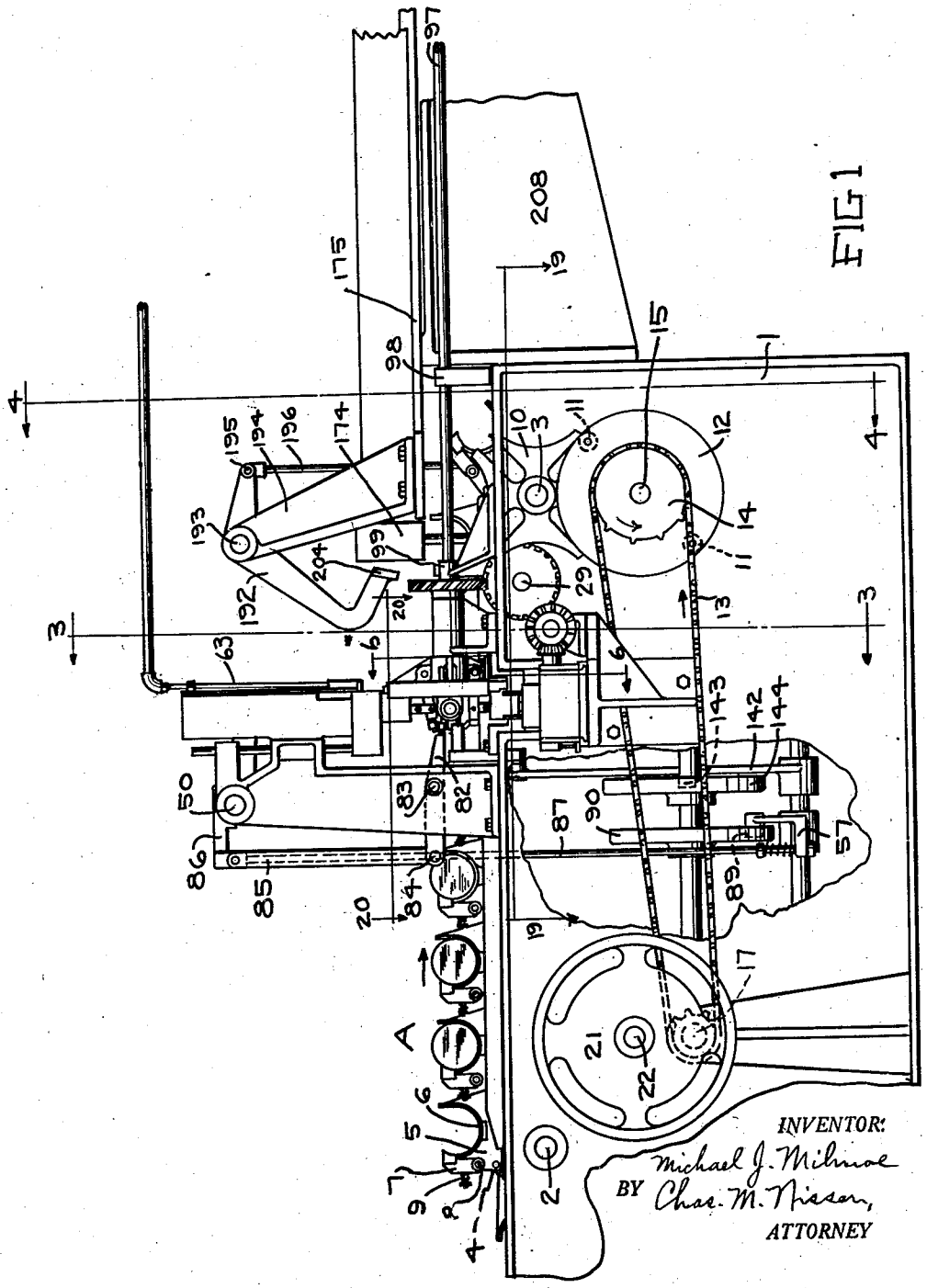
Nov. 28, 1933. M. J. MILMOE 1,937,476

LABELING MACHINE

Filed Sept. 24, 1929 11 Sheets-Sheet 1



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LABELING MACHINE

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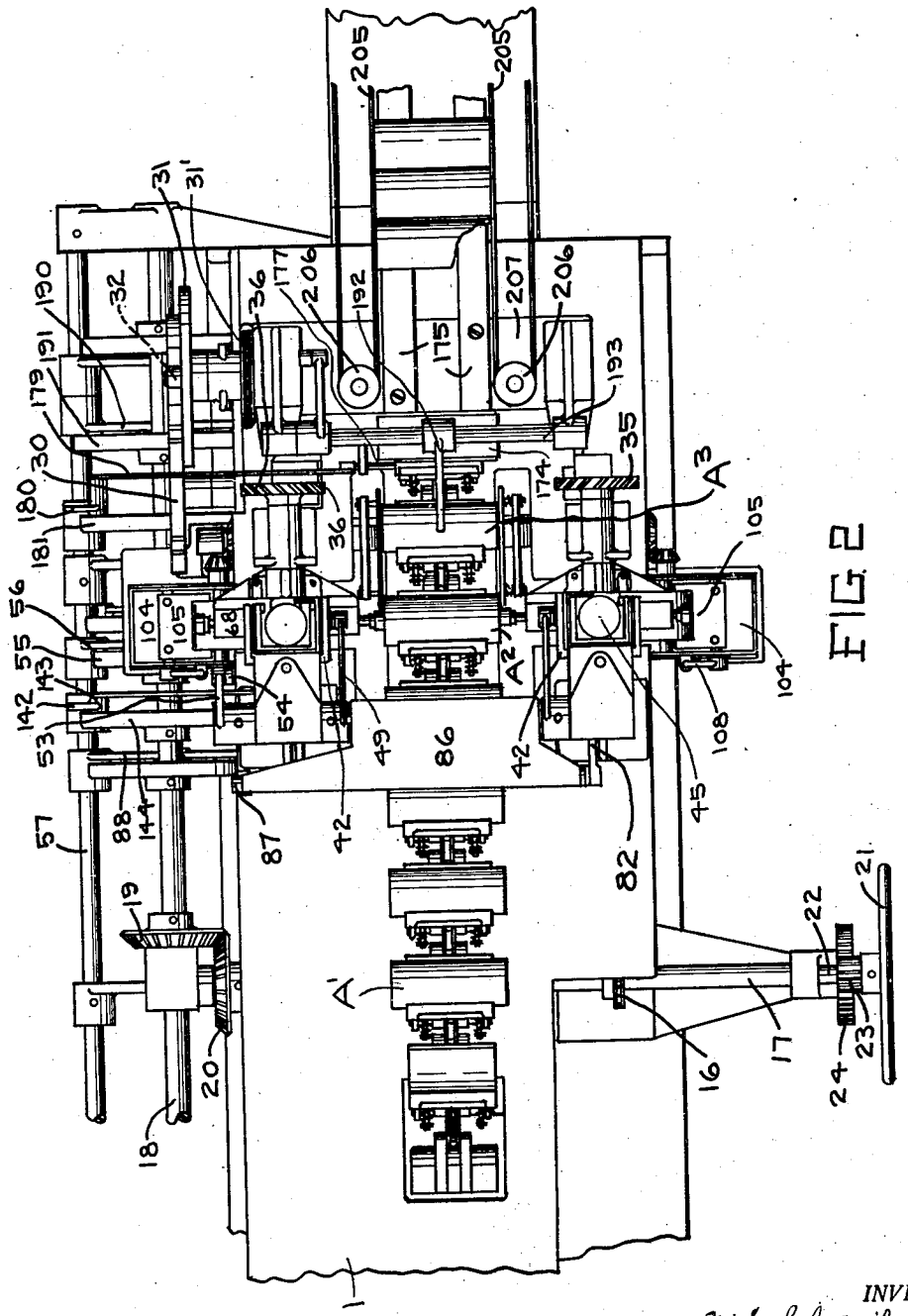


FIG 2

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LABELING MACHINE

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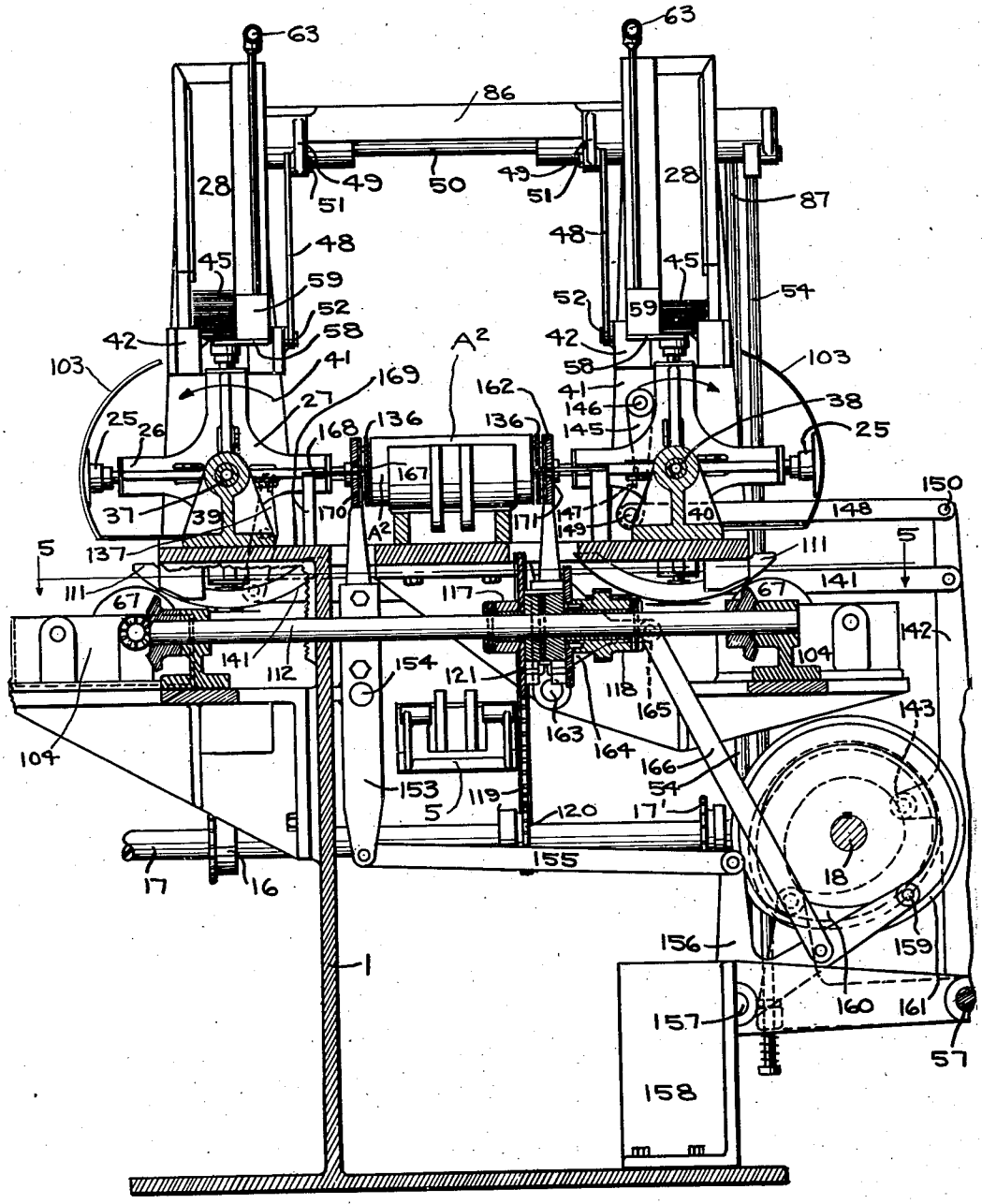


FIG. 3

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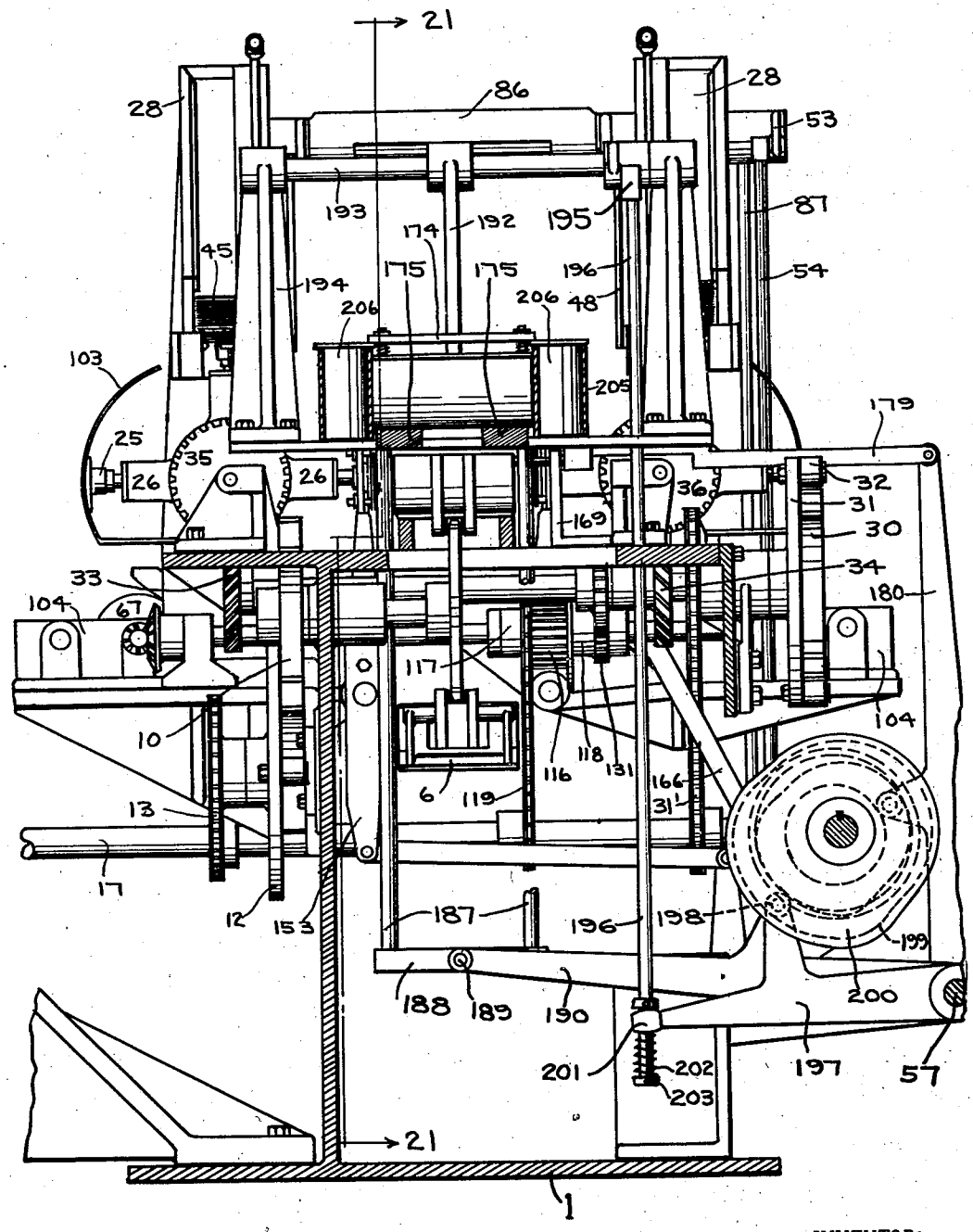


FIG. 4

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LABELING MACHINE

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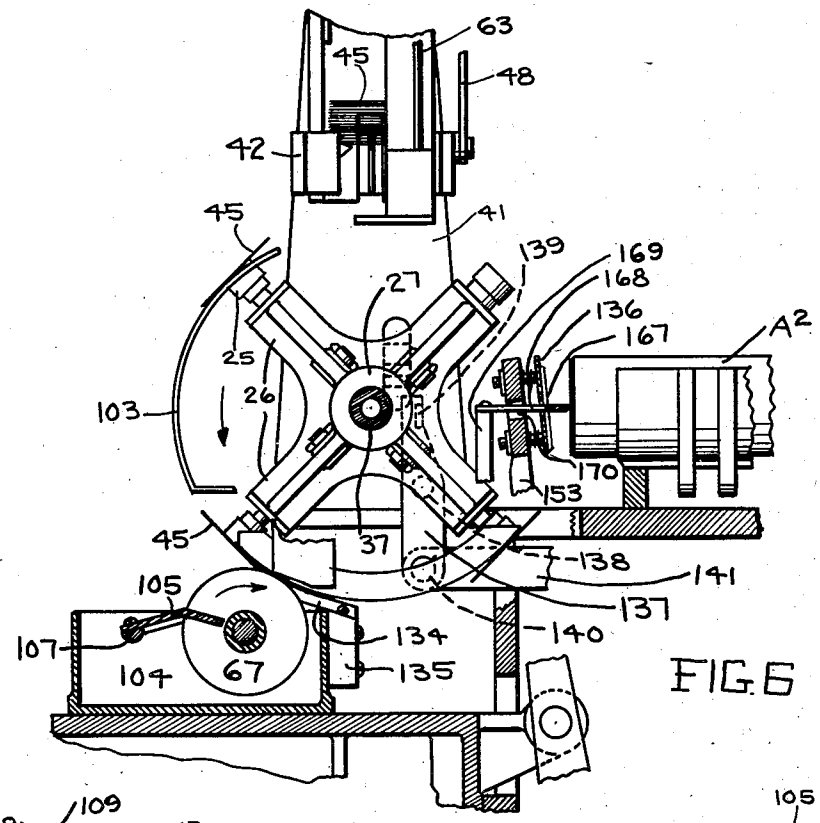


FIG. 6

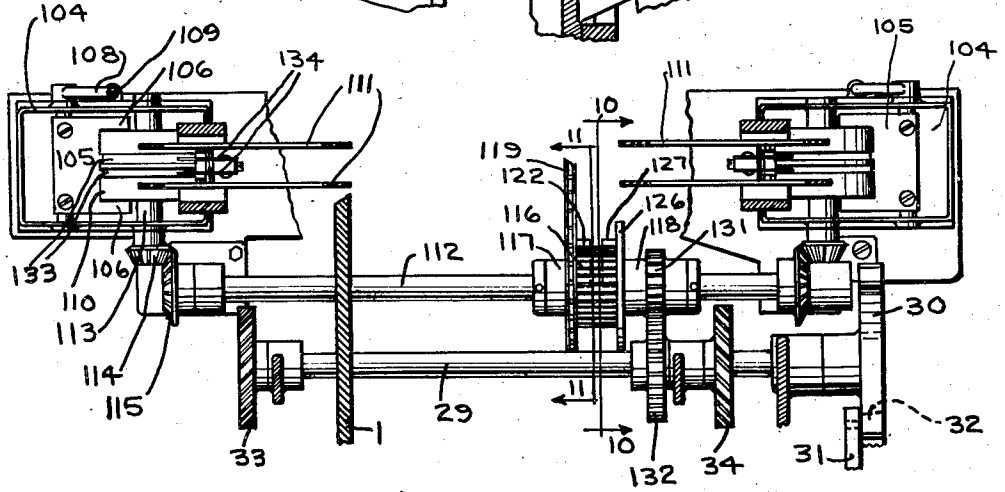


FIG. 5

INVENTOR:
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BY Chas. M. Nissen,
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Nov. 28, 1933. M. J. MILMOE 1,937,476

LABELING MACHINE

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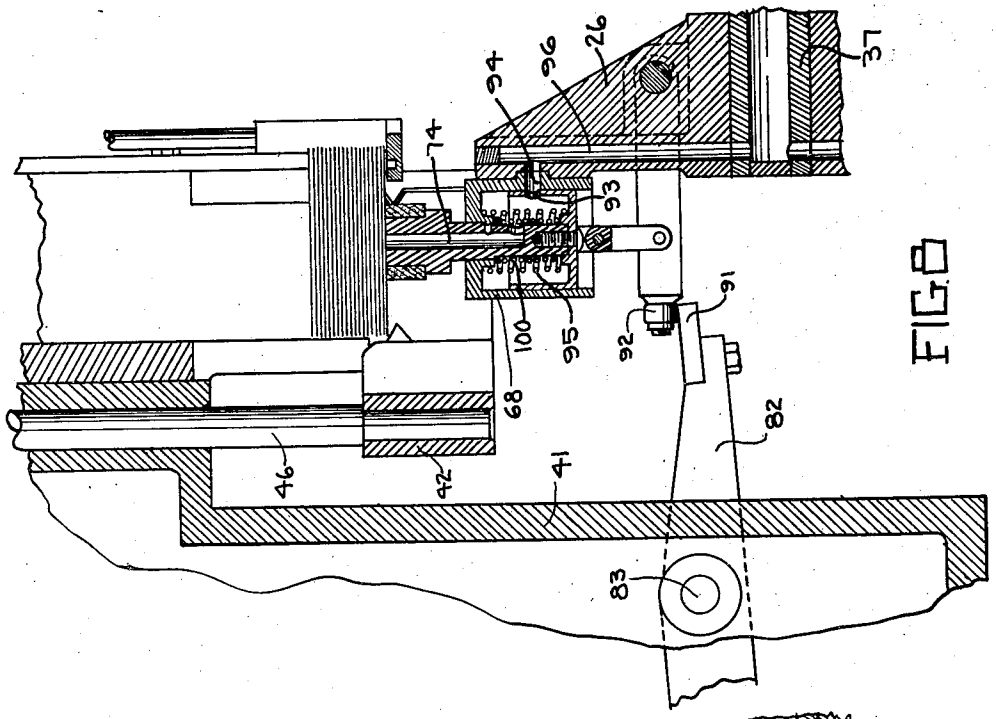


FIG 8

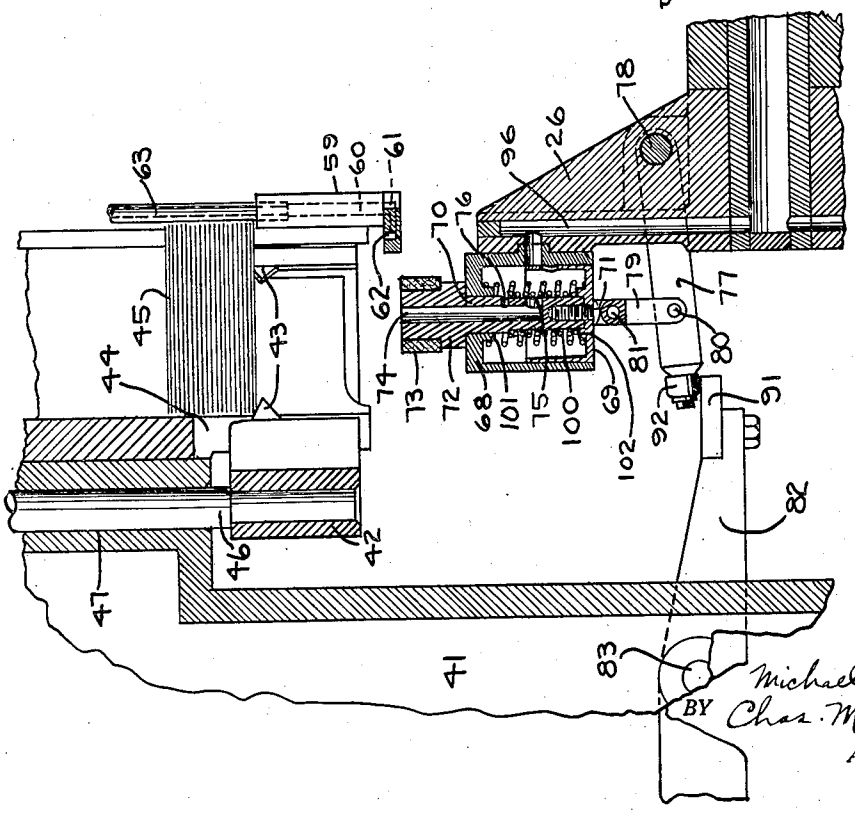


FIG 7

INVENTOR:
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LABELING MACHINE

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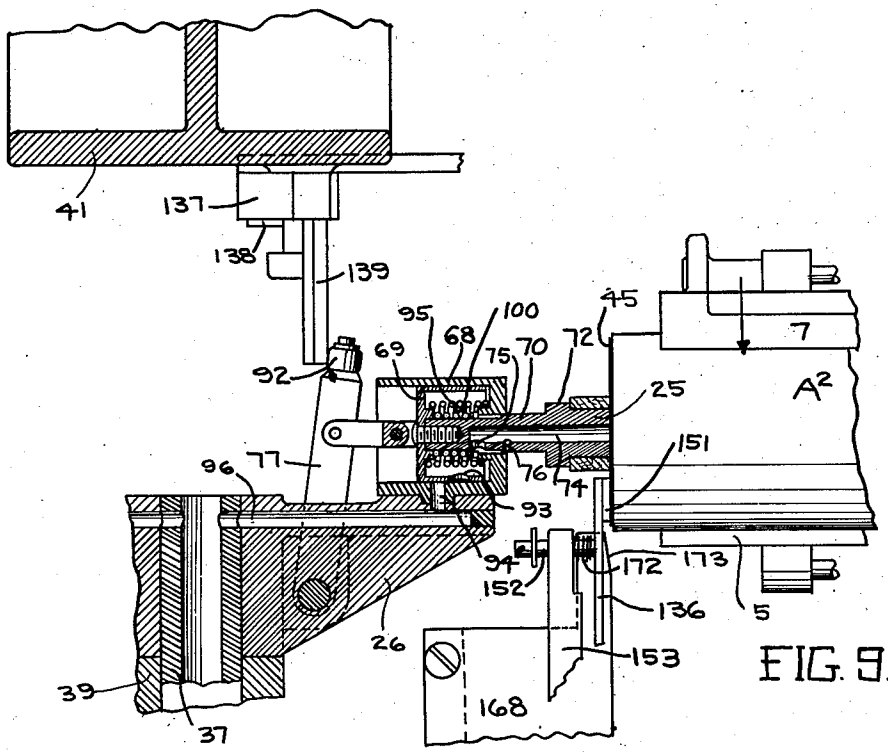


FIG. 9.

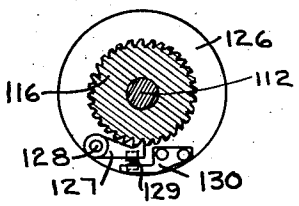


FIG. 10

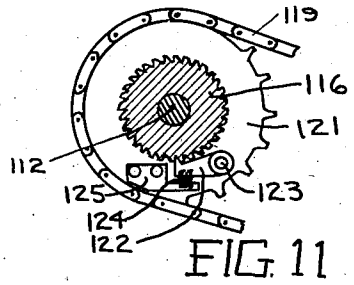


FIG. 11

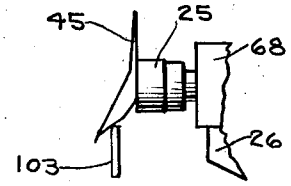


FIG. 12

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LABELING MACHINE

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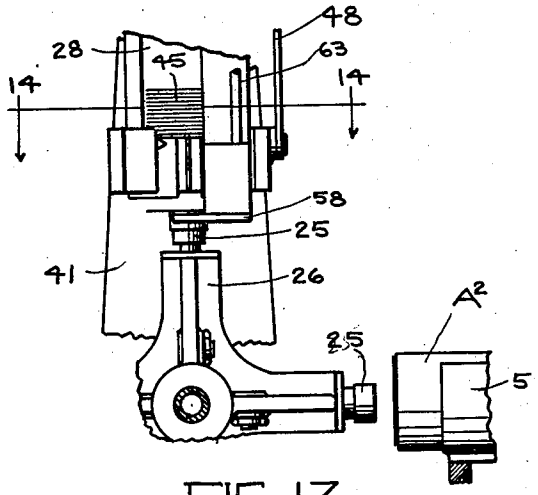


FIG. 13

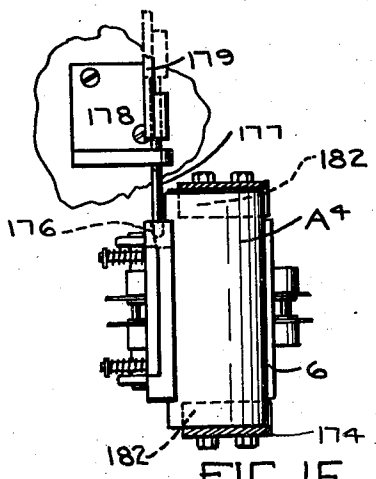


FIG. 15

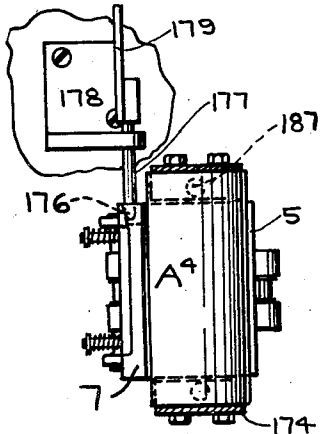


FIG. 16

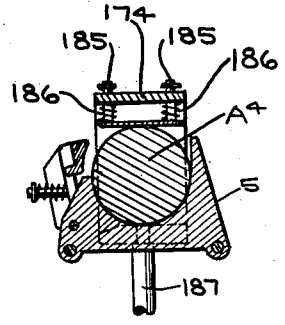


FIG. 17

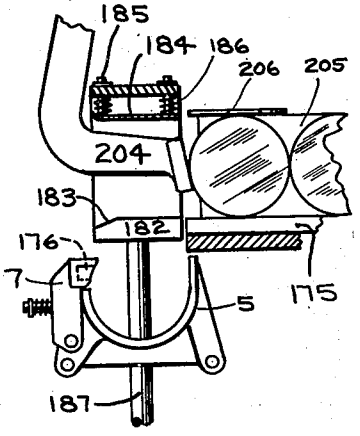


FIG. 18

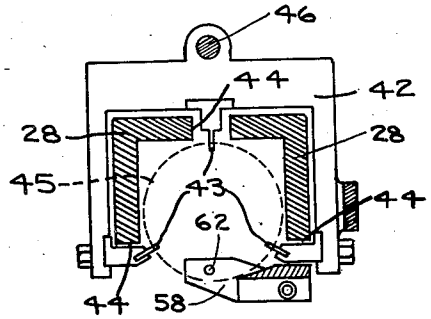


FIG. 14

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Nov. 28, 1933. M. J. MILMOE 1,937,476

LABELING MACHINE

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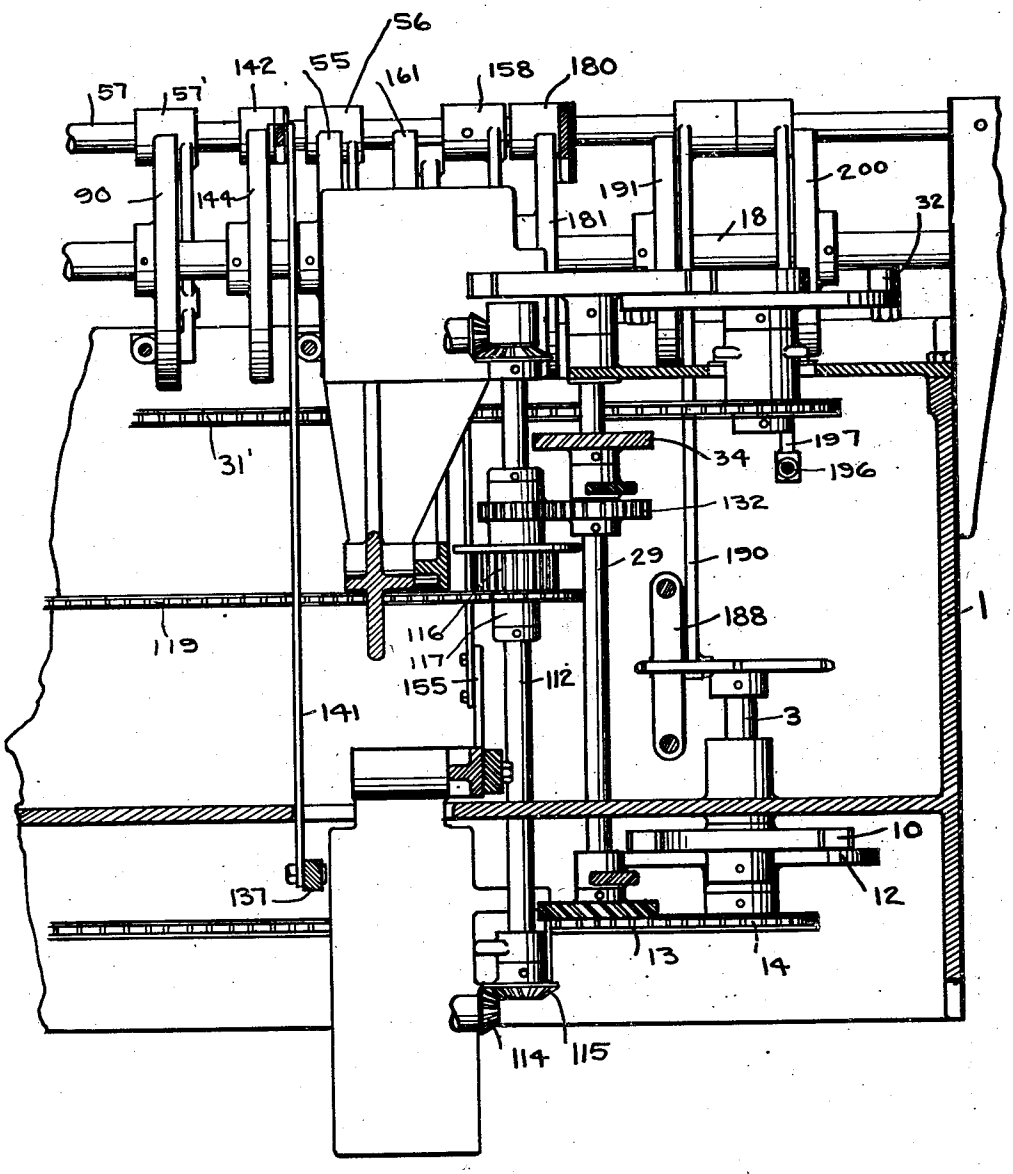


FIG. 19

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Nov. 28, 1933. M. J. MILMOE 1,937,476

LABELING MACHINE

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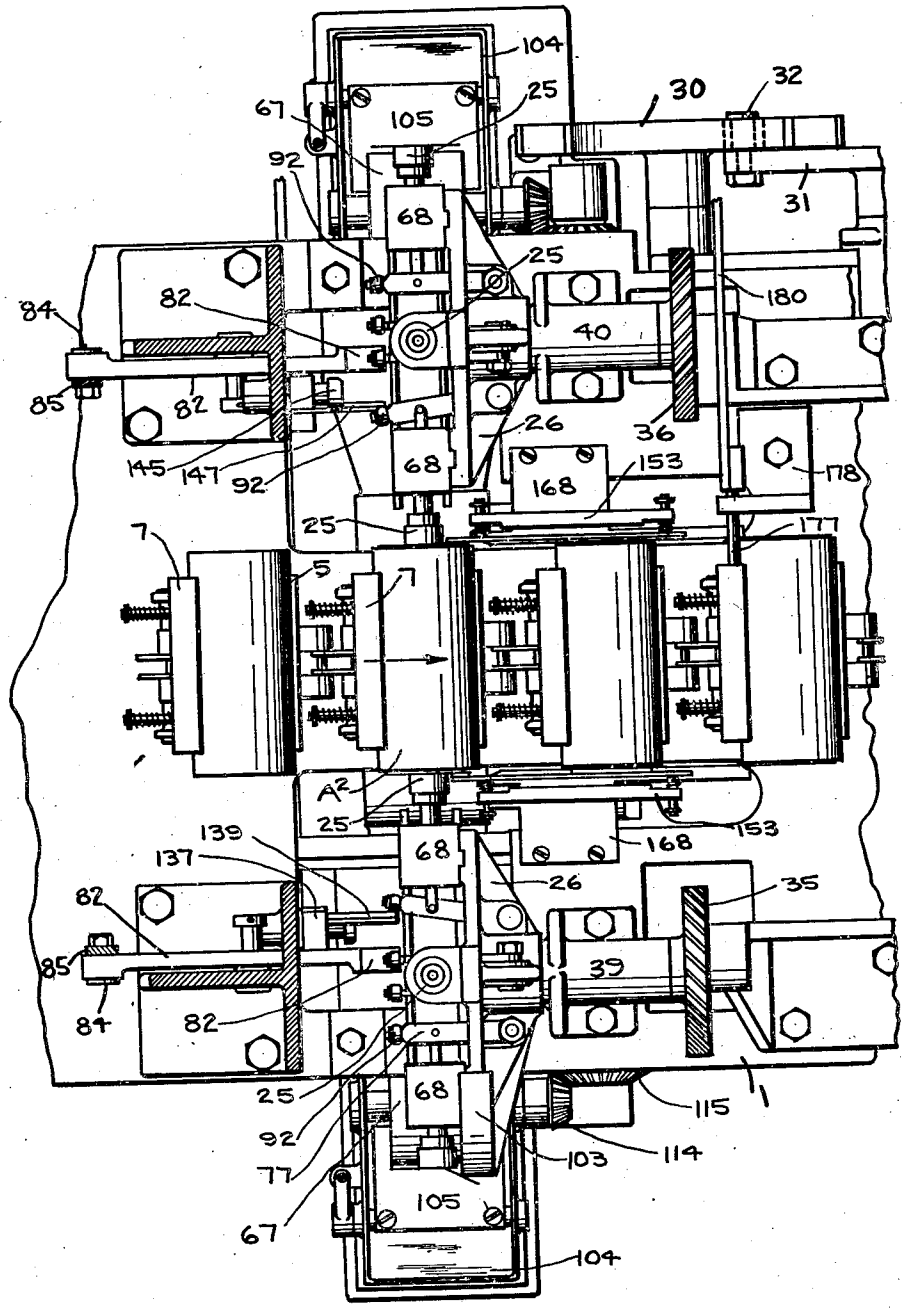


FIG. 20

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LABELING MACHINE

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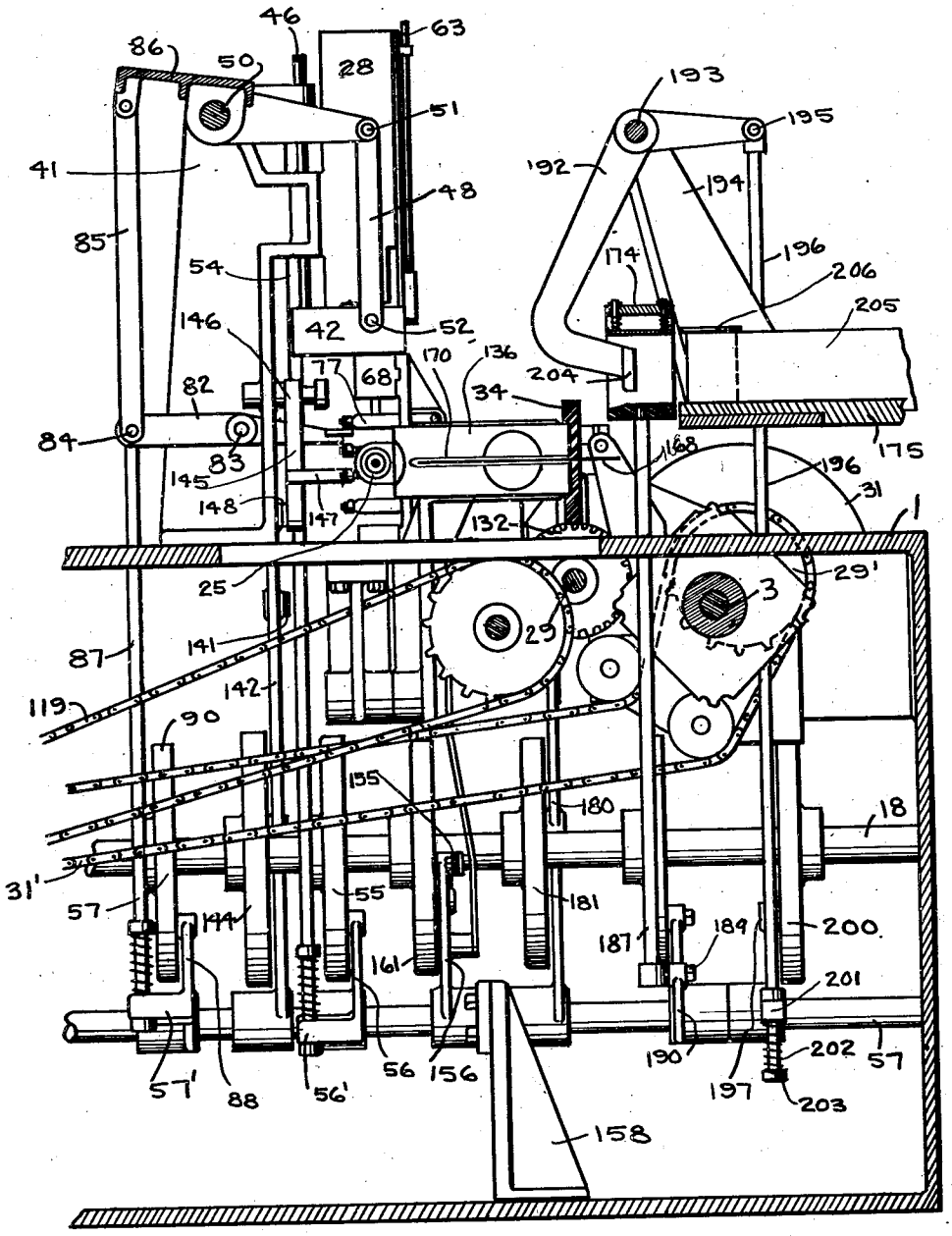


FIG 21

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Patented Nov. 28, 1933 1,937,476

UNITED STATES PATENT OFFICE

1,937,476

LABELING MACHINE

Michael J. Milmoe, Chicago, Ill., assignor to F. B. Redington Co., Chicago, Ill., a corporation of Illinois

Application September 24, 1929
Serial No. 394,822

36 Claims. (Cl. 91—51)

The present invention relates to a labeling machine and particularly to that class of labeling machine in which a label is applied to the opposite ends of cylindrical or drum-shaped cans although the invention is capable of being used to place labels on other types of containers such as boxes, wrapped packages and the like. The cans, packages or the like, do not necessarily have to be cylindrical in shape but may be of any desired shape and I wish to have it understood that my invention is capable of being embodied in a machine which is adapted to apply labels to only one end of the can or package.

One object of this invention is the provision of improved means for feeding the labels to the position where they are to be applied to the cans.

Another object of this invention is the provision of improved means for applying glue to the labels before they are placed on the cans. This comprises means for imparting movement to the gluing rollers at times when the turrets which carry the labels are at rest. This means is also adapted to change the speed of the gluing rollers so that as the labels move into contact therewith, the peripheral speed of the gluing rollers is substantially the same as the speed of the label as it moves past the gluing roller and in contact therewith.

Another object of this invention is to provide turrets carrying suitable label gripping devices which are adapted to carry the labels from the hoppers to the opposite ends of a can to which the labels are to be applied.

A further object of this invention is the provision of an improved type of suction device for gripping the labels and for insuring that only a single label is delivered to each of the gluing rollers and to each end of the can.

A still further object of this invention is the provision of means for moving the labeled cans from one conveyer to another after the labels have been applied to the ends of the cans, the last-mentioned conveying means comprising means which, in addition to conveying the cans, tend to firmly press the labels against the ends thereof to further insure that the labels will adhere thereto.

In the drawings:—

Fig. 1 represents an elevational view of the front side of a machine embodying my invention;

Fig. 2 is a plan view of the machine shown in Fig. 1;

Fig. 3 is a cross-section on the line 3—3 of Fig. 1;

Fig. 4 is a cross-section on the line 4—4 of Fig. 1;

Fig. 5 is a cross-section on the line 5—5 of Fig. 3;

Fig. 6 is a cross-section substantially on the line 6—6 of Fig. 1;

Fig. 7 is a view showing one of the suction gripping devices for removing a label from the hopper and delivering it to a position adjacent the end of the can;

Fig. 8 is a view similar to Fig. 7 showing the parts in a slightly different position;

Fig. 9 is a detail view partly in cross-section showing the label being applied to the can by means of the suction gripping device;

Figs. 10 and 11 are cross-sections substantially on the lines 10—10 and 11—11, respectively, of Fig. 5;

Fig. 12 is a view showing the means for insuring that only a single label will remain on the suction gripping device;

Fig. 13 is a fragmentary view showing another position of the parts shown in Figs. 7, 8 and 9;

Fig. 14 is a cross-section substantially on the line 14—14 of Fig. 13;

Figs. 15 to 18, inclusive, show the means employed for moving the cans from one conveyor to another after the labels have been applied to the cans;

Fig. 19 is a cross-section substantially on the line 19—19 of Fig. 1;

Fig. 20 is a cross-section substantially on the line 20—20 of Fig. 1; and

Fig. 21 is a vertical section taken substantially along the longitudinal center line of Fig. 2.

Referring more particularly to Figs. 1, 2 and 3, the machine shown comprises a frame 1 having a cross section substantially as shown in Fig. 3 and this frame is adapted to support the various operating parts of the machine. Rotatably mounted in the frame 1 of the machine and in suitable brackets attached thereto are the shafts 2 and 3, respectively. The shafts 2 and 3 have suitable sprockets attached thereto and these sprockets are adapted to support an endless conveyor designated generally as 4. This endless conveyer is made up of the links 5 pivoted to each other by connecting links, the upper surface of these links being formed with a substantially semi-cylindrical recess 6. A retaining element 7 is pivoted at 8 to each link 5 and the spring 9 yieldingly urges the retaining member to the right as viewed in Fig. 1. The chain moves in the direction of the arrow, shown in Fig. 1, and, as each of the links 5 comes into a position above the surface of the

frame 1, a can is placed therein at the position A, the retaining member 7 yielding sufficiently to permit the can to be inserted in the pocket 6. Thereafter the retaining member 7 holds the can in the pocket against accidental displacement therefrom. The chain is given an intermittent movement by means of a suitable Geneva gear 10 mounted on the forward end of the shaft 3 actuated by the pin 11 on the continuously rotating disc 12 driven by means of a chain 13 trained over a sprocket 14 rigid with the shaft 15 which also carries the disc 12 and a sprocket 16 on the shaft 17, the latter being rotatably mounted in the frame 1. The Geneva movement just referred to is of well-known construction and further description thereof is not deemed to be necessary. It is sufficient to say that the pockets on the chain 4 are moved through successive positions, each position being spaced-apart the distance between the centers of two adjacent pockets.

The shaft 17 is driven directly from the drive shaft 18 by means of the bevel gears 19 and 20. If desired, the shaft 17 may be rotated by means of the hand wheel 21 mounted on the stub shaft 22 which also carries a gear 23 meshing with a gear 24 rigid with the shaft 17. This hand wheel is ordinarily used merely for the purpose of moving the various parts of the machine through small distances in order to arrange the parts in a desired position for inspection or before starting the machine.

The labels are applied to the cans when the cans arrive at the position indicated as A^2 (see Fig. 2) and these labels are applied by means of suction gripping devices 25 mounted on the arms 26 of the turrets designated generally as 27. These suction devices carry labels from the hoppers 28 to the ends of a can located at the position A^2. Glue is applied to the labels as they are moved from the hoppers 28 to the ends of the cans. The operation of the turrets will now be described, the description referring particularly to Figs. 3, 5, 6, 7, 8, 9 and 19.

A suitable shaft 29 is rotatably mounted in the frame 1 (see particularly Figs. 5 and 19) and carries a Geneva gear 30 at the rear end thereof, the disc 31, carrying a suitable pin 32, being used to rotate the Geneva gear 30 in a well-known manner so as to give an intermittent rotative movement to the shaft 29. The shaft 29 carries the spiral gears 33 and 34 meshing with the gears 35 and 36, respectively, rigid with the hollow shafts 37 and 38 mounted in the bearings 39 and 40 supported on the frame 1. The turrets 27 mounted on the shafts 37 and 38, respectively, are identical in construction but are adapted to rotate in opposite directions, the directions of rotation being indicated by the arrows in Fig. 3. It will be noted that since the shaft 29 is given an intermittent rotation, this intermittent rotation will impart an intermittent rotation to the turrets 27, the turrets being adapted to rotate an angular distance equal to the angular distance between adjacent arms on said turrets. In the present instance, since there are four arms provided, the turret is rotated one-fourth of a revolution at a time. The disc 31 is driven by means of a chain 31' trained over a sprocket 29' on the shaft supporting disc 31 and a sprocket 17' on the shaft 17.

Labels, which are to be applied to the suction gripping devices 25, are placed in the hoppers 28 rigidly supported on the brackets 41 mounted on the frame 1. Each of the hoppers 28 is open at one side as will be readily seen by an inspection of Fig. 3, and a suitable carrier 42 is adapted to slide exteriorly thereof and to extend substantially all the way around said hopper, as will be best seen from an inspection of Fig. 14. Referring now to Fig. 14, it will be seen that the carrier 42 has a plurality of fingers 43 mounted thereon and these fingers extend through the slots 44 in the hopper 28. The fingers 43 form a three-point support for the stack of labels 45, each finger engaging the under-side of the lowermost label adjacent the edge thereof. The carrier 42 is fastened to the lower end of a rod 46, as best illustrated in Figs. 7 and 8, and this rod is adapted to be reciprocated in a bearing 47 in the bracket 41.

Referring now to Figs. 1, 2, 3 and 21, it will be seen that the carriers 42 are connected by means of the links 48 to the arms 49 rigidly mounted on the shaft 50 which is rotatably supported in the brackets 41. The links 48 have pivotal connection with the arms 49 at 51 and pivotal connection with the carriers 42 at 52. To the rear end of the shaft 50 (see Figs. 2 and 21), is secured an arm 53 pivotally connected to a link 54 which extends downwardly to a position adjacent the cam 55 and is connected to the arm 56 pivoted to the shaft 57 by means of a loose connection at 56'. The arm 56 is rocked about the shaft 57 by means of a roller thereon engaging a suitable cam groove in the cam 55. As the cam 55 rotates, a substantially vertical movement is imparted to the link 54 and this, in turn, rocks the shaft 50 to thereby move the links 48 in a substantially vertical direction. The vertical movement of the links 48 causes the carriers 42 to move in a similar manner and as the carriers 42 move upwardly, they carry therewith the stacks of labels 45. When the carriers 42 again move to their lowermost position, the stacks 45 are carried therewith into a position wherein the suction gripping devices 25 may remove a label from the bottom of each stack.

As the carriers 42 reach the lowermost extent of their travel, the lowermost label comes into contact with projections 58 secured to the blocks 59 which, in turn, are secured to the hoppers 28. As is best illustrated in Fig. 7, each of the blocks 59 is provided with a bore 60 extending substantially vertically therethrough and this bore communicates with a conduit 61 in the projection 58, said conduit terminating at 62 in a position where it will be entirely covered by the lowermost label of the stack when said stack of labels has been lowered into the position shown in Fig. 8. The bore 60 communicates with a suitable conduit 63 at its upper end and this conduit may be connected to any suitable suction producing device, such as an ordinary vacuum pump. The suction caused by the suction producing device tends to draw the edge of the lowermost label adjacent the projection downwardly toward said projection with a fluttering action to thereby separate the edge of said lowermost label from the stack and permit air to enter between said label and the next adjacent label so that as the suction gripping member 25 which transfers the labels from the hopper to the article, will withdraw only a single label from the stack. This fluttering action also tends to separate the edges which a great many times adhere together due to the fact that, in cutting the labels, small overhanging portions formed during the cutting action overlap and interlock, tending to make the labels move together rather than to separate the same. Note that the open end of the conduit 62

is not surrounded by a leather washer or the like which would tend to cause a gripping action, as it is preferred that the action of the suction produce a fluttering action rather than merely to draw the label against the projection 60. While this means does not absolutely insure that only one label will be withdrawn, it is quite effective and it is only occasionally that more than one label is withdrawn by the suction transferring device, which will be later described. In order to insure that there will be but a single label on said suction transferring device as it passes the gluing apparatus, I provide an additional means which will later be described.

I will now proceed to describe the suction operated transferring device, which is best illustrated in Figs. 6, 7, 8 and 9. This device comprises a turret 27 and this turret has a plurality of arms 26 each adapted to carry one of the suction holders 25, the details of which are clearly shown in Figs. 7, 8 and 9. These suction holders are adapted to engage and withdraw a label from the bottom of the stack of labels 45 within the hopper and transfer it past the gluing roller 67 into engagement with the end of a can located at the position A^2.

Each of the suction holders 25 comprises a cylinder 68 having at one end a cup-shaped piston 69 adapted to slide therein, said piston being connected to a piston rod 70 by means of a screw 71, said piston rod being slidably mounted in one end of the cylinder 68 and having an enlarged head 72 surrounded by a piece of flexible material 73. The piston rod 70 has a longitudinal bore 74 communicating with an exterior surface of said enlarged head and with the interior of said cylinder between the piston and the closed end of said cylinder. An opening 75 forms a communicating means between the bore 74 and the interior of the cylinder. Spaced from the opening 75 is a second opening 76 normally forming a second communicating means between the bore 74 and the interior of the cylinder.

An arm 77 is pivotally connected at 78 to the arm 65 and a link 79 is pivoted to said arm 77 and to said piston 69 at 80 and 81, respectively. A lever 82 pivoted at 83 is adapted to actuate said arm 77 in a manner later to be described and this lever 82 is pivoted at 84 to a link 85 which, in turn, is pivotally connected to a rocker arm 86 rotatably mounted upon the shaft 50 (see Figs. 1 and 21). This rocker arm 86 is rocked about the shaft 50 by means of a link 87 pivotally connected thereto and operatively connected to the arm 88 pivotally mounted on the shaft 57 at 51'. The arm 88 carries a suitable roller 89 adapted to engage a suitable cam groove in the cam 90 mounted on the shaft 18. As the cam 90 rotates, the connecting link 87 rocks the rocker arm 86 in such a manner that the free end of the lever 82 will be moved upwardly (see Fig. 7) as one of the suction holders 25 arrives in a position just below the stack of labels 45 in the hopper 28. This free end of the lever 82 carries a wear plate 91 which engages a roller 92 on the end of the arm 77 and moves the arm 77 and the piston 69 into the position shown in Fig. 8.

When the piston has been moved to the position shown in Fig. 8, the enlarged head 72 is in engagement with the lowermost label in the stack 45 which stack was lowered into the position shown in Fig. 8 simultaneously with the movement of the enlarged head 72 in a vertical direction, the cam 55 moving the carrier 42 downwardly for this purpose. It will be noted that with the parts in the position shown in Fig. 8, the openings 93 and 94 in the piston and cylinder, respectively, are in registration, the spring 95 which normally urges the piston 69 toward the position of the piston shown in Fig. 7, being compressed when the piston is moved into the position shown in Fig. 8. The opening 94 communicates with a suitable conduit 96 in the arm 26 and this conduit, in turn, communicates with the interior of the hollow shaft 37. A pipe 97 is fixed in the bearings 98 and 99 and communicates with the interior of the hollow bearing 37. This pipe 97 leads to a suitable suction producing device which may be the same or a different suction producing device than that which produces the suction in the conduit 63. As soon as the head 72 engages the lowermost label in the stack, this label will seal the end of the bore 74 which communicates with the outer surface of the head upon which the label rests. Therefore, a partial vacuum is created within the cylinder 68 and this partial vacuum tends to draw the label firmly against the head 72. It will be noted, however, that this partial vacuum also tends to draw the piston upwardly in the cylinder and, to prevent this, I provide a second spring 100 which surrounds the piston rod 70 but is inoperative while in the position shown in Fig. 7 due to the fact that the spring, when fully extended, has an overall length which is less than the distance between the opposed abutments 101 and 102 on the cylinder and piston, respectively. When the parts are in the position shown in Fig. 8, the spring comes into engagement with both of the abutments 101 and 102 and any further movement of the piston in a vertical direction is resisted by the spring with a force sufficient to overcome any further movement of the piston in a vertical direction under the influence of the partial vacuum within the cylinder. The spring, however, permits movement of the piston in a vertical direction or in a direction towards the closed end of the cylinder when a force is applied thereto greater than the force exerted by the partial vacuum for a purpose which will later be described.

Referring now particularly to Fig. 6, it will be seen that the suction holder 25 at the upper left is shown carrying a label which has been removed from the hopper in the manner just described, the carrier 42 being moved vertically upwards in time to permit the suction holder 25 to rotate about the shaft 37 into the position shown without having this movement obstructed by the carrier 42 which, as shown in Fig. 8, occupies a position surrounding the suction holder 25 while the label is being removed from the stack of labels in the hopper. In the position of the suction holder shown at the upper left in Fig. 6, the label has an edge thereof engaged by means of a suitable flexing device 103 which engages under one edge of the label and flexes the label in the manner best illustrated in Fig. 12. By doing this, any labels which adhere to the label which is in direct contact with the suction holder 25, will be disengaged from the last-mentioned label and only a single label will remain on the suction holder.

This remaining label is carried by means of the suction holder into the position shown at the lower left in Fig. 6, where it is first presented to the gluing roller 67 which rotates in the glue trough 104, a scraper 105 extending into close proximity with the peripheral surface of the

gluing roller. The scraper 105 is provided with a pair of extensions 106 adapted to lie adjacent the flat surfaces on the gluing roller 67 to scrape the glue from the sides thereof. The scraper 105 is mounted on a rockable shaft 107 provided exteriorly with an arm 108 having an adjusting screw 109 for adjusting the angular position of the scraper 105 to thereby move the edge 110 of the scraper 105 toward and from the periphery of the gluing roller 67 to predetermine the thickness of the layer of glue on the periphery of said roller. Guides 111 each have a curvature on the outer surface thereof substantially equal to the radius at which the label moves about the shaft 37. These guides are adapted to engage the label on the side away from the gluing roller and to press the label towards the peripheral surface of the gluing roller, the label picking up glue from the surface of said gluing roller as it rotates thereby. In order that the best results be obtained, it is necessary that the label and the peripheral surface of the gluing roller be travelling at substantially the same linear speed while the label is in contact with the glue on the surface of said roller. It will be noted that according to the previous description of the means for rotating the turret 27, an intermittent movement is given thereto by means of the Geneva movement 30, 31 and 32. During the time that the turret is moving, its speed is not constant but varies a considerable amount due to the movement imparted thereby by the said Geneva movement. Therefore, it is necessary that the gluing roller be rotated at a varying speed corresponding to the varying speed of the turret and, for this purpose, I provide means for connecting the gluing roller to the same Geneva movement which drives the turret. This means is best illustrated in Figs. 5 and 19. It comprises a shaft 112 which drives the gluing roller 67 mounted on the shaft 113 by means of the bevel gears 114 and 115 rigid with the shafts 113 and 112, respectively. The shaft 112 also has a ratchet 116 rigid therewith and sleeves 117 and 118 on opposite sides of the ratchet 116, these sleeves being freely rotatable on the shaft 112. The sleeve 117 is driven continuously by means of a chain 119 driven from a sprocket 120 on the shaft 17 and trained over the sprocket 121 (see Figs. 3 and 11) rigid with the sleeve 117. The sprocket 121 has a pawl 122 pivoted thereto at 123 and this pawl is urged into contact with the ratchet 116 by means of the spring 124 interposed between the pawl 122 and an abutment 125 on the sprocket 121. The sleeve 118 carries a disc 126 and this disc 126 carries a pawl 127 pivoted thereto at 128 and is yieldingly forced into engagement with the ratchet 116 by means of a spring 129 interposed between the pawl 127 and the abutment 130, as best illustrated in Fig. 10. The sleeve 118 also carries a gear 131 meshing with the gear 132 on the shaft 29, which is the shaft upon which the Geneva gear 30 is rigidly mounted. Therefore, it will be seen that the sleeve 118 is given an intermittent movement corresponding to the movement given to the turret and the sleeve 117 is continuously rotated under the influence of the chain 119.

Assuming for the present that the sleeve 117 and its operative connections to the ratchet 116 are inoperative, it will be seen that the shaft 112 as well as the shaft 29 will be given corresponding intermittent movements which movements are transmitted to the gluing roller 67 and the turret 27 by means of the operative connections previously described, the gearing being such that the peripheral speed imparted to the gluing roller 67 is substantially equal to the linear speed of the label. However, if the gluing roller were only provided with the driving connection from the Geneva gear 30 through the shaft 112, the gluing roller would remain at rest at intervals corresponding to the periods of rest for the turret 26. This would be very unsatisfactory since the glue would have a tendency to become hard on the exposed surface thereof and there would also be a tendency for an excess amount of the glue to accumulate on the gluing roller. To avoid this difficulty, I provide means for driving the turret during the time that the labels are out of contact with the gluing roller 67, and this means comprises the sleeve 117 and associated mechanism previously described.

Whenever the speed of rotation of the disc 126 is less than the speed of rotation of the sprocket 121, the spring 124 will drive the shaft 112 through the pawl 122 and ratchet 116 and the pawl 127 on the disc 126 will ride over the teeth on the ratchet 116 as the sprocket 121 and pawl 122 carry the ratchet away from the pawl 127. On the other hand, as soon as the disc 126 begins to rotate faster than the sprocket 121, the pawl 127 will carry the ratchet 116 away from the pawl 122 and cause the latter to ride over the teeth on the ratchet. By this arrangement, therefore, it will be seen that the gluing roller is continuously rotated at a varying speed, the Geneva gear driving the gluing roller during the time that the label is in contact therewith and the chain 119 driving the gluing roller at all times when the speed of rotation of the disc 126 is less than the speed of rotation of the sprocket 121.

As the labels move past the gluing roller 67, there is a tendency for the labels to adhere to the surface of the gluing roller. In order to prevent this, I provide a plurality of grooves 133 in the periphery of the gluing roller and I also provide the fingers 134 mounted on the bracket 135 fastened to the glue trough 104, as best illustrated in Figs. 5 and 6. These fingers 134 strip the label from the glue roller so that the label will remain on the suction holder 25.

The label is next moved to the position shown at the lower right in Fig. 6, and, from there, it is moved into a position adjacent the end of the can located at A^2, the plate 136 being retracted into the position shown in Fig. 6 to permit the edge of the label to pass between said plate 136 and the end of the can. It is now necessary to move the label into engagement with the end of the can and in order to do this, I provide a lever 137 pivoted at 138 to the bracket 41, the free end of this lever carrying a plate 139 which is adapted to engage the roller 92 on the arm 77 in the manner illustrated in Fig. 9. This lever 137 is pivoted at 140 to a link 141 (see Figs. 1 and 3). The link 141 is also pivotally connected to an arm 142 carrying a roller 143 engaging in a suitable cam groove in the cam 144 (see Figs. 1, 2, 3 and 21). The arm 142 is pivotally mounted on the shaft 57. The connections just described are for the turret shown at the left in Fig. 3 and while similar connections could be provided for the turret at the right, by the use of a separate cam and arm corresponding to cam 144 and arm 142, I prefer to use the cam 144 and the arm 142 for both turrets, it being necessary, however, to change the type of lever used for operating the roller 92 in order

to move the lever in the proper direction as it will be noted that the turrets 27 rotate in opposite directions. For this purpose, I provide a lever 145 pivoted at 146 to the bracket 41 and this lever carries a plate 147 thereon adapted to engage the rollers 92 on the arm 77 carried by the turret 27, shown at the right in Fig. 3. A link 148 is pivotally connected at 149 to the lever 145 and at 150 to the arm 142. As the arm 142 moves to the left, as seen in Fig. 3, the plates 139 and 147 move in a direction toward the can at the position A^2 and this movement causes these plates to engage the adjacent rollers 92 on the arms 77 to move the piston rod 70 and, as a result, the head 72 and label 45, toward the adjacent end of the can in the manner best illustrated in Fig. 9.

By referring to Fig. 9, it will be noted that the plate 139 engages the roller 92 on the arm 77 and moves it in a clockwise direction about its pivot to thereby move the piston 69 to the right an amount sufficient to bring the opening 76 outside of the cylinder 68 so that a communication is provided between the bore 74 and the atmosphere. Simultaneously the openings 93 and 94 are moved out of registration so that there is no communication between the suction producing means and the interior of the cylinder and air can rush into the cylinder through the opening 76, bore 74 and opening 75. Since the label 45 is in engagement with the end of the can, the glue on said label tends to hold it against the end of the can and as soon as the suction in the bore 74 has been relieved, the head 72 can be retracted without drawing the label 45 along therewith since the glue has a greater tendency to hold the label against the can than the head has to withdraw the label therefrom. At this time the plate 139 is withdrawn, permitting the piston 69 to be moved to the left under the influence of the spring 95 and also the spring 100 to position the parts in the position illustrated in Fig. 7, and thereafter the cycle of operation for the suction holder may be repeated.

The plate 136 carries a pressing member 151 at one end thereof adjacent the end of the can located at the position A^2 and adjacent one end thereof so as not to interfere with the operation of the suction holder 25. The plate 136 has a plurality of pins 152 rigid therewith and these pins extend through the upper end of the arm 153 which is pivoted at 154 to the frame 1. The lower end of the arm 153 is pivoted to a link 155 which, in turn, is pivotally connected to one arm of a bell crank lever 156 pivoted at 157 to a bracket 158 on the frame 1, the other end of the bell crank lever having a roller 159 at the end thereof and this roller is adapted to engage a groove 160 in the cam 161 rigid with the shaft 13 and adapted to rotate therewith. The mechanism just described has reference to the manner in which the plate 136, located at the left of Fig. 3, is mounted. The other plate 136 shown at the right is supported upon the upper end of an arm 162 pivoted at 163 to the bracket 2. This arm 162 has an extension 164 rigid therewith and this extension 164 is pivoted at 165 to a link 166 which is pivoted to the same arm of the bell crank lever 156 as that on which the roller 159 is rotatably mounted. As the cam 161 rotates, both of the plates 136 are moved away from the can to permit the label to move into the position adjacent the end of the can. Each of the plates is provided with a longitudinal slot 167 (see Figs. 3 and 6) through which the stationary plates 168, rigidly supported on brackets 169, are adapted to extend. The arms 153 and 162 are also provided with slots 170 and 171, respectively, to permit the plates 168 to extend therethrough. Springs 172, (see Fig. 9), are adapted to surround the pins 152 between the plates 136 and their supporting arms 153 and 162, respectively, so that these plates can yieldingly engage the labels on the ends of the can and press them firmly thereagainst.

It will be noted from an inspection of Fig. 9 that the forward edge of the plate 168 which first engages the label on the can as it is carried from the position A^2 to the position A^3 (Fig. 1), is beveled as at 173. The plates 168 are for the purpose of holding the labels against the opposite ends of the can, during its movement from the position A^2 to the position A^3 to thereby prevent the labels from being withdrawn from the can when the plates 136 are moved into the position shown in Fig. 6. The brackets 169 permit the plates 168 to yield laterally a small amount. The beveled edges 173 of the plates 168 are adapted to engage the outer surface of the label and the edge of the can to deflect the plates 168 and prevent the forward edge thereof from abutting against the edge of the label as it is obvious that if the plate engages the edge of the label first, the label will be torn off of the can.

The cans are next moved from the position A^3 to a position adjacent the transfer device 174 which is adapted to lift the cans out of the pockets 6 to a position where they can be moved onto the support 175. The means for transferring the cans from the pockets 6 to the support 175 is best illustrated in Figs. 1, 2, 15 to 18, inclusive, and 21. The position of the can adjacent the transfer device 174 is designated as A^4. Fig. 15 shows the position of the parts just prior to the time when the pocket 6 reaches a position directly in alignment with the transfer device 174. Fig. 16 illustrates the position of the parts at the time the pocket 6 arrives at a position directly in alignment with the transfer device. Fig. 17 illustrated the parts in substantially the same position as shown in Fig. 16 but this view shows a cross section substantially through the center of Fig. 16 on a horizontal line. Fig. 18 shows the position of the parts just after the can has been transferred to the support 175.

The retaining member 7 is provided with a recess 176 adjacent the rear edge thereof, as best illustrated in Figs. 15, 16 and 18, and this recess is adapted to be engaged by a plunger 177 slidable in the bracket 178 and operatively connected by means of a link 179 to an arm 180 rotatably mounted on the shaft 57 and having a roller engaging a suitable groove in the cam 181. Rotation of this cam 181 causes the arm 180 to oscillate and impart a reciprocating movement to the link 179 and this movement is, in turn, imparted to the plunger 177. The plunger 177 is so actuated as to extend into the recess 176 when the pocket 6 arrives at the position shown in Fig. 15, and since this plunger is fixed against movement in the direction of the chain movement, the same tends to retract the retaining member 7 into the position shown in Fig. 16 so that the can can be readily lifted out of the pocket without the necessity of overcoming the resistance which the retaining member normally would offer to the removal of the can, while the retaining member is in the position shown in Fig. 15. Before the can is moved into the position shown at A^4, the transfer device 174 is

brought to its lowermost position, as illustrated in Fig. 17. This transfer device is a substantially inverted U-shaped member having lugs 182 at the opposite ends of said U-shaped member, each of these lugs having a beveled surface 183 sloping downwardly in a direction towards the approaching can and the lugs 182 are adapted to lie alongside of the chain in a position to engage the portions of the can extending outwardly from the sides of said chain, in the manner illustrated by dotted lines in Figs. 15 and 16.

A plate 184 having a plurality of pins 185 rigid therewith, is positioned between the sides of the U-shaped member, as best illustrated in Figs. 17 and 18, and this plate is adapted to engage the upper surface of the can when it arrives at the position A^4. The pins on this plate are surrounded by the springs 186 and are interposed between the upper portion of the U-shaped member and the plate 184 to press the plate yieldingly against the top of the can so as to retain the can in position on top of the lugs 182.

The transfer device 174 is mounted on the upper ends of the rods 187 and the rods 187 are connected at their lower ends by means of a cross bar 188 having pivotal connection at 189 with an arm 190 pivoted on the shaft 57. This arm 190 has a roller thereon (not shown) adapted to engage in a suitable cam groove in the cam 191, said cam being so designed as to move the transfer device vertically upward just after the pocket 6 arrives at the position A^4 and the can is properly positioned within the transfer device.

When the transfer device moves into the position shown in Fig. 18, the upper surfaces of the lugs 182 are substantially flush with the support 175 and the can is in a position ready to be moved out of the transfer device onto said support. In order to move the cans out of said transfer device onto said support, I provide a bell crank lever 192 pivoted at 193 to a bracket 194 suitably mounted on the frame 1. One end of the bell crank is pivotally connected at 195 to a link 196 and this link is connected at its lower end to an arm 197 pivoted on the shaft 57, said arm having a suitable roller 198 engaging a cam groove 199 in the cam 200. Since the reciprocating motion of the lever 197 does not impart a straight-line movement to the outer end thereof, it is necessary to provide a yielding free connection which consists of a bearing 201 at the outer end of the lever 197 having an opening substantially larger than the link 196 which extends therethrough, a spring 202 abutting against the spring 201 and the collar 203 on the link 196. This type of connection is also used on other of the levers in which substantially the same condition exists as between the arm 197 and the link 196 as will be seen in Fig. 21. The other end of the bell crank lever 192 has a projection 204 thereon. This projection has a face which has a considerable area so as to more effectively engage a can located in the transfer device, and when the transfer device is in the position shown in Fig. 18, the bell crank lever 192 is rocked in a counter-clockwise direction (see Fig. 1) so that the projection 204 will move into engagement with the can in the transfer device and push the can out of said transfer device onto the support 175, the bell crank lever thereafter being rocked in a clockwise direction to move the projection 204 out of the transfer device so that the transfer device may then descend into the position shown in Fig. 17 to receive the next can which is moved to the position A^4.

Referring now more particularly to Figs. 1, 2 and 4, it will be seen that the support 175 comprises two longitudinal strips upon which the cans are placed by the transferring means just described. Adjacent the opposite sides of the support 175 are a pair of belts 205, each having a run thereof adjacent one of the ends of the cans supported on the support 175. The belts 205 are rotatably supported by means of the pulleys 206 rotatably mounted on the bracket 207, which, in turn, is supported on the bracket 208 rigid with the frame 1. The other ends of the belts 205 (not shown) are supported by pulleys similar to the pulleys 206. The belts 205 serve to guide the cans in their movement along the support 175 and also serve as a means to press the labels on the opposite ends of the cans against the cans and thereby tend to hold the labels thereon while the glue is drying. The cams are moved along the support 175 to a position where they can be removed by hand or into a suitable receptacle or packing machine.

I will now proceed to describe the operation of the device as briefly as possible.

The cans are placed in the pocket 6 on the conveyer 4 and held in place therein by the retaining members 7. These cans are moved successively to the positions A, A^2, A^3 and A^4. As the cans arrive at the position A^2, labels are applied to the opposite ends of the same by means of the suction holders 25, the labels previously having passed the rollers 67 and received a coating of glue thereon. Simultaneously with this application of the labels to the ends of the cans, others of the suction holders 25 are receiving labels from the hoppers 28 from which position they, in turn, are moved past the gluing rollers to a position adjacent the ends of the can, arriving at the position A^2 simultaneously with the movement of the suction holders to the position shown in Fig. 9. The plates 136 prevent the suction holders from withdrawing the labels therewith as they are returned to the position shown in Fig. 7 and assist in pressing the labels against the ends of the can, the plates 167 holding the labels against the can as it moves from the position A^2 to the position A^3. The can next moves from the position A^3 to the position A^4 where it is picked up by the transfer device and moved out of the pocket 6 and pushed onto the conveyer 175 by the extension 204 on the end of the bell crank lever 192, the cans then being conveyed away in the manner previously described.

It will be noted that in case a label is not picked up by the suction holder 25 when in the position shown in Fig. 8, the suction produced in the cylinder 68 becomes ineffective to hold the piston in its extended position and air rushes in through the bore 74, the spring 95 retracting the piston into the position shown in Fig. 7. Therefore, the surface of the suction holder will not contact with the glue on the gluing roller as the turret rotates past said gluing roller and thus get an undesirable coating of glue thereon which would stick to the printed side of the next label and not only injure the same but perhaps prevent the removal of the label from the suction holder to the can. The same effect occurs when no labels are present in the hoppers.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I wish therefore not to be

restricted to the precise construction herein disclosed.

Having thus fully disclosed an embodiment of my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. A suction transferring device for labeling machines comprising a means movable from a position adjacent a stack of labels to a position where the label is to be applied, said means comprising a suction cup, a cylinder having an opening communicating with the interior of said cup, a piston in said cylinder, means for creating a suction in said cylinder to move the piston in one direction, and means for limiting the amount of movement of said piston in the same direction.

2. A suction transferring device comprising a member having an opening therein leading into a cylinder at one end thereof, and communicating with an outer surface of said member at the other end thereof, a piston in said cylinder, means for urging the piston in one direction to increase the effective size of the space between the said end wall of said cylinder and said piston, means for moving said piston against the action of said last-mentioned means to decrease the volume of said cylinder, means for producing a suction within said space, and additional means for resisting the tendency of the suction to move said piston in a direction toward said end.

3. A suction transfer device comprising a cylinder, a movable piston in said cylinder, means for positively moving said piston in one direction, means communicating with a vacuum producing means and said cylinder to create a suction in said cylinder, and means for resisting the tendency of the piston to move under the influence of said suction, whereby reduction of the suction created therein is prevented.

4. A suction transfer device comprising a cylinder, a movable piston in said cylinder, means for positively moving said piston in one direction, means communicating with a vacuum producing means and said cylinder to create a suction in said cylinder, means for resisting the tendency of the piston to move under the influence of said suction, whereby reduction of the suction created therein is prevented and means for moving the piston in a direction opposite to that in which it is moved by said means which moves it positively in one direction.

5. A suction transfer device comprising a cylinder, a piston in said cylinder, means for positively moving said piston in one direction, means communicating with a vacuum producing means and said cylinder to create a suction in said cylinder, means for resisting the tendency of the piston to move because of said suction, and yielding means for moving the piston in a direction opposite to that in which it is moved by said first mentioned means.

6. A suction operated label transferring device comprising a cylinder, a member having a longitudinal bore therein slidably mounted in one end of said cylinder, a piston connected with said slidably mounted member, said opening communicating with said cylinder, yielding means for moving the piston in one direction, and positive means for moving said piston in the opposite direction.

7. A suction operated device for picking up labels or the like comprising a member slidably mounted in the end of a cylinder, said member having a longitudinal bore communicating with the interior of said cylinder and with an outer surface of said member, a piston operatively connected to said member, and slidable in said cylinder, an opening in said cylinder wall in registration with a conduit leading to a vacuum producing means, and means for uncovering said opening as said piston moves in said cylinder for causing a vacuum in said cylinder which draws a label tightly against said member when said label is moved adjacent the bore thereof.

8. A device as claimed in claim 7 in which means is provided to prevent substantial movement of said piston due to the difference in the air pressure on opposite sides thereof.

9. A suction device for picking up articles comprising a member having a longitudinal bore, a piston on one end thereof, an opening in said piston, a cylinder within which the piston is adapted to slide, said bore communicating with means for reducing the air pressure within said cylinder, and means for moving said piston relative to said cylinder to cause the openings in said piston and cylinder to come into registration, said longitudinal bore in said member opening into said cylinder.

10. A suction device as claimed in claim 9 in which means is provided for resisting movement of said piston due to the difference in pressure exerted on the opposite sides of said piston.

11. A suction device for picking up articles comprising a member having a longitudinal bore, a piston on one end thereof, an opening in said piston, a cylinder within which the piston is adapted to slide, an opening in said cylinder, means for moving said piston relative to said cylinder to cause the openings in said piston and cylinder to come into registration, said longitudinal bore in said member opening into said cylinder, means to normally prevent substantial movement of said piston due to the reduction of air pressure within said cylinder, an opening in said member communicating with said bore and also normally communicating with the interior of said cylinder, and means for moving said piston against the action of the means which prevents substantial movement of said piston due to the reduction in pressure within said cylinder, to thereby move said member so that the last-mentioned opening communicates with the atmosphere outside of the cylinder to thereby permit air to be drawn through said last-mentioned opening and bore into said cylinder.

12. A device as claimed in claim 11 in which the openings in said cylinder and piston which are adapted to register with each other are out of registration when said last-mentioned opening in said bore is in communication with the atmosphere.

13. A device as claimed in claim 11 in which a means is provided for moving said piston into a position where said last-mentioned opening in said bore again communicates with said cylinder.

14. A labeling machine comprising a turret for removing labels from a hopper and transferring them to the end of a package, said turret comprising a plurality of suction devices mounted thereon at spaced intervals about said turret, each of said suction devices including a cylinder, a piston operatively mounted in said cylinder, a piston rod operatively connected to said piston and having a bore communicating with the interior of said cylinder and the end of said piston rod opposite to that end which is connected to said piston, openings in said piston and said cylinder, said opening in said cylinder communicating with a suction producing means, and means for moving said piston to cause said openings to move into registration with each other.

15. A labeling machine comprising a turret for removing labels from a hopper and transferring them to the end of a package, said turret comprising a plurality of suction devices mounted thereon at spaced intervals about said turret, each of said suction devices including a cylinder, a piston operatively mounted in said cylinder, a piston rod operatively connected to said piston and having a bore communicating with the interior of said cylinder and the end of said piston rod opposite to that end which is connected to said piston, openings in said piston and said cylinder, said opening in said cylinder communicating with a suction producing means, means for moving said piston to cause said openings to move into registration with each other, an opening in said piston rod communicating with said bore and normally within said cylinder, and means for moving said piston to thereby move said piston rod and cause said last-mentioned opening to form a communication between the bore and the atmosphere outside of said cylinder to thereby release the suction created within said cylinder.

16. A device as claimed in claim 14 in which the piston is connected with a pivoted lever on said turret adapted to be moved by suitable cam operated means to thereby move said piston in the manner described.

17. A device as claimed in claim 15 in which the piston is connected with a pivoted lever on said turret adapted to be moved by suitable cam operated means to thereby move said piston in the manner described.

18. A transfer device for labeling machines comprising a member for withdrawing a label from a stack, and means for releasing any additional labels that tend to adhere thereto.

19. A transfer device for labeling machines comprising a member for withdrawing a label from a stack, and means for releasing any additional labels that tend to adhere thereto comprising means for flexing the labels on said member to overcome the adhesion therebetween.

20. A labeling machine comprising a glue applying means, an arm movable about a pivot, a member movable with respect to said arm and adapted to carry a label, suction means for moving said member with respect to said arm so that it extends in a position in close proximity to said glue applying device as said arm is moved about its pivot when a label is on said member, means for automatically rendering said suction means inoperative for the purposes set forth, and means retracting said member so that it passes said glue applying device at a substantial distance when no label is on said member.

21. A labeling machine comprising an arm movable past a glue applying device, suction operated means thereon normally moving in close proximity to said glue applying device to present a label thereto when a label is on said suction operated means, and means carried wholly by said arm for automatically rendering said suction operated means inoperative to move close to said glue applying device when a label is not on said member.

22. In a labeling machine, a gluing wheel, means for applying glue to said wheel, means for moving labels past said wheel and in contact with the glue thereon, a single means for moving said wheel so that the surface adjacent the label is travelling at substantially the same speed as said label while said label is in contact therewith and for periodically stopping said label moving means, and means for driving said wheel while said label moving means is stopped.

23. In a labeling machine, a gluing wheel, means for applying glue to said wheel, means for moving labels past said wheel and in contact with the glue thereon, a single means for moving said wheel so that the surface adjacent the label is travelling at substantially the same speed as said label while said label is in contact therewith and for periodically stopping said label moving means, and means for driving said wheel while said label moving means is stopped, said single means comprising a single intermittently movable shaft on which are provided means to drive said label moving means and means having operative driving connection with said wheel, said means for driving said wheel while the label moving means is stopped comprising means for disconnecting the drive to said wheel when the intermittent means is stopped and for establishing a drive between said wheel and a continuously moving driving element.

24. In a labeling machine, a gluing wheel, means for applying glue to said wheel, means for moving labels past said wheel and in contact with the glue thereon, a single means for moving said wheel so that the surface adjacent the label is travelling at substantially the same speed as said label while said label is in contact therewith and for periodically stopping said label moving means, and means for driving said wheel while said label moving means is stopped, said single means comprising a single intermittently movable shaft on which are provided means to drive said label moving means and means having operative driving connection with said wheel, said means for driving said wheel while the label moving means is stopped comprising means for disconnecting the drive to said wheel from said intermittently movable shaft when the intermittently movable shaft slows down to a predetermined speed and for establishing a drive between said wheel and a continuously moving driving element, said driving connection from said intermittently movable shaft and said continuously moving means to said wheel each including independent pawls rotatably carried by suitable sleeves on a glue roller driving shaft and adapted to rotate a ratchet rigid with said last-mentioned shaft, and also including means for driving said sleeves from said intermittently movable shaft and said continuously moving driving element.

25. A device as claimed in claim 24 in which the intermittently movable shaft tends to drive said shaft carrying the ratchet at a variable speed proportionate to the speed of said intermittently movable shaft and in which the continuously moving driving element tends to rotate said shaft carrying said ratchet at a speed less than the maximum speed at which said last-mentioned shaft is rotating while said label is in contact with the glue on said gluing wheel.

26. A device as claimed in claim 24 in which the intermittently movable shaft tends to drive said shaft carrying the ratchet at a variable speed proportionate to the speed of said intermittently movable shaft and in which the continuously moving driving element tends to rotate said shaft carrying said ratchet at a speed less than the minimum speed at which said last-mentioned shaft is rotating while said label is in contact with the glue on said gluing wheel.

27. A labeling machine comprising means for holding a stack of labels, a transfer device for

transferring labels from said stack to articles mounted on a support, a glue applying device for applying glue to said labels as they are moved from said stack to said articles, said transferring device comprising a label holding member adapted to extend into close proximity to said glue applying device if and when a label is carried thereby, and means for retracting said label holding member so that the same will pass said glue applying device at a substantial distance if and when a label is not being carried by said label holding member, said retracting means comprising means located solely on said transferring device.

28. A labeling machine comprising a transfer device, means for feeding labels to and from said transfer device when said transfer device is located at a predetermined position, means for moving said feeding means a substantial distance toward said transfer device, means for moving said transfer device toward said feeding means to bring said transfer device into contact with one of said labels, and means for thereafter moving said feeding means away from said transfer device, the movement of said feeding means and said transfer device toward each other being substantially in a rectilinear direction.

29. A labeling machine comprising a glue applying device, a label carrying member movable past said glue applying device, suction operated means for moving said label carrying member into close proximity to said glue applying device as said label carrying member moves past said glue applying device, and means for rendering said suction operated means inoperative to move said label carrying member into close proximity with said glue applying device as said member moves thereby except when said member is carrying a label.

30. In a labeling machine, the combination with a rotatable arm movable about a fixed axis, a cylinder mounted on said arm, a piston operating within said cylinder, suction operated label holding means carried by said piston and movable therewith, a glue applying member, means for moving said label holding means past said glue applying member, fluid operated means for moving said label holding means into close proximity with said glue applying member when a label is held by said label holding means, and means for normally holding said label holding means in a retracted position such that it will move past said glue applying member at a substantial distance when a label is not held by said label holding means.

31. A device as claimed in claim 30 in which said means for holding said label holding means in retracted position comprises a spring, and in which the fluid operating means for said piston is the same as the suction operating means for holding labels on said label holding means.

32. A label feeding device for labeling machines comprising a hopper for receiving thin paper labels and the like having a supporting means associated therewith for supporting said labels, a transfer device periodically engaging and gripping the end-most label of a stack supported within said hopper for withdrawing the label from said stack and transferring said label to another position, and means movable into proximity with a free edge of said label to be withdrawn for circulating a current of air over the edge of said label to flutter the edge thereof to separate the edge thereof from an adjacent label and to permit air to enter between the end-most label and the one next to it, whereby when said end-most label is moved away from the stack by said transfer means, other labels will not be carried along with the same.

33. A label feeding device for labeling machines comprising a hopper for receiving thin paper labels and the like having a supporting means associated therewith for supporting said labels, a transfer device periodically engaging and gripping the end-most label of a stack supported within said hopper for withdrawing the label from said stack and transferring said label to another position, and means movable into proximity with a free edge of said label to be withdrawn for circulating a current of air over the edge of said label to flutter the edge thereof to separate the edge thereof from an adjacent label and to permit air to enter between the end-most label and the one next to it, whereby when said end-most label is moved away from the stack by said transfer means, other labels will not be carried along with the same, said means for circulating a current of air over the edge of said label comprising a suction means positioned when operative adjacent the edge of said label for drawing the edge of said label toward said suction means and for creating a current of air over the edge of said label so that the edge of said label will be deflected away from and toward the remaining labels with a vibratory motion, and air will enter between said end-most label and the label adjacent thereto.

34. A label feeding device for labeling machines comprising a hopper for receiving thin paper labels and the like having a supporting means associated therewith for supporting said labels, a transfer device periodically engaging and gripping the end-most label of a stack supported within said hopper for withdrawing the label from said stack and transferring said label to another position, and means movable into proximity with a free edge of said label to be withdrawn for circulating a current of air over the edge of said label to flutter the edge thereof to separate the edge thereof from an adjacent label and to permit air to enter between the end-most label and the one next to it, whereby when said end-most label is moved away from the stack by said transfer means, other labels will not be carried along with the same comprising means, movable to and from the edge of the label which is to be removed having an opening therein lying in proximity to the edge of said label when adjacent said label, and means for reducing the air pressure in said opening so that air rushes past and flutters the edge of said label to cause the same to separate from the next adjacent label and permit the air to enter therebetween, whereby the end-most label does not carry with it the next adjacent label when the end-most label is moved.

35. A label feeding device for labeling machines comprising a hopper for receiving thin paper labels and the like having a supporting means associated therewith extending at all times into label-supporting position for supporting said labels, a transfer device periodically engaging and gripping the end-most label of a stack supported within said hopper for withdrawing the label from said stack and transferring said label to another position, and means movable into proximity with a free edge of said label to be withdrawn for circulating a current of air over the edge of said label to flutter the edge thereof to separate the edge thereof from an adjacent label

and to permit air to enter between the end-most label and the one next to it, whereby when said end-most label is moved away from the stack by said transfer means, other labels will not be carried along with the same.

36. A label feeding device for labeling machines comprising a hopper for receiving thin paper labels and the like having a supporting means associated therewith extending at all times into label-supporting position for supporting said labels, a transfer device periodically engaging and gripping the end-most label of a stack supported within said hopper for withdrawing the label from said stack and transferring said label to another position, and means movable into proximity with a free edge of said label to be withdrawn for circulating a current of air over the edge of said label to flutter the edge thereof to separate the edge thereof from an adjacent label and to permit air to enter between the end-most label and the one next to it, whereby when said end-most label is moved away from the stack by said transfer means, other labels will not be carried along with the same, said means for circulating a current of air over the edge of said label comprising a suction means positioned when operative adjacent the edge of said label for drawing the edge of said label toward said suction means and for creating a current of air over the edge of said label so that the edge of said label will be deflected away from and toward the remaining labels with a vibratory motion, and air will enter between said end-most label and the label adjacent thereto.

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