, 90° out of phase with respect to that of figure 3, likewise with the bodywork cut away and in which the arm for hauling the machine is associated to such machines, an enlarged close view of the same being shown turned.

Figure 7.- Is a perspective view of the flexible transmission elements that is the fitting that can be coupled to the power supply of the machine as such.

Figure 8.- Is a diagrammatic plan view of a practical embodiment of the polisher in which the tool shaft has a fixed and considerably off-centre position.

Figure 9.- Is a front elevation view of the same machine of the above figure, with the bodywork partially cut away to show the internal structure thereof.

Figure 10.- Is a front or axial elevation close view of the plate fitted at either end of the drive shaft.

Figure 11.- Is a plan cross-section and close view of the plate or head of the above figure with the relevant brush or tool, which is shown in the two assembled and disassembled positions.

Figure 12.- Is a diagrammatic view of the machine, cut away right beneath the tool drive motor support, in accordance with the embodiment in which the transverse movement of the tool-support shaft is achieved manually.

figure 13.- Is a side elevation and cross-section view of the machine of the above figure.

Figures 14 and 15.- Are finally two general perspective facing views of the machine showing the general appearance the same can have.

PREFERRED EMBODIMENT OF THE INVENTION

The figures show that the polishing machine subject hereof is structured with a rolling platform (1) having arms (2) on opposite sides that bend upwards first and then outwards, such that the free end of each such arm (2) is fitted with a wheel (3), preferably of the free-moving kind, that is largely fitted in the step defined in the respective arm, whereby the platform as such (1) stays very close to the floor (4) as shown in particular in figure (2).

The said rolling platform (1) is fitted with a frame (5) which holds inside the operating elements of the machine, in particular a motor (6) with characteristics suited to provide the polishing tool with the appropriate turning speed, which motor (6) is mounted upon a support (7) so that the said motor uses the highest part of the frame (5), its drive shaft ending in a pulley (8) through which, working with a belt (9), movement is transmitted to the other lower pulley (10) duly keyed to the drive shaft (11) of the machine, which projects outside the frame (5) and ends in the appropriate polishing head (12) to which the polishing tool will in turn be attached.

The said support (7) for the operative machine unit is mounted upon the frame (5) and can be vertically adjusted, in particular with the assistance of spindles (13) diagrammatically shown in the figures, driven from outside the said frame (5) by means of the respective control elements, that are not shown, so that through such spindles (13) the driving unit as a whole and hence the polishing head (12) can rise or drop until it reaches the best position in respect of the floor (4) for the machine to perform its polishing function, in particular with the perimetric area of the said polishing tool working on the floor. As aforesaid, the tool associated to the polishing head (12) can however axially act upon a skirting board to clean the same and the drive shaft (11) may not only be adjusted as to height, as aforesaid, but as to its side position.

In the embodiment shown in figures 3 to 7, starting with the same basic structure, i.e. the same base platform (1) having wheels (3) of little diameter barely separating the same from the floor, upon which a support (5) is placed for the electric drive motor (6) of adjustable height through vertical wheels (13), the plate (12) for attachment of the tool (14) is fitted to an axial bush (15) that is telescopically coupled on the said drive shaft (11), a spring (16) being fitted between both elements tending to project the said plate (13) outwards, towards a limiting position defined by a screw (17) playing within a slot (18) in the bush (15) and acting as a key-slot allowing the telescopic elongation of the tool shaft, holding the two sectors making up such shaft still angularly.

The machine, in addition to the main motor (6), has a small auxiliary motor (19) the output shaft (20) of which has a spindle (21) through which movement is transmitted to a ring (22) the shaft of which in turn comprises a transverse spindle (23) in which a nut or threaded bush (24) plays coupled to a skid (25) that can move transversely along guides (26) and that is in turn the support for the tool (14) shaft (11), transmitting a horizontal displacement movement to such shaft and hence to the tool as the operator shall see fit.

This transverse displacement of the tool (14) shaft (11) clearly means that the pulley (10) coupled to the said shaft (11) can be variably spaced from the pulley (19) coupled to the main motor (6) output shaft, to which end it is provided that the belt (9) transmitting movement be moreover fitted with a tension pulley (27), in turn associated to a skid (28), that can move transversely and is fitted with a spring (29), so that this spring (29) tends to hold the auxiliary pulley (27) taught or pressed against the drive belt (9) and, hence, transmission is ensured in any relative position between the main motor (6) and the tool shaft (11), that is laterally displaceable.

It has moreover been provided that the main motor (6) shaft be fitted with an extension (30), ending in a power supply (30') that can be fitted with bearings (31), to which a flexible transmission element (32) can be coupled, comprising a fixed casing inside which a transmission cable ending in a small clip (33) plays, which plays within a head (34) held manually that caps the said transmission element, which clip can be fitted with a small tool to execute tasks in places that are difficult to reach, this transmission element having a considerable length ensuring for the same a wide scope for operations. In order to expedite handling of the machine in this sense, the said flexible transmission element (32) is fitted with an electric cable (35) ending in an operating push-button or switch (36) through which the main motor (6) is controlled, which cable (35) is capped at its other end with a connector (37) that can be plugged to its matching connector duly established in the machine bodywork (38).

As shown in figure 6, the said bodywork (38) is, in addition to having a handle for the machine to be handled directly, fitted with a considerably long arm (39) that can be removably coupled to such bodywork in order that it can be used at will, the same ending in a double grip (40) to make it easier to hold by hand, a small head (41) being fitted at the said grip (40) in which a push-button (42) is located to drive the main motor (4), fitted with the respective signalling pilot (43) and a switch (44) to turn on the auxiliary motor in either direction, the said head (41) being moreover related to the ma-

chine through another cable or electric conductor (45), ending in the relevant connector (46) that can be plugged into the matching connector (47) operatively fitted in the bodywork (38) of the machine, which shall moreover have the respective mains lead and other necessary fittings for the said motors such as condensers, fuses and so forth.

In accordance with a different embodiment, as shown in figures 8 to 12, to replace the system for transverse movement of the driving shaft (11) referred to hereinbefore, the said shaft (11) has been provided to have a considerably side or off-centre position, as shown in particular in figure 8, and for both ends of this shaft (11) to simultaneously project from the bodywork (38) of the machine, ending in two plates or operative heads (12-12').

The tool (14) can thus have absolute access to any corner, since it projects from the side of the machine bodywork (38) using either end of the shaft (11), depending on whether the corner is to the right or to the left, as can be inferred by observing figure 9, where the said tool is shown with a broken line.

To complement the solution shown in figures 8 and 9 or any of the previous two versions of the machine, it has also been provided that each plate or head (12) have several arched wide or slotted holes (48) with arcuation centre over the very shaft (11) and with expansions (48') at either end, through which respective heads or expansions (49) of the same number of rods (50) stiffened to the core (51) of the brush or tool (14) can be coupled in such holes (48), such rods (50) being numerically and positionally coincident with the holes (48) in order that the tool (14) may be fixed to the plate (15) by quick "bayonet" type coupling that tends to be stabilised by the direction of rotation of the tool itself. It is further provided that within each head (12) another plate (52) will be provided, moving axially, and fitted with a spring (53), permanently tending to be projected against the head (49) of the rods (5), acting as a braking element for the latter, or in other words as a stabilising means in coupling the tool to the head.

Returning again to the problem of the tool (14) having access to any corner, this can be solved with the embodiment shown in figures 12 to 15 in which the tool shaft (11), with its respective pulley (10) receiving the movement through the drive belt (9) is mounted with freedom of rotation through bearings that are not shown, within a containing body (54) mounted upon a carriage (55) that can move transversely with the assistance of guides (56) such that the said carriage (55) is capable of taking up two end side positions within the context of the machine and hence of the tool (14) associated to the shaft (11) accompanying the said carriage (55) in its transverse displacements.

These transverse displacements are carried out by hand with the assistance of a lever (57) mounted with the possibility of swinging freely and horizontally through a shaft (58) upon the support (59) of the motor (6), which lever (57) converts through its inner end and through a bolt its own swinging movement into a transverse movement for the body (54). This lever (57) extends to the outside as an operating handle (61) which crosses the machine bodywork through a horizontally wide slot (62), the said lever (57) moreover having an L-shaped arched expansion (63) the vertical branch of which is provided with two end holes (64) to lock a retractable cog (65) that can be operated by hand through a knob (66) and through a spring working therewith which tends to project it permanently against the curved and convex surface of the lever expansion (63), locking itself automatically in one of the end holes (64) which define the two stable positions provided for such lever and hence the two stable positions also provided for the shaft (1) carrying the tool.

It only remains to be said that the general appearance of the machine shown in figures 14 and 15 is merely illustrative and the bodywork may vary in accordance with any line of design without this in any event affecting the essence of the invention.

Claims

1. A polishing machine, especially designed to polish the edges of floors and to clean skirting boards, essentially characterised in comprising a rolling platform (1) upon which a frame (5) is mounted containing the driving unit of the machine, which unit comprises a motor (6) of suitable capacity, in turn mounted upon the respective support and through a set of pulleys (8) and (10) and a belt (9) transmitting movement to a horizontal drive shaft (11) projecting from the side of the frame (5) and ending in the relevant polishing head (12), it being provided that the said drive shaft be located beneath the motor, in a position closest to the rolling platform (1).

2. A polishing machine, as in claim 1, characterised in that the rolling platform (1) has at the point where its wheels (3) are provided, two arms (2) bending both upwards and outwards, in order for the said wheels to be fitted in such bends and the platform (1) as such to take up a position close to the lower generator of the said wheels and hence close to the floor.

3. A polishing machine, as in the above claims, characterised in that the support for the drive

unit is mounted upon the frame with the assistance of vertical spindles (13) so that the said spindles (13) make it possible to adjust the working position at a height for the drive shaft (11) and hence for the polishing head (12) in order to draw it near to or away from the floor, the said drive shaft (11) being also provided to have a adjustable position sideways.

4. A polishing machine, as in claim 3, characterised in that as means for side displacement of the drive shaft (11) a small auxiliary motor (19) is fitted supplying a transverse movement through a suitable transmission to a support or skid (25) mounted upon transverse guides (26), which support is fitted with the tool shaft (11).

5. A polishing machine, as in claim 4, characterised in that the drive belt (9) relating the pulley (8) of the main motor and the pulley (10) of the tool shaft (11) is moreover acted upon by the tension pulley (27) in turn mounted on a transversely displaceable support or skid (28), fitted with a spring (29) that tends to hold the said pulley in a taught position for the drive belt (9).

6. A polishing machine, as in the above claims, characterised in that the tool shaft (11) is divided into two parts, a transverse and displaceable associated shaft (11) as such incorporating the pulley (10) receiving the movement from the main motor, and a bush (15) to which the tool-support plate (12) is in turn coupled, these two elements making up the shaft being telescopically coupled, with the insertion of a spring (16) that tends to project the said plate (12) to the outside, up to a limiting position defined by a screw (17) threaded to the shaft (11) as such and playing in a longitudinal slot (18) of the bush (15).

7. A polishing machine, as in the above claims, characterised in that the output shaft (30) of the main motor (6), in addition to the transmission pulley (8) towards the tool shaft (11) is associated through a suitable transmission to a power supply (30') established in the actual bodywork of the machine and allowing a considerably long flexible transmission element (32) to be coupled to the said main motor in due course, its free end being capped by a small head (34) held by hand, within which there is a clip (33) for the attachment of a likewise auxiliary tool, this flexible transmission element allowing places that are difficult to reach to be worked in, which the main machine tool could obviously not reach, it being moreover provided that the said electric conduction cable (35) have one of its ends capped by a terminal (37) for connection to the machine and the other, at the said head, by a push-button (36) operating the main machine motor.

8. A polishing machine, as in the above claims, characterised in that the machine bodywork, in addition to a handle to directly operate the same, is fitted with means for removable coupling of a long arm (39) ending in a double grip (40) and likewise fitted with an electric conduction cable (45) that can be removably connected to the machine as such, the said double grip having a head (41) wherein a push-button (42) is positioned to operate the main motor (6) fitted with a signalling pilot (43) and a switch (44) to operate the auxiliary motor (19) which moves the tool transversely.

9. A polishing machine, as in claims 1 to 3, 7 and 8, characterised in that the said drive shaft (11) is established in the frame of the machine in a considerably off-centre arrangement, in particular at one of the sides of the said frame, so that the working tool (14) can reach the area of both the floor and the skirting board at a corner facing such side of the machine, it being moreover provided that the said drive shaft (11) project from the machine bodywork (38) at either end and be capped with two heads or operating plates (12) to which respective tools (14) can be fixed, so that inverting the position of the machine a corner facing a direction opposite the former can be reached.

10. A polishing machine, as in claims 1 to 3, 7 and 8, characterised in that the drive shaft (11) is mounted with freedom of rotation on a containing body (54) associated to a carriage (55) that can move transversely on the base of the machine frame with the assistance of transverse guides (56), the said containing body (54) being able to move transversely with the assistance of a lever (57) swinging to one side, ending in an outer handle (61) for manual operation and fitted with locking means at two end positions which are the two likewise end working positions provided for the shaft (11) bearing the tool (14).

11. A polishing machine, as in claim 10, characterised in that the said lever (57) is swivel-mounted on the support (59) of the motor (6) or any other suitable static element, through a swivel shaft (58), its inner free end having a bolt (60) transmitting movement to the body

(54) containing the tool shaft (11), whereas close to its other end, just before the slot (62) of the bodywork through which the handle (61) projects to the outside, there is provided a wide L-shaped and arched transverse expansion (63) the vertical branch and end areas of which are provided with two holes (64) to lock the said lever in the two set working positions, with the assistance of a cog (65) that tends to be permanently projected towards the lever by a spring and that can be locked in one of the said holes (64), which cog (65) is retractable through a knob (66) outside the machine bodywork.

12. A polishing machine, as in the above claims, characterised in that each head or operating plate (12) established in each of the ends of the drive shaft (11), is provided with several arched wide holes (48) in equiangular distribution, designed to receive in bayonet type coupling the same number of rods (50) associated to the core of the brush or tool (14) at issue, which rods (50) end in expanded heads (49) matched by expansions (48') existing at one of the ends of the said wide holes (48) in the plate (12) to allow coupling of the said rods which numerically and positionally coincide with the said holes.

13. A polishing machine, as in the above claims, characterised in that each operating head (12) is fitted with another inner plate (52) that is axially displaceable against the outer plate (12) by action of a spring (53) and designed to constitute a means to press the heads (49) of the rods (50) of the tool (14) to stabilise the same in the assembled position.

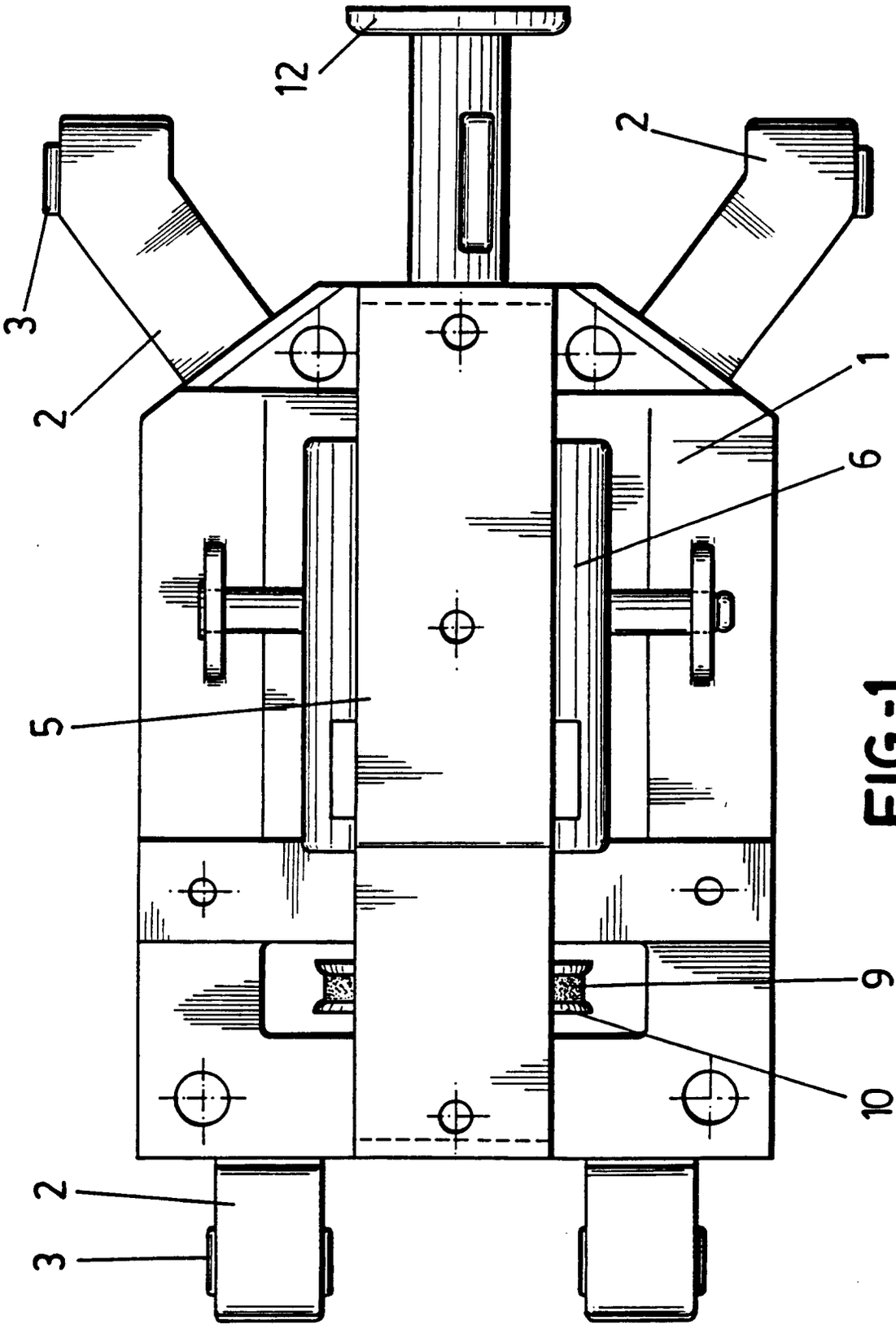
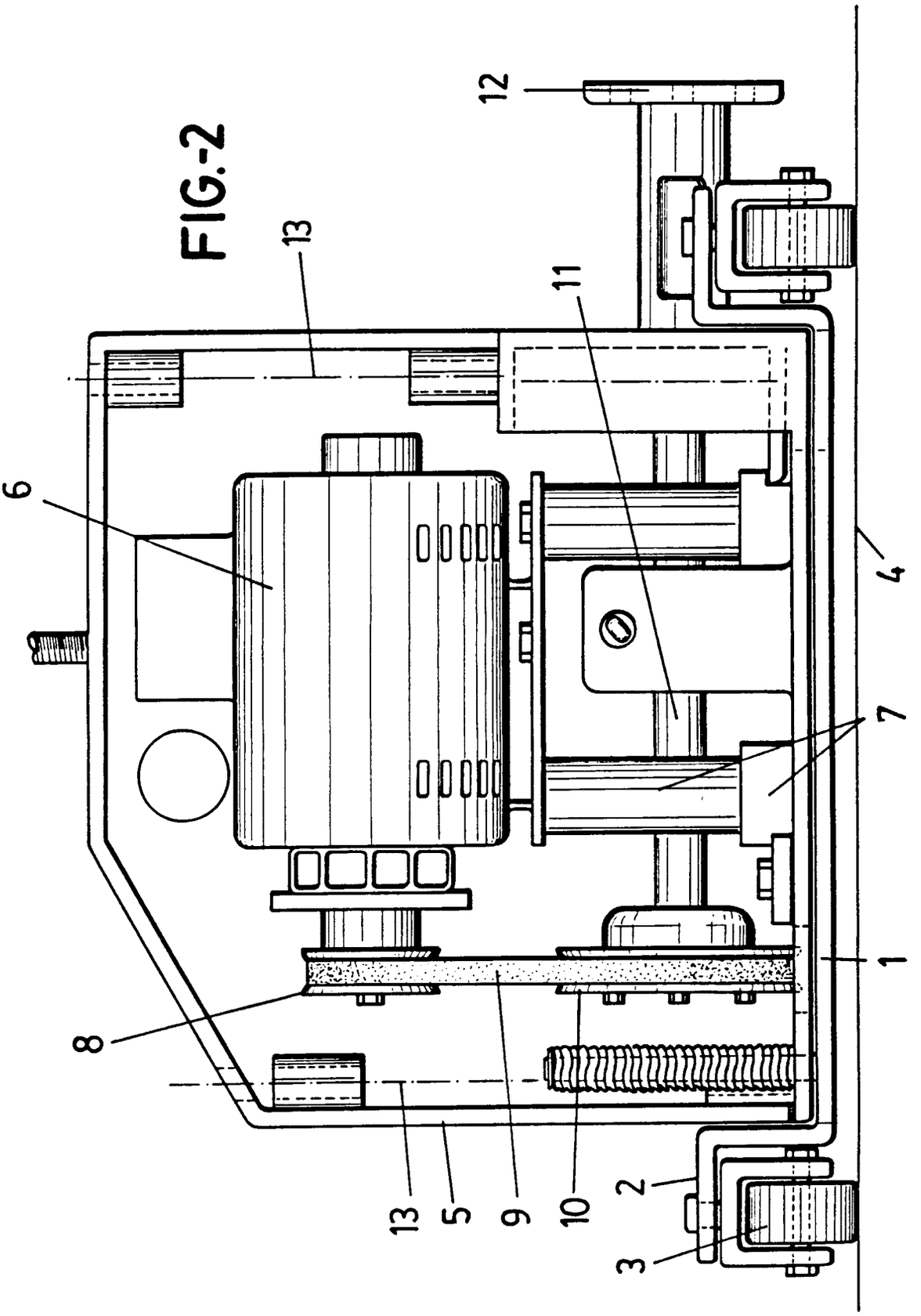


FIG.-1

FIG.-2



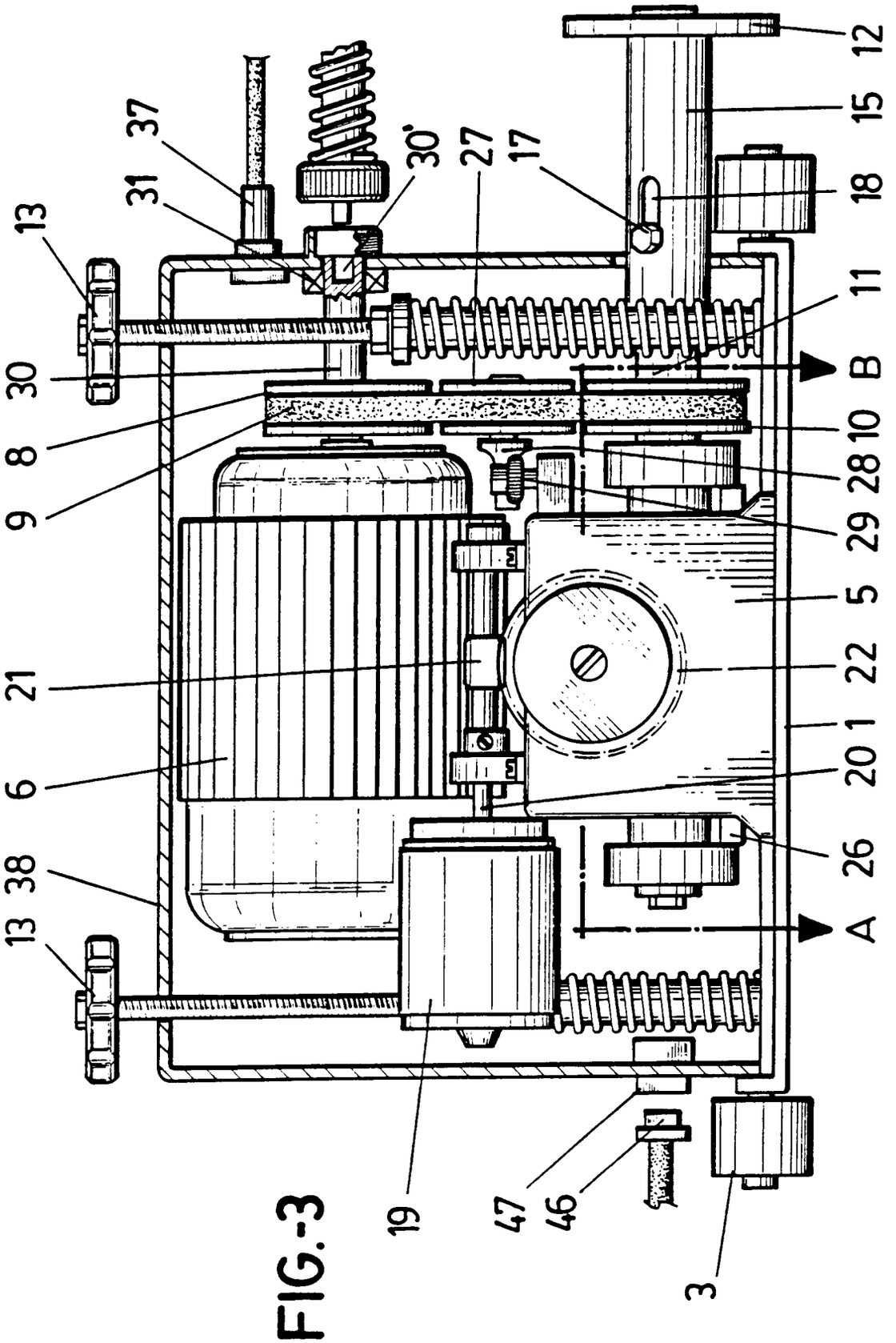

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FIG.-3

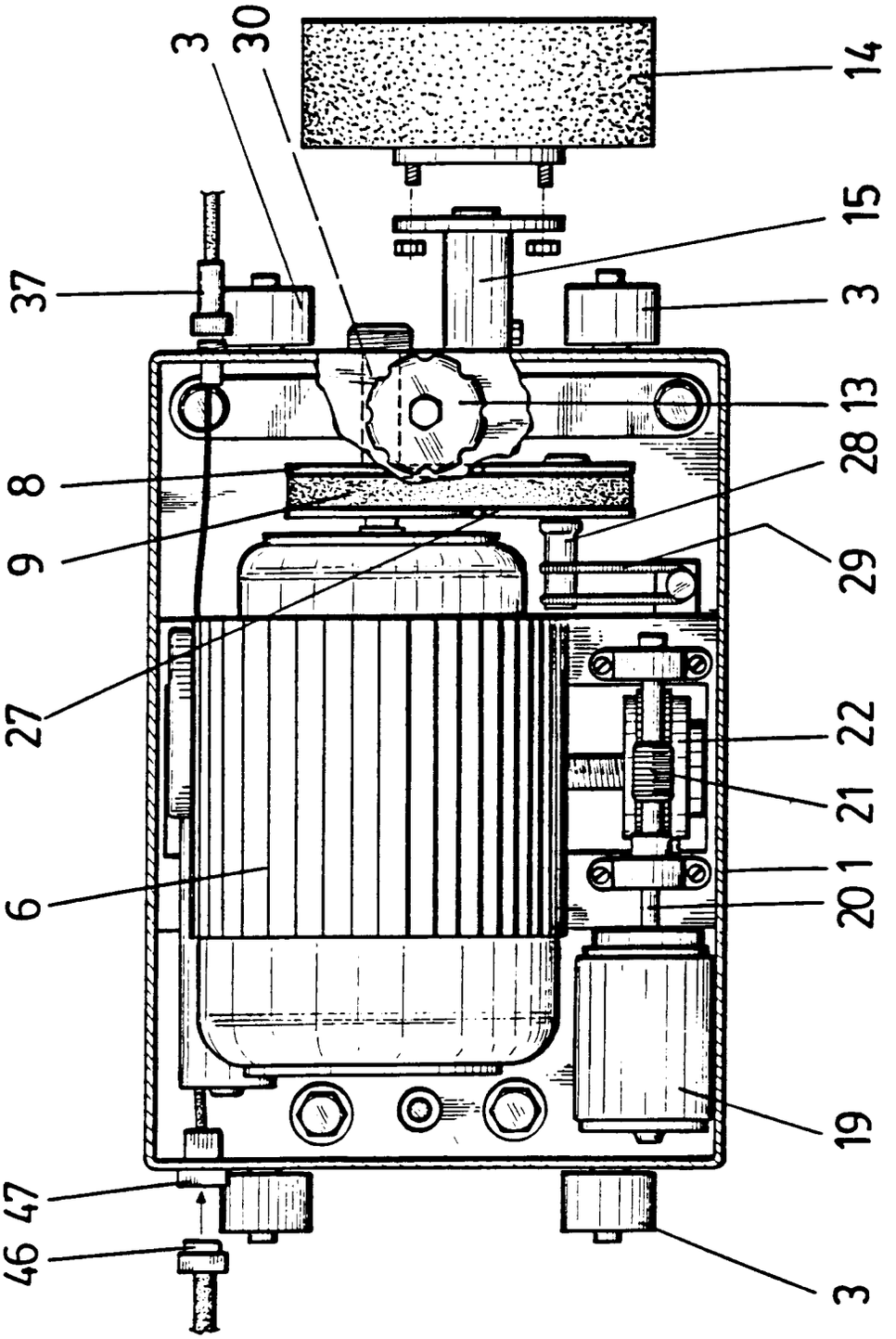

FIG.-4

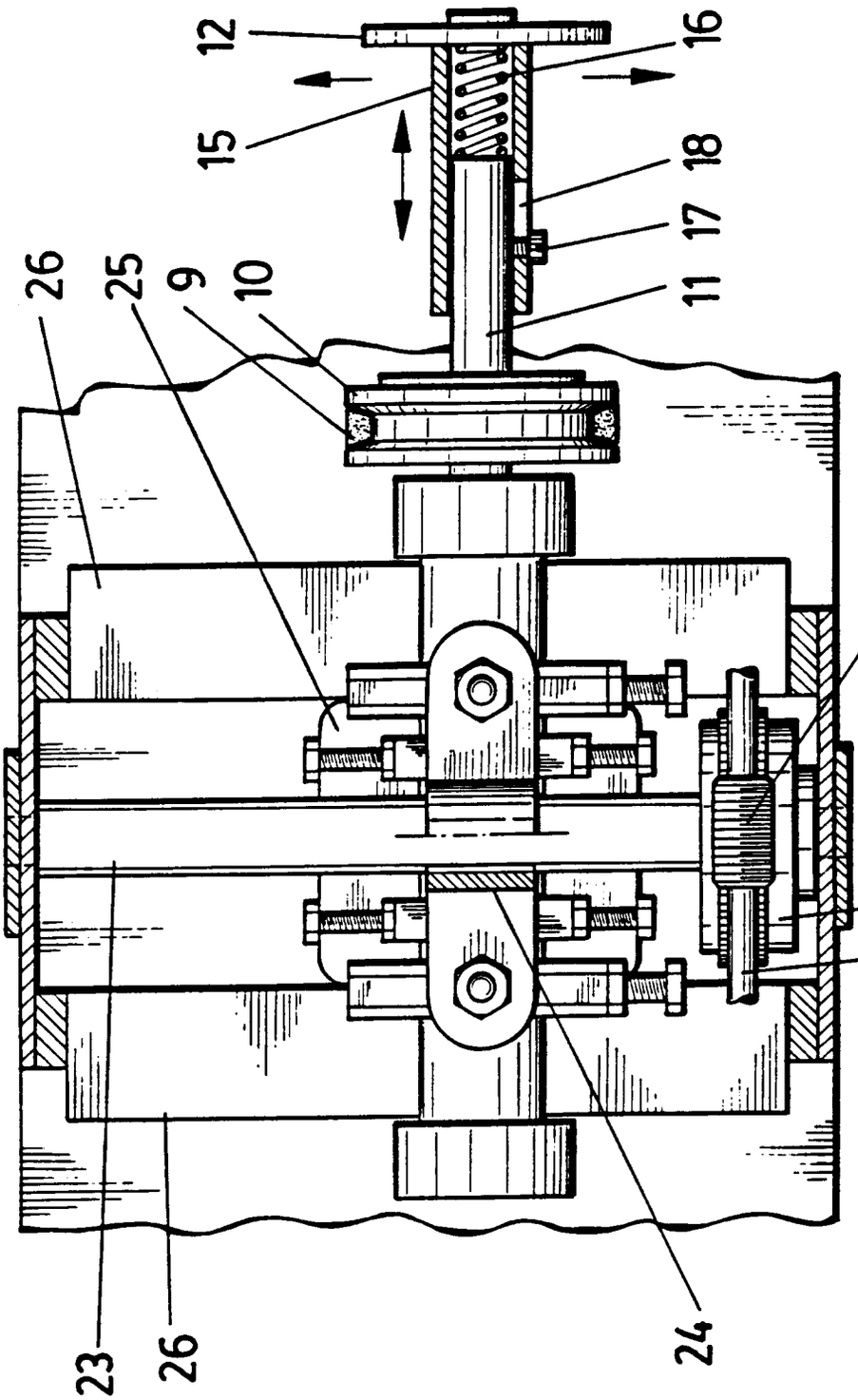

FIG.-5

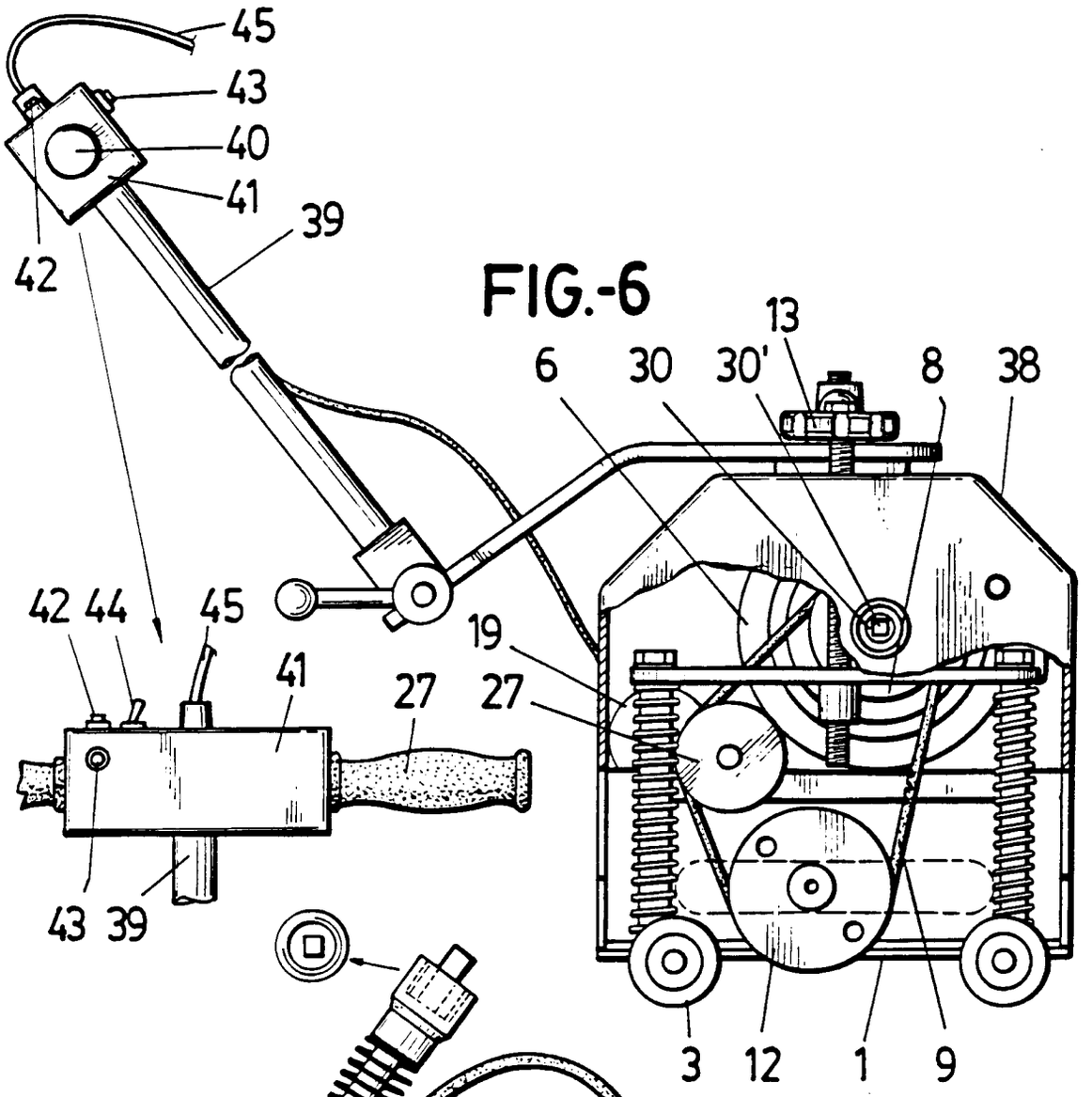
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FIG.-6

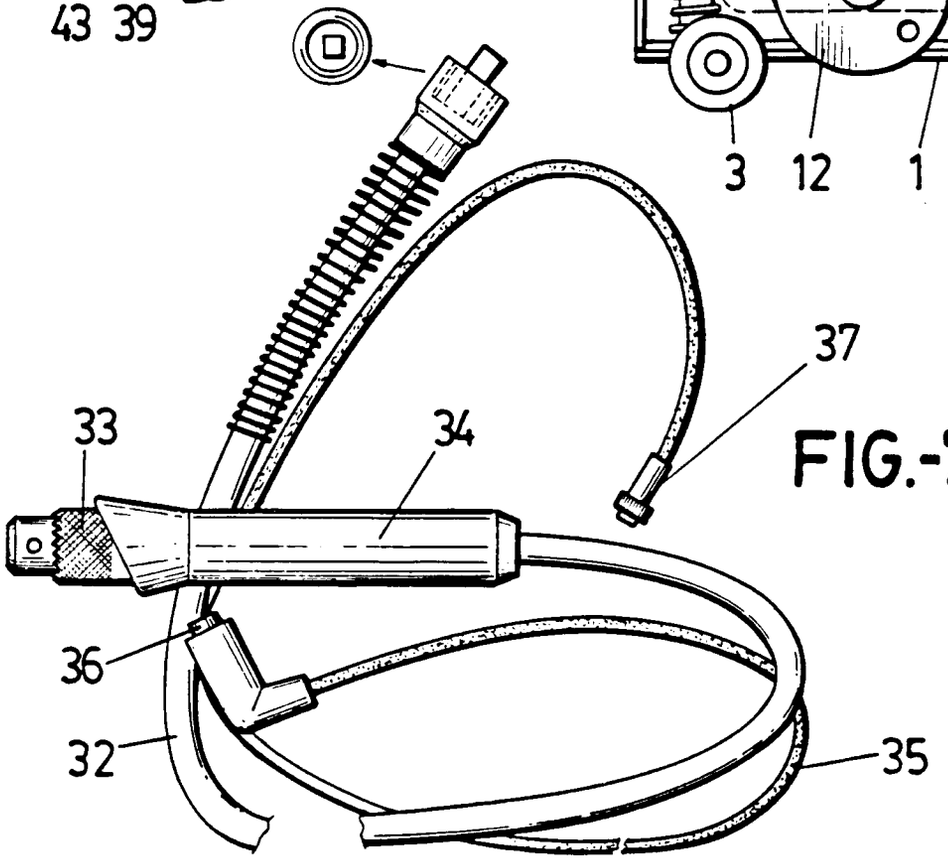
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FIG.-7

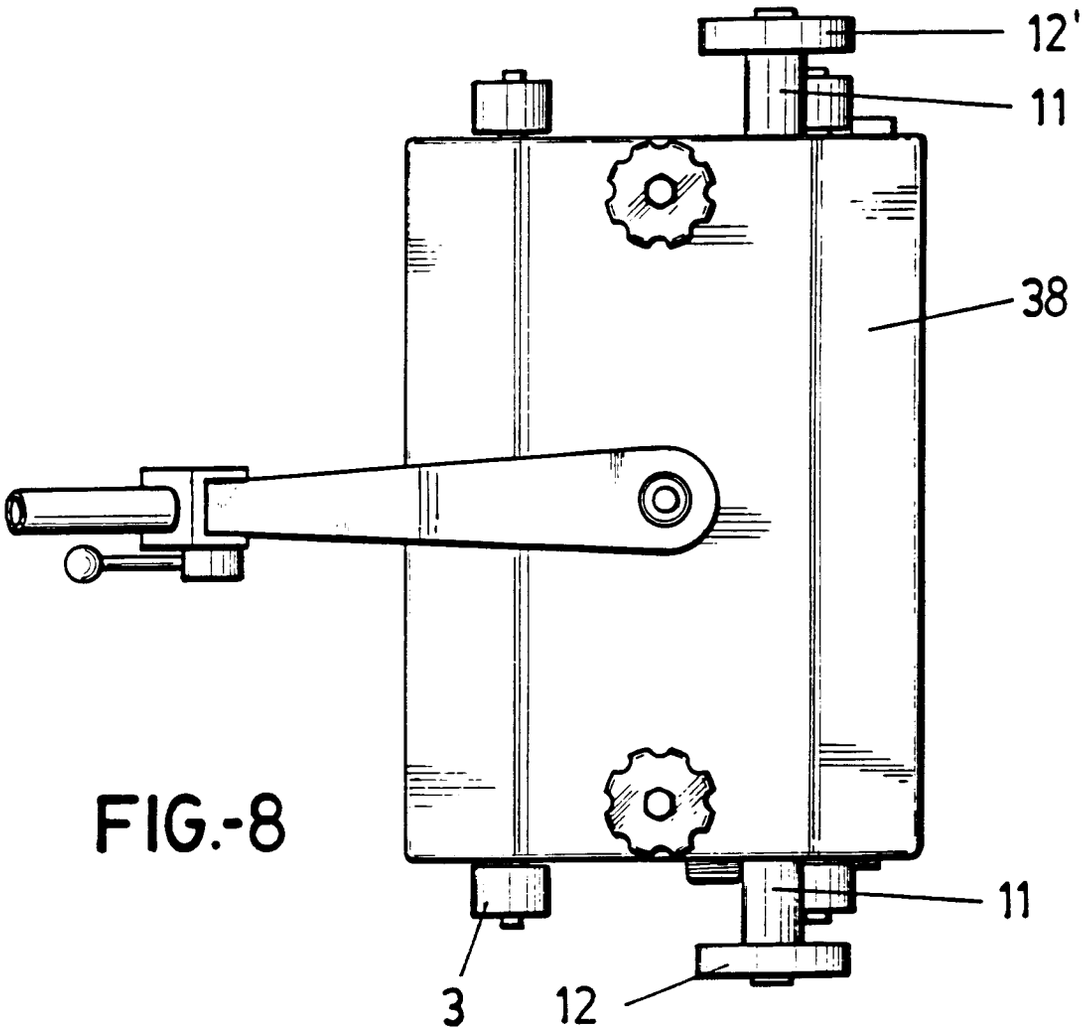

FIG.-8

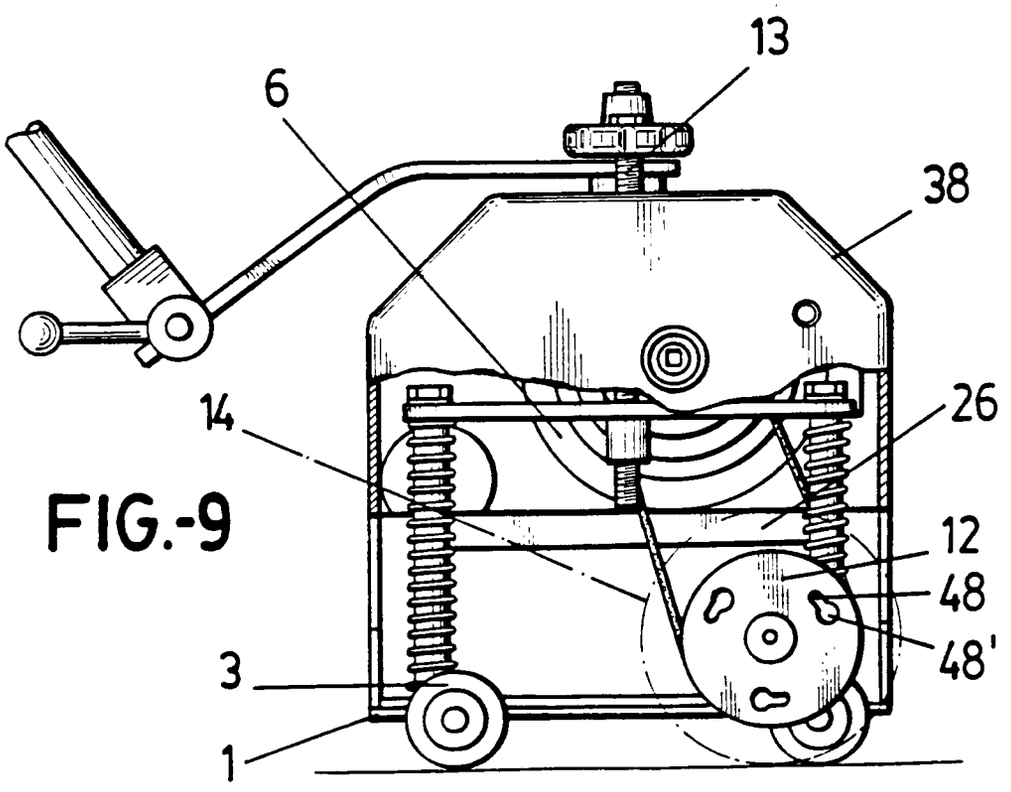

FIG.-9

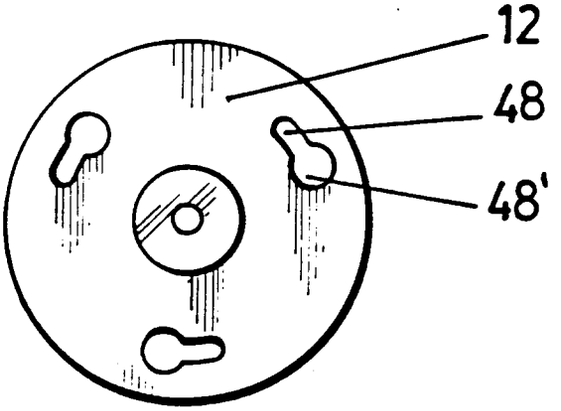

FIG.-10

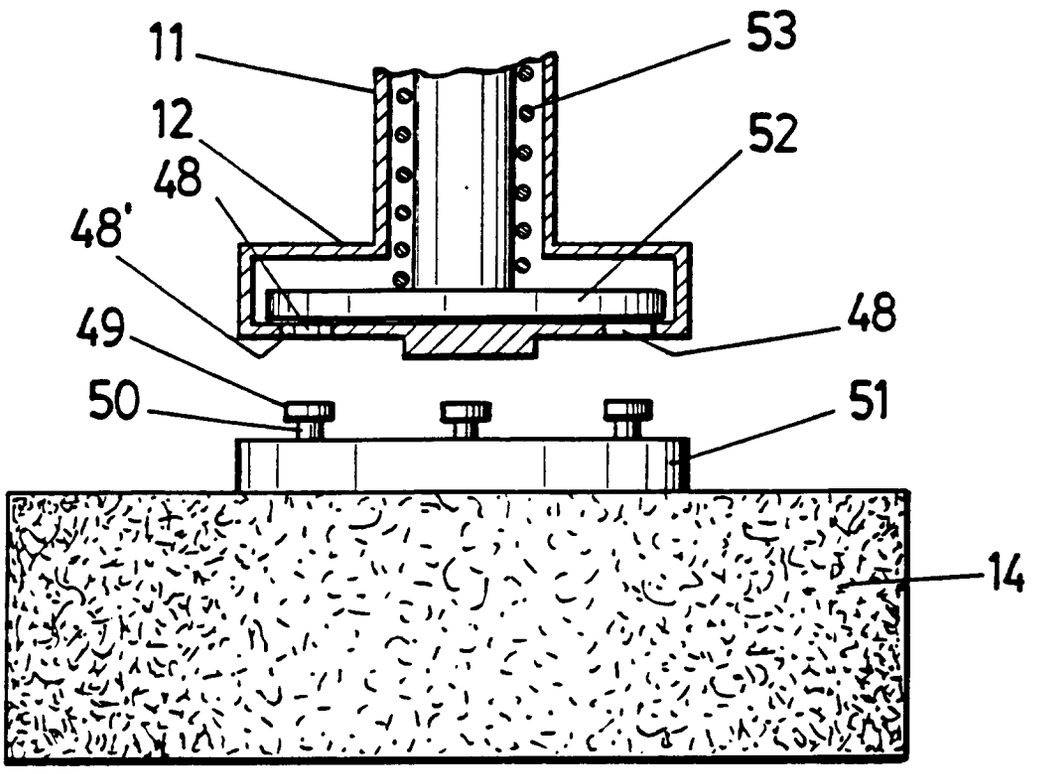

FIG.-11

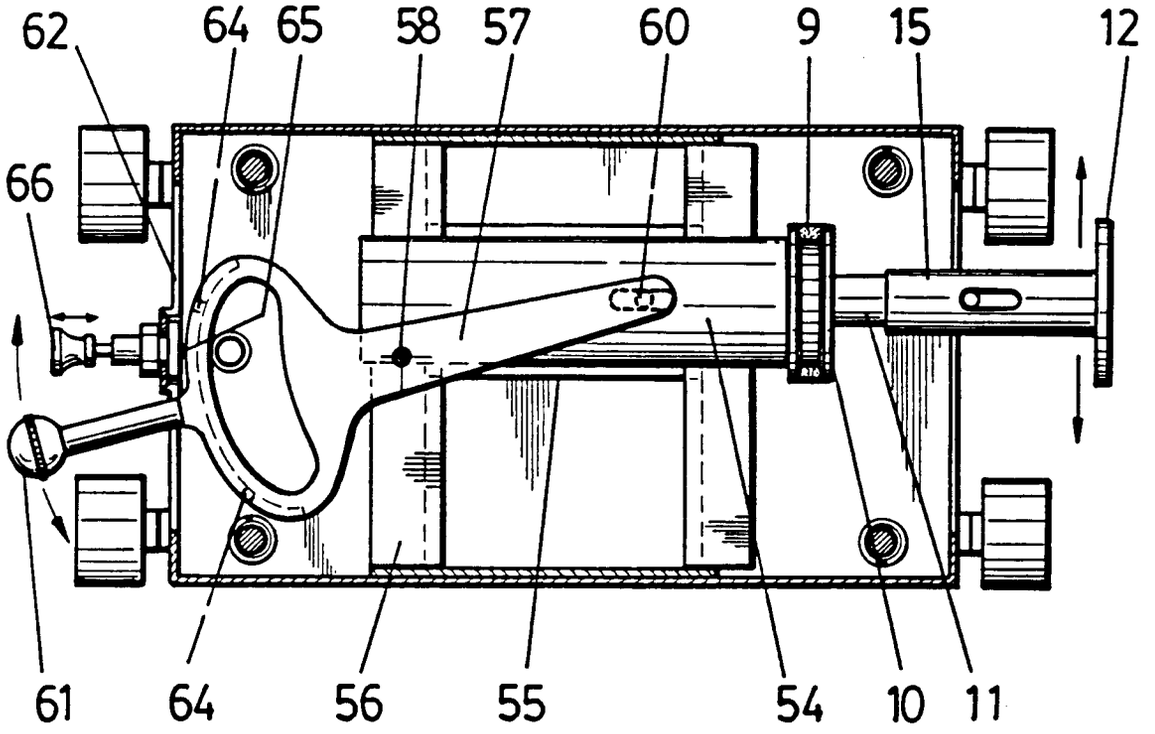
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FIG.-12

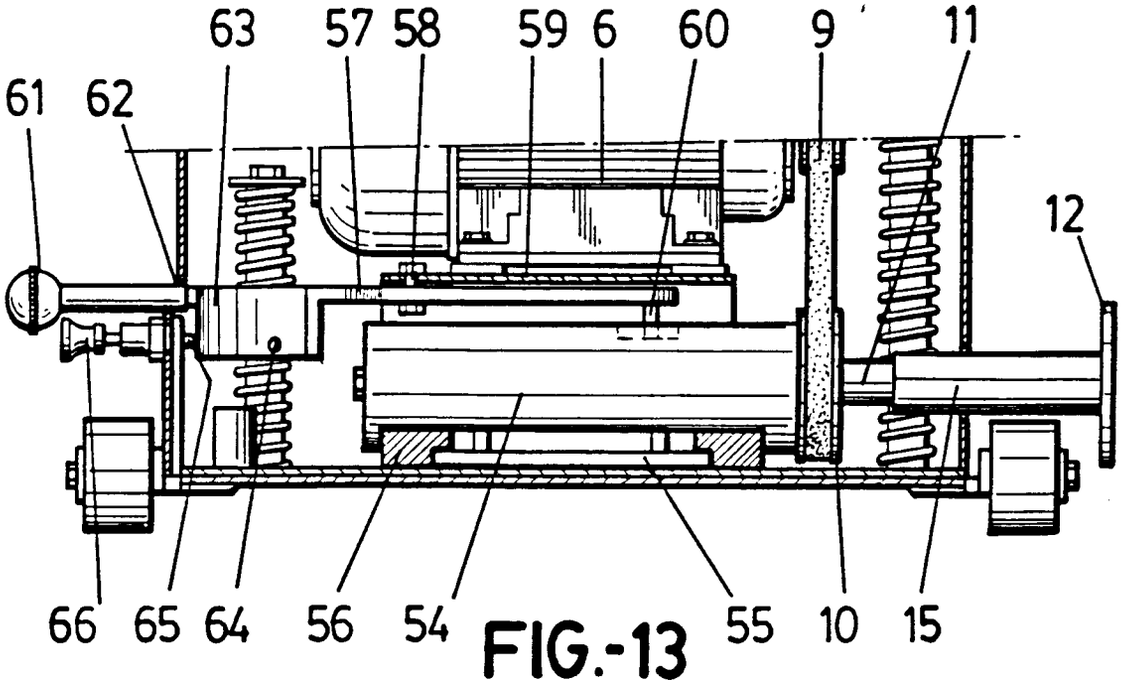
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FIG.-13

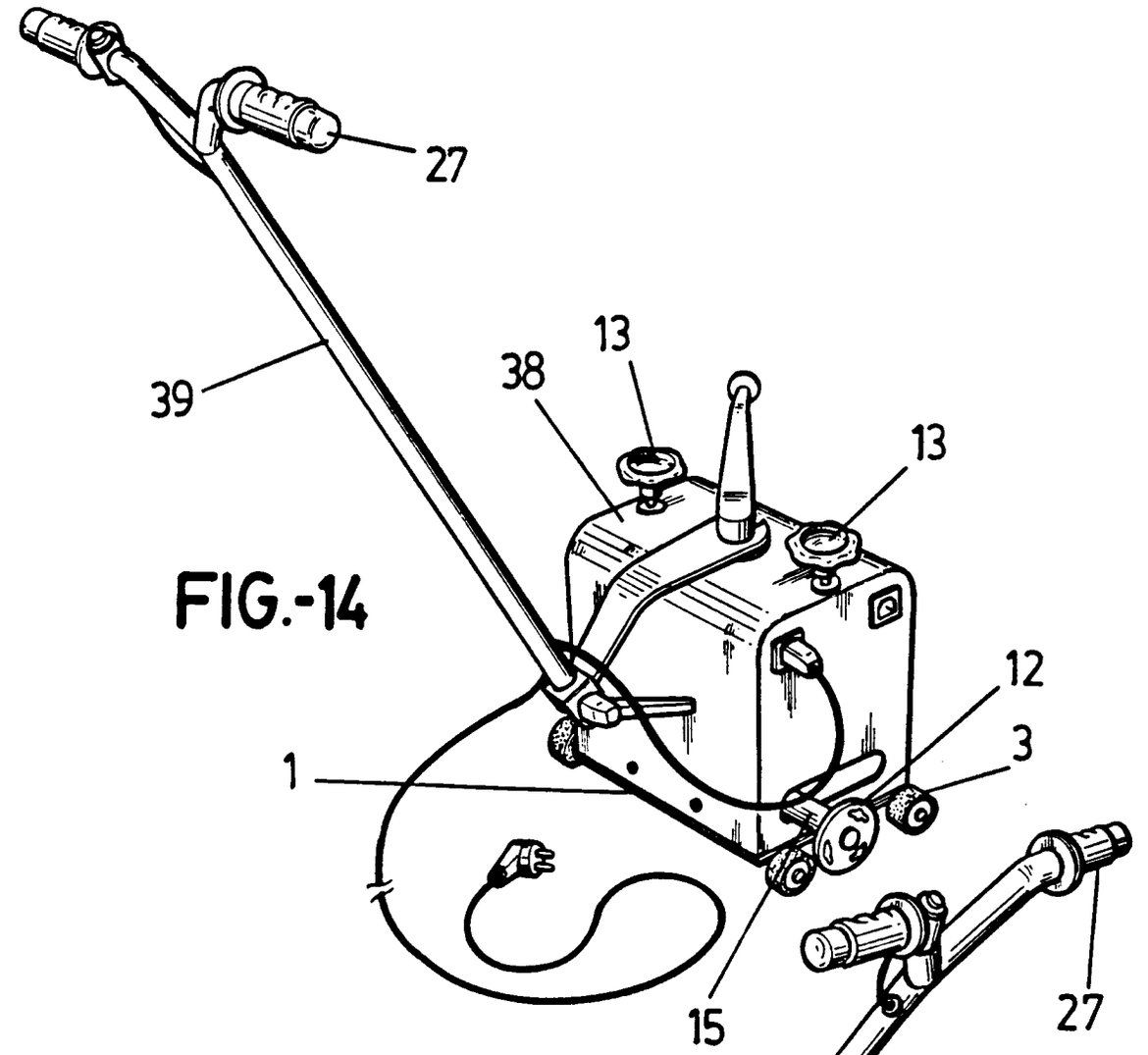

FIG.-14

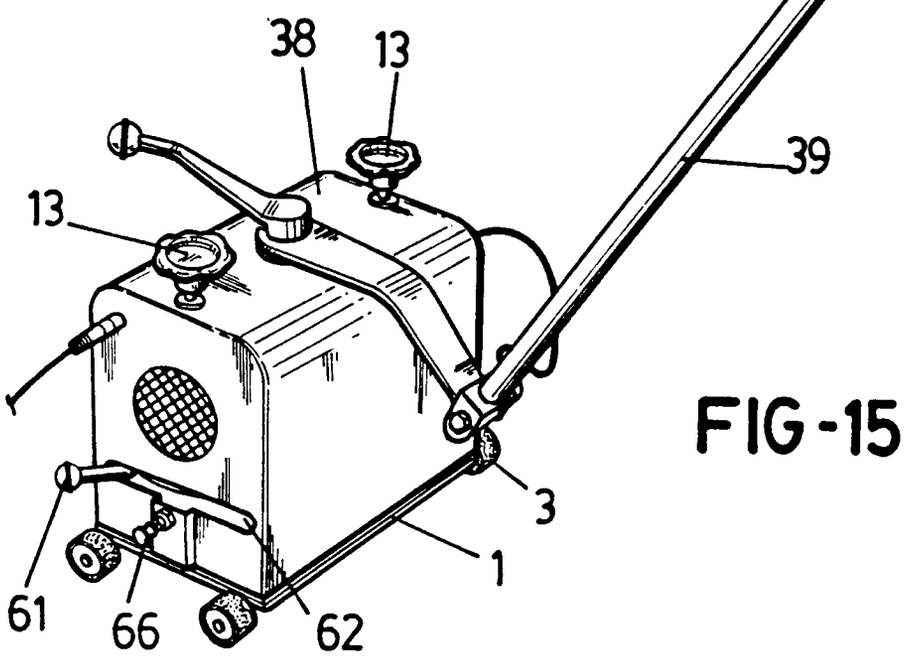

FIG-15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 93/00081

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl.[5]: A 47 L 11/10 A 47 L 11/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl.[5]: A 47 L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4024597 (THE RAYMOND LEE ORGANIZATION) 24 May 1977, see the whole document	1
A	US, A, 3533120 (R.I. DE MERCADO) 13 October 1970	
A	US, A, 2989763 (C.J. BRADLEY) 27 June 1961	
A	GB, A, 746802 (F.PH. LALONDE) 21 March 1956	
A	US, A, 2603919 (A.P. ROBINSON) 22 July 1952	
A	US, A, 4783872 (THE 3J COMPANY) 15 November 1988	

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 January 1994 (21.01.94)	18 February 1994 (18.02.94)
Name and mailing address of the ISA/ European Patent Office	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)