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BOTTLE PACKING MACHINE

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2 Sheets-Sheet 1

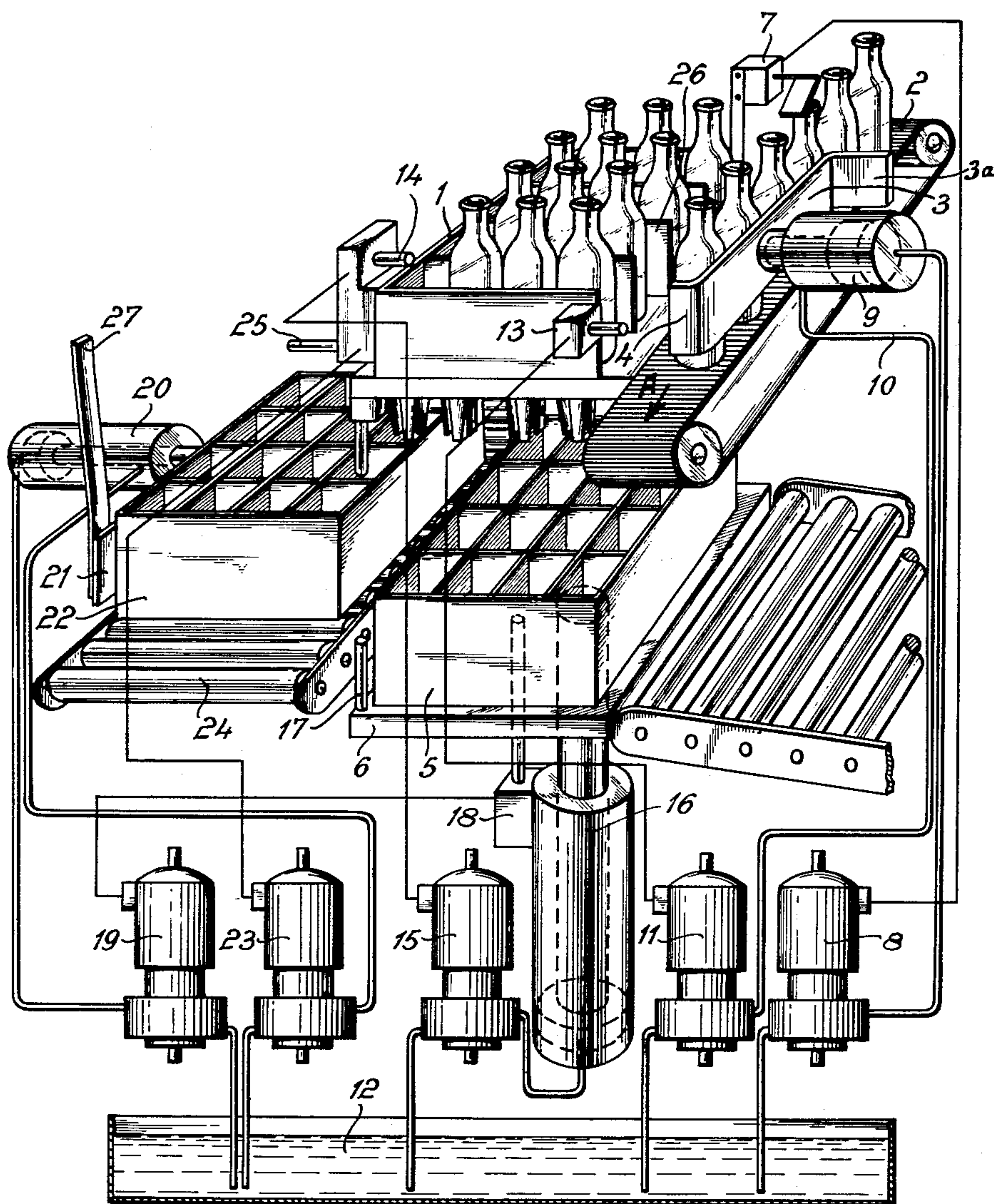


Fig. 1

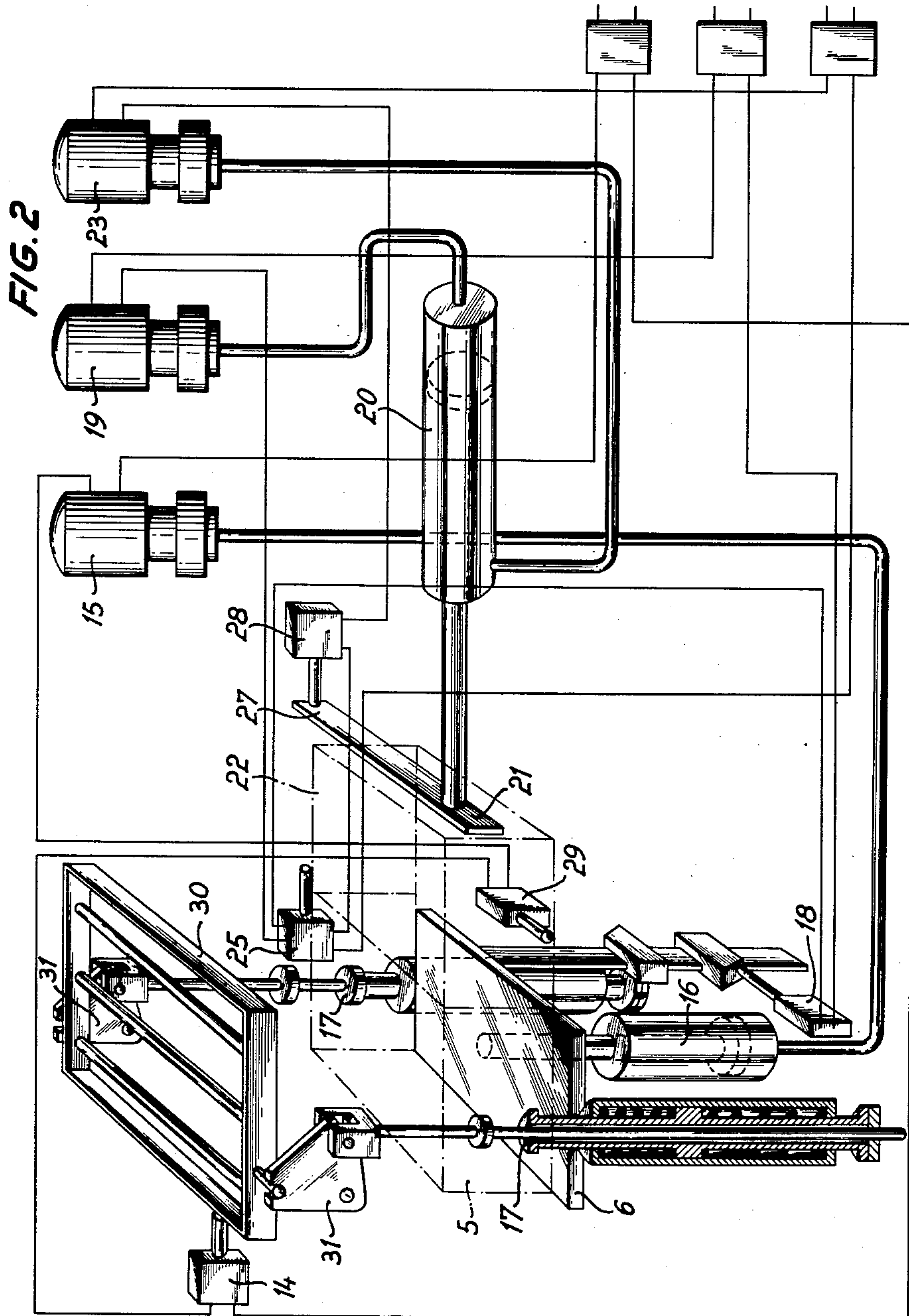
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1

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BOTTLE PACKING MACHINE

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The present invention relates to a packing machine and, more specifically, to an automatic bottle packing machine.

With heretofore known automatic bottle packing machines in which the bottles are moved by means of a conveyor belt to a magazine, the magazine is arranged in such a way that the entrance openings for the magazine are located at one end of the conveyor belt in longitudinal direction of the latter. For purposes of filling the magazine, the bottles arriving on the belt are fed to a distributor system composed of a plurality of feeding paths, and the bottles are, due to the pressure of the succeeding bottles, arranged in rows adjacent each other ahead of each entrance opening.

The above known arrangement has the drawback that the bottles accumulate in front of the distributing system. In order to prevent the belt from sliding below the bottles whereby the further feeding movement would be interrupted, the belt has to be loaded with so many bottles that the weight thereof will overcome the accumulating pressure in front of the distributing system. Since, furthermore, the width of the belt depends on the width of the magazine, the above mentioned heretofore known packing machines have to be designed for packing one single bottle size only and cannot be adjusted for different bottle sizes.

It is, therefore, an object of the present invention to provide a bottle packing machine, which will overcome the above mentioned drawbacks.

It is another object of this invention to provide a bottle packing machine which, without requiring great expenditure and while avoiding accumulations of the bottles in front of the magazine, will allow a proper filling of the magazine with bottles even if the belt is loaded unevenly and sparsely with bottles to be packed.

It is also an object of this invention to provide a bottle packing machine which, without requiring any change in the feeding belt, will allow the packing of bottles into various size magazines.

These and other objects and advantages of the present invention will appear more clearly from the following specification in connection with the accompanying drawing in which Fig. 1 diagrammatically and perspective illustrates a bottle packing machine according to the present invention.

Fig. 2 diagrammatically illustrates the control means for controlling certain operations of the bottle packing machine of Fig. 1.

General arrangement

The bottle packing machine according to the present invention is characterized primarily in that the magazine is arranged alongside the belt, i.e. along the longitudinal side of the belt, in such a way that its entrance openings are located laterally of and adjacent to the conveyor belt. The arrangement furthermore comprises a slide movable transverse to the conveyor belt and controlled in such a way that each time a row of bottles corresponding in number to the number of entrance openings in the maga-

2

zine is placed in front of said entrance openings, said slide will move said bottles into the entrance openings of the magazine. Means arranged in front of the magazine check the readiness of the bottles for their introduction into the magazine and control the feeding slide.

Inasmuch as in this way the introduction of the bottles into the magazine is effected by a slide, the belt has merely to transport the bottles so that less driving power is required for the belt and the conveyor can be designed correspondingly lighter. The arrangement of a checking mechanism checking the readiness of the bottles or bottle row for introduction into the magazine and controlling the time of feeding the bottles into the magazine by said slide assures a proper packing process without any difficulties. Furthermore, the arrangement according to the invention also makes it possible to employ the same in connection with different size magazines without requiring a change in the conveyor.

Structural arrangement

Referring now to the drawing in detail, the magazine 1 is provided with entrance openings 26 and is arranged alongside a conveyor belt 2 moving at constant speed in the direction of the arrow A. Opposite the entrance openings 26 and on the other side of conveyor belt 2 there is arranged a hydraulically operable slide 3 extending over the entire width of the magazine 1. Slide 3 has its end 4 somewhat bent toward the magazine for catching and grasping the bottles.

Perpendicularly below the bottom of the magazine, which bottom is adapted to be opened, there is provided a lift 6 for receiving an empty packing container 5. The bottles which are advanced on the conveyor belt 2 are counted by means of an electric counting mechanism 7 which is arranged ahead of the magazine 1. This counting mechanism 7 controls slide 3. When a number of bottles has been counted which corresponds to the number of entrance openings 26, counting mechanism 7 turns on a pump 8 which delivers pressure fluid to and thereby actuates an actuating piston 9 for slide 3. As a result thereof, slide 3 is moved toward magazine 1 and introduces the bottles in front of said slide through entrance openings 26 into the magazine. The fluid in front of piston 9 is returned through conduit 10 and pump 11 into a fluid reservoir 12. Magazine 1 is equipped with a feeler 13 which is abutted by slide 3 at the end of each feeding movement. The feeler 13 initiates the return stroke of slide 3. Feeler 13 actuates pump 11 by means of which pressure fluid is conveyed to the other side of piston 9, i.e. the return side of piston 9 so that slide 3 will carry out a return stroke away from the magazine. This cycle is repeated until the entire magazine is filled. When this occurs, an automatic device initiating the removal of the magazine becomes effective. This device comprises a lift having an empty packing container thereon which is raised by said lift against the bottom of the magazine while normally closed passages in the magazine are opened so that the bottles in the magazine will then drop into said empty packing container. Thereupon the packing container is lowered by said lift and is conveyed to a discharging station while another empty packing container is placed upon the lift.

In connection with the lateral movement of bottle slide 3, since the bottle conveyor belt 2 moves continuously, bottles will still advance on the conveyor when the slide is not in position to receive them. To prevent such bottles from passing behind the slide, there is the bottle stop 3a provided, which may be a stiff sheet metal member attached to the end of slide 3, as illustrated in Figure 1 so as to extend out at right angles therefrom and about as wide as belt 2. This will stop any bottles reaching the end of the slide while the slide is moving laterally.

The time for the slide to so move is about a second or less so that only from three to four bottles will collect in front of stop 3a.

More specifically, when the magazine has been filled, the bottles first introduced into the magazine are pushed against a feeler 14 at that side of the magazine which is opposite slide 3. It will be appreciated that while slide 3 each time moves the bottles only into the magazine near the entrance openings, the succeeding fed bottles push the previously introduced bottles further into the magazine. Feeler 14 when actuated in the above mentioned manner brings about actuation of pump 15 which latter feeds pressure fluid into a lifting cylinder 16 of the lift 6 so that the latter with the empty packing containers 5 thereon will be moved upwardly toward the bottom of the magazine. During this upward movement an abutment 17 engages and actuates a rod which latter by means of a lever 31 moves the magazine bottom 30 (Fig. 2) toward one side so that the bottles can pass freely downwardly into the respective packing container 5. When lift 6 reaches its uppermost position, a feeler 29 is actuated and shuts off pump 15. Subsequently, due to the weight of the filled container, lift 6 moves downwardly back into its initial position. During the downward movement of lift 6, lever 31 automatically returns the magazine bottom 30 to its normal position in which it supports the bottles in the magazine. At the end of the downward movement of lift 6, a feeler 18 is actuated by means of which pump 19 is turned on again which then feeds pressure fluid into a cylinder 20 operatively connected to a slide 21 and adapted to reciprocate the same. Slide 21 will then by means of the respective empty container 22 push the filled container 5 off from lift 6 so that the filled container will be replaced by an empty container. The empty containers are fed in front of slide 21 by means of a roller conveyor 24. At the end of the feeding movement of slide 21, an abutment 27 is actuated which in turn actuates a switch 25 by means of which pump 23 is caused to feed fluid to the opposite side of the piston in cylinder 20 so that slide 21 will be returned to its starting position. It will be appreciated that the end position of slide 21 is limited by switch 25 which then turns off pump 19 and turns on pump 23 for the return of slide 21. When slide 21 reaches its end position, a feeler or switch 28 is engaged which turns pump 23 off again.

According to a further development of the invention, the walls of the magazine receiving the bottles from slide 3 and from which the bottles slide into an empty packing container 5 below said magazine are produced of a wear-resistant and elastic synthetic material as, for instance nylon.

The construction of the walls of the magazine of such synthetic material is advantageous in the following respect. It has been found, especially when the bottles are labeled, that during the sliding movement of the bottles from the magazine into the empty packing container therebelow the labels might be damaged and might even be stripped off the bottle. This would require a new checking of the bottles and possibly re-labeling of some of the bottles thereby complicating the entire process and

interfering with the automation of the packing operation. If, however, the walls of the magazine consist of a synthetic material of the above mentioned type, these walls can easily absorb and yield under the respective impacts so that the above mentioned drawback will be avoided.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawing but also comprises any modifications within the scope of the appended claims.

In Fig. 2 is shown how the bottom of the magazine is opened and shut with the controlling members which are necessary for that.

What we claim is:

1. In a bottle packing machine: a magazine having a plurality of entrance openings for receiving the bottles to be packed, a conveyor adapted to receive and to feed the bottles to be packed to said magazine, said magazine being arranged adjacent to and alongside a longitudinal side of said conveyor with the entrance openings of said magazine arranged adjacent said conveyor, a slide reciprocable transverse to the longitudinal direction of said conveyor and adapted to pick from said conveyor a plurality of bottles and to feed the same into said magazine through said entrance openings, a lift arranged below said magazine and adapted to receive a packing container and to lift the same into a position below and adjacent to the bottom of said magazine, first control means associated with said magazine and operable in response to the complete filling of said magazine to initiate the lifting movement of said lift, second control means responsive to the packing container on said lift reaching its lifted end position for releasing the bottles from said magazine into said packing container, third control means responsive to the pressure of a certain weight on said lift for initiating downward movement of said lift, and means responsive to said lift reaching the end position of its downward movement for causing removal of said filled packing container on said lift from the latter while feeding another empty packing container onto said lift.

2. A packing machine according to claim 1, which includes fluid pressure operable means for actuating said slide and discharging the bottles from said magazine and also for replacing the filled container on said lift by an empty container.

3. A packing machine according to claim 2, in which said fluid pressure operable means comprises a plurality of fluid operable cylinder piston systems for respectively reciprocating said slide actuating said lift and replacing a filled packing container on said lift by an empty one, and in which there is provided a plurality of pump units respectively communicating with said cylinder piston systems.

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