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(54) **Apparatus for continuous forming and filling of sacks.**

(57) An apparatus for forming containers in the form of sacks, in a continuous manner, and conveying them to a filling station, the apparatus comprising a general supporting frame for: rotating spool holding means on which the flat tubular material for forming the sacks is wound; mechanically actuated traction means apt to dispense said tubular material from the feeding spool through guiding means directing it on to continuously advancing conveying means; means for automatically measuring a preset length of each containing sack; means for cutting the tubular material to said preset size; means for separating the edges of the opening of each containing sack to be formed; means for forming the closed bottom of each containing sack; means for opening the aperture of each formed sack; prong means for picking up each formed sack by its opened aperture and transferring said sack to appropriate holding means of a filling station port; conventional mechanical, electrical and electronic means apt to carry out the operative cycle of the apparatus according to a programmed sequence.

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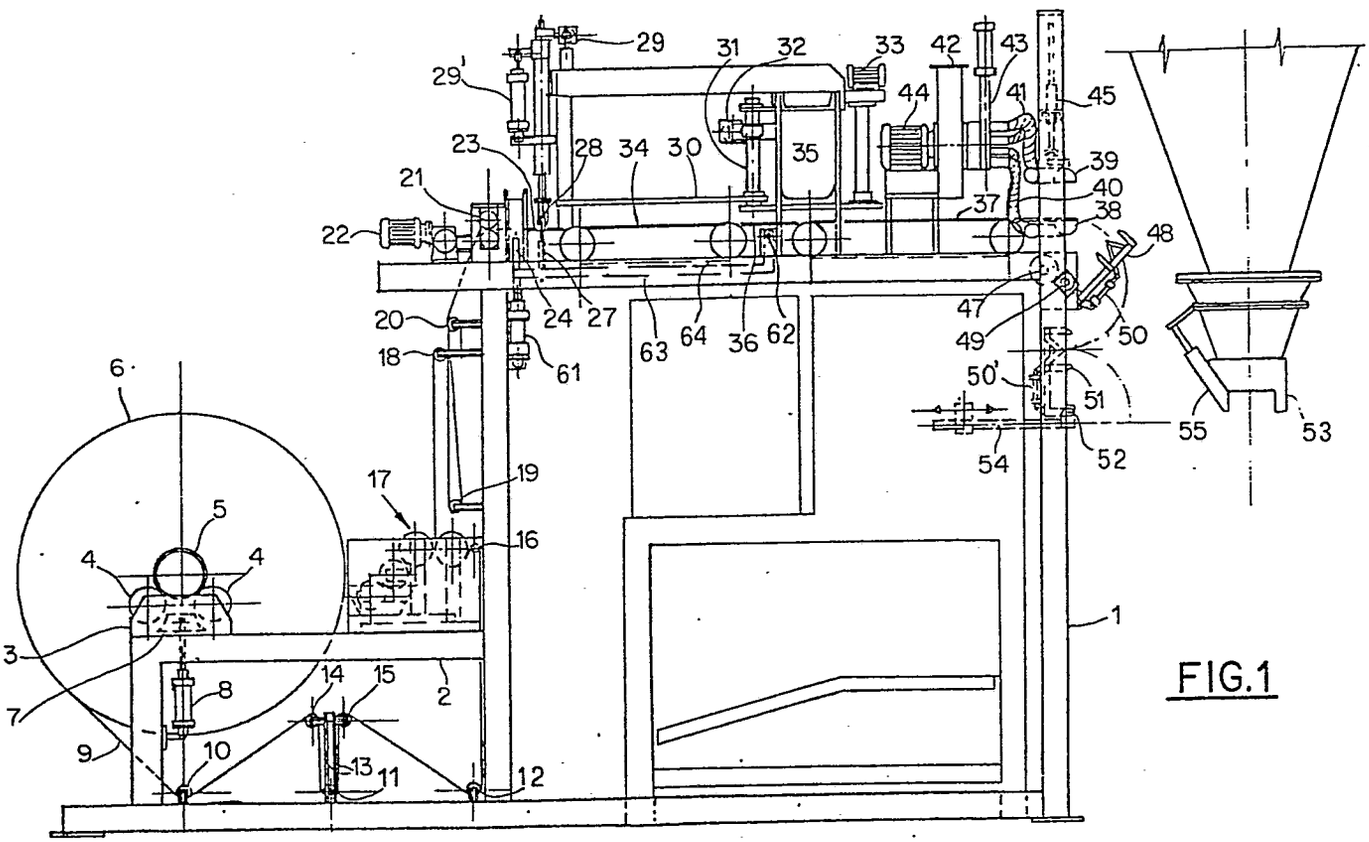
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FIG.1

TEODORO CONCETTI

Apparatus for continuous forming and filling of sacks.

This invention refers to a machine apt to continuously form sacks of any kind of flexible material, in sheet, and carry out transferring of the sacks so formed to a filling station.

Machines in use today for feeding sacks to be filled, automatically take up each individual sack from a special storage space, open the aperture thereof and place them on a holding device in coincidence of a filling station port.

Said machines, aside from their efficiency, are hindered with several practical and economical disadvantages deriving in particular from the necessity of having to provide for the supply of sacks of different sizes and materials with relation to their use, their bulk while stored awaiting to be used, their cost of purchase with specialized companies.

It is the object of this invention to provide a machine which is capable of automatically, continuously and rapidly forming sacks of the desired material and dimensions and of forwarding each sack in succession so formed to a special holding device in coincidence of the port of a filling station, thus avoiding the disadvantages mentioned above associated with conventional machines for feeding of sacks for the filling operation.

The invention will be further illustrated by the description of an example of a preferred embodiment with reference to the enclosed drawings. In the drawings:

Fig. 1 is a side elevation schematic view of the apparatus according to the invention;

Fig. 2 is a detailed view of the group of devices which preliminarily open and cut the sacks to be formed in jute and raffia material or the like, also providing for folding over of the bottom of each individual sack cut to the desired size, which form a part of the apparatus according to Fig. 1;

Figs. 3 are front elevation views, in two different operating positions (see Figs. 3a and 3b), and side elevation views (Fig. 3c) in detail;

Fig. 4 is a detailed view of the arm which supports the devices for gripping the folded over bottom of the sack cut to size and for turning said folded

over bottom upside down, which are again part of the apparatus according to Fig. 1;

Fig. 5 is a detailed view of the devices for gripping the folded over bottom of the sack cut to size, and of the conveyor arm which transfers the sack to a stitching machine which closes the bottom of the sack turned upside down and folded over which are also part of the apparatus according to Fig. 1;

Fig. 6 is an illustrated view of the sack cut to size, its bottom turned upside down and folded over, ready for being received by the stitching machine being part of the apparatus according to Fig. 1;

Figures 7a and 7b are top elevation and plan views respectively of the suction belt conveyor of the apparatus according to Fig. 1;

Fig. 8 is a view of the prong devices for gripping the sack formed by the apparatus according to Fig. 1; and

Fig. 9 is a view of the assembly for cutting the sacks to be formed of plastic material, and the like, as well as for heat sealing the bottom of each individual cut sack as an alternative to the assembly of Fig. 2, of the apparatus according to the invention.

With reference to Fig. 1, the numeral 1 indicates the basic frame of the machine according to the

invention comprising on the front an appendix formed by two L shaped elements, of which only one is shown and indicated in 2, and each showing the end of a long and short extension both being integral respectively with a corresponding mounting pillar and base girder of basic frame 1 itself.

On the front end of each of said L shaped elements a supporting member 3 of two bearing and supporting wheels 4 of a respective end of shaft 5 of a spool 6 onto which the tubular material in sheet for continuous formation of sacks, which in the present example is raffia, is wound, there being provided a breaking device 7 for every two wheels 4 which is actuated by a double action pneumatic cylinder 8.

The tubular raffia material, schematically shown and indicated in 9, during its unwinding travel is first of all guided downwards to ensure good adhesion between shaft 5 of spool 6 and the pairs of bearing wheels 4 and to this end it is successively caused to pass over rollers 10, 11 and 12 of which the first and third are pivotally fixed to the base of frame 1, while the second is free to move from the bottom on up and viceversa along appropriate vertical guides 13 in order to avoid irregular unwinding of tubular material 9 which from fixed roller 10 reaches free roller 11 and continues on, from the latter, towards the other fixed roller 12 through rollers 14 and 15, respectively, which are pivotally fixed in coincidence with the upper ends of guides 13. From roller 12 tubular material 9 travels on

upwards in order to pass, by means of roller 16, through ink dispensing cylinders on a conventional printing device, generally indicated in 17, description of which is omitted as known, which permits descriptions and desired identification designs to be formed and printed on the sacks.

From the ink dispensing rollers the tubular material 9 travels on upwards and then downwards onto roller 18, so as to allow the ink of the print to dry out, and then again upwards onto roller 19 to roller 20 from which it passes through traction cylinders 21 actuated, through a chain transmission, by a gearbox 22, said cylinders 21 provide upstream unwinding of the tubular material 9 from spool 6 pulling it along the previously described path and, downstream, provide for making it proceed to a first face plane 23 on which two parallel transversal and spaced apertures are formed, while at the same time an automatic measuring device, such as an electronic impulse counter (not shown), determins the preset length of the sack to be formed and according to such length tubular material 9 undergoes a cutting operation along a line which is transversal and perpendicular to the axis of the sack itself.

It should be stated at this point that the components and devices which will be mentioned further on in the description will be generally indicated in Fig. 1, in which they are schematically shown, and will be described later more in depth with reference to the enclosed detailed drawings.

In order to obtain a clean and rapid cut this operation must take place under heat condition and therefore, in coincidence of the first transversal aperture in the face plane 23 a cutting device 24 is provided (see Fig. 2) which through appropriate means is brought to high temperature.

The cutting operation under such conditions causes the ends of the edges of the tubular raffia material to be sealed both downstream and upstream of the cutting operation that is in coincidence of the bottom of the sack already cut to size and respectively of the opening of the following sack still to be cut. Now while in the first case no problem arises and on the contrary the advantage is obtained of achieving a pre-closing of the bottom of the already cut sack, in the second case it is necessary to proceed to re-open the heat sealed edges of tubular material in order to re-form the opening of the next sack to be cut, it is in other words necessary to perform a separation of the edges of the sack. To this end the installation of a first and second series of steel brushes is provided for, which are not shown for reasons of space in Fig. 1, and of which the first is placed above face plane 23 and the second beneath it, as shown in detail in Fig. 2 wherein a brush 25 of the first series and a brush 26 of the second series are visible.

Beneath the second transversal opening in face plane 23 there is a laminar element 27 (see Figs. 2 and 3) apt to perform a folding over operation on the

bottom of the sack, previously cut to size, in cooperation with a certain number of flat jaw devices 28 (see Figs. 3, 4 and 5) placed in a spaced relationship on a supporting bar. Said folding over operation of the bottom of the sack being absolutely necessary in raffia and jute sacks, and the like, in order to obtain a definite closing of the sack's bottom itself.

With the folded over bottom of the sack gripped in flat jaw devices 28, the laminar element disengages allowing said supporting bar to be first raised upwards under the action of pneumatic cylinder 29' and then undergo under the action of double action pneumatic cylinder 29, by 90° counterclockwise so as to cause turning upside down of the folded over bottom of the sack, from a perpendicular direction to a direction parallel to the sense of the sack's advancing direction, thus placing it beyond its corresponding side edge (see Fig. 6).

The folded over bottom of the sack, so positioned, is gripped between the fixed part and movable part, the latter being driven by a pneumatic double action cylinder 32, of chain driven conveyor arm 30 (see Fig. 5) which is supported at one end, by a small column 32 and is actuated through motor 33.

Due to said gripping operation said supporting bar, with jaw devices 28 no longer in engagement, performs a rotation in the opposite sense to the preceding sense under the inverted action of pneumatic cylinder

29, thus returning to the starting position.

At this point the folded over bottom of the sack is situated and held, as previously stated, on conveyor arm 30, while the remaining part of the sack lies on a first conveying belt 34 onto which, in the meanwhile, it has been transferred during the advancing movement and where it is adequately held by a suction system (see Fig. 7) to be described further on.

Conveyor arm 30, actuated by motor 33 after the gripping of the folded over and turned upside down bottom of the sack causes the latter to advance beneath a conventional machine 35 for stitching while at the same time conveyor belt 34 advances, with a synchronous movement, the remaining part of the sack which is lying on it, which, in coincidence of said seaming machine 35, is transferred to a second face plane 36 which is fixed and from here is forwarded, by the advancing mechanism of the stitching machine itself to a second conveyor belt 37 onto which falls eventually also the stitched sack's bottom, still in said upside down position (see Fig. 6).

Second fixed face plane 36 for transferring from the first to the second conveying belt 34 and respectively 37, which operate independently from each other, serves the purpose of filling in on any dead time occurring in preceding or following operating phases.

The second conveyor belt 37 on which now the formed sack lies, provides for forwarding of the sack towards the exit end of the apparatus in coincidence with which are situated two upper and lower suction hoods 38 and 39 which are connected through respective tubes 40 and 41 to a suction device 42 equipped with an interception valve 43 and actuated by motor 44.

As the opening of the formed sack reaches suction hoods 38 and 39 the sack itself temporarily stops due to the interruption of movement of the second conveyor belt and automatically the interception valve 43 opens while at the same time upper hood 39 moves downwards, under the action of pneumatic double action cylinder 45, thus approaching lower hood 38. At the end of its travel upper hood 39 begins to raise again due to the inverse movement of the pneumatic cylinder 45 and with the aid of the strong suction air stream provides for separation, to a certain extent, of the edges of the sack's opening.

Afterwards, under the action of pneumatic double action cylinder 47 rotation upwards is determined around fulcrum 49 of a first gripping device 48 (see Fig. 8) in an open position, which in turn determines its consequent introduction into the open aperture of the sack onto which it closes, under the action of double action cylinder 50, thus gripping the sack.

The first gripping device 48, with the gripped sack, undergoes a downwards rotation around fulcrum 49 and still under the action of pneumatic cylinder 47 till it reaches the open prongs of a second gripping device 51 (see Fig. 8) which,under the action of the associated pneumatic cylinder 50', close thus gripping the sack while the prongs of the first gripping device 48 open due to the inverse action of pneumatic cylinder 50 thus allowing it to return to its starting position.

The second gripping device 51, which holds the sack, performs a 90° rotation downwards around fulcrum 52 under the drive of a further pneumatic double action cylinder (not shown) till it positions horizontally, and in such position it is brought underneath the sack holding device 53 of the loading port through the action of supporting rod 54 which slides towards the outside.

In a known manner the sack holding device 52 grips the sack which is held by the second gripping device 51 allowing the latter to return to its starting position once its prongs open again.

It should be noticed at this point that in order to allow transferring along a horizontal path of the second gripping device 51 in order to position itself underneath the sack holding device 53 avoiding further rotation movements with consequent complication of the various mechanisms, wall 55 of sack holding device 53, which is in front of the second gripping

device 51, as in opposition to what is provided for in known conventional sack holding devices, is made so as to be able to slide upwards and downwards under the action of double action pneumatic cylinder (not shown) so that in the upper position it allows the second gripping device 51 to follow its straight path till it reaches the position underneath the sack holding machine 52 and then movable wall 55 is once again brought downwards thus resetting the usual operating procedure of the sack holding device 52 itself.

In illustrating the important details of the machine according to the invention which have been already generally disclosed in the foregoing, reference is made to Fig. 2, which shows the heated cutting device 24, the device for separating the edges of the opening of the sack comprising the series of steel brushes 25 and 26 and the device for folding over the bottom of the cut sack comprising tubular element 27.

The heated cutting device 24 comprises a blade 56 and a counter-blade 57 respectively above and beneath the first face plane 23 in coicidence of the first aperture of the latter. Blade 56, vertically fixed to the free end of a support 58 the other end of which is integral with a system of movable frames to be described later, is associated with an electric resistance apt to heat it to a temperature of 220 - 250°C for achieving best results in cutting of the tubular material 9 of raffia or the like.

The device for separating the edges of the aperture of the sack, as previously stated, comprises a certain number of upper steel brushes 25 and lower steel brushes 26, placed in an equally distanced relation according to a perpendicular alignement with respect to face plane 23, the upper series of brushes 25 being supported by a sprung and adjustable system 59 while the series of lower brushes 26 is supported in a movable way by said system of moving frames to which the lower end of support 60 of laminar element 27 for folding over the bottom of the cut sack situated in coincidence with the second aperture of face plane 23 is also fixed.

A particularly brilliant and original solution for the movement of the three above mentioned devices has been obtained through the adoption of said movable frame system actuated by a single,double action pneumatic cylinder 61.

The moving frame system has been obtained by placing its fulcrum, as shown in 62 of Fig. 1, at one end of two heavy frames of which one, 63, is external and the other, 64, internal with the addition of a third frame 65 which has its fulcrum on the other end of the internal frame 64 in order to always be in a vertical position while the free end of the piston rod of the double action pneumatic cylinder 65 uses the other free end of external frame 63 as fulcrum.

On respective appendixes 66 and 67 of said other

ends of the external and internal frames 63 and 64, are fastened the ends of a helical spring 68, in an unloaded condition with said frames in the rest position, that is horizontal. On each of the two opposed side faces of vertical frame 65, of which one is formed by the plane of the drawing in Fig. 2, a bearing is upperly journalled , of which only one is visible and indicated in 69 in Fig. 2, apt to slide in an associated curved link 70, integral with external frame 63, while a part of L shaped support 71, for the series of lower brushes 26 fixed on the other part of support 71 itself, is fixed on its upper terminating part.

In operation, withdrawal of the piston rod from double action pneumatic cylinder 61 moves the associated end of external frame 63 upwards, which rotates around fulcrum 62, and so determines the extension of spring 68 which pulls internal frame 64 upwards and consequently vertical frame 65 which has its fulcrum thereon, moves up as well.

Said movements cause the raising of blade 56, the support 58 of which is integral with internal frame 64, so as to perform, in a position with the counterblade 57, the operation of heat cutting of tubular material 9 of raffia through the first opening on face plane 23 and at the same time raising of the series of lower brushes 26 till they are brought, through appropriate openings (not shown) formed on face plane 23 in contact with the corresponding series of upper brushes 25 with the interposition of the

free terminal part of the tubular material upstream of the cutting just performed thus forming the opening of the next sack after the one already cut and which due to the heat cutting operation will appear to be sealed. In such position, while the series of upper brushes 25 remains fixed holding the upper edge of the tubular material, the series of lower brushes 26 moves towards the traction rollers 21 due to the sliding of bearings 69 in their associated links 70 integral with external frame 63, which continues to move upwards, while lower frame 64 has stopped at the time in which blade 56 has come into contact with counterblade 57, and because of the contrasting positioning of the two series of brushes 25 and 26. Said side movement of the series of lower brushes 26 causes a pulling action on the lower edge of the tubular material, and this action, in conjunction with said holding action of the upper edge by the series of upper brushes 25 determines separation of the ends of the two edges and the consequent opening of what will be the opening of the sack which is to be successively cut to size.

Said continuation of the raising of external frame 63 after internal frame 64 has stopped also determines the upwards movement, through the second opening on face plane 23, of laminar element 27 the support 60 of which is integral with external frame 63 itself.

The action of laminar element 27 for the folding over of the bottom of the sack just previously cut

to size is best illustrated in Fig. 3 wherein it may be seen that said component engages in its upwards movement the cut sack, partially shown and indicated in 72, at a short distance from its rear end and carries the folded over bottom of the sack in coincidence of a series of gripping devices placed in a spaced relation on a movable supporting bar perpendicular to the direction of advancement of the sack in the starting position.

Each gripping device, previously indicated generally in 28, comprises a fixed member 74 and a moving member 75 actuated by a double action pneumatic cylinder 76, the device having, in coincidence of the moving member's free end, a helical return spring 77. When the laminar element 27 in its rising action has brought the folded over bottom of the sack 72 between members 74 and 75 of each gripping device, member 75 due to the withdrawal of the rod of pneumatic piston 76, closes onto member 74 determining, at the same time, the extension of return spring 77. At the same time the laminar element 27 is withdrawn from between closed members 74 and 75 and it moves downwards, due to a similar movement of said associated external frame 63.

In order to make the withdrawal of laminar element 27 easier, this element does not have a continuous surface but empty spaces are formed on it which flank the entrance portions between members 74 and 75 so as to reduce its dimensions to a minimum indispensable for carrying out the assigned job,

as can be better seen in the front partial elevated view on the right of Fig. 3.

Fig. 4 shows the rotating movement of bar 78 which carries the gripping devices 28 apt to perform overturning of the gripped sack, said overturning being already described in the preliminary general description of the machine according to the invention with reference to Fig. 1.

Said overturning of the gripped bottom of the sack is done by causing a rotation by 90°, in a counter-clockwise direction, of bar 78 shown in broken lines in the starting position and in full lines in the final position. Said rotation takes place through withdrawal of the rod of the piston of the double action pneumatic cylinder 29 which is journalled on an end of a lever 79 the other end of which is fixed to pivot 80 integral with a terminal part of bar 78 itself.

In Fig. 5 a subsequent operative phase of the apparatus according to the invention is shown, which provides stitching of the folded over and turned over bottom of the sack.

The above mentioned rotation of bar 78, besides performing the overturning of the folded over bottom of the gripped sack in the various gripping devices 28, transfers it to spring jaws 81 of the fixed part 82 of a chain actuated conveying arm already generally indicated in 30 in Fig. 1 which movable

part 83 carrying a longitudinal contrasting bar 84 is caused to rotate till it places itself beside the fixed part 82 in such a manner as to close the bottom of the folded over sack between the spring jaws 81 and contrasting bar 84 while at the same time moving members 75 of gripping devices 28 open due to the retraction of the rods of the pistons of the respective pneumatic cylinders 76 and under the action of respective return springs 77 placed under tension when the previous closing of moving members 75 has taken place, allowing the shaft 78 to return to the initial starting position.

As previously stated, conveying arm 30 carries the folded over and overturned bottom of the sack to the stitching machine 35 which provides for sewing a seam in the sack, the sack with the sewed bottom still in the overturned position being then transferred to the second conveyor belt 37, after passing the second fixed plane 36, for forwarding towards the exit of the machine as is clearly visible in Fig. 6.

With reference to Fig. 7 the particular and original structure of the first conveying arm 34 will be described, said conveying arm serving the purpose of avoiding undesirable movements of the part of the sack which lies on it during synchronous advancement with its folded over and overturned bottom engaged on the overhead conveying arm 30 and in movement towards the sewing station 35.

In order to achieve the above mentioned object,

on belt 85 driven by rollers 86, three spaced parallel rows of through holes 87 have been formed in a longitudinal sense along the entire extension of the belt itself, and beneath the part of belt 85 which provides for advancing the sack a suction chamber 88 is provided which opens on the top of each opposed sidewall, where a pipe union 89 is provided apt to be connected to a suction device (not shown) such as to create an air suction in coincidence of each through hole 87 of the portion of belt 85 which travels above the suction chamber 88 in such a way that said part of the sack lying on it is properly held during the advancing movement of belt 85 itself.

As previously stated, the sack, completely formed, through the second conveyor belt 37 arrives to the exit end of the machine where the suction hoods 38 and 39 open the opening of the sack itself so that it may be gripped by the first gripping device 48 and then transferred onto the second gripping device 51 which forwards the sack to the sack holding device 52 of the loading station 53, as previously described.

The gripping device 48 in a closed position and 51 in an open position are shown in detail in Fig. 8 wherein it is also possible to clearly observe the rotation movement of the first over the second for said transferring of the sack from one to the other.

With reference to the above mentioned figure, each of said gripping devices comprises two parallel and spaced arms, of which only one is shown and indicated in 90, each of which is integral in coincidence of an end with an appendix 91 the free end of which is journalled on a common rotating shaft 92 which in the general description of the apparatus with reference to Fig. 1 corresponds to fulcrum points 49 and respectively 52 of the first and second gripping devices 48 and 51.

On the terminal free part of each arm 90 are fixed in a parallel and spaced relation first and second shorter fixed arms 93 and 94 and between these are first and second journalled prongs 95 and 96 respectively the fulcrum part of each of which is integral with an appendix 97 and 98 respectively, the center lines of which form an angle of 90° with the associated centerlines of prongs 95 and 96 the ends of which are connected rotatably through pivot 99.

The rod of the second prong 96 extends beyond the fulcrum point on its respective arm 90 till it connects with the end of the rod of the piston of a double action pneumatic cylinder 100, already indicated respectively in 50 and 50' in the first and second gripping device 48 and 51 in the general description of the apparatus with reference to Fig. 1, said cylinder is being supported at the base by a support 101 integral with its associated arm 90.

As can be easily seen from Fig. 8 withdrawal of

the rod of the piston of each pneumatic cylinder 100 causes rotation of the associated second prong 96 towards the corresponding second and fixed arm 94 while the simultaneous rotation of appendix 98 of said second prong 96 causes rotation in the opposite direction, through fulcrum 98, of the associated appendix 97 of the first prong 95 which in turn causes rotation of said prong 96 towards the corresponding first fixed arm 93.

At the end of the withdrawal travel of said piston rod the first and second prongs 95 and 96 will be blocked against the respective first and second fixed arms 93 and 94 (see gripping device indicated generally in 48) firmly gripping the opening of the sack

It should be considered that in order to achieve transferring of the gripped sack from the first gripping device 48 to the second gripping device 51 for the following gripping on the part of the latter, the distance between the outside faces of the fixed arms 93 and 94 of the first gripping device is smaller than the distance between the inside faces of the respective fixed arms 93 and 94 of the second gripping device in order to allow for the entrance of the arms of first between the arms of second.

It should be noted at this point that transferring of the formed sack from the exit of the apparatus to the device for holding the sack at the filling

station, could be performed instead of by means of the two gripping devices 48 and 51 previously described, with a single gripping device, as an alternative, of the type previously illustrated in which the free end of said appendix of each prong carrying arm is journalled on the end of a shaft apt to perform an angular movement from one preferably vertical position to a horizontal position, to rotate around its own axis and to linearly move towards the outside and viceversa, so that with said shaft in a preferably vertical position a rotation of the prong carrying arms of the gripping device around the fulcrum of the respective appendixes causes the gripping device itself to grip the sack in coincidence of the exit of the apparatus and the next angular movement up to the horizontal position of said shaft and its rotation will carry the gripping device downwards in alignment with the device for holding the sack at the filling station while the following linear movement towards the outside of the shaft itself will bring the gripping device beneath the sack holding station.

With reference to Fig. 9, the cutting and closing devices of the bottom of the sack will now be illustrated starting from a tubular plastic material.

In this case it is no longer necessary to perform the operations of heat cutting and edge separating of the tubular material as well as those operations of folding over, overturning and stitching of the bottom of the cut sack since it is sufficient to

perform the cutting operation without heat in which case sealing of the edges of the tubular material in coincidence of the cut itself is not involved, then proceeding to close the bottom of the cut sack through heat-sealing.

For performing such operations, the apparatus according to the invention is provided, as an alternative, with a blade 102 and associated counter-blade 103 and immediately after, with a plate 104 and a counter-plate 105 for heat-sealing which are brought to adequate temperature through appropriate electrical resistances, the operation taking place in the same manner as that of similar components previously described, that is through movement upwards through respective apertures on said first face plane of blade 102 and of plate 104 through said system of movable internal and external frames 63 and 64 till blade 102 and said plate 104 are brought in contrast respectively with the counter-blade 103 and counter-plate 105.

All the movements of the components of the apparatus according to the invention both in order to perform the operation assigned to each of them and return to the starting position once the operation is terminated are controlled, through said double action pneumatic cylinders mentioned in the description, as well as through appropriate known mechanisms, by means of a conventional electric and electronic section apt to allow the various operative phases to be carried out according to a programmed continuous cycle.

It should be finally pointed out that the apparatus according to the invention may be conveniently used with a conventional apparatus for feeding prefabricated sacks and in particular with the apparatus described and claimed in patent No. 1035782 assigned to the applicant of this patent in which case said second previously mentioned gripping device for transferring of the sack to the sack holding device of the feeding station could consist of the gripping device provided in said feeding apparatus according to the above mentioned patent.

This invention is not to be considered as being limited to the example of the described embodiment but includes any modification and/or variation thereof.

Claims

1. An apparatus for the continuous formation of sacks and for forwarding them to a feeding station comprising: a main supporting frame, means for rotatably supporting a spool on which the material in sheet form which is used for the formation of the sacks in tubular form is wound, mechanically actuated traction means apt to unwind said tubular sheet material from the spool with the interposition of guiding means and for causing it to reach a fixed face plane and then conveying means for continuous advancement in coincidence of which automatic preset measuring means of the length of the individual sack to be formed are provided, means for cutting the tubular sheet material according to said preset measure, possible means for separating the ends of said tubular sheet material, which will later form the opening of the individual sacks to be formed, upstream with respect to the performed cut, means apt to form the closed bottom of the individual sack cut to size, opening means for the opening of the individual formed sacks, jaw means for gripping each formed sack through its opening and transferring it to appropriate gripping means of a filling station, mechanical, electrical and electronic conventional means for carrying out the operative cycle in a continuous manner.

2. The apparatus according to claim 1, wherein said rotating supporting means of said spool on which the material in sheet in tubular form for the formation of sacks is wound consist of two pairs of wheels journalled on respective supports integral with said main frame in a reciprocally spaced relation so that each of said pairs of wheels is apt to support a respective end of the shaft of said spool on it, a brake actuated by a double action pneumatic cylinder being provided for each pair of wheels.

3. The apparatus according to claims 1 and 2, wherein said traction means are two cylinders, rotatably supported on the upper part of said main frame one over the other in an extremely close relation and caused to rotate through a chain transmission gearmotor in such a way to cause the tubular sheet material placed between them to be pulled upstream thus unwinding it from said spool and a pushing action downstream so as to forward it on said fixed face plane, said guiding means placed between said spool and said traction cylinders comprising a certain number of rollers journalled on said main frame and placed in such a way as to cause said tubular sheet material to follow an unwinding path in an initial downward direction in order to ensure an adequate adhesion between the spool's center line and said respective pairs of supporting wheels and then upwards till it causes said tubular sheet material to arrive between said traction cylinders.

4. The apparatus according to claim 3, wherein at least one of said guiding rollers placed in such a way as to initially guide the unwinding path of said tubular sheet material downwards, is free to move in a vertical sense along appropriate guides in order to avoid an uneven unwinding of said material.

5. The apparatus according to any of the preceding claims, wherein said automatic preset measuring means of the length of the individual sacks to be formed comprise an electronic impulse counter.

6. The apparatus according to any of the preceding claims, wherein said means for cutting the tubular sheet material according to said preset measure comprise, in the case in which said material for the formation of the sack is raffia, jute or the like, a blade and counter-blade oppositely positioned with respect to a first aperture formed in said fixed face plane perpendicularly to its own axis, said blade including an electric resistance apt to bring it to a high temperature, for example 220 - 250°C, and being connected to movable supporting means apt to move it upwards through said first aperture in the fixed face plane till it comes in contact against said counter-blade.

7. The apparatus according to any of the preceding claims wherein said possible separating means, provided in the case of the heat cutting operation according to claim 6 which determins the sealing of said end of the tubular sheet material in raffia, jute or

the like, comprise steel brushes placed according to a first and second series, respectively above and beneath said fixed face plane in coincidence of respective apertures thereon, each of said series comprising a certain number of said brushes in a similarly spaced relation and aligned perpendicularly to the axis of said fixed face plane, said brushes of the first series being integral with a support which is sprung and adjustable while said brushes of the second series are connected to movable supporting means apt to move them up to said apertures on said fixed face plane till they are in contrast with the respective brushes of the first series and successively to move them sideways in order to allow them to slide the lower edge of the tubular sheet material upstream with respect to the upper edge held by the brushes of the first series.

8. The apparatus according to any of the preceding claims wherein said means apt to form the closed bottom of each individual sack cut to size of the tubular material of raffia, jute or the like comprise a laminar element placed vertically beneath a second aperture formed in said fixed face plane perpendicularly to its own axis and integral with movable supporting means apt to move it upwards through said second aperture in the fixed face plane so as to perform folding over of the bottom of each sack cut to size and transfer said folded over bottom in an engagement relation on a certain number of gripping devices, fixed in a spaced relation, of a supporting bar having its fulcrum on an end which, under the action

of conventional driving means, for example a double action pneumatic cylinder, is apt to rotate by 90° around said fulcrum in order to overturn the folded over bottom of the gripped sack from a perpendicular direction to a parallel direction with respect to the sense of advancing motion of the sack, placing it beyond the corresponding side edge of the sack itself and in such a position as to transfer it in an engaged relation on a conveying arm which forwards it into a stitching machine which stitches said bottom, the remaining part of the sack passing in the meantime from said fixed face plane to a first belt conveyor at the same level of said fixed face plane but at a lower level with respect to said conveying arm with the bottom of the sack in engagement with which it moves in synchronism, said first belt conveyor being equipped with means apt to withhold said part of the sack lying thereon.

9. The apparatus according to claim 8, wherein each of said gripping devices comprises a fixed prong and a movable prong apt to rotate, coming closer to the fixed prong under the drive of the rod of the piston of a double action pneumatic cylinder and in contrast with a return spring and moving away from the fixed prong when said drive ceases and under the action of said return spring loaded in said closing-in phase.

10. The apparatus according to claims 7 and 8, wherein said laminar element presents a discontinuous surface wherein empty spaces are formed which flank the

parts which, during transfer of the folded over bottom of the sack to the respective gripping devices, enter between the fixed and movable prongs of each of them, in such a way to reduce to the minimum indispensible the dimensions of said parts so as to allow their easy withdrawal from the closed prongs of the respective gripping devices.

11. The apparatus according to claim 8, wherein said conveying arm comprises a chain conveyor which in turn comprises a fixed part equipped on one side with a certain number of spring jaws in a aligned and spaced relation and a movable part having its fulcrum on one end apt to rotate from one raised position to a position flanking said fixed part and carrying a longitudinal contrasting bar apt to perform, in cooperation with said spring jaws of the fixed part, the gripping of the folded over and overturned bottom of the sack transferred by rotation of said supporting bar of said gripping devices.

12. The apparatus according to claim 8, wherein said means apt to hold said part of the sack lying on said first belt conveyor during the advancement movement comprise a suction hood placed beneath said portion of the belt conveyor which moves higher up, and equipped with means apt to connect it to a suction device, the entire surface of said conveyor being provided with a plurality of through holes so that in those on said portion in coincidence with said suction chamber an air suction may be

created apt to provide the holding action of said part of the overlying sack.

13. The apparatus according to any of the preceding claims, wherein said movable supporting means of said blade for the heat cutting operation, of said brushes of the second series beneath the fixed face plane for the operation of separation of the edges of the sack and of said laminar element for the operation of folding over of the bottom of the cut sack comprise a system of movable frames actuated by a single driving means, for example a double action pneumatic cylinder, and formed by an external frame carrying said laminar element for folding over the bottom of the cut sack and an internal frame integral with said heat cutting blade, which are in a horizontal rest position their fulcrum being concentrical and at a convenient distance in coincidence of a first end,and a third frame having its fulcrum on the second opposed end of said internal frame in such a way as to remain constantly in a vertical position and integral on the top with said brushes of the second series, on the second opposed end of said external frame the free end of the rod of the piston of said pneumatic cylinder has its fulcrum, said second ends of the internal and external frames being interconnected by a helical spring in a compressed state with said frames in rest position; on each side face of said third vertical frame a bearing is journalled, which is apt to slide in a curved link integral with said external frame, withdrawal of the rod of the piston

of said pneumatic cylinder determining the raising of the second end of said external frame, which rotates around the fulcrum on the first end, and at the same time the expansion of said helical spring which in turn calls the second end of said internal frame back up, which rotates around the fulcrum on the first end, along with a third frame, said movements of said frames carrying, first of all, said blade into contact with the respective counterblade through the first aperture in said fixed face plane after which stopping of the raising of the internal frame is determined while the heat cutting operation is carried out on the tubular sheet material and at almost the same time the brushes of the second series arrive in contrast with the respective brushes of the first series with the free terminal part of the heat cut sheet material interposed while prosecution of the raising of the second end of said external frame causes sliding of said bearings journalled on said third vertical frame in the respective curved links determining said side sliding of the brushes of the second series in order to carry out said operation of separating the edges of the sack and at the same time cause said laminar element to move upwards through the second aperture of said fixed face plane so as to bring it in engagement with the back terminal part of the cut sack in order to carry out said operation of folding over of the bottom.

14. The apparatus according to claims from 1 to 5 wherein said cutting means of the tubular sheet

material according to said measure comprise, in the case in which said material is plastic, a blade and a counter-blade in the form of a scissors placed in opposite positions with respect to a corresponding aperture on said fixed face plane said blade being connected to movable supporting means apt to move it through said aperture till it is in contrast with said counter-blade in order to carry out a cutting operation without heat.

15. The apparatus according to claims from 1 to 5 and 14, wherein said means apt to form the closed bottom of each individual sack cut to size comprise a plate and a counterplate provided with electrical heating resistances for carrying out an operation of thermal sealing of said bottom and placed respectively beneath and above a corresponding aperture in said fixed face plane, said plate being connected to movable supporting means apt to move it upwards through said aperture till it is brought into contact with said counterplate.

16. The apparatus according to claims 14 and 15, wherein said movable supporting means apt to move said blade for the operation of cutting of said tubular plastic sheet material and said plate for the operation of thermally sealing said bottom of each individual sack comprise a system of movable frames, comprising an external frame integral with said cutting blade in coincidence of said second end and an internal frame integral with said thermal sealing plate in coincidence of said respective second end.

17. The apparatus according to any of the preceding claims wherein said aperture means of the opening of each individual formed sack comprise two suction hoods, an upper one and a lower one, connected through respective flexible tubes to a suction device equipped with an interception valve, said upper suction hood being movable towards and away with respecto to the fixed lower hood, so that by performing said second movement after it has previously carried out the first with the simultaneous opening of the interception valve of the suction device an air sucking action is determined on the edges of the opening of the formed sack which separates them.

18. The apparatus according to any of the preceding claims, wherein said jaw means for gripping each formed sack through the opening comprise spaced and parallel arms each of which presents an end journalled in a common rotative shaft while on the opposed free terminal part there are fixed in a parallel and spaced relation a first and second fixed arm and between these are journalled a first and second movable arm respectively, the fulcrum part of each of which is integral with a respective appendix the axis of which forms an angle of 90° with the axis of the respective movable arm, the free ends of said appendixes of the first and second movable part being connected rotatably one to the other, the rod of one of said movable arms being connected rotatably to the end of the rod of the piston of a double action pneumatic cylinder the base of which is integral with said arm so that

the withdrawal of said piston rod determins locking of said movable arm connected to it on the respective fixed arm and the simultaneous locking of the other movable arm to the other fixed arm through the articulated connection of said appendixes.

19. The apparatus according to any of the preceding claims, wherein on said guided path of the tubular material from said spool to said traction means an appropriate conventional printing machine is interposed apt to print on each individual sack to be formed wordings and desired designs.

20. The apparatus according to any of the preceding claims wherein said filling station of the formed sacks is equipped with a device for holding the sacks, or sack holding device, wherein the wall facing towards said gripping means apt to transfer the formed engaged sack to said sack holding device is slidable from the bottom up and viceversa in such a way as to allow in the raised position said transferring of the formed sack according to a straight path and in the lowered position, after the transferring of the formed sack has taken place, to reset the operation of said sack holding device.

21. The apparatus according to any of the preceding claims wherein a possible second conveyor belt is provided after said first conveyor belt with a second fixed face plane interposed between them in order to fill in dead times in the preceding or following operation phases.

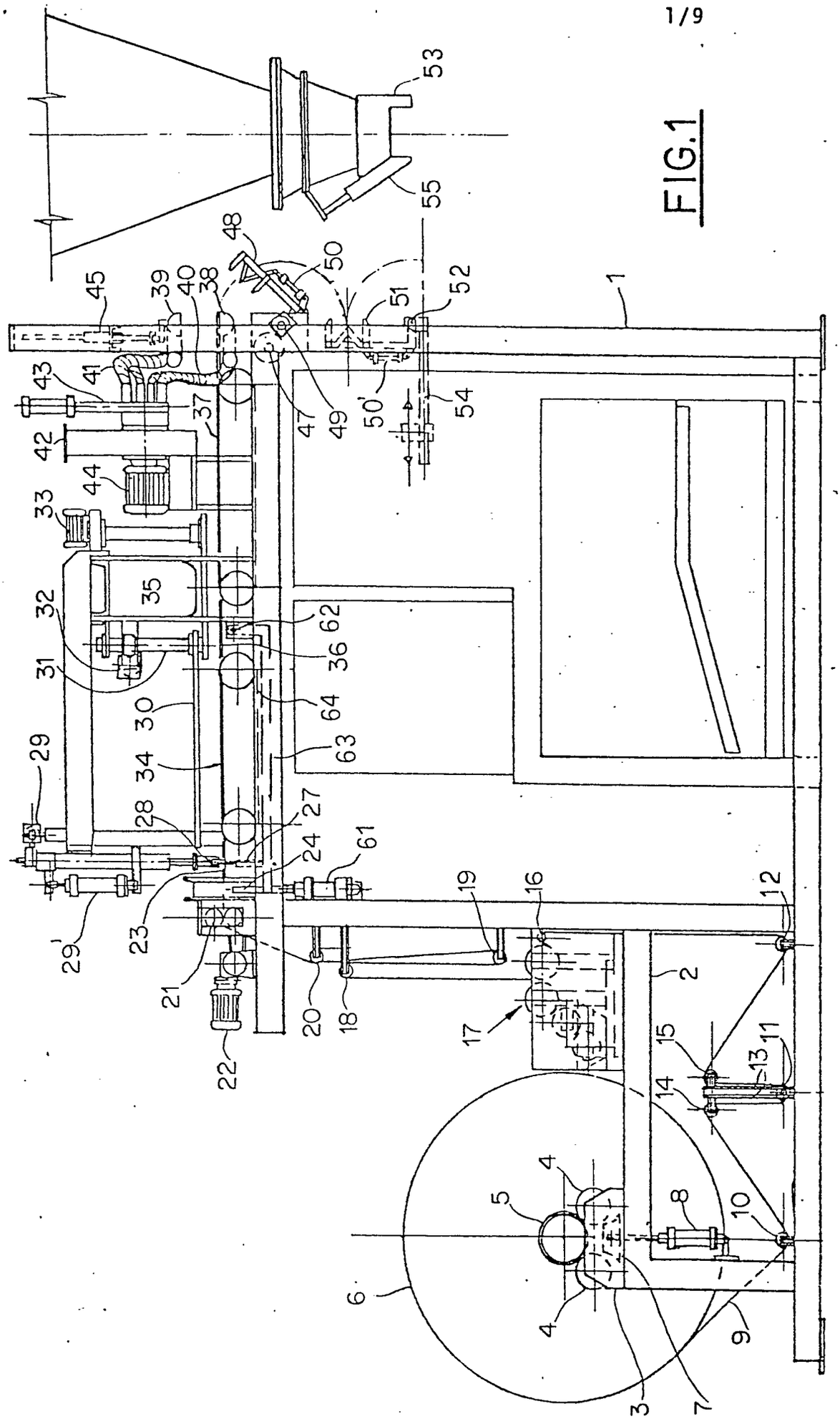


FIG.1

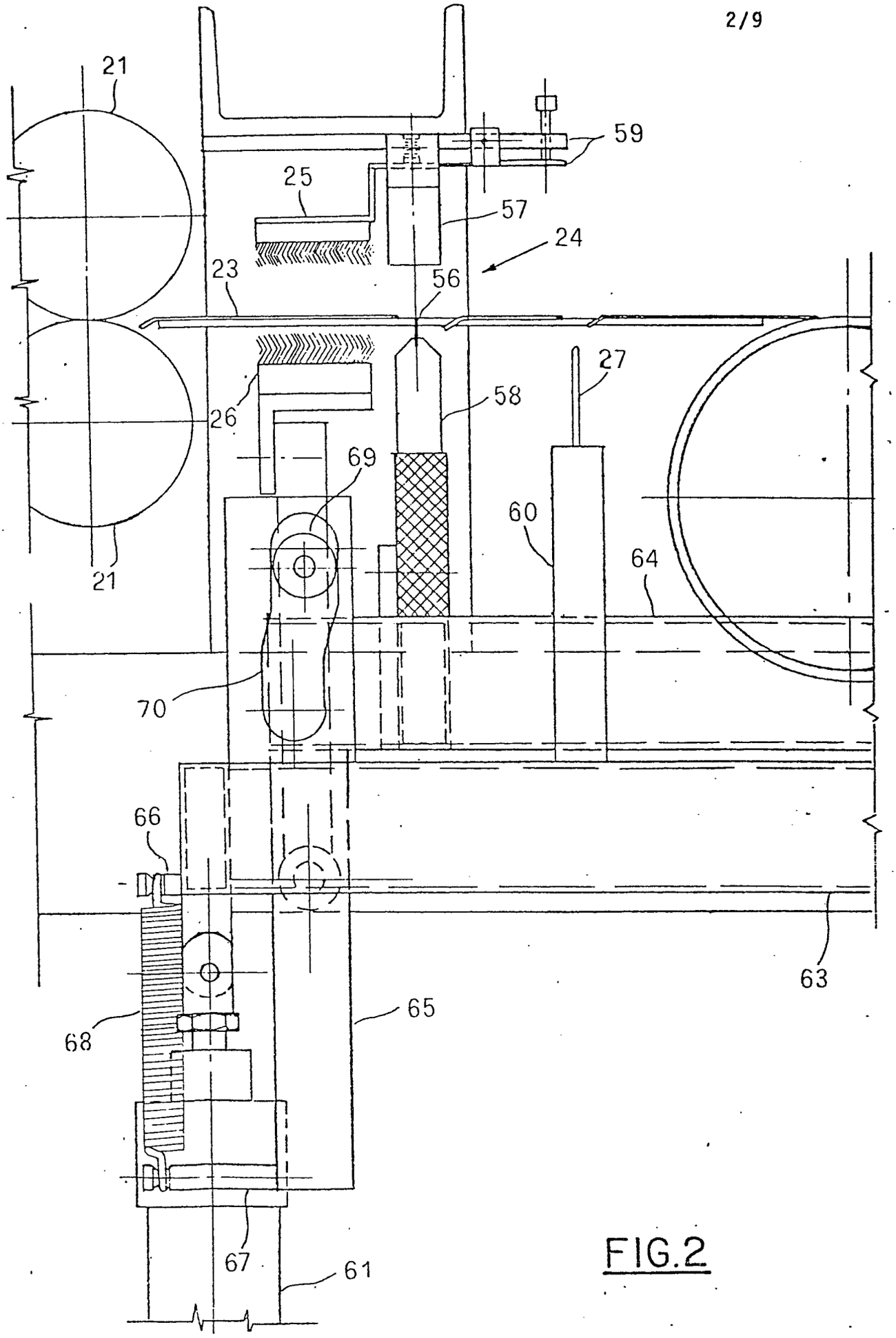
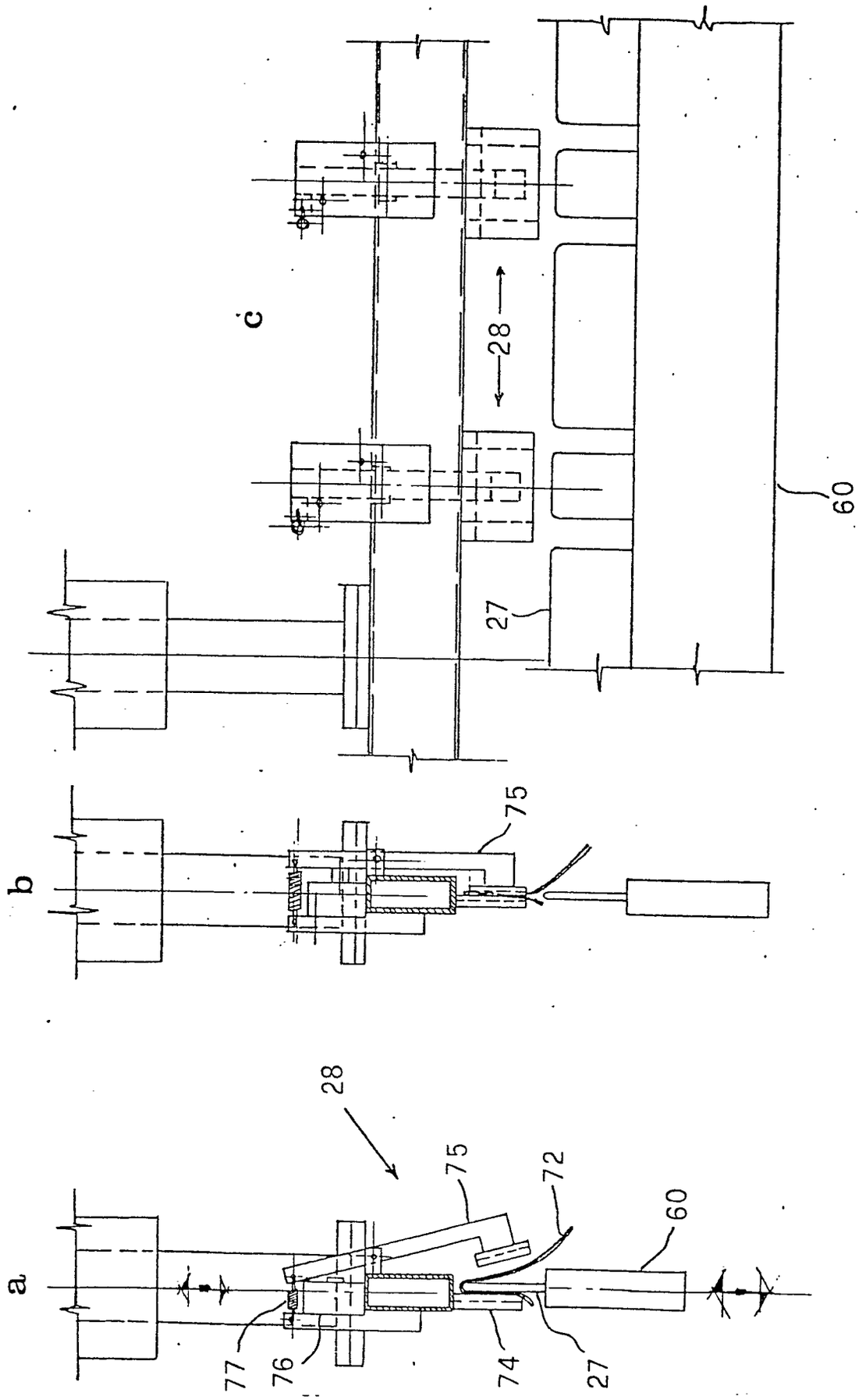


FIG.2

FIG.3



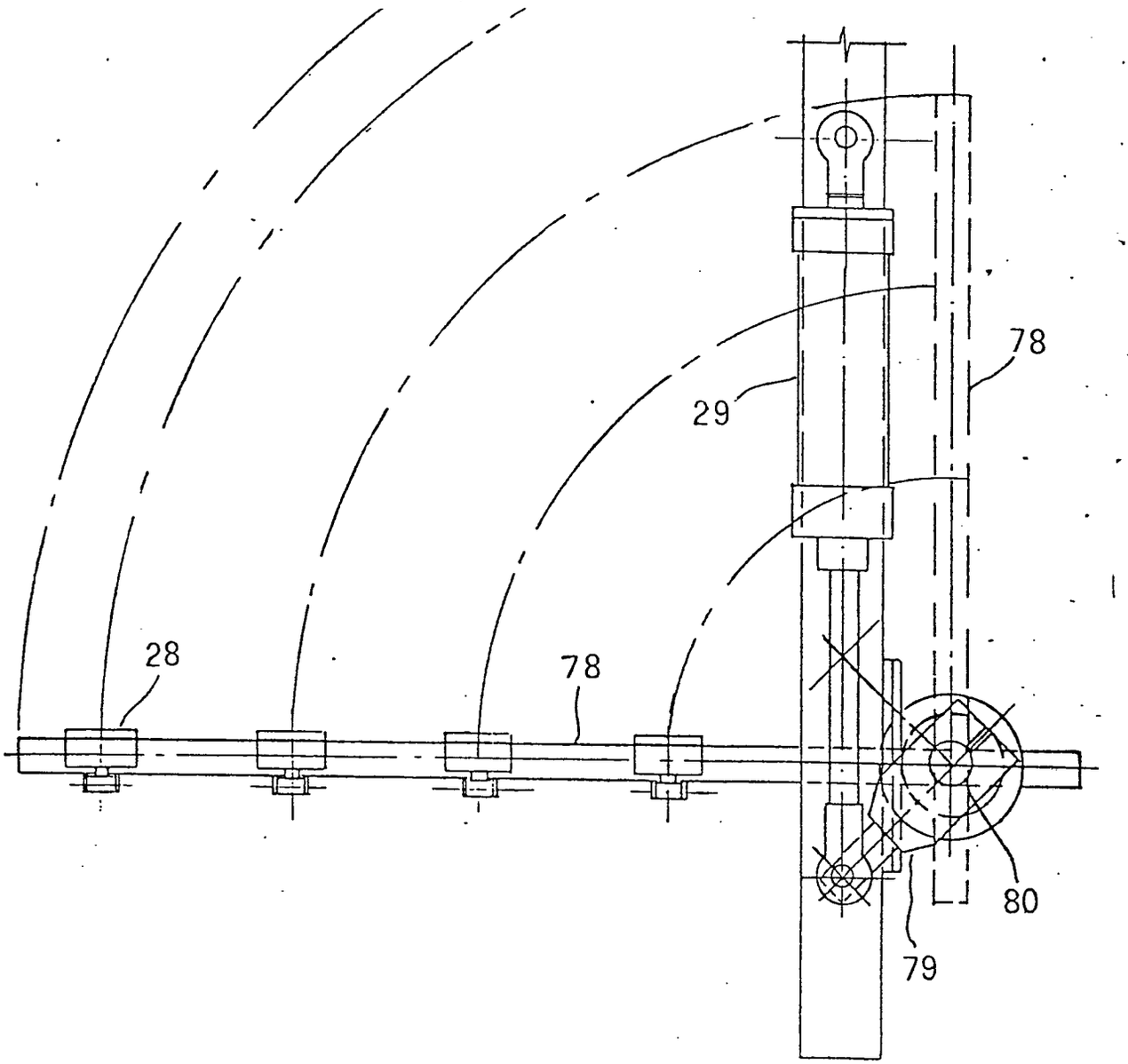


FIG.4

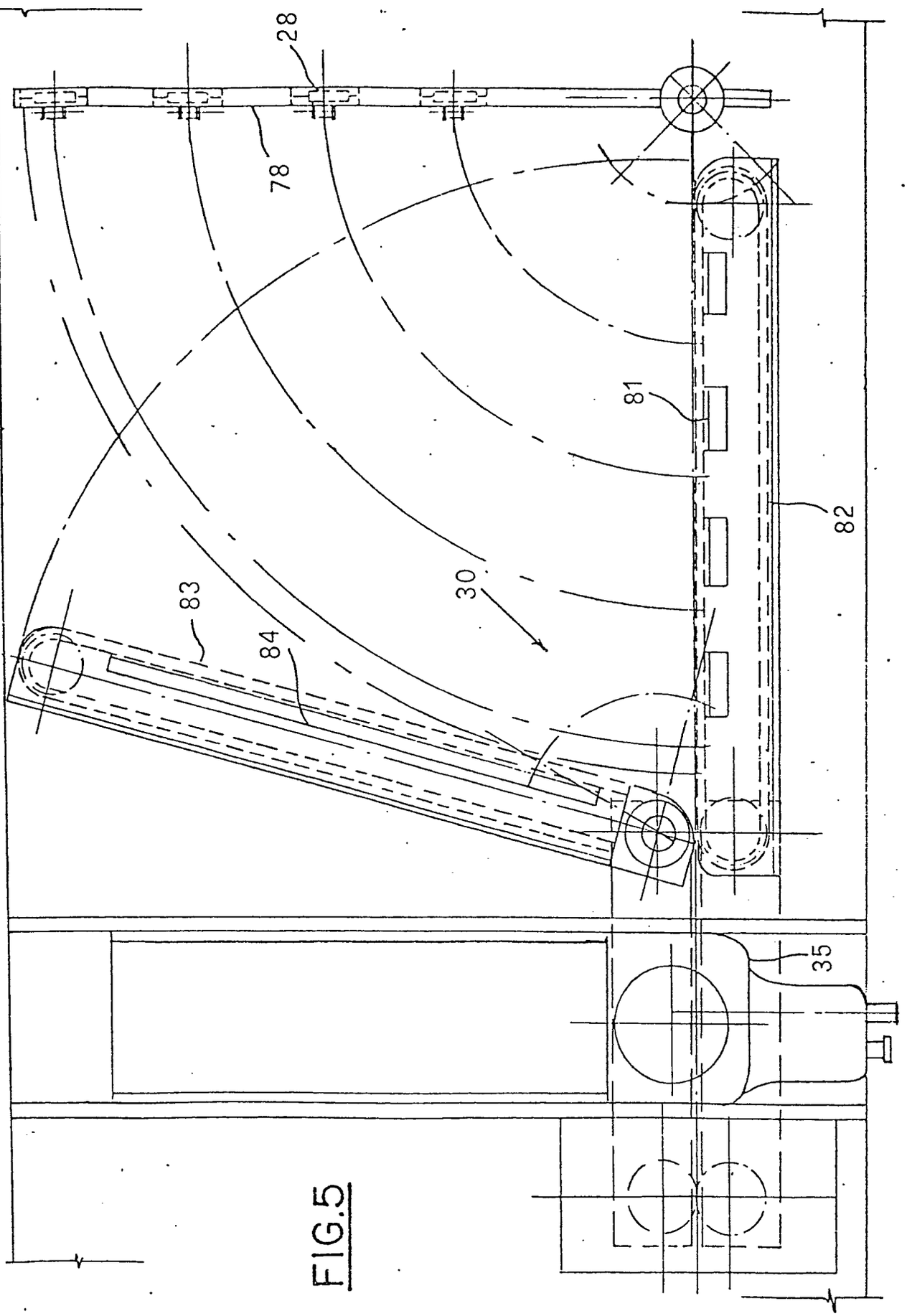


FIG.5

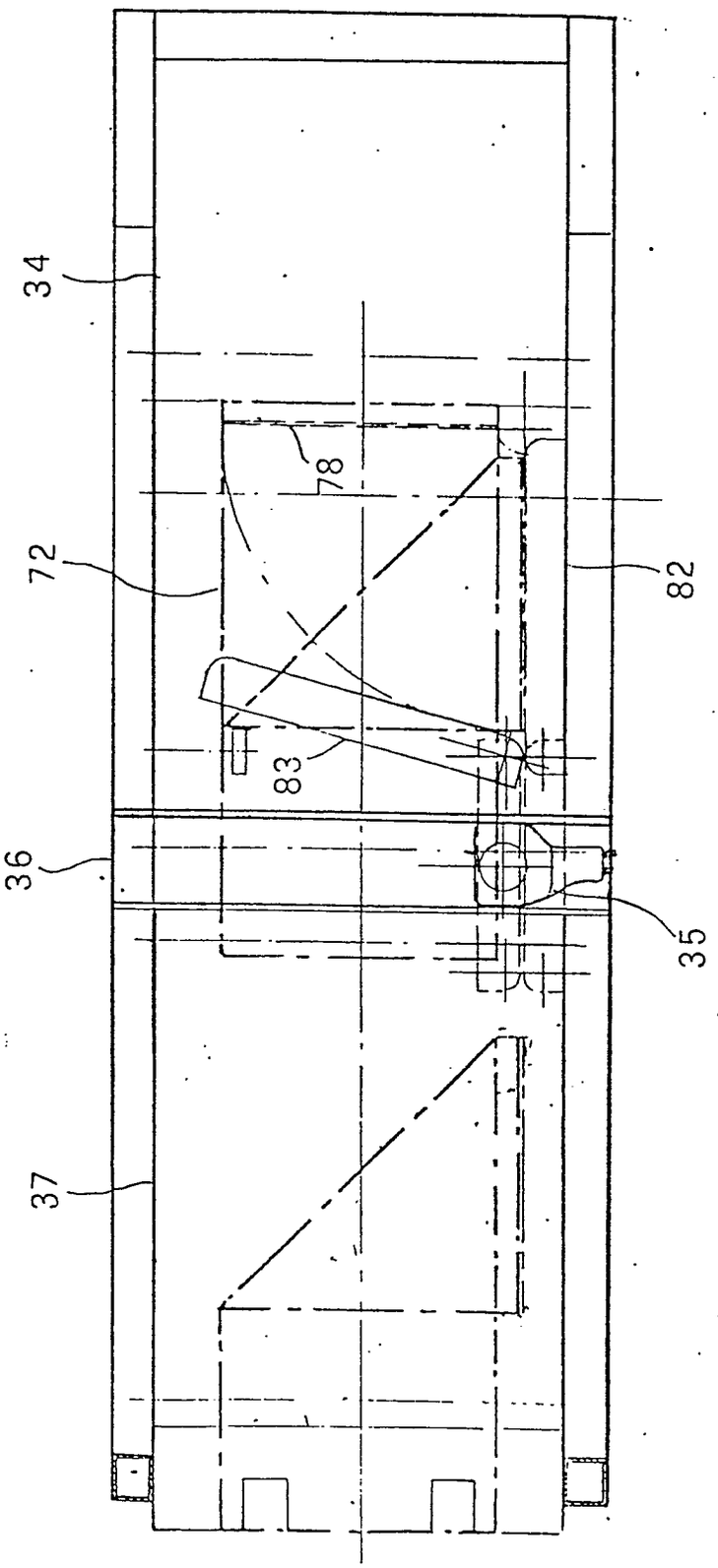


FIG.6

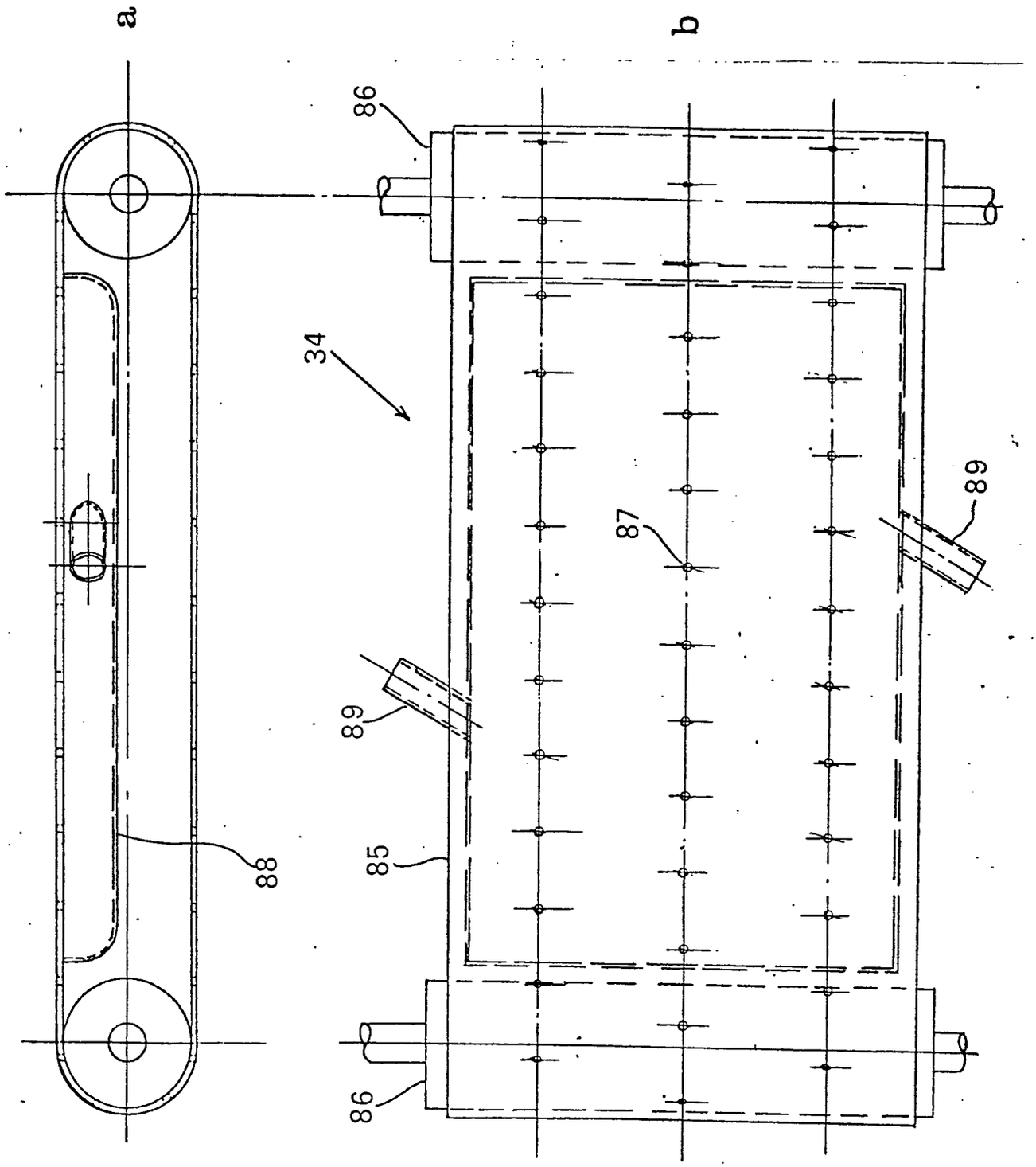


FIG.7

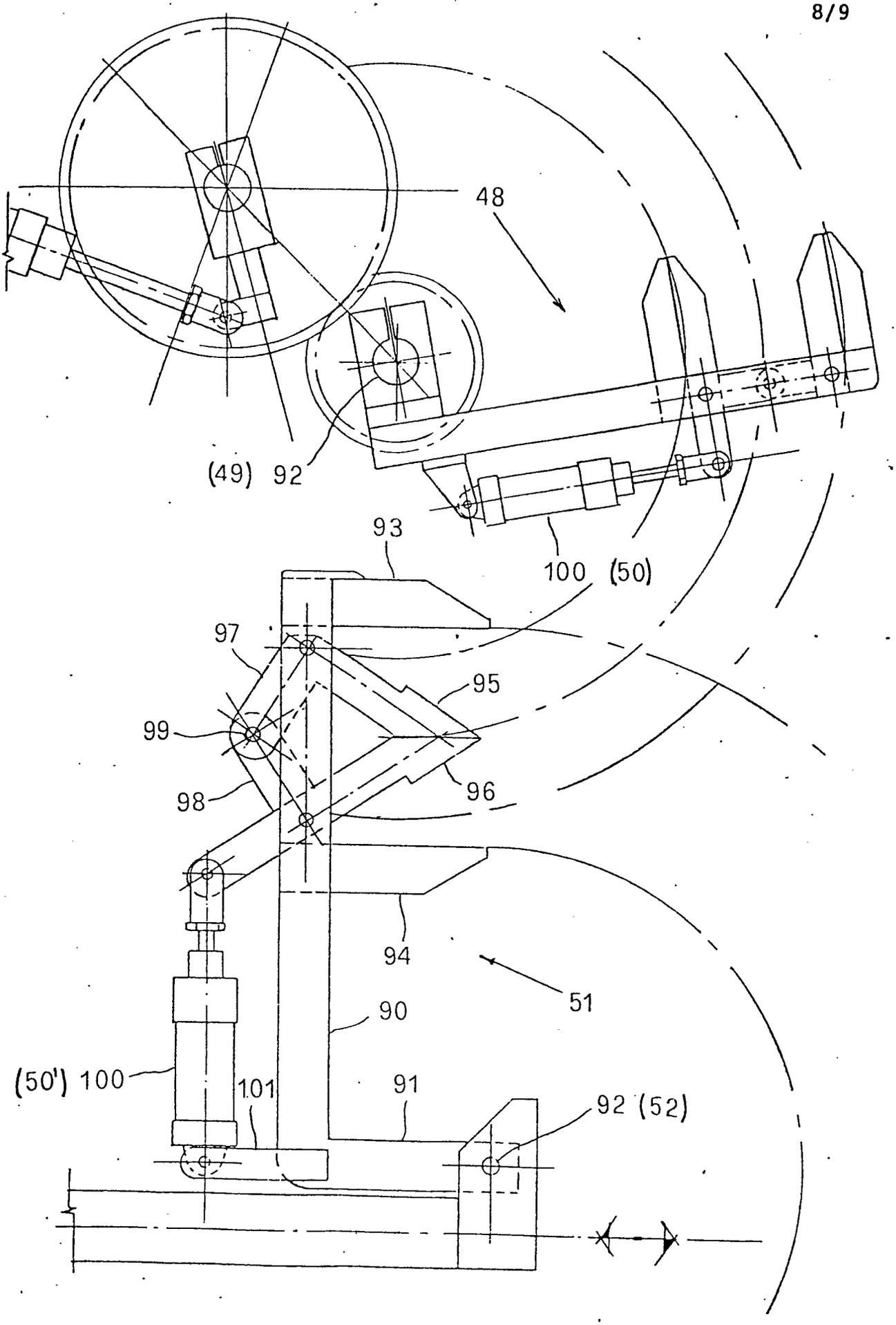


FIG.8

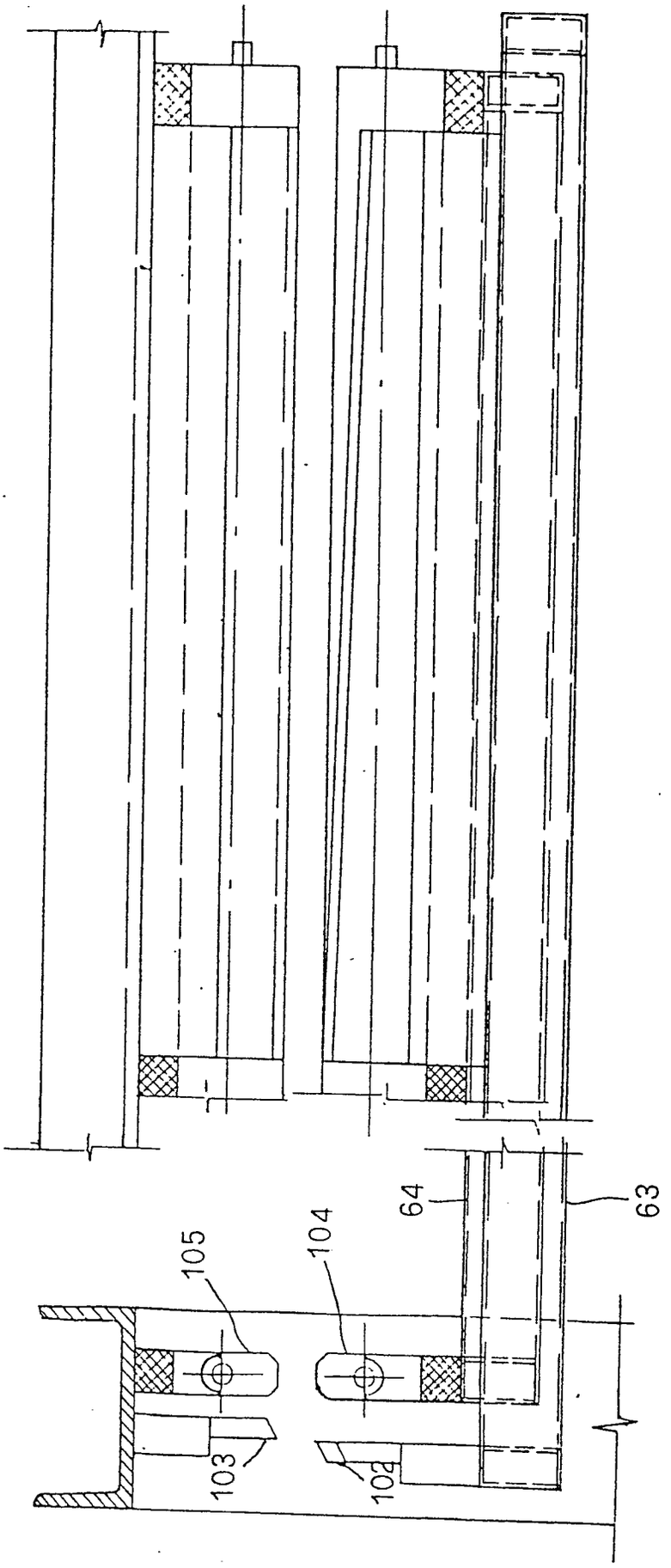


FIG.9