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(54) Picking up and closing unit for soft plastic caps, particularly for straight chamber capping machines.

(57) The picking up and closing unit for soft plastic caps is particularly useful for straight chamber capping machines, in which the containers to be closed are supplied in a continuous way, resting on a conveyor belt and pressed between two belts which proceed parallel to the conveyor belt at a certain distance from it, till a position in which each of them hooks with its upper edge the lower edge of a cap which leans out of a suitable feed guide, entraining the cap with it, at first under a picking up roller, then under a pressure roller and finally under a finishing roller.

While the pressure roller presses the cap centrally, a lower tab of the feed guide keeps lifted up the back ege of the cap, making the air way out from the container to be closed easier and allowing the carrying out of a certain depression inside the closed container.

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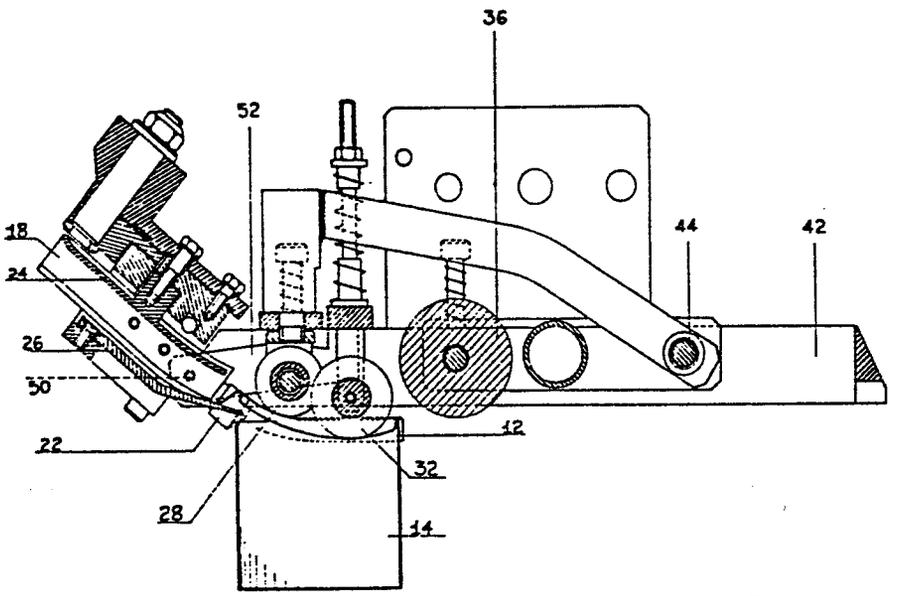

FIG. 4

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Picking up and closing unit for soft plastic caps, particularly for straight chamber capping machines.

The present invention refers to a picking up and closing unit for soft and thus bendable plastic caps, particularly for straight chamber capping machines, in which the containers to be closed are supplied in a continuous way at high speed, instead of stepwise as it usually happens with capping machines of the rotating type.

The straight chamber capping machines are generally designed to apply, usually by screwing, at high speed, metal caps on containers or cans, containing perishable foods, which therefore need to be kept under vacuum.

On the contrary, for the canning by a dry method of products which do not need to be kept under vacuum, soft plastic caps are usually utilized which are applied on the cans in rotating capping machines working in free air, since, as already stated, there is no need of closing under vacuum.

Although the rotating capping machines are generally cheaper, however they have some drawbacks which make them not very effective for the canning by a dry method.

The main one of these drawbacks is the little intrinsic speed of such machines, due to their operation with stepwise feed.

Another drawback of the stepwise feed is the possibility that the contents brim over the edge of the cans, which are being closed, due to the repeated great accelerations, which the cans are submitted to.

Furthermore, such capping machines apply the caps with a vertical movement from top to bottom, i. e. in a flat way, and this gives rise to the compression of a certain amount of air inside the can. As a consequence of this, it can occur that the caps lift up again, in a more or less short time, till causing sometimes the unsuccessful tight seal between the cap and the can, with a consequent waste of

the product contained in the can, due to leak or contamination. As this drawback cannot obviously be accepted, a manual final revision is requested by workers taken on on purpose, which leads to a noticeable rise in the production costs.

On the other hand, in the food packing factories there are almost always straight chamber capping machines, in which the cans to be closed under vacuum are fed, gathered together in any way, to a conveyor belt on which they proceed, pressed between two belts which proceed parallel to the conveyor belt at a certain distance from it, till under a closing unit which applies the metal caps generally by screwing, in an environment at high temperature, which, in consequence of the cooling, generates a depression and hence a closing under vacuum.

Therefore, one has thought of taking advantage of the better characteristics of such straight chamber machines, by making use of a new picking up and closing unit for soft, and thus bendable, plastic caps, for dealing by means of such machines also with the products that require a packing by a dry method.

According to the present invention, a picking up and closing unit for soft plastic caps, particularly for straight chamber capping machines, is characterized in that it comprises a pressure roller having a narrow crosswise dimension with respect to the cap diameter, which acts on the cap while it is going out of the feed guide, exercising, under the action of a suitable spring thereof, a force concentrated on the cap centre, so as to warrant the air way out and the carrying out of a certain depression inside the closed container.

Furthermore, the feed guide can comprise a lower tab extending towards the pressure roller to keep lifted up the back edge of a cap, which is being centrally pressed on a container to be closed, so as to make the air way out from the container easier.

In the following, the present invention will be further clarified from the description of one form of practical embodiment of the pick-

ing up and closing unit for soft plastic caps, particularly for straight chamber capping machines, description made in a purely illustrative and not limitative way, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of the unit of the present invention;

Figure 2 is a lateral section view taken on the line II-II of figure 1; and

Figures 3 to 5 are lateral views of the present unit and show the cap and the can in some significant positions during the closing operation.

With reference to the accompanying drawings, and in particular to the figures 1 and 2 thereof, it is seen that the present picking up and closing unit for soft plastic caps, particularly for straight chamber capping machines, comprises a feed guide 10 for the caps 12 that must be applied on containers or cans 14 which proceed on a suitable conveyor belt of the endless type (not shown).

As it is usual in the straight chamber machines, the containers or cans 14 proceed in a continuous way and at a uniform speed, gathered together in any way, on a conveyor belt, laterally guided by two belts that proceed parallel to the conveyor belt at a certain height from it and press the cans on their sides, forcing them to proceed without overturning.

The feed guide 10 for the caps comprises two lateral C shaped rails 16, 18, inside which the caps 12 slide. The two lateral rails 16 and 18 end in two lateral spring stop 20 and 22, respectively, whereas the upper part of the guide 10 ends in an upper guide tab 24 and the lower part of the guide 10 itself ends in a lower guide tab 26.

A front picking up roller 28 is located immediately downstream the output of the feed guide 10 and has a groove 30 in which a wheel or central pressure roller 32 goes in, loaded by a spring 34 downwards,

as seen in figure 2, in the direction that tends to compress the cap on the underlying can.

A back finishing roller 36 is located downstream the central roller 32 and is spring loaded downwards, as seen in figure 2, by a spring 38.

The front roller 28 is spring loaded downwards, always as seen in figure 2, by a spring 40 and both the rollers 28 and 36 are hinged to the frame 42 of the picking up unit around a hinge shaft 44, by means of suitable bearings 46 and 48.

The central pressure roller 32 is hinged around a hinge shaft 50 by means of a suitable bearing 52.

Further structural details of the picking up and closing unit will be pointed out in the following, during the explanation of the operation of the unit, with reference to the figures 3, 4 and 5.

Each cap 12, under the push of its own weight and that of the caps which follow it, in its turn, locates itself at the stroke end in the feed guide 10, resting against the spring stops 20 and 22, as shown in figure 3. In this position, the cap 12 is kept centered in the crosswise direction with respect to the motion direction by the guides 16 and 18 and in the vertical direction by the upper guide tab 24 and the lower guide tab 26. Therefore the waiting position, in which the cap 12 waits for being engaged by the can, is unambiguous and well determined.

When a can or glass 14, advancing entrained by the conveyor belt and lateral belts, reaches the position shown in figure 3, it touches the front edge of the cap and penetrates inside it, securing the entrainment of the cap. In other words, the flat surface of the cap 12 exhibits a certain angle with respect to the glass 14, resting on the lower tab 26, but its front edge goes down till under the edge of the glass 14 and thus is hooked by it.

From this moment, the can 14, advancing, entrains the cap with it, at first under the front roller 28, which acts as an extension of the feed guide 10, accompanying the cap in its advancing, and then under the central pressure roller 32, till the position shown in figure 4.

In this position, it is pointed out that the central roller, being much narrower than the cap, under the action of its spring 34, exercises a force concentrated on the centre of the cap 12, and this serves to secure the way out of the air, while at the same time the lower tab 26 keeps lifted up the back edge of the cap 12 itself, in order to always provide a way out for the air, which otherwise would remain trapped inside the can and could subsequently cause the re-opening of the can, due to the lifting of the cap.

By further proceeding in its movement, the glass 14 arrives under the back roller 36, as better shown in figure 5. The function of the back roller 36 is to secure the stability of the can 14, in the moment in which the central roller 32 presses with all the force of the spring 34 on the back edge of the can 14. Furthermore, the back roller 36 serves for finishing the closing of the glass 14, since it presses on the surface of the cap all along the edge of the can 14.

Therefore, when the central pressure roller 32 leaves the cap, inside the closed container a certain depression remains, which helps the mantaining of the closure.

It is to be noted that, in the regular operation, the front roller 28 is at its stroke end downwards and from this position it is moved only in the case in which there are cans ill-positioned on the conveyor belt or out of tolerance, whereas the back finishing roller 36 carries out a little upwards movement equal to the tolerances in height among the various glasses, i. e. in other words, the front picking up roller 28 is designed yielding against the action of the spring 40, only for safety's sake.

Furthermore, it is to be noted that the rotation centres of the bearings of the three rollers are so located that the lifting path of the

central roller 32 has a component directed in the direction of advancing of the can, and this helps the lifting of the roller 32 by the can, whereas the lifting paths of the front roller 28 and back roller 36 have a component directed in the direction opposite to the advancing of the can, and this in order to carry out the last attempt to correctly relocate the can in case of fortuitous bad positioning.

In such a manner, the fulcrum system of the various rollers, takes the maximum advantage of the load of the springs, without stressing the bearings, which assure anyway the necessary stiffness.

Obviously, instead of using hinged bearings, means can be used, which allow a vertical straight movement of the various rollers, under the above described forces, such as for example stud bolts with antifriction guides.

It is obvious that other numerous and different changes and modifications can be performed by the skilled in the art on the embodiment of the present invention hereinbefore described, without departing from its scope. It is intended therefore that all these changes and modifications are encompassed in the field of this invention.

Claims

1. A picking up and closing unit for soft plastic caps, particularly for straight chamber capping machines, in which the containers to be closed are supplied in a continuous way, resting on a conveyor belt and pressed between two belts which proceed parallel to the conveyor belt at a certain distance from it, till a position in which each of them hooks with its upper edge the lower edge of a cap which leans out of a suitable feed guide, entraining the cap with it, which unit is characterized in that it comprises a pressure roller (32), having a narrow crosswise dimension with respect to the cap diameter, which acts on the cap while it is going out of the feed guide (10), exercising, under the action of a suitable spring (34) thereof, a force concentrated on the centre of the cap (12), so as to warrant the air way out and the carrying out of a certain depression inside the closed container.

2. A unit according to claim 1, characterized in that said feed guide (10) comprises a lower tab (26) extending towards said central roller (32) to keep lifted up the back edge of a cap (12), which is being centrally pressed on a container to be closed, so as to make the air way out from the container easier.

3. A unit according to claim 1 or 2, characterized in that said feed guide (10) comprises a upper guide tab (24), which cooperates with the lateral rails (16, 18) of the feed guide (10) to keep centered the cap in its waiting position.

4. A unit according to any one of the preceding claims, characterized in that it further comprises a picking up roller (28), which is located immediately downstream the output of the feed guide (10) and acts as an extention thereof, accompanying the cap in its advancing.

5. A unit according to any one of the preceding claims, characterized in that it further comprises a finishing roller (36), located downstream the pressure roller (32) and laterally extending beyond the edges of the container to be closed, to stabilize it and finish the

closure.

6. A unit according to any one of the preceding claims, characterized in that said pressure roller (32) is installed on a bearing hinged to the unit frame upstream said pressure roller (32), the arrangement being such that the lifting path thereof has a component directed in the direction of advancing of the container to be closed.

7. A unit according to claim 4, characterized in that said picking up roller (28) is installed on a bearing hinged to the unit frame downstream said picking up roller (28), the arrangement being such that the lifting path thereof has a component directed in the opposite direction to the advancing direction of the container to be closed.

8. A unit according to claim 5, characterized in that said finishing roller (36) is installed on a bearing hinged to the unit frame downstream said finishing roller (36), the arrangement being such that the lifting path thereof has a component directed in the opposite direction to the advancing direction of the container to be closed.

9. A unit according to any one of the claims 1 to 5, characterized in that said pressure roller (32) is installed on stud bolts with antifriction guides.

10. A unit according to claim 4, characterized in that said picking up roller (28) is installed on stud bolts with antifriction guides.

11. A unit according to claim 5, characterized in that said finishing roller (36) is installed on stud bolts with antifriction guides.

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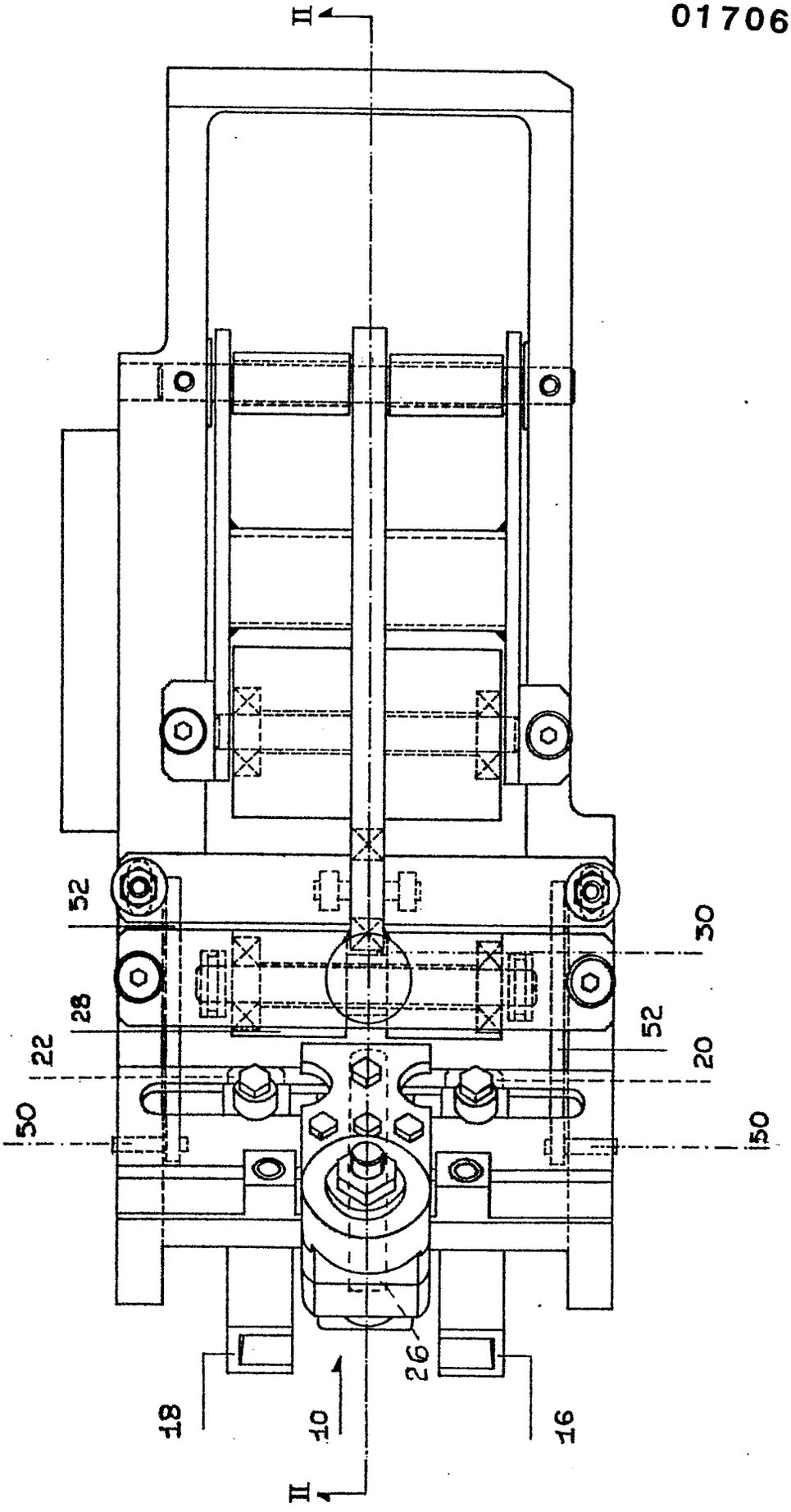

FIG. 1

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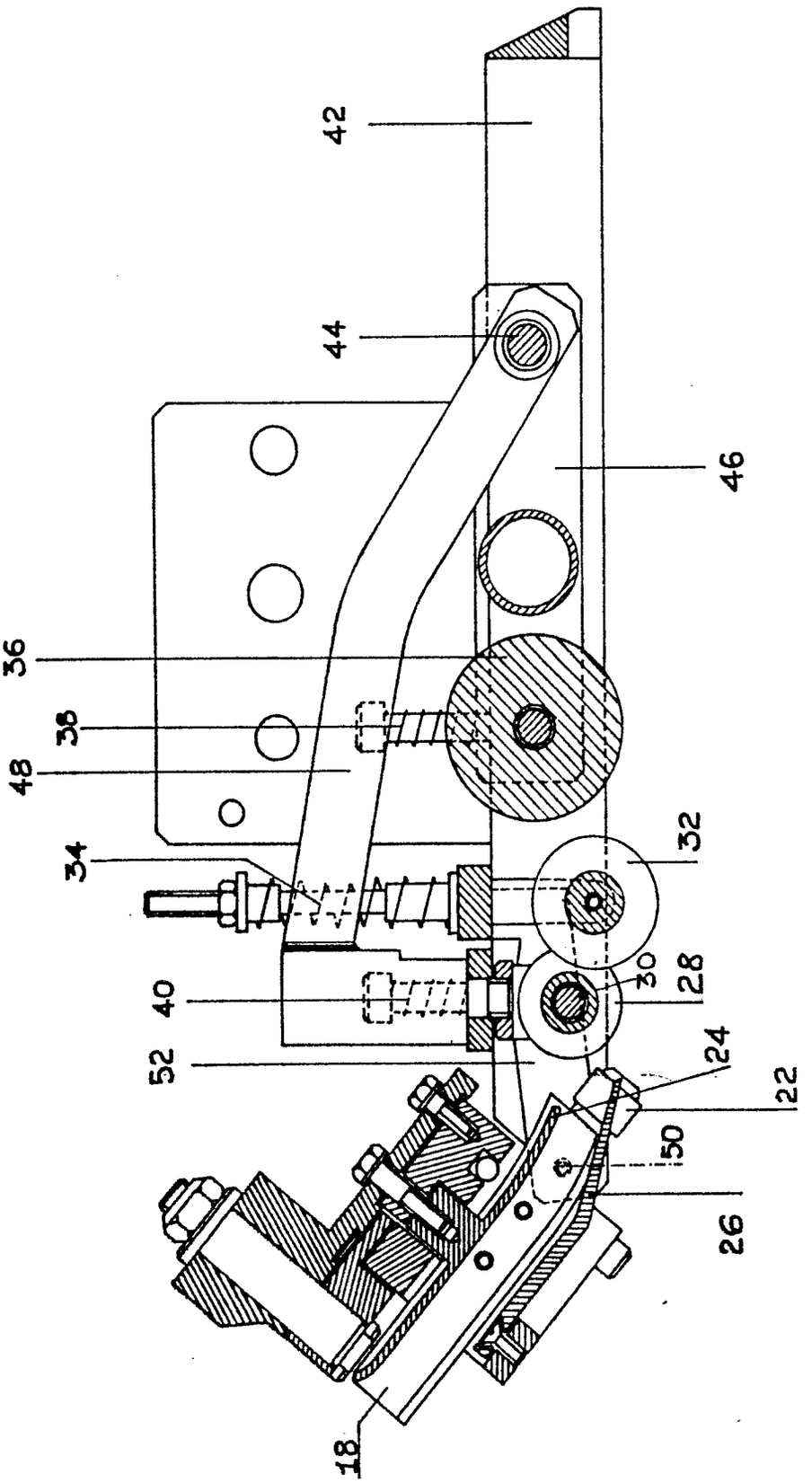

FIG. 2

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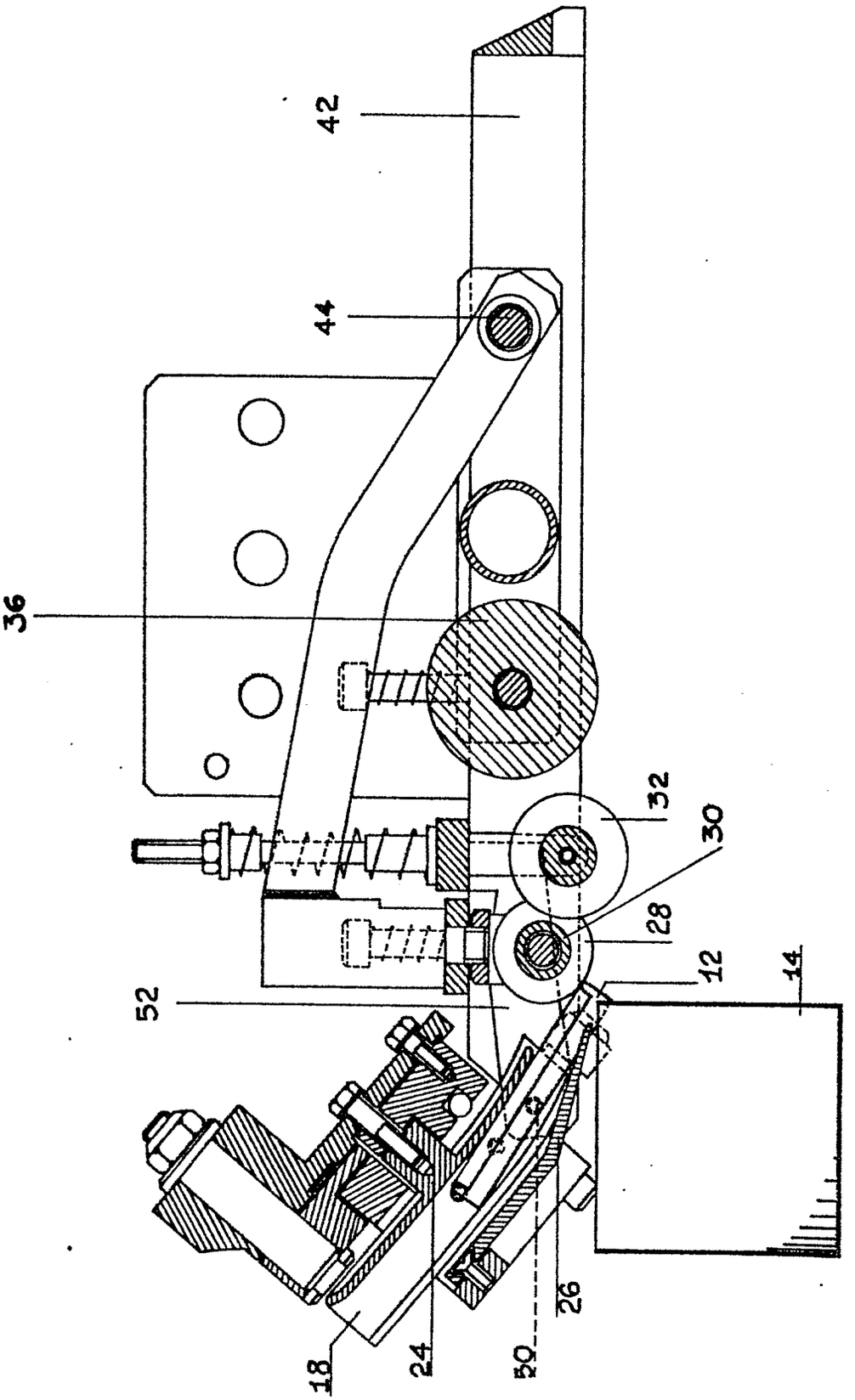

FIG. 3

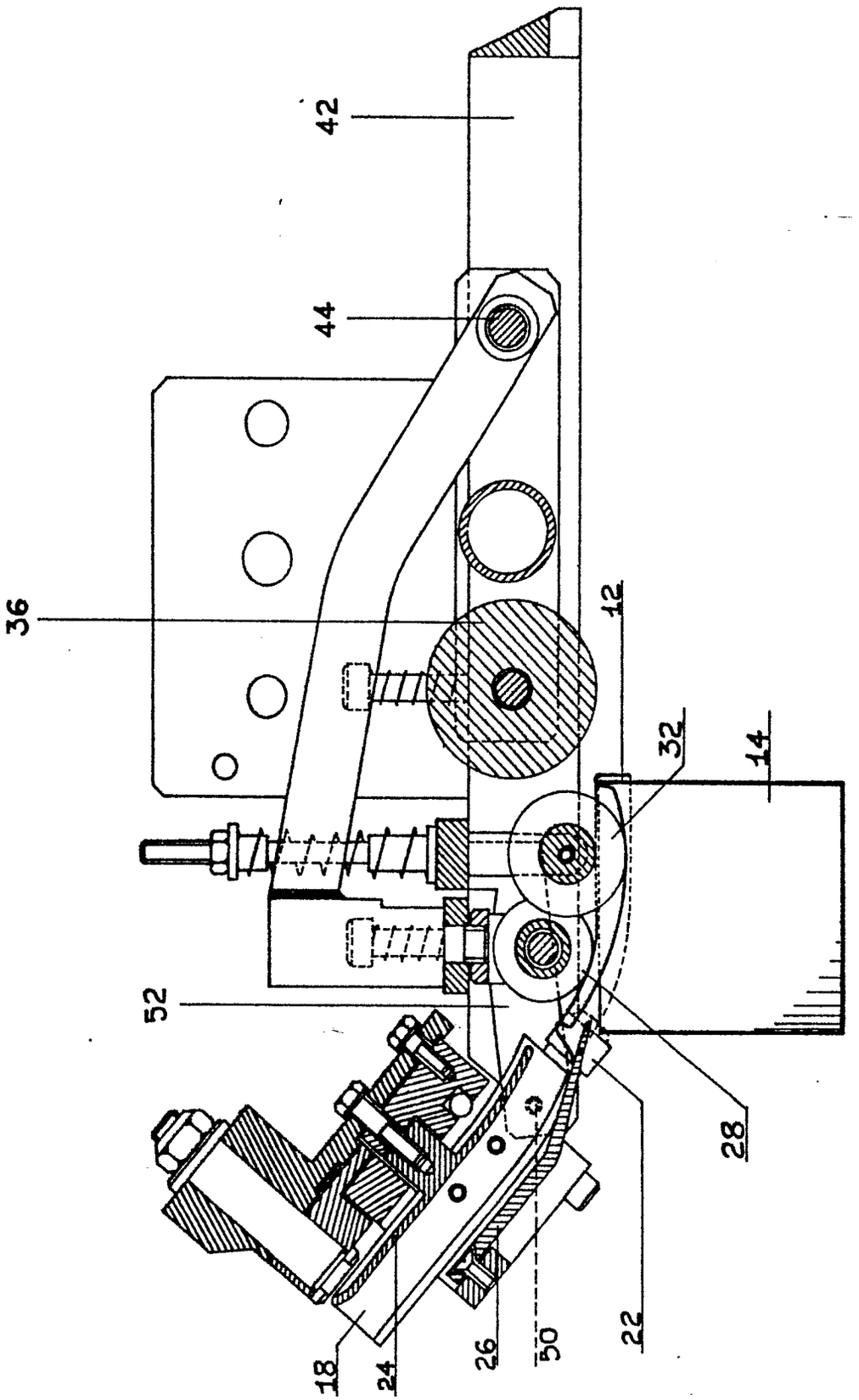

FIG. 4

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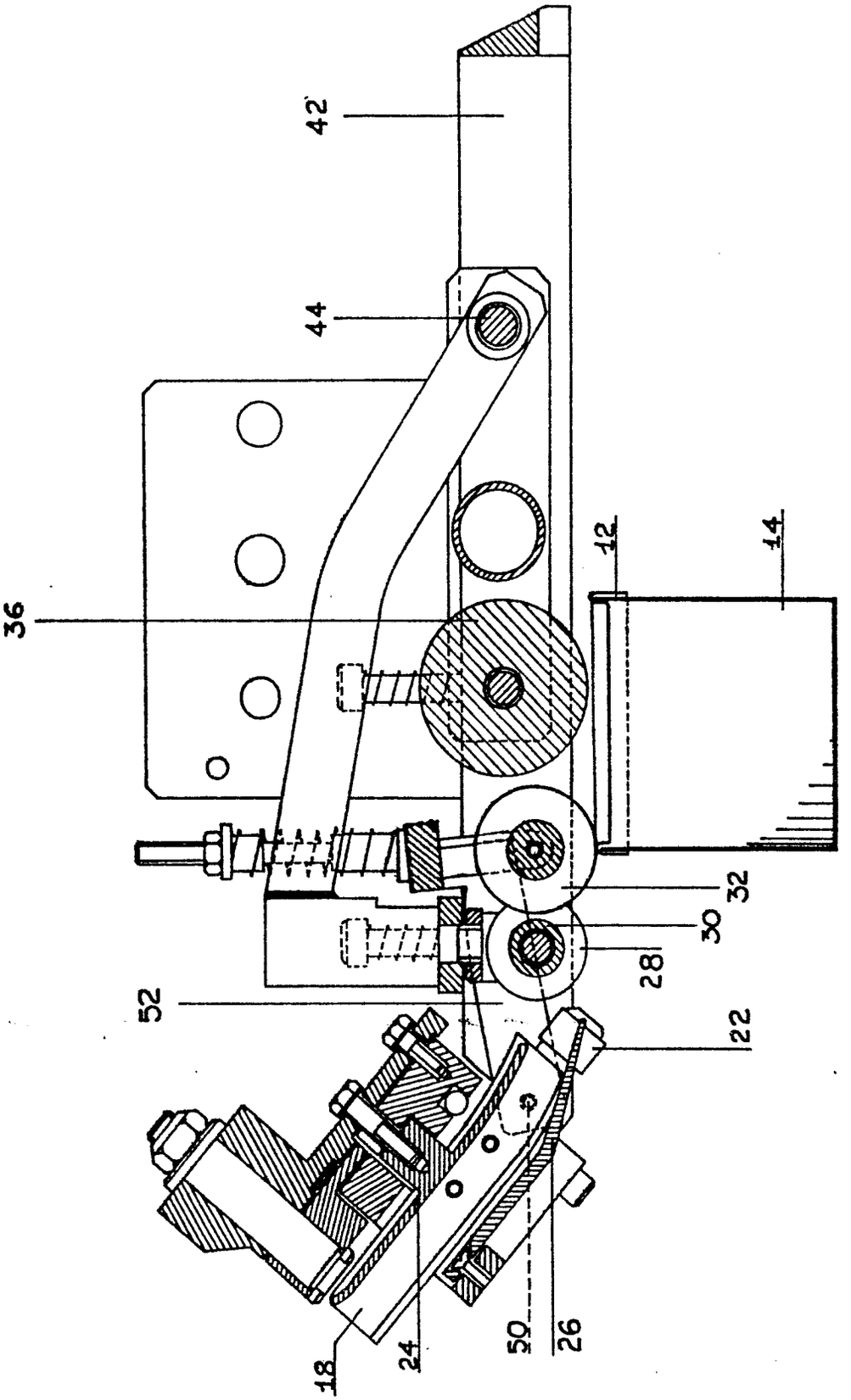

FIG. 5