

Nov. 8, 1966

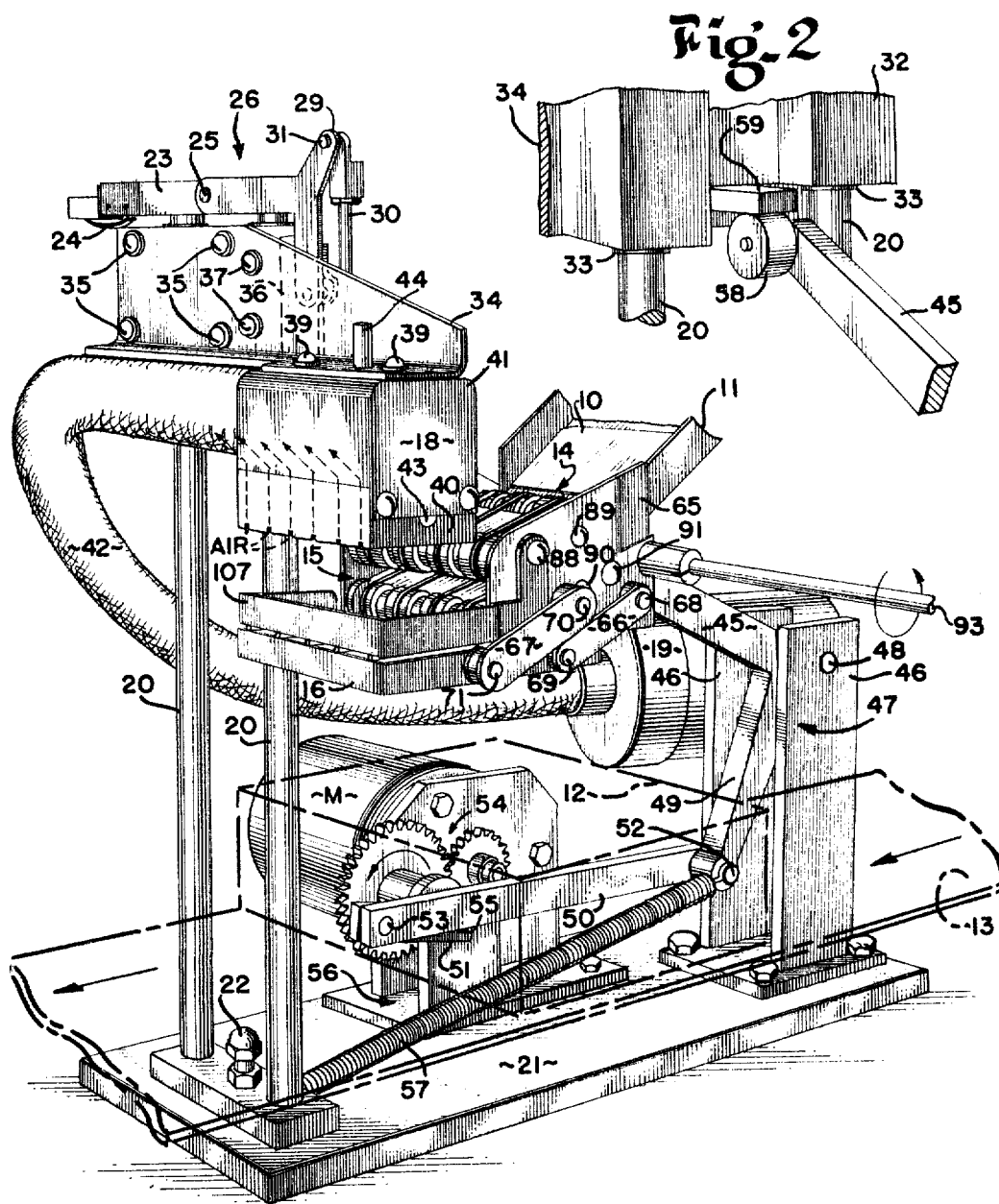
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3,284,265

LABEL APPLICATORS

Filed Aug. 3, 1962

6 Sheets-Sheet 1



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Fig. 4

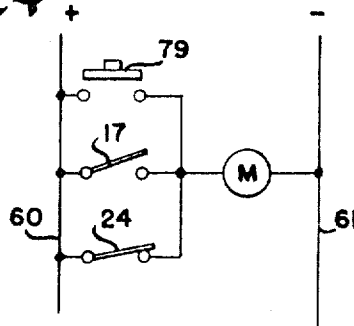
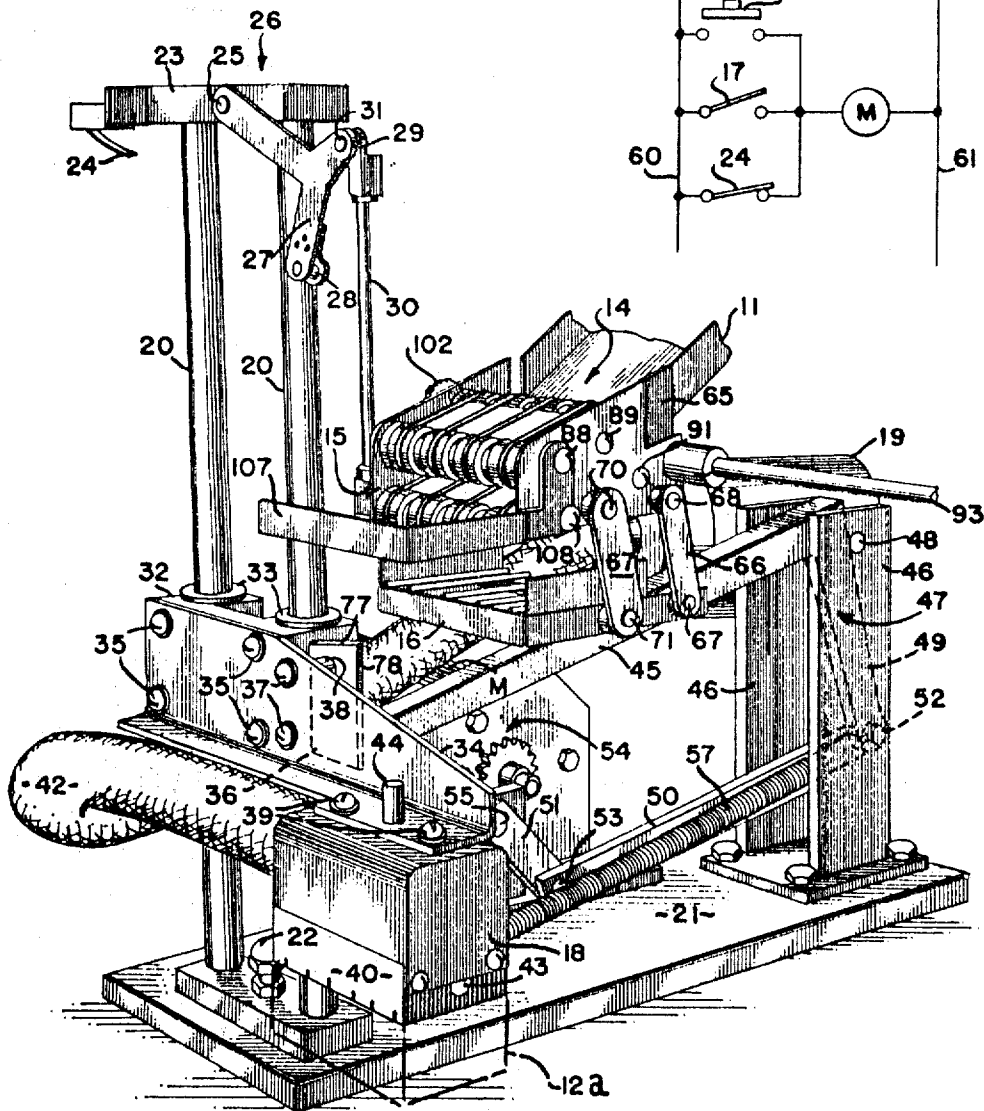


Fig. 3

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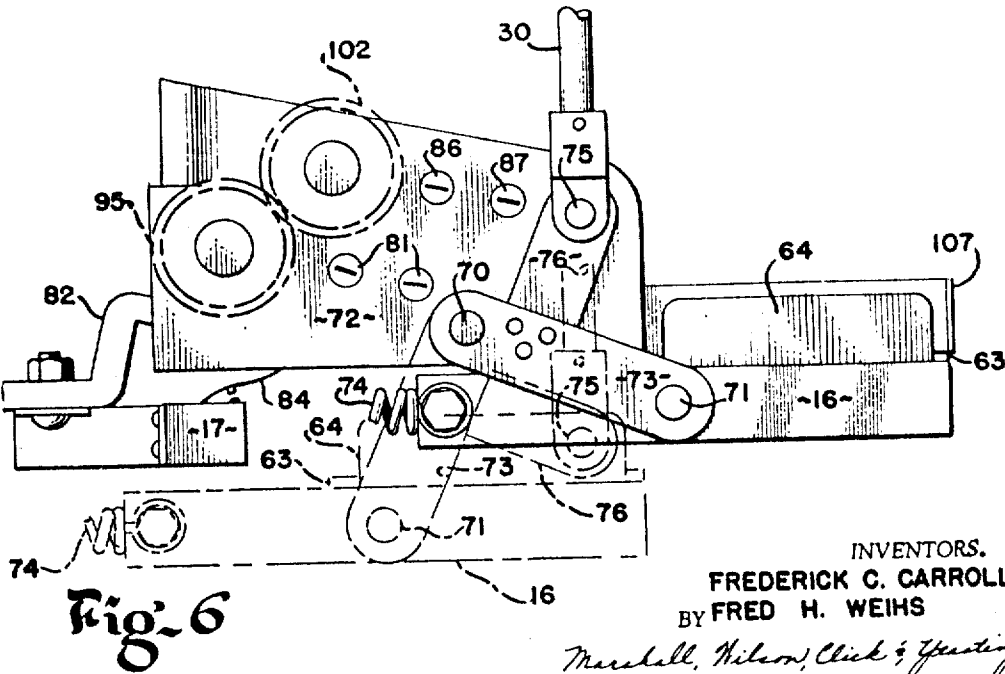
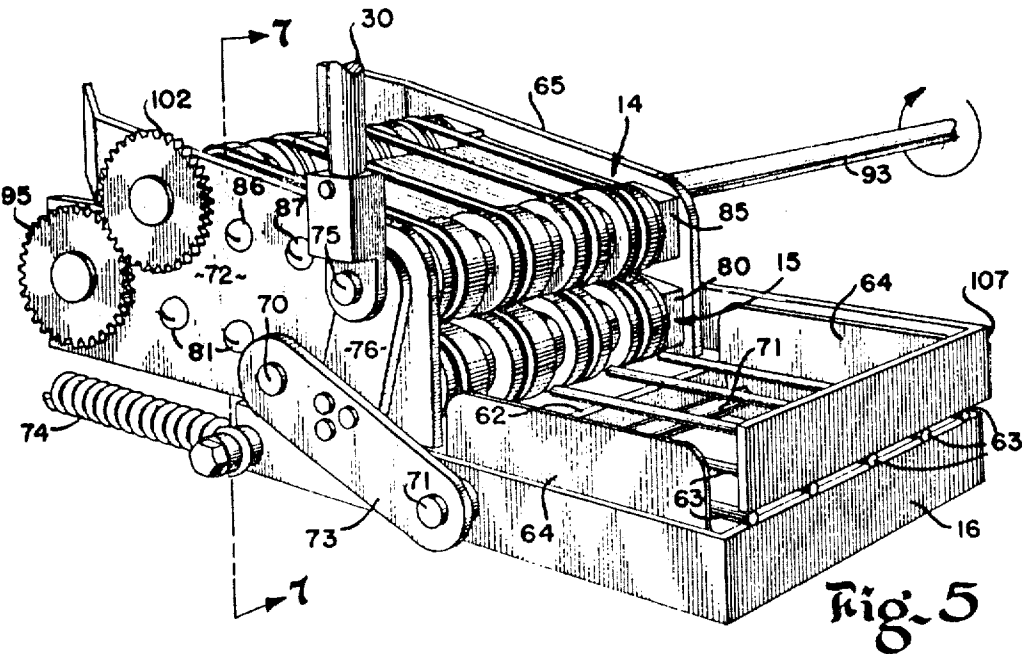
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6 Sheets-Sheet 3



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LABEL APPLICATORS

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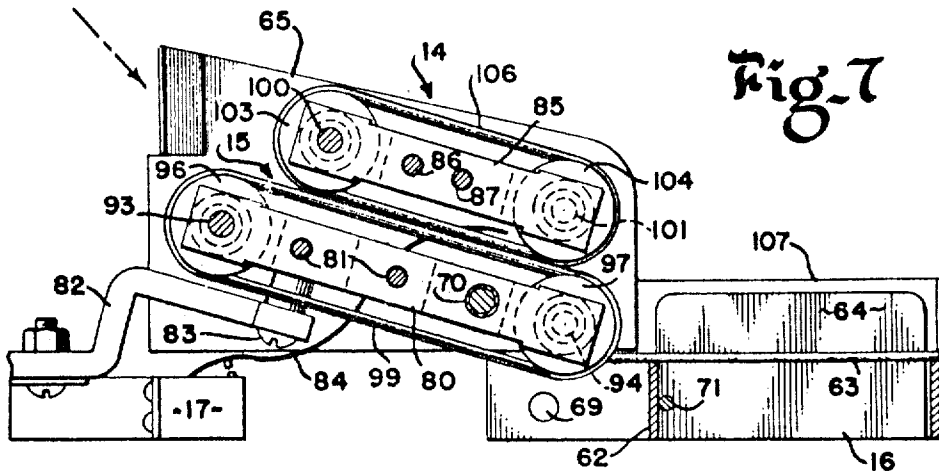


Fig. 7

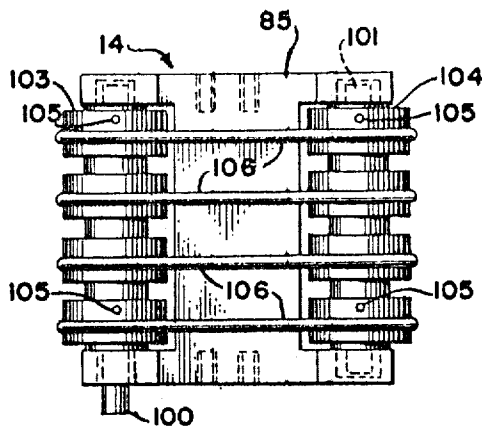


Fig. 8

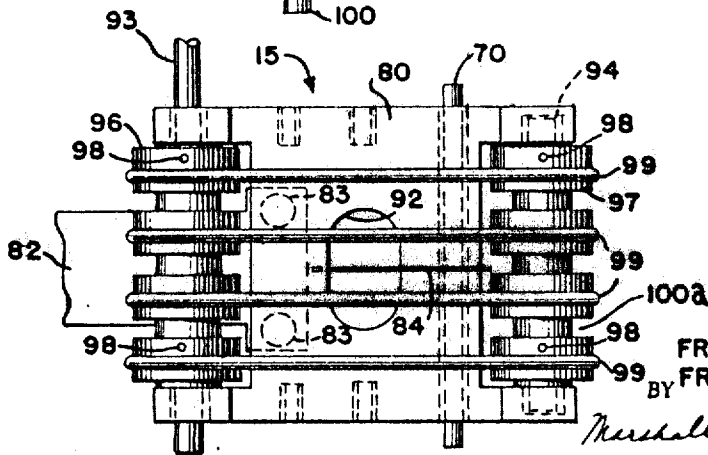


Fig. 9

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LABEL APPLICATORS

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Fig. 10

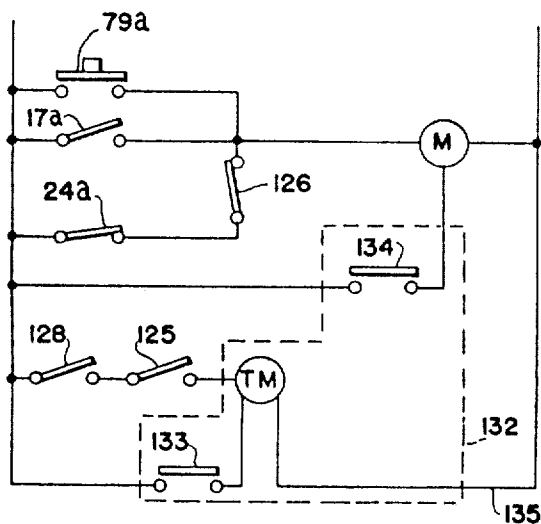
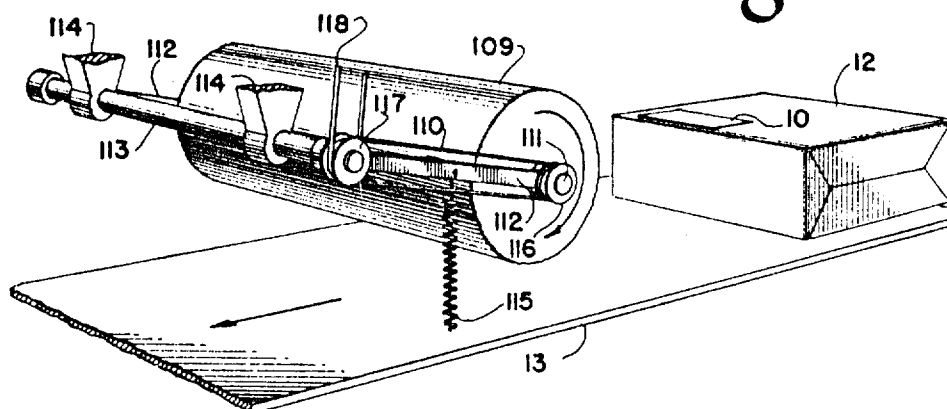


Fig. 11

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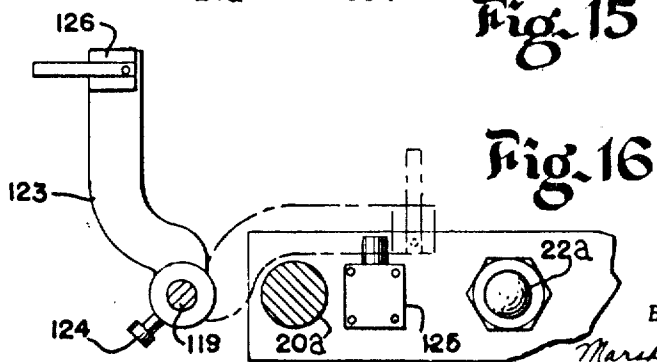
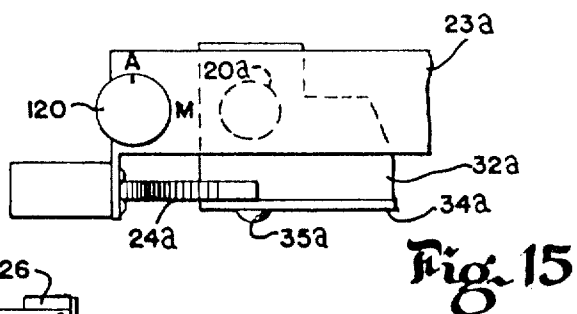
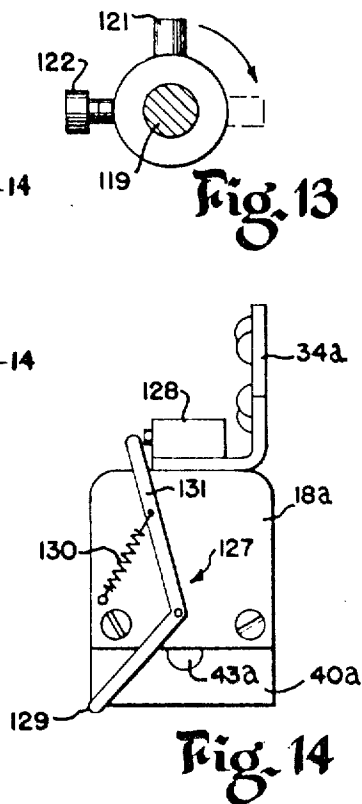
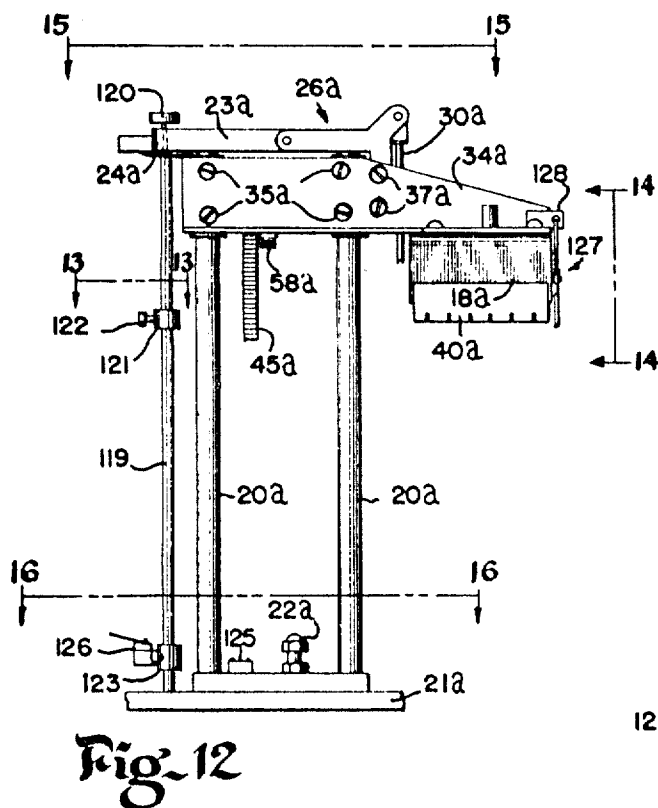
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LABEL APPLICATORS

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6 Sheets-Sheet 6



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LABEL APPLICATORS

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Filed Aug. 3, 1962, Ser. No. 214,563

9 Claims. (Cl. 156-350)

This invention relates to label applicators.

An object of this invention is to provide a label applicator which is simple in construction, economical to manufacture and more convenient for the operator to use than present applicators.

Another object is to improve and simplify the automatic operation of label applicators.

Still another object is to improve and simplify label handling techniques and mechanisms in label applicators.

A further objective is to provide a label applicator which will accommodate packages of random sizes without damaging such packages.

Another object is to increase the speed of operation and the precision of label applicators.

Still another object is to provide an interlock for preventing the operation of automatic label applicators unless labels are in position for use.

A further object is to provide a label applicator having a simple rectilinear operating motion.

Another object is to provide an automatic label applicator which is readily adaptable to manual operation.

One embodiment of this invention enabling the realization of these objects is a machine utilizing a grid-type heating element or activator associated with air-inducing means capable of retaining a label in position on the heating element during activation of a thermo-activatable adhesive coating on the label. The label is delivered to the machine from the gravity chute of a printer through which the label slides until it is picked up between continuously running conveyor belts in the machine. The belts deliver the label into a tray, the label tripping a limit switch as it passes between the belts to initiate an automatic labeling cycle. Alternatively, the label can be delivered by hand directly into the tray.

Upon initiation of the cycle, the label activator, which is slidably mounted on vertical rods, moves downwardly under the influence of gravity. When the label activator gets close to the label in the tray, it sucks the label up onto its heated lower surface, and then the tray automatically is moved downwardly and rearwardly out of the way of the activator, the activator moving downwardly continuously until it engages a package to be labeled, whereupon the heat-activated label adheres to the package. The activator rests on a lifting arm at the beginning of the cycle which continues down for a short interval after the activator comes to rest on the package and then returns, lifting the activator back to its home position.

In accordance with the above, one feature of this invention resides in the superior simplicity of the machine and in the ease with which it is operated.

Another feature resides in the simplicity of the automatic operation of the machine, the label tripping the limit switch as it passes between the belts to initiate the automatic cycle and the activator opening another limit switch when it returns to its home position to stop the machine. This requires only a very simple electrical circuit.

Still another feature resides in the ready adaptability of the automatic machine to manual operation.

A further feature resides in improved and simplified label handling mechanism. The conveyor belts are in two sets, one on top of the other, between which the labels are conveyed. The belts flatten the labels, prevent the labels from getting air-borne as in the case of gravity-fed labels, deliver the labels at high speed, impart a uniform

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delivery keeping the machine in time, are horizontally arranged to save space, and cooperate with a stop to square up the labels for precise application of the labels.

Another feature resides in the accommodation of packages of random sizes. The activator carrying the label moves downwardly under the influence of gravity until it engages the package to be labeled, the lifting arm continuing to move downwardly so that only the weight of the activator and its adjuncts rests upon the package. That is, the activator moves to random package heights. Hence, packages of all heights within the capacity of the machine are accommodated, and are never damaged because the activator is light.

Still another feature resides in the rectilinear activator motion on the vertical rods. This permits a simple overall design and imparts high speed and is in contrast to complicated prior motions having arcuate, horizontal, vertical and rectilinear components.

A further feature resides in the initiation of the automatic labeling cycle by the label passing between the belts. This is a safety interlock for preventing operation unless a label is in position for use and prevents the hot activator from descending to burn a package.

The above and other objects and features of this invention will be appreciated more fully from the following detailed description when read with reference to the accompanying drawings wherein:

FIG. 1 is a perspective view of a label applicator according to this invention with the parts in their home positions prior to the initiation of an operating cycle;

FIG. 2 is a fragmentary perspective view of the upper part of the label applicator shown in FIG. 1 as seen from the rear of the machine;

FIG. 3 is a perspective view of the label applicator shown in FIG. 1 with the parts in their down operating positions prior to their return to the home position;

FIG. 4 is an electrical wiring diagram showing manually and automatically operated control systems for the label applicator;

FIG. 5 is an enlarged, fragmentary perspective view of label conveying and handling mechanism shown in FIG. 1 as seen from a position to the left of the label applicator as viewed in Fig. 1;

FIG. 6 is a side elevational view of the mechanism shown in FIG. 5 illustrating two operating positions;

FIG. 7 is a vertical sectional view taken along the line 7-7 of FIG. 5;

FIG. 8 is a plan view of the upper set of conveyor belts and its support shown in FIG. 7;

FIG. 9 is a plan view of the lower set of conveyor belts and its support shown in FIG. 7;

FIG. 10 is a fragmentary, perspective view of a conveyor belt and its adjuncts showing a package which has been labeled by the label applicator shown in FIG. 1;

FIG. 11 is an electrical wiring diagram showing a modified control system for automatic and manual operation of the label applicator;

FIG. 12 is a fragmentary, front elevational view of the label applicator shown in FIG. 1 with added structure for adapting an automatically operated machine to a machine which can be operated either automatically or manually;

FIG. 13 is an enlarged, horizontal sectional view taken along the line 13-13 of FIG. 12;

FIG. 14 is an enlarged, end elevational view as seen from line 14-14 of FIG. 12;

FIG. 15 is a fragmentary plan view as seen from line 15-15 of FIG. 12; and

FIG. 16 is a fragmentary, horizontal sectional view taken along the line 16-16 of FIG. 12.

Referring to the drawings, in FIG. 1 a label applicator as contemplated in this invention is shown in its home

position prior to the initiation of an automatic operating cycle. Labels, one of which is identified by the numeral 10 in FIG. 1, are delivered to the label applicator from the stationary gravity chute 11 of a printer which is disclosed in U.S. applications Serial No. 791,728, filed February 6, 1959, now U.S. Patent No. 3,122,995, in the names of C. E. Adler and F. C. Carroll and Serial No. 11,707 filed February 29, 1960, now U.S. Patent No. 3,119,326, in the name of R. E. Bell. The printer is described in such applications in connection with an automatic computing weighing scale, the scale and the printer being constructed as a unit to weigh commodities and to issue printed tickets or labels each bearing the net weight, price per pound, and computed value of a weighed commodity together with such variable data as the date, store code, commodity name, and commodity grade. When the printer is used with the label applicator, the labels 10 are slid down the stationary chute 11 with their printed faces up so that thermo-activatable adhesive coatings on the backs of the labels can be introduced into contact with the packages to be labeled. The printer delivers the labels 10 selectively in a face-up or a face-down position to the stationary chute 11.

The automatic computing weighing scale is disclosed in U.S. application Serial No. 92,233, filed February 28, 1961, now U.S. Patent No. 3,163,247, in the names of R. E. Bell and D. B. Kendall. In automated operations, transfer mechanism, controlled by the scale, pushes packages, one of which is identified by the numeral 12 in FIG. 1, onto the scale to be weighed and then, after being weighed, off the scale onto a conveyor 13. While the computing scale computes the value of the package and then prints the label to be affixed thereto, the conveyor 13, which is intermittently operated, carries the package 12 to the position shown in FIG. 1 and then stops and waits for the label to be affixed. Accordingly, the label 10 shown in FIG. 1 is the one which goes with the package 12 shown in FIG. 1. The intermittently operated conveyor 13 is so timed that it waits long enough for the package to be labeled before restarting. Every package is labeled in the same corner spot as every other package as an aid in storing and displaying the packages for sale.

The label 10 slides down the chute 11 until it is picked up between an upper set 14 and a lower set 15 of continuously running conveyor belts. The belts deliver the label into a tray 16 while the tray is in its position shown in FIG. 1, the label closing a normally open limit switch 17 (FIGS. 4 and 7) as it passes between the belts to start a motor M (FIGS. 1 and 4) and initiate an automatic labeling cycle. The label applicator utilizes a grid-type heating element or activator 18 associated with air-inducing means 19 capable of retaining the label 10 on the hot activator during activation of the thermo-activatable adhesive coating on the back of the label. Upon initiation of the cycle, the activator 18, which is slidably mounted on two vertical rods 20 extending upwardly from a base plate 21, moves downwardly under the influence of gravity. When the label activator 18 gets close to the label 10 in the tray 16, it sucks the label up onto its heated lower surface, and then the tray 16 automatically is moved from its position shown in FIG. 1 downwardly and rearwardly to its position shown in FIG. 3 out of the way of the activator, the activator moving downwardly continuously until it engages the package 12, whereupon the heat-activated label adheres to the package. The package 12 is shown in FIG. 1 on the conveyor 13 in position ready to be labeled. A package 12a being labeled is shown in FIG. 3 located at the base plate 21 to illustrate how the activator 18 moves to random package heights. If the package is located below the base plate 21, the activator 18 can continue down until a stop 22 on the base plate is engaged. The activator 18 rests on a lifting arm 45 at the beginning of the cycle which continues down for a short interval after the activator comes

to rest on the package and then returns, lifting the activator from its down position shown in FIG. 3 back to its home position shown in FIG. 1.

The pair of vertical rods 20 supports a plate 23 atop the rods which carries a normally closed limit switch 24 and a pivot 25 for a bell crank 26. The lower arm 27 of the bell crank 26 has a bifurcated end carrying a roller 28 and the upper arm 29 of the bell crank is pivotally connected to the upper end of a vertical rod 30 at 31. An integrally formed block 32 provided with four bushings 33, an upper two of which can be seen in FIG. 3 and a lower two of which can be seen in FIG. 2, is slidably mounted on the vertical rods 20. An angle 34 is attached to the block 32 by means of four screws 35 for up and down movement as one with the block. The upper left hand corner of the angle 34 functions to hold the normally closed limit switch 24 open when the angle is in its home position. The angle 34 carries a cam 36, attached to the angle by means of two screws 37 and spaced from the back of the angle by means of spacers 38 one of which is shown in FIG. 3, and also carries the label activator 18 which is attached by means of two screws 39 to the angle.

The label activator 18 is of the type shown in U.S. Patent No. 2,775,677, issued on December 25, 1956 to H. O. Schuetze; it includes a slotted hot plate 40 communicating, as indicated by the arrows in FIG. 1, with a vacuum chamber 41 communicating in turn through a flexible hose 42 with the air-inducing means 19. The slotted hot plate 40 is formed in one piece and is provided with an electrical resistance heating cartridge 43 to supply the requisite heat for activating the labels. A thermostat 44 controls the temperature. The air-inducing means 19, which is fixed to one of a pair of spaced vertical plates 46 extending upwardly from the base plate 21, includes a vacuum-type fan, as shown in the above U.S. Patent No. 2,775,677, which draws air inwardly through the slotted hot plate 40. The heater and the fan are run continuously. When the label activator 18 gets close to the label 10 in the tray 16 during its down stroke, it sucks the label up onto its heated lower surface and softens the label's adhesive coating. When the label activator 18, which now carries the label on its lower surface, engages the package, the heat-activated label adheres to the package so tightly that it remains on the package even when the label activator backs off with the vacuum still on. Hence, the fan can be run continuously without need for on and off controls.

The lifting arm 45 is part of a bell crank 47 pivoted at 48 between the spaced vertical plates 46. A lower arm 49 of the bell crank 47 is connected through a long link 50 to a crank 51, the long link being pivoted at 52 to the lower bell crank arm 49 and at 53 to the crank 51. The motor M is connected through gearing 54 to the crank 51 at 55, the motor M and its adjuncts being supported by a pair of plates 56 extending upwardly from the base plate 21. The motor M turns the gearing 54 in the direction indicated by the curved arrow in FIG. 1 to rotate the crank 51 in a counterclockwise direction about the axis of its connection at 55 one revolution for each label applying cycle. During this counterclockwise revolution, the crank 51 passes through its position shown in FIG. 3. One end of a spring 57 also is pivotally connected to the lower bell crank arm 49 at 52, the other end of the spring 57 being connected to the base plate 21 to urge the bell crank 47 in a clockwise direction about the pivot 48. The upper end of the lifting bell crank arm 45 carries a roller 58 (FIG. 2) which is engageable with a block 59 carried by the slidable block 32.

In the home position of the label applicator shown in FIG. 1, the lifting bell crank arm 45, by engagement of its roller 58 with the block 59, holds the block 32 in its most upward position. In such position, the angle 34 holds the normally closed limit switch 24 open to para-

lyze the motor M. With reference to FIG. 4, closing of the normally open limit switch 17 momentarily by a label passing between the belts 14 and 15 initiates the cycle by allowing current to flow from a supply lead through the motor M to a return line 61. Energization of the motor M causes it to turn the crank 51 from its home position shown in FIG. 1 toward its position shown in FIG. 3. The crank 51, by means of its operative connection through the link 50 with the bell crank 47, drives the bell crank 47 at the beginning of the cycle, in opposition to the spring 57, in a counterclockwise direction about the bell crank pivot 48 from its home position shown in FIG. 1 toward its position shown in FIG. 3. This moves the roller 58 carried by the bell crank lifting arm 45 downwardly. The slidable block 32 carrying the label activator 18 follows the roller 58 down under the influence of gravity. An instant after the slidable block 32 starts moving, the angle 34 carried by the slidable block 32 moves out of engagement with the normally closed switch 24 which closes and allows current to continue to flow from the supply lead 60 through the motor M to the return line 61. Hence, the momentary closing of normally open switch 17 initiates operation of the motor M and the continual closing of the normally closed switch 24, i.e., continued once the cycle is started, keeps the motor M energized. The slidable blocks carrying the label activator 18 continues to move down under the influence of gravity until the label activator comes to rest on the package 12 and the roller 58 carried by the bell crank lifting arm 45 continues to move down as driven by the motor M until the crank 51 reaches a point where it reverses the direction of movement of the bell crank 47 and starts driving the bell crank 47 in a clockwise direction about the bell crank pivot 48. The spring 57 aids the motor M drive the bell crank 47 in its clockwise direction. After the label activator 18 is stopped by the package 12, the roller 58 on the bell crank lifting arm 45 moves away from the block 59 until the bell crank 47 is reversed and then during its upward movement the roller 58 picks the slidable block 32 up and returns the label activator to its home position. Return of the label activator 18 to its home position causes the angle 34 to reopen the normally closed switch 24 stopping the motor M.

To summarize the operation of the drive, closing of the limit switch 17 momentarily by a label passing between the belts 14 and 15 initiates the cycle by starting the motor M. The motor M runs until it is stopped by the opening of switch 24 turning the crank 51 through one revolution which in turn rocks the bell crank 47 from its position shown in FIG. 1 through its position shown in FIG. 3 and finally back to its position shown in FIG. 1. The bell crank 47 first lowers its roller 58 to permit the label activator 18 to descend under the influence of gravity until the activator is stopped by the package 12 and then raises its roller 58 which re-engages the block 59 and lifts the label activator 18 back up to its home position.

The tray 16 has a flat-bottomed U-shape strengthened by a cross member 62 and has a plurality of horizontally extending spaced rods 63 carried by the bottom of the U and the cross member 62. The label 10 is deposited by the belts 14 and 15 on top of the rods 63, wings 64 carried by the legs of the U limiting sideways movement of the label in the tray. The right hand leg of the U as viewed in FIG. 1 is mounted from a plate 65 by means of a pair of parallel links 66 and 67. Right hand link 66 is pivoted on studs 68 and 69 extending from the plate 65 and tray leg, respectively. Left hand link 67 is pivoted on the ends of shafts 70 and 71. The mounting for the shaft 70 will be described hereinafter. Shaft 71 extends between the legs of the tray 16 as shown in FIG. 5. The left hand leg of the tray 16 as viewed in FIG. 5 is mounted from a plate 72 by means of a link 73 pivoted on the ends of the shafts 70 and 71. A spring 74

urges the tray to the left as viewed in FIG. 5. The vertical rod 30, which has its upper end pivotally connected to the bell crank 26 (FIGS. 1 and 3), is pivotally connected at its lower end at 75 to a link 76 rigidly connected to the link 73 intermediate the ends of the link 73. Upward movement of the rod 30 moves the tray 16 from the broken line position of the tray shown in FIG. 6 to the full line position of the tray shown in FIG. 6 in opposition to the spring 74.

The rod 30 is driven upwardly by the bell crank 26 which is in turn driven by the cam 36 carried by the angle 34. When the label activator 18 is in its down position (FIG. 3), the spring 74 holds the tray 16 in its position shown in broken lines in FIG. 6 (see also FIG. 3). The rod 30 following the tray 16 into its broken line position shown in FIG. 6 because of the operative connection between the rod 30 and the tray 16. The parallel links 66 and 67 merely follow the tray movement supporting the right hand leg of the tray in its several positions, one shown in FIG. 1 and the other shown in FIG. 3. The cam 36 has the form of a generally rectangular plate with an upper edge 77 which slopes upwardly from the horizontal from left to right as viewed in FIG. 3. When the label activator 18 moves upwardly from its position shown in FIG. 3, the lower part of the upwardly sloping cam edge 77 engages the bell crank roller 28 pivoting the bell crank 26 counterclockwise about the pivot 25. As the cam 36 continues to move upwardly, the bell crank roller 28 rolls along the cam edge 77 to the right as viewed in FIG. 3 until it runs off the cam edge 77 and then the bell crank roller 28 rolls along a side 78 of the cam 36 assuming its position shown in FIG. 1 when the cam 36 stops moving upwardly. The spacing of the cam 36 from the back of the angle 34 provided by the spacers 38 permits the bell crank arm 27 to be received between the cam 36 and the back of the angle 34 as shown in FIG. 1. This counterclockwise movement of the bell crank 26 drives the rod 30 upwardly in opposition to the spring 74 and moves the tray 16 from the broken line position of the tray shown in FIG. 6 to the full line position of the tray shown in FIG. 6. FIG. 3 shows the position of the tray 16 which corresponds to its broken line position shown in FIG. 6. FIGS. 1 and 5 show the position of the tray 16 which corresponds to its full line position shown in FIG. 6. The cam 36 holds the bell crank 26 in its position shown in FIG. 1 in opposition to the spring 74. Accordingly, the tray 16 is set to move from its full line position shown in FIG. 6 to its broken line position shown in FIG. 6 with trigger-like action when the cam 36 releases the bell crank 26. Up and down movement of the rod 30 causes the link 73 (FIGS. 5 and 6), operatively connected to the rod 30, to pivot about the axis of the shaft 70. The link 73 is pivoted on the same shafts 70 and 71 as is the parallel link 67 (FIG. 1) on the other side of the tray 16. Accordingly, both legs of the tray 16 move together without binding. Downward movement of the rod 30 as driven by the spring 74 pivots the link 73 about the axis of the shaft 70 from its full line to its broken line position shown in FIG. 6. Upward movement of the rod 30 as driven by the cam 36 in opposition to the spring 74 pivots the link 73 about the axis of the shaft 70 from its broken line to its full line position shown in FIG. 6.

Upon initiation of a label applying cycle, the label activator 18 moves downwardly from its home position shown in FIG. 1 and the bell crank roller 28 rolls along the downwardly moving cam side 78. When the label activator 18 gets close to the label 10 in the tray 16, it sucks the label up onto its heated lower surface. Then the bell crank roller 28 rolls off of the downwardly moving cam side 78, i.e., the cam 36 moves out of engagement with the roller, and the spring 74 with trigger-like action moves the tray 16 downwardly and rearwardly to its position shown in FIG. 3 out of the path of the activa-

tor, the activator moving downwardly continuously until it engages the package 12. The length of the cam side 78 times the tray movement with the activator movement. Return of the activator 18 to its home position drives the tray 16 back to its home position ready to receive the next label. Hence, the motor M drives both the label activator 18 and the tray 16, the cam 36 synchronizing the mechanisms.

One of the features of the label applicator resides in the simple rectilinear activator motion on the vertical rods 20. This permits a simple overall design and imparts high speed.

Another feature resides in the simplicity of the automatic operation and the ease with which the machine may be operated, the label tripping the limit switch 17 as it passes between the belts 14 and 15 to initiate the automatic cycle and the angle 34 opening the limit switch 24 at the end of the cycle to stop the machine. This requires only the simple electrical circuit shown in FIG. 4.

Still another feature resides in the accommodation of packages of random heights. The label activator 18 carrying the label moves downwardly under the influence of gravity until it engages a package so that only the weight of the activator and its adjuncts rests upon the package. Hence, packages of all heights within the capacity of the machine are accommodated, and are never damaged because the activator is light.

A further feature resides in the initiation of the automatic cycle by the label closing the limit switch 17. This is a safety interlock for preventing operation unless a label is in position for use and prevents the hot activator from descending without a label between it and the package to burn a package.

Another feature resides in the adaptability of the automatically fed and operated machine to manual operation without alteration of the machine. That is, instead of using the conveyor belts 14 and 15 to deliver the labels to the tray 16, the labels can be dropped by hand into the tray. The application cycle then is initiated by hand. In some instances, instead of having the automatic computing and printing weighing scale deliver the labels into the stationary printer chute 11, the labels are printed in quantity by the scale when it is acting as a ticket printer. That is, the label applicator is useful for applying labels printed up by any printer. In hand operation, the operator places a package to be labeled as shown in FIG. 3 directly below the activator 18, drops the corresponding label into the tray 16 by hand, and presses a push button 79 (FIG. 4) to start the motor M. The machine then goes through the same cycle as though the label had closed switch 17 to start the motor M.

The plate 72 (FIG. 5) is fixed to a lower H-shaped frame 80 by means of two screws 81, the H-shaped frame 80 being fixed in turn to a stationarily mounted bracket 82 by means of a pair of studs 83 carried by the bracket. The label-operable limit switch 17 (FIG. 7) also is carried by the bracket 82, the operating finger 84 of the switch 17 extending forwardly and upwardly between the sets of conveyor belts 14 and 15 and being so curved in the direction of label travel as shown in FIG. 7 that every label which passes between the conveyor belts 14 and 15 closes the normally open switch 17. Hence, the stationarily mounted bracket 82 supports the lower H-shaped frame 80 and the frame 80 in turn supports the plate 72. The plate 72 also is fixed to an upper H-shaped frame 85 by means of two screws 86 and 87 which frame is attached at its side shown in FIG. 1 to the plate 65 by means of two screws 88 and 89, the plate 65 also being attached to the lower H-shaped frame 80 by means of two screws 90 and 91. Accordingly, the side plates 65 and 72 together with the spacing H-shaped frames 80 and 85 make up a rigid structure supported by the bracket 82. The lower H-shaped frame 80 is provided with a hole 92 through which the switch-operating finger 84 extends.

The lower H-shaped frame 80 journals the shaft 70

(FIG. 9) and also a pair of conveyor roller shafts 93 and 94. Shaft 93 extends out to the side of the machine as shown in FIG. 1 and is turned continuously by any suitable means. The other end of the shaft 93 shown in FIG. 5 carries a gear 95. Curved arrows in FIGS. 1 and 5 indicate the direction of rotation of the gear 95. Located between the arms of the lower H-shaped frame 80 and fixed to the shaft 93 is a set of integrally formed rollers 96 which are continuously rotated clockwise as viewed in FIG. 7 and located between the legs of the H-shaped frame 80 and fixed to the shaft 94 is a set of integrally formed idler rollers 97. Pins 98 secure the rollers 96 and 97 to their respective shafts. Rubber O-rings 99 are stretched around the rollers 96 and 97 and make up the lower set 15 of continuously running conveyor belts. Grooves 100a are formed between the rollers 97 to accommodate the ends of the tray rods 63 which as shown in FIG. 5 extend between the rollers 97. The other rollers are made alike. Hence, as viewed in FIG. 7, the lower set 15 of conveyor belts runs continuously in the clockwise direction.

The upper H-shaped frame 85 journals a pair of conveyor roller shafts 100 and 101. Shaft 100 extends out to the side of the plate 72 as shown in FIG. 5 and carries a gear 102 which is meshed with the continuously turning gear 95. Hence, the gear 102 and the shaft 100 also turn continuously, but in a direction opposite to that of the gear 95. Located between the arms of the upper H-shaped frame 85 and fixed to the shaft 100 is a set of integrally formed rollers 103 and located between the legs of the H-shaped frame 85 and fixed to the shaft 101 is a set of integrally formed idler rollers 104. Pins 105 secure the rollers 103 and 104 to their respective shafts. Rubber O-rings 106 are stretched around the rollers 103 and 104 and make up the upper set 14 of continuously running conveyor belts. Hence, as viewed in FIG. 7, the upper set 15 of conveyor belts runs continuously in the counterclockwise direction. The spacing between the lower conveyor belts 15 is the same as that between the upper conveyor belts 14. As shown in FIG. 7, the upper runs of the lower conveyor belts 15 engage the lower runs of the upper conveyor belts 14. Also, as viewed in FIG. 7, the upper runs of the lower conveyor belts 15 travel in the same direction, i.e., to the right, as do the lower runs of the upper conveyor belts 14, and at the same speed.

The label 10, which slides down the chute 11 in the direction indicated by the arrow in FIG. 7, gets caught in the bite between the conveyor belts 14 and 15 and is carried at great speed between the belts 14 and 15 which direct the label against an L-shaped stationary stop 107, attached by the screw 88 and a screw 108 (FIG. 1) to the plate 65, and onto the tray rods 63. The label then is ready to be picked up by the activator 18. The width of the chute 11 is slightly greater than the width of the label 10. Hence, the label always is square or about square with the conveyor belts 14 and 15. The stop 107 which is square with the conveyor belts functions to properly align any misaligned label. Accordingly, every label is deposited in the tray 16 in a consistent orientation for precise positioning of the labels on the packages.

Another of the features of the label activator resides in the label handling and conveying mechanism. The conveyor belts 14 and 15 are in two sets, one on top of the other, between which the labels are conveyed. The belts flatten the labels, prevent the labels from getting airborne as in the case of gravity-fed labels, deliver the labels at high speed, impart a uniform delivery keeping the machine in time and also in time with the conveyor 13, are horizontally arranged to save space, and cooperate with the stop 107 to square up the labels for precise application of the labels.

In operation, labels 10 are delivered one at a time into the chute 11 by a printer. The label gets caught in the bite between the conveyor belts 14 and 15 and is carried between the belts and deposited in the tray 16 ready to be picked up by the activator 18. As the label passes

between the belts it closes the normally open limit switch 17 to start the motor M thus initiating an automatic labeling cycle. The motor M runs until it is stopped by the opening of the switch 24 turning the crank 51 through one revolution which in turn rocks the bell crank 47 from its position shown in FIG. 1 through its position shown in FIG. 3 and finally back to its position shown in FIG. 1. The bell crank first lowers its roller 58 to permit the label activator 18 to descend under the influence of gravity to a random package height and then raises its roller 58 which reengages the block 59 and lifts the label activator 18 back up to its home position. During the descent of the activator, as soon as the activator gets close to the label in the tray 16, it sucks the label up onto its heated lower surface, and then the tray automatically is moved downwardly and rearwardly out of the way of the activator, the activator moving downwardly continuously to the random package height, whereupon the heat-activated label adheres to the package.

To ensure that the label is affixed smoothly to the package 12, the conveyor belt 13, as shown in FIG. 10, carries the labeled package 12 into contact with and under a soft rubber roll 109 which is driven by a drive belt 110 at about the same peripheral speed as the speed of the conveyor belt 13. The rubber roll 109 pushes any unattached portion of the activated label into smooth contact with the package. The rubber roll 109 is carried by a shaft 111 which is mounted for rotation between a pair of arms 112 which arms 112 are mounted to rock about the axis of a stationary shaft 113 that is supported by stationary members 114. As the package 12 passes under the rubber roll 109, it lifts the roll 109 about the axis of the shaft 113 in opposition to a return spring 115 which returns the roll 109 to its home position shown in FIG. 10 after the package becomes disengaged from the roll 109, the spring 115 being connected between one of the arms 112 and any suitable stationary point. The drive belt 110 runs around a sheave 116 fixed concentrically on the rubber roll shaft 111 and a double-grooved pulley 117 rotatably mounted on the stationary shaft 113, the pulley 117 being driven by a drive belt 118 at a speed such that the rubber roll 109 is driven at the above described peripheral speed.

The label applicator shown in FIGS. 1-9 is modified for manual operation, of a type different from the manual operation described above, as illustrated in FIGS. 11-16. The modified machine is operated either automatically or manually. Similar reference numbers in FIGS. 1-9 and in 11-16 refer to parts which are alike in structure and function.

The label applicator shown in FIG. 12 includes everything which is included in the machine shown in FIG. 1 plus additional structure hereinafter described, much of the previously described elements being omitted for the sake of simplicity. The additional structure includes a vertical shaft 119 journaled in the base plate 21a and the plate 23a and carrying a manually operable knob 120 having a pointer which points either to "A" (FIG. 15) indicating automatic operation or to "M" (FIG. 15) indicating manual operation. The shaft 119 also carries a mechanical stop 121, which is held in an adjustable position on the shaft 119 by means of a set-screw 122, and a switch operator 123, which is held in an adjustable position on the shaft 119 by means of a set-screw 124. The switch operator 123 functions both to operate a stationary limit switch 125 and to carry a limit switch 126 between a nonoperative position shown in solid lines in FIG. 16 and an operative position shown in broken lines in FIG. 16. The mechanical stop 121 is so located on the shaft 119 that when it is rotated from a nonoperative position shown in solid lines in FIG. 13 to its operative position shown in broken lines in FIG. 13 it engages the bottom of the block 32a (FIG. 15) just after the downwardly moving slotted hot plate 40a has picked up a label from the tray shown in FIGS. 1 and 3 and the tray has moved

into its downward and rearward position shown in FIG. 3. That is, when the machine is on manual operation, the hot plate 40a moves downwardly as described hereinbefore in connection with its automatic operation until it is stopped by the mechanical stop 121. The additional structure also includes a bell crank 127 which is pivotally mounted on the label activator 18a and a limit switch 128 carried by the angle 34a, the bell crank 127 being pivoted in a clockwise direction, as viewed in FIG. 14, by hand or package pressure against the bottom of its lower arm 129, in opposition to a spring 130 extending between an upper bell crank arm 131 and the label activator 18a into operative engagement with the switch 128.

The label applicator is conditioned for automatic operation by setting the knob 120 at "A" (FIG. 15). This positions the stop 121 in its inoperative position shown in solid lines in FIG. 13 and the switch operator 123 in its inoperative position shown in solid lines in FIG. 16.

The label applicator is conditioned for manual operation by setting the knob 120 at "M" (FIG. 15). This positions the stop 121 in its operative position shown in broken lines in FIG. 13 and the switch operator 123 in its operative position shown in broken lines in FIG. 16, and closes normally open switch 125.

The automatic operation takes place as previously described in connection with FIG. 4, i. e., with reference to FIG. 11, closing of the limit switch 17a momentarily by a label passing between the belts initiates the automatic cycle by starting the motor M. The motor M runs until it is stopped by the opening of switch 24a.

In the manual operation, the package is placed on the weighing scale by hand and a label is delivered automatically to the tray in the same way as in the automatic operation, such label closing the limit switch 17a (FIG. 11) to initiate the cycle by starting the motor M as in the automatic operation. The motor M runs until the limit switch 126 (normally closed) is opened by being engaged by the upper bell crank arm 45a, the limit switch 126 being positioned in the path of the upper bell crank arm 45a by the turning of the knob 120 to "M." A detent cam on the motor shaft and a spring-loaded follower can be used to help hold the crank linkage in stopped position. In any event, the motor M is stopped with the upper bell crank arm 45a in its down position holding the limit switch 126 open, limit switch 17a being open and limit switch 24a being closed at this time. As shown in FIG. 11, limit switch 126 is located in the circuit between limit switch 24a and the motor M so that the opening of limit switch 126 when limit switch 24a is closed stops the motor M. Such turning of the knob 120 to "M" also causes the switch operator 123 to close limit switch 125. Limit switches 125 and 128 (normally open) are in series with a timer motor TM (FIG. 11) of a timer 132 having timer contacts 133 and 134. At this time, the apparatus is paralyzed, since motor M is stopped, the timer motor TM is deenergized because the contacts of limit switch 128 are open, and the hot plate 40a, after the upper bell crank arm 45a moved downwardly, moved downwardly under the influence of gravity until it was stopped by the engagement of the block 32a with the stop 121.

The operator then picks the package up from the scale and moves it into contact with the label on the bottom of the hot plate 40a rocking the package to affix the label smoothly. When the package engages the hot plate 40a it also engages the lower bell crank arm 129 causing the bell crank 127 to pivot and close the normally open limit switch 128. The label, alternatively, could be removed from the hot plate by any other means and the bell crank 127 rocked by hand to close the limit switch 128. The momentary closing of the contacts of limit switch 128 completes a circuit through the closed contacts of limit switch 125, the timer motor TM and a lead 135 to the opposite side of the line. Immediately after the timer motor TM starts, it closes its contacts 133

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to keep the timer motor TM running after the contacts of limit switch 128 open. After about ten seconds, the timer motor TM closes its contacts 134 momentarily and, after contacts 134 reopen, the timer motor TM reopens its contacts 133 to cut off current to the timer motor TM. The momentary closing of the timer contacts 134 completes a circuit to the motor M which moves the upper bell crank arm 45a back to its home position to return the hot plate 40a to its home position shown in FIG. 12, the motor M being kept energized after timer contacts 134 open by a circuit through limit switch 126 which recloses as soon as the upper bell crank arm 45a starts moving upwardly. The motor M is stopped by the opening of switch 24a in the same way as it is stopped by the opening of switch 24a during the automatic operation. The timer 132 is provided to give the operator time to affix the label to the package and to get out of the way before the apparatus starts moving. Closing of limit switch 128 by the bell crank 127 during the automatic cycle accomplishes nothing because at such time contacts 125 are open and the timer motor TM cannot be started.

Hence, in the automatic operation, the open contacts of switch 125 by isolating the timer 132 from the rest of the circuit and switch 126 by being in an inoperable position cause the circuit shown in FIG. 11 to function in the same way as does the circuit shown in FIG. 4. That is, the momentary closing of switch 17a starts the motor M, the closed contacts of switch 24a, which close as soon as the motor M starts, keeps the motor M energized until the end of the automatic cycle, and the opening of switch 24a at the end of the cycle stops the motor M. In the manual operation, the closing of switch 125 by the operator turning the knob 120 to "M" brings the timer 132 into the circuit, which turning of the knob 120 to "M" also moves the switch 126 and the stop 121 into their operative positions. Momentary closing of the switch 17a starts the motor M which runs until switch 126 is opened, which motor M is restarted after the time delay following the momentary closing of switch 128 by the package being pressed by hand on the hot plate 40a and then runs until switch 24a is opened at the end of the cycle.

It is to be understood that the above description is illustrative of this invention and that various modifications thereof can be utilized without departing from its spirit and scope.

Having described the invention, we claim:

1. A label applicator comprising, in combination, label applying means movable in a path between a home position and a random package height position, the length of the path varying with the height of the package, means for supplying labels to the label applying means, means for synchronizing movements of one means with the other means, and drive means for lifting the label applying means to said home position and for moving downwardly below said random package height position, whereby the drive means and the label applying means separate and the label applying means comes to rest under the influence of gravity upon the package.

2. A label applicator comprising, in combination, label applying means having a suction head movable in a path between home and label applying positions, a tray movable between a position in said path and another position out of said path for supplying labels to the head, and resilient means for moving the tray into one of its positions, the tray being moved by the head in opposition to the resilient means into its other position and being so synchronized with the head that the tray is moved out of said path just before the head reaches the tray on its way to the label applying position, whereby the head sucks up labels from the tray and carries them to its label applying position.

3. A label applicator comprising, in combination, an automatically operable suction head movable between

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home and label applying positions, supply means for supplying labels to the head, and interlock means for initiating operation of the head when a label is in the supply means in position for use by the head.

4. A label applicator comprising, in combination, a suction head movable in a path between home and label applying positions, drive means for the head, a tray so movable in synchronism with the head into and out of the path that the head sucks up labels in the tray and carries them to its label applying position, conveyor means for supplying labels one at a time to the tray, and interlock means operated by labels on the conveyor means for initiating operation of the drive means.

5. An automatically operable label applicator comprising, in combination, label applying means, supply means for supplying labels to the label applying means, and interlock means for preventing operation of the label applying means unless a label is in the supply means in position for use.

6. An automatically operable label applicator comprising, in combination, label applying means, supply means for delivering labels into position for use by the label applying means, said supply means including first and second conveyor belt means one on top of the other and between which the labels are conveyed, and interlock means operated by labels carried by the conveyor belt means for preventing operation of the applicator unless a label is in said position for use.

7. A label applicator comprising, in combination, a suction head movable in a path between home and label applying positions, a tray movable into and out of said path, first and second conveyor belt means one on top of the other and between which labels are conveyed to the tray, and resilient means for moving the tray out of said path, the tray being moved by the head in opposition to the resilient means into said path and being so synchronized with the head that the tray is moved out of said path by the resilient means just before the head reaches the tray on its way to the label applying position, whereby the head sucks up labels from the tray and carries them to its label applying position.

8. A label applicator comprising, in combination, a suction head movable under the influence of gravity from a home position to a random package height position, supply means for supplying labels to the head, lift means movable from said home position to said random package height position plus an increment more and then back to said home position for lifting the head back to its home position, interlock means for initiating operation of the head when a label is in the supply means in position for use by the head, and drive means operable only when a label is in said position for use for driving the lift means, said supply means including a tray movable in synchronism with the head into the path of the head for supplying labels to the head and out of the path of the head after the head has sucked up a label from the tray, the head carrying such label into contact with a package to be labeled.

9. A label applicator comprising, in combination, label applying means movable between home and label applying positions, selectively operable means for conditioning the applicator for first and second modes of operation, drive means operable when the applicator is in the first mode of operation for moving the label applying means automatically from the home position into engagement with an article to be labeled in a label applying position and back to the home position and operable when the applicator is in the second mode of operation for moving the label applying means automatically between the home and a label applying position, means operable in the second mode of operation for stopping the label applying means in said label applying position and for stopping the drive means before it starts to return the label applying means to the home position, and manually operable means

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for restarting said stopped drive means whereby the drive means returns the label applying means to the home position.

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