July 6, 1965 E. E. MESSMER ETAL 3,193,430

AUTOMATIC LABELING APPARATUS

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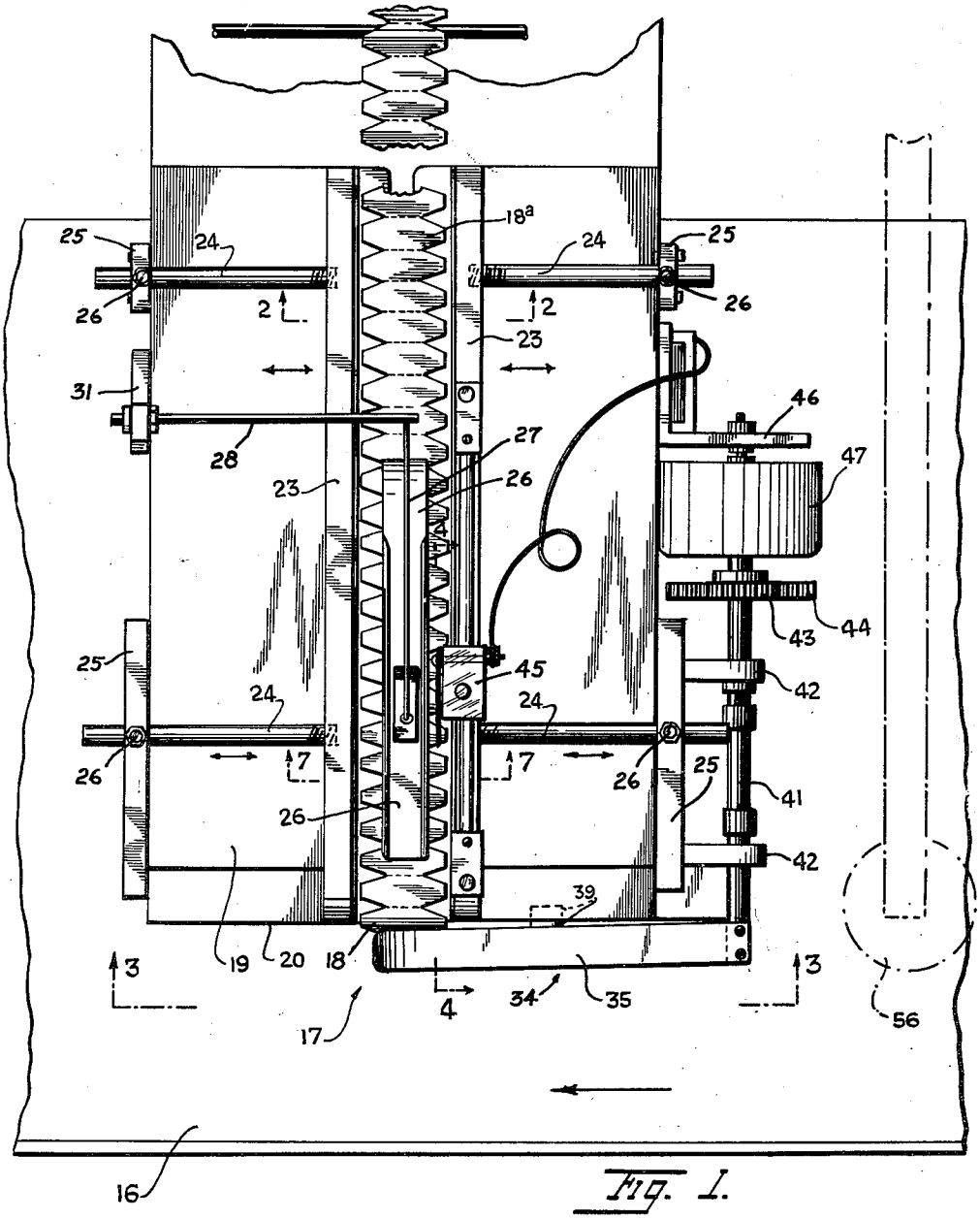

Fig. 1.

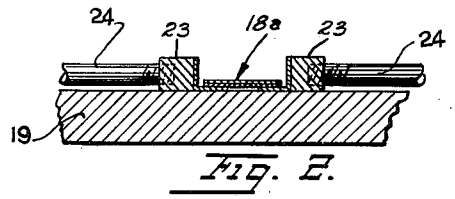

Fig. 2.

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July 6, 1965 E. E. MESSMER ETAL 3,193,430

AUTOMATIC LABELING APPARATUS

Filed April 11, 1960 4 Sheets-Sheet 2

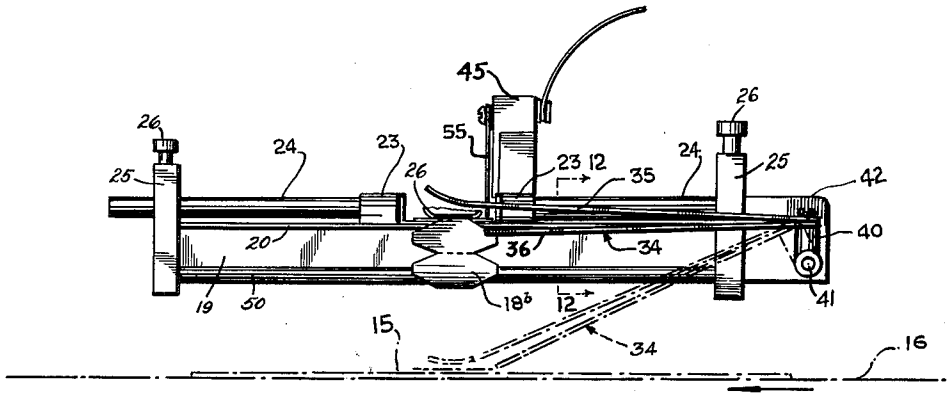

Fig. 3.

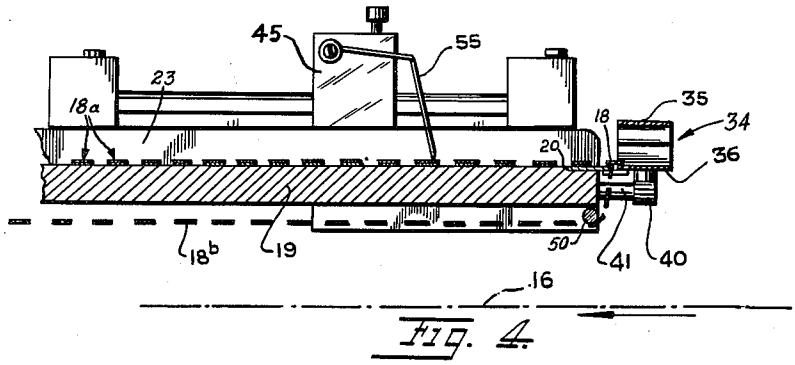

Fig. 4.

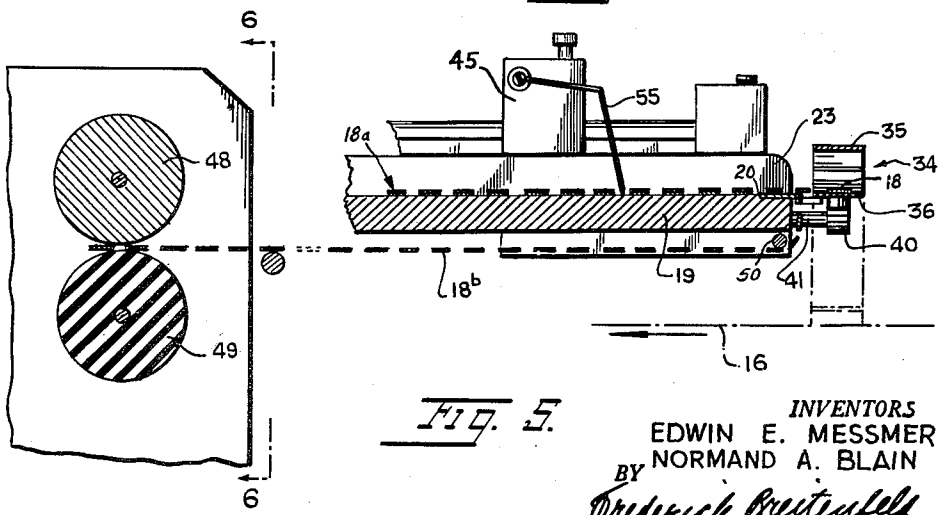

Fig. 5.

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AUTOMATIC LABELING APPARATUS

Filed April 11, 1960 4 Sheets-Sheet 3

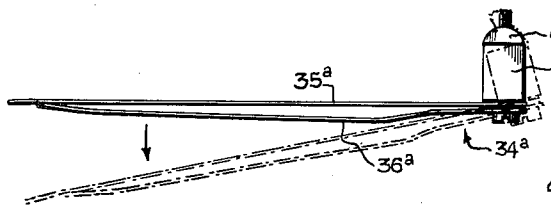

Fig. 10A.

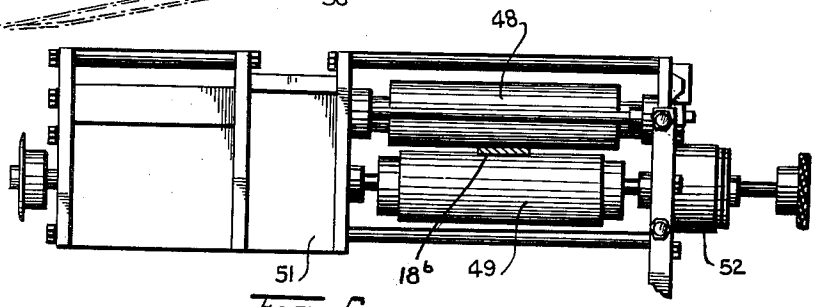

Fig. 6.

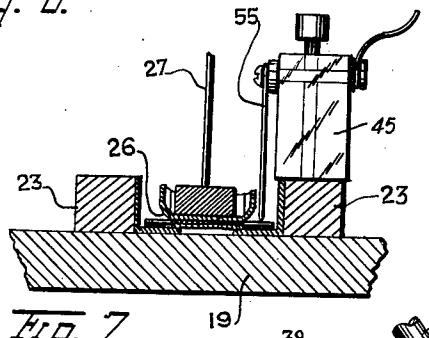

Fig. 7.

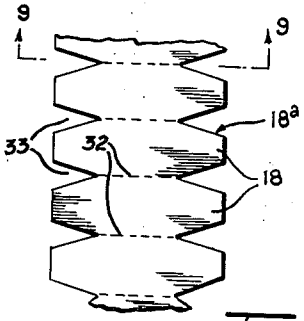

Fig. 8.

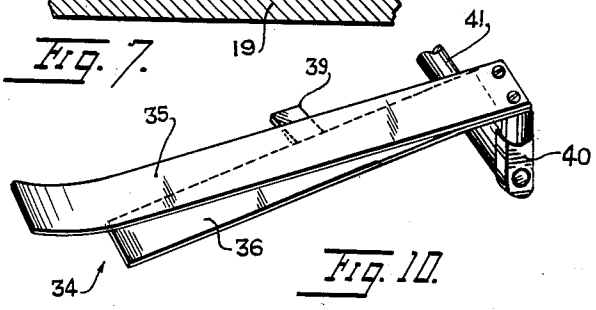

Fig. 10.

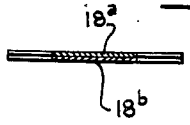

Fig. 9.

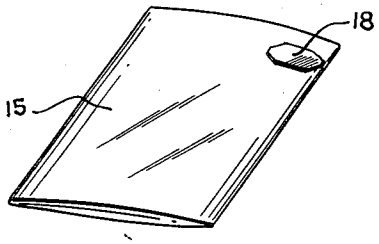

Fig. 11.

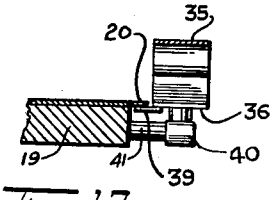

Fig. 12.

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July 6, 1965 E. E. MESSMER ETAL 3,193,430

AUTOMATIC LABELING APPARATUS

Filed April 11, 1960 4 Sheets-Sheet 4

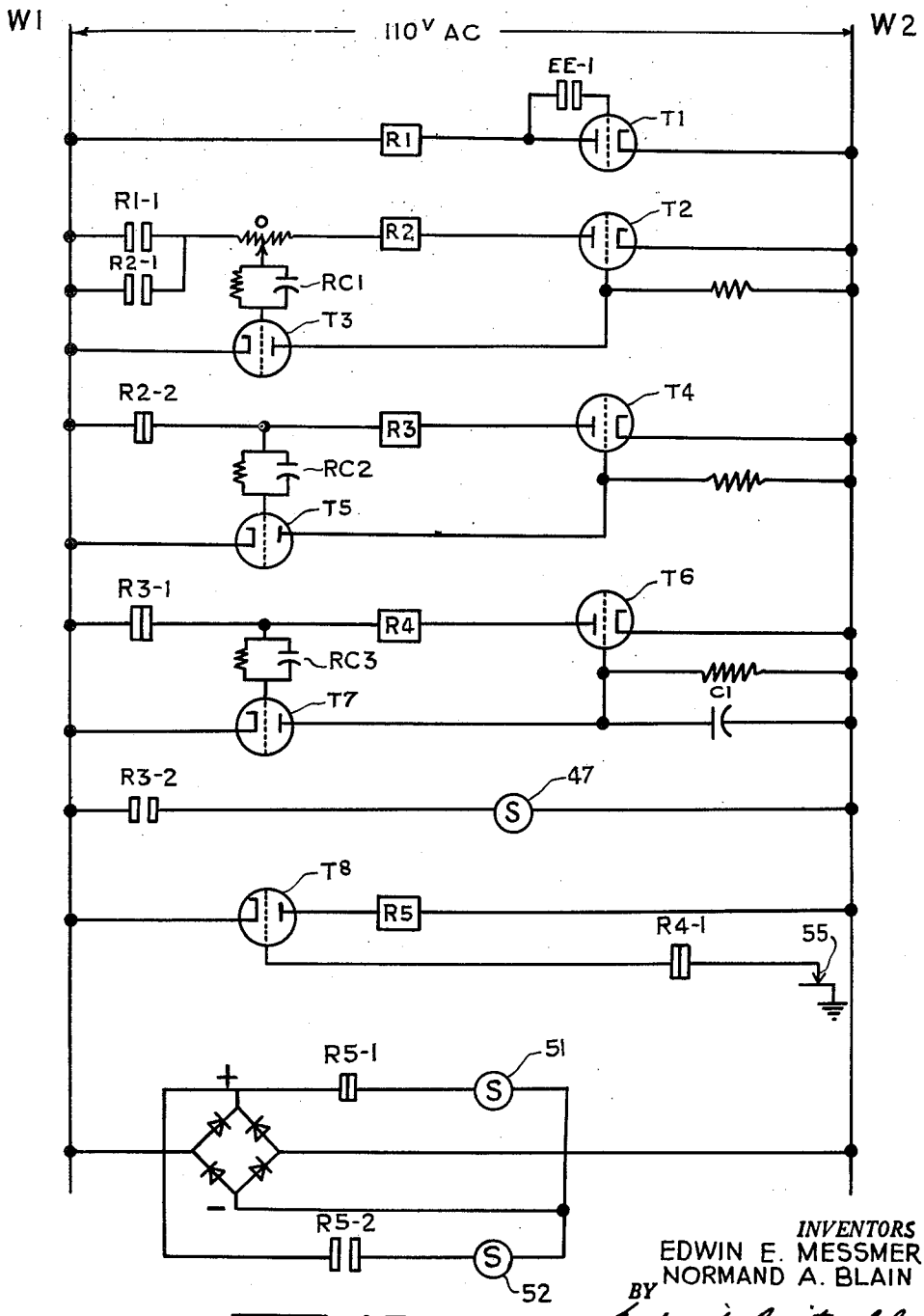

FIG. 13

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United States Patent Office 3,193,430 Patented July 6, 1965

3,193,430

AUTOMATIC LABELING APPARATUS

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Filed Apr. 11, 1960, Ser. No. 21,438
10 Claims. (Cl. 156—355)

This invention relates generally to labeling apparatus, and has particular reference to a label-applying or ticketing apparatus capable of rapidly applying an adhesive-coated label or ticket to each of a succesion of articles.

It is the general object of the invention to provide a ticketing or labeling device which is thoroughly practical in nature and capable of high speed automatic operation in feeding and applying labels to a series of articles.

It is a more particular objective to provide a labeling apparatus which may be inexpensively manufactured and installed, whose operation is simple and reliable, and which may be readily adapted for a variety of purposes.

The present apparatus is admirably adapted for use as a part of an integrated mechanism for packaging merchandise in a container, sealing the container, and applying a ticket or label to it. It is understood, however, that the apparatus is by no means limited to such use.

Among the special features of the invention are: an improved arrangement of parts whereby a label supply in the form of a continuous ribbon can be conveniently employed; an applicator of novel character adapted to engage the endmost label on the supply ribbon, separate it from the supply, and apply it to an article; automatically controllable means for coordinating the operations, at unusually high speeds of the applicator, and of a means for intermittently advancing the ribbon supply; and an arrangement of the elements in such a way that the entire operation may be coordinated with the advancing movements of articles being brought successively to the labeling station. Advantageously the article advance may be on a conveyor, and the conveyor may be one which forms part of a conventional packaging machine. For example, plastic bags newly filled with merchandise may be transported directly to the improved ticketing apparatus.

Toward this end, the present apparatus comprises generally a conveyor for carrying the articles past a label-applying station, a supply of labels in the form of a continuous ribbon of separable sequentially arranged labels, and a means for intermittently advancing the labels in order to bring them one at a time into cooperative relation with a label applicator located at the labeling station. In addition, there is preferably a triggering device located in the path of movement of the articles as they approach the labeler which detects the approach of an article and in response thereto activates a means for actuating the applicator. After the applicator returns to its normal position, another label is automatically brought to the labeling station in readiness for application to the next article.

It is a further object of this invention to provide a labeling apparatus which is adjustable so that the label may be placed at any desired location on the article.

It is still another object to provide an apparatus wherein the labels themselves control the advance of the label ribbon to the labeling station.

Yet another object of the invention is to provide an apparatus wherein the label applicator is adapted to positively grasp each label and apply it with positive pressure to the article.

The invention is not necessarily restricted to completely automatic operation. Novel features of the label ribbon advancing and control means, and of the label applicator and its mode of operation, are independently useful.

Other objects and advantages of the present invention will be apparent from the following description.

In the drawings:

FIG. 1 is a plan view of a label or ticket applying apparatus constructed in accordance with the present invention;

FIG. 2 is a cross-sectional view taken on line **2—2** of FIG. 1;

FIG. 3 is an end view of the apparatus taken on line **3—3** of FIG. 1;

FIG. 4 is a cross-sectional view taken on line **4—4** of FIG. 1;

FIG. 5 is a view similar to FIG. 4 showing the label advancing means;

FIG. 6 is a view of the label advancing means taken on line **6—6** of FIG. 5;

FIG. 7 is a cross-sectional view taken on line **7—7** of FIG. 1;

FIG. 8 is a fragmentary view of a ribbon of labels shown on an enlarged scale;

FIG. 9 is a cross-sectional view of an individual label taken on line **9—9** of FIG. 8;

FIG. 10 is a perspective view, on an enlarged scale, of the label applicator;

FIG. 10*a* is a front elevational view of an alternate embodiment of the label applicator;

FIG. 11 shows a container after it has been ticketed by the present apparatus;

FIG. 12 is a cross-sectional view taken on line **12—12** of FIG. 3; and

FIG. 13 is a schematic showing of the electrical circuits which control the operation of the present apparatus.

While the apparatus is capable of operating on many varied types of articles or packages, one type with which it may be used is a container made of heat sealable material, such as the bag **15** shown in FIG. 11. The container **15**, or any other article to be labeled, is placed on a conveyor **16** (see FIGS. 1 and 3–5) and as the conveyor moves it past the label-applying apparatus, referred to generally by the reference numeral **17**, a label **18**, which may have a pressure-sensitive adhesive on its underside, is applied to the container. In the embodiment of the invention chosen for illustration, the apparatus includes a base or platform **19** which overhangs the conveyor **16** in cantilever fashion. The platform is preferably metallic so that it conducts heat and may serve as an electrical ground. At its forward end, the platform **19** is provided with a sharp ledge **20** (FIG. 12). The upper surface of platform **19** is provided with a guide channel which accommodates a supply ribbon **18***a* of labels **18**, and guides the ribbon lengthwise along the upper surface of the platform. The guide channel is formed by two side members **23**, slidable transversely with respect to the platform, and adjustable toward and away from each other depending upon the width of the labels being used. Adjustment of the side members can be effected by means of the studs **24**, each of which is, at one end, threaded into its associated side member **23**, and near its other end, slidably supported in a bracket **25** mounted on the platform **19**. Once the side members **23** are adjusted to the proper spacing, the set screws **26** in the brackets **25** are tightened upon the studs **24** in order to maintain the side members in stationary condition with respect to the platform **19**.

Located between the side members **23** is a plate **26** which presses upon the label ribbon **18***a* under the force

of the spring member 27, in order to keep the ribbon from buckling as it approaches the labeling station. The spring 27 is fastened at one end to the upper surface of the plate 26, and is mounted at its other end on a rod 28 which extends over the platform 19 from a bracket 31 mounted on the edge of the platform.

As may be seen in FIGS. 8 and 9, the continuous ribbon 18*a* comprises labels 18 separably connected end-to-end along the lines 32. The labels are all pre-printed with desired information, and in addition, each label is preferably provided with a pressure-sensitive adhesive coating on its underside, and a continuous ribbon of facing material 18*b* is separably adhered to the underside of the ribbon. The facing material is, of course, pulled from the labels before the latter are applied to the articles. Note also that the two-ply ribbon comprising the label ribbon 18*a* and the facing ribbon 18*b* is provided with a series of notches 33 along each side, one notch of each series being located between each of the labels. The purpose of these notches is to facilitate separation of the individual labels, and also to afford a means for automatic electric control of ribbon advance.

Located directly forward of the platform 19 is a label applicator 34. As may be seen clearly in FIG. 10 the applicator comprises a pair of superposed label-grasping fingers 35 and 36. These fingers are elongated in a direction parallel to the forward edge 20 of the platform 19 and are mounted with their label-grasping ends facing in the direction of movement of the conveyor 16. The upper finger 35 is rigid in nature, while the lower finger 36 is preferably fabricated of spring material. In certain situations, however, it may be advantageous to form the upper finger 35, as well as the lower finger 36, of spring material. In addition, the lower finger is provided with an abutment member 39 projecting transversely therefrom.

The fingers 35 and 36 are pivotable as a unit to swing the label-grasping ends between a raised label-receiving position and a depressed label-applying position. The fingers are fastened together at one end of the applicator 34 so that normally the free end of the finger 36 contacts the lower surface of the finger 35. However, in the normal position of the applicator 34, the finger 35 is arranged at a level above the ledge 20, whereas the abutment member 39 contacts the underside of the ledge 20 (see FIG. 12) and prevents the finger 36 from rising above the ledge. Consequently, the finger 36 is bent downwardly away from the finger 35 when the applicator is in its normal position. As a result of the spaced relation of the fingers, the endmost label 18 of the ribbon 18*a* is permitted to be advanced between the fingers of the applicator. When the applicator 34 is actuated, by means to be described below, the upper finger swings downwardly against the lower finger thus positively grasping the label between them, and upon further downward movement of both fingers, the grasped label is separated from the remainder of the ribbon along one of the lines of separation 32 and applied to the container moving below. It will be noticed that the upper finger is longer than the lower finger, so that it almost completely covers the label between the fingers, and in addition, the endmost portion of the upper finger is turned upwardly. In this way, after the label contacts the container, and the latter continues to move past the applicator, the upturned end of the upper finger presses the entire label against the container, thus insuring that all of the adhesive material on the back of the label contacts the container and secures the label firmly to it.

The fingers 35 and 36 are mounted at their interconnected end on a fixture 40, which is in turn mounted on the end of an oscillatable shaft 41. The shaft 41 is rotatably mounted in the brackets 42, which are themselves mounted on the platform 19, and the shaft is provided with a gear 43 at its free end. Arranged in meshing arrangement with the gear 43 is a gear 44 mounted on the armature of a rotary solenoid 47 which is fixed to the platform 19 by means of the bracket 46. When the solenoid 47 is energized, the motion of its armature is transmitted by means of the gearing 43 and 44, and the shaft 41, to the label applicator 34 in order to swing the latter downwardly in an arcuate path about the axis of the shaft 41. In some situations, it may be desirable to mount the fixture 40 and applicator 34*a* on the shaft 41 below the axis of the latter, as in FIG. 10*a*, rather than above the axis, as in FIG. 10. In the alternative embodiment of FIG. 10*a*, the upper finger 35*a* as well as the lower finger 36*a*, is fabricated from spring material, and the end of the finger 35*a* is not turned upwardly as is the end of the finger 35.

The advance of the label ribbon 18*a* along the platform 19 toward the labeling station is effected by means of the rollers 48 and 49 (see FIGS. 5 and 6), in cooperation with the facing ribbon 18*b*. The rollers are arranged behind the platform 19 with their bite below the level of the platform. While the label ribbon 18*a* is on the upper surface of the platform 19 it adheres to the facing ribbon 18*b*. However, when the two ribbons reach the ledge 20 at the forward end of the platform 19, the facing ribbon is pulled around the sharp edge and then trained around the roller 50, and travels rearwardly beneath the platform to the point at which it is gripped between the rollers 48 and 49. It may be seen therefore that as the rollers are given intermittent rotary movement, the labels 18 will be advanced one-by-one past the ledge 20 of the platform 19, and between the fingers 35 and 36 of the label applicator.

Intermittent movement of the rollers 48 and 49 is provided by means of a magnetic clutch and brake, 51 and 52, respectively, which cooperate to control the action of the rollers. When a label is to be advanced, the clutch is engaged and the brake is released. When the endmost label of the ribbon 18*a* is located between the fingers of the applicator 34, the clutch is disengaged and the brake applied to arrest the advance of the label ribbon. The manner in which the clutch 51 and the brake 52 are controlled will be described below with reference to the electrical circuits of FIG. 13.

An element of the electrical circuits which control the operation of the present apparatus is the electrically conductive wire finger 55 (FIGS. 1, 3–5, and 7). The finger 55 is mounted on the insulated block 45 which is fixed to one of the side members 23. While the label ribbon 18*a* is in stationary position, the free end of the finger 55 is permitted to contact the upper surface of the platform 19 through one of the notches 33 thus forming a ground connection. As soon as the label ribbon begins to move, however, a label moves between the finger 55 and the platform 19 and breaks the ground connection between the finger and the platform. When the finger 55 once again contacts the platform 19, i.e., when the succeeding notch 33 registers with the end of the finger, the latter serves to halt the advance of the labels by disengaging the clutch 51 and applying the brake 52.

In operation, an article, such as the bag 15, is moved along by the conveyor 16 in a leftward direction in FIGS. 1 and 3. Along its path of movement as it approaches the labeling station there is an electric eye 56 or its equivalent, adapted to trigger the operation of the apparatus as the bag 15 passes, so that by the time the article reaches a position below the left end of the label applicator 34 the solenoid 47 is actuated and the applicator swings downwardly to apply a label to the package. The article then continues along the conveyor to a delivery station. Upon the return of the label applicator 34 to its normal position, the clutch 51 and the brake 52 are actuated to effect the advance of a new label 18 between the fingers 35 and 36 of the label applicator by means of the rollers 48 and 49. Once this occurs, the clutch and brake are actuated again to stop the feeding of labels. The appa-

ratus is now prepared for the approach of a succeeding article, whereupon the labeling operation is repeated.

The conveyor **16** may be one which leads from a packaging apparatus. For example, the bag shown at **15** may be a newly filled plastic container which has just been conveyed by the element **16** past a filling station and a sealing station (not shown). However, such a close association with a packaging apparatus is not essential, and so far as the present invention is concerned the articles **15** may be laid onto the conveyor **16** by hand, or otherwise.

Electric circuits for operating the apparatus may be seen by referring to FIG. 13. The circuits are shown in a "straight" or "across-the-line" form in which the contacts of a relay are shown separated from the relay coil which operates them and arranged in the circuit in a straight line between parallel lines W1 and W2 representing the power source.

In the across-the-line diagram, the relays **R1, R2, R3, R4,** and **R5** will be found. Throughout the description which follows, these letters will be applied to the coils of the relays, and with reference numerals appended thereto, they will be applied to the contacts of these relays. The relay contacts are shown in de-energized condition.

In addition to the above-mentioned relays, FIG. 13 also includes the contacts **EE1** controlled by the electric eye **56**, the applicator solenoid **47**, the magnetic clutch **51**, the magnetic brake **52**, and the contact finger **55**. Furthermore, eight electronic tubes T_1–T_8 are involved, as well as three timer circuits, **RC1, RC2** and **RC3**; **RC1** being a variable timer.

Because the contacts **R1–1** and **R2–1** are normally open, there is no charge on the grid of tube **T3** when power (e.g., 110 volts A.C.) is first applied to the circuits. Hence the tube **T3** is conductive. The conductivity of tube **T3** allows a charge to be applied to the grid of tube **T2** whereby the latter becomes non-conductive. At the same time, since contacts **R2–2** and **R3–1** are normally closed, the application of power applies a charge to the grids of tubes **T5** and **T7** whereby each of these is momentarily non-conductive. However, after a short time, determined by their respective timing circuits **RC2** and **RC3**, they too become conducting thus charging the grids of the tubes **T4** and **T6** respectively whereby the latter tubes are maintained in non-conducting condition. Furthermore, since the tube **T8** is normally conducting when its grid is grounded, a circuit is immediately completed to energize the relay **R5** whereupon the contacts **R5–1** open, in order to de-energize the magnetic clutch **51**, and the contacts **R5–2** close, in order to energize the magnetic brake **52**. The label supply **18***a* is thus in stationary condition.

When an article passes the electric eye **56**, the contacts **EE–1** close thus permitting the tube **T1** to fire and energize the relay **R1**. As a result, the contacts **R1–1** close thus charging the grid of the tube **T3** through the variable timer **RC1**, thus making the tube **T3** non-conducting. Consequently, the tube **T2** becomes conducting and results in the energization of the relay coil **R2**. The contacts **R2–1** then close to make the circuit self-holding, since the contacts **R1–1** open as soon as the article passes the electric eye. In addition, the contacts **R2–2** open, but this has no effect since tube **T5** is already conducting and remains so, and the tube **T4** therefore remains non-conducting.

After a time determined by the variable timer **RC1** the tube **T3** becomes conducting once again, thus making the tube **T2** non-conducting, and de-energizing the relay coil **R2**. The contacts **R2–2** then close thus charging the grid of the tube **T5** making the latter non-conducting, hence the tube **T4** becomes conducting and the relay **R3** is energized. At this point, the contacts **R3–1** open, but this has no effect since the tube **T7** remains conducting and the tube **T6** non-conducting. Also, the contacts **R3–2** close, thus energizing the solenoid **47** whereupon the label applicator **34** is actuated and a label is applied to the package. It may be seen, therefore, that the time interval between the time that the article passes the electric eye and the time that the label applicator is actuated depends upon the adjustment of the variable timer **RC1**. Merely by varying the time **RC1**, therefore, the location on the article at which the label is placed may be varied in the direction of movement of the article.

After a period of time determined by the timer **RC2**, the tube **T5** becomes conducting once again, whereupon the tube **T4** becomes non-conducting and the relay coil **R3** is de-energized. The solenoid **47** is therefore de-energized permitting the label applicator **34** to return to its normal position. The contacts **R3–1** then close once again, thus charging the grid of the tube **T7** which immediately becomes non-conducting, and the relay **R4** is energized. The capacitor **C1** provides a time delay to insure that the label applicator has returned to its normal position before the relay **R4** is energized. Energization of the relay coil **R4** causes the contacts **R4–1** to open thus breaking the circuit for energizing the relay coil **R5**. As a result, the contacts **R5–1** close to energize the clutch **51**, and the contacts **R5–2** open to disengage the brake **52**, whereupon the rollers **48** and **49** are rotated and the label ribbon **18***a* begins to advance.

After a short period of time, determined by the timer circuit **RC3**, the tube **T7** becomes conducting once again, whereupon the tube **T6** becomes non-conducting and the relay **R4** is de-energized thus causing the contacts **R4–1** to close. The relay **R5** is not however immediately de-energized since there is a label between the finger **55** and the platform **19**. However, when one of the notches **33** once again registers with the contact **55**, the grid of the tube **T8** is again grounded, whereupon the tube **T8** becomes conducting and a circuit is completed to energize the relay **R5**, thus de-energizing the clutch **51** and energizing the brake **52** to arrest the feeding of labels.

If desired, an additional circuit (not shown) may be included having a device for heating the platform **19**, so that as the label and facing ribbons **18***a* and **18***b* move along the platform, the adhesive on the labels **18** will become softened and facilitate the separation of the labels from the facing.

The invention has been shown and described in preferred form only and by way of example, but many variations and modifications may be made therein and in its mode of application which will still be comprised within its spirit. It is understood, therefore, that the invention is not limited to any specific form or embodiment, except insofar as such limitations are specified in the appended claims.

What is claimed is:

1. In an apparatus for applying labels to containers, a conveyor for advancing successive containers to and past a labeling station, a label supply in the form of a continuous ribbon comprising labels separably arranged end to end, means for intermittently advancing said ribbon to bring the endmost label to the labeling station, an applicator mounted in a normal rest position and movable to engage said endmost label and apply it to a container moving through the labeling station, said applicator comprising a pair of superposed fingers spaced apart when said applicator is in its normal rest position whereby the endmost label may be advanced between them and said fingers coming together upon being moved into engagement with said label so as to grasp the latter between them, activatable means for moving said applicator, and control means responsive to the movement of containers past it for activating said activatable means only when a container is in a label-receptive position.

2. In an apparatus for applying labels to containers, the elements defined in claim **1** including time delay means for delaying the reaction of said activatable means to the operation of said control means in order to provide sufficient time for said containers to move from said control means to said labeling station before said applicator is moved into label-applying position, said time delay

means being variable so that the point on the container at which the label is applied may be varied.

3. In an apparatus for applying labels to articles, a platform having a forward edge, a label supply in the form of a continuous ribbon comprising labels separably arranged end to end, said ribbon being supported on the platform, means for intermittently advancing the ribbon to bring the endmost label beyond said forward edge, a conveyor mounted for movement beneath said platform in a direction transverse to the direction of label advancement, said conveyor being adapted to bring successive articles to a label-receiving position beneath said platform edge, an applicator mounted adjacent to said edge and comprising label-engaging fingers substantially parallel to said edge, one of said fingers being longer than the other and normally lying above the level of said platform and the other normally lying below said level whereby the advancement of said ribbon brings the endmost label into a position between said fingers, electrically operable means for moving said upper finger toward said conveyor so that the endmost label is grasped and applied to an article, and an electric eye responsive to the movement of articles on said conveyor for activating said electrically operable means.

4. In an apparatus for applying labels to articles, the elements defined in claim 3 including an electrical circuit, said electrically operable means and said electric eye being arranged in said circuit, and time delay means in said circuit for delaying the activation of said electrically operable means after said electric eye responds to article movement.

5. In an apparatus for applying labels, the elements defined in claim 4, including means for adjusting said time delay means to alter the magnitude of said delay.

6. In an apparatus for applying labels to articles, a label supply in the form of a strip of sequentially arranged labels, a platform having a forward edge, means for intermittently advancing said strip along said platform in a direction at right angles to said edge so as to advance labels successively to and beyond said edge, an article conveyor adjacent to said platform edge and mounted for movement in a direction transverse to the direction of advance of said labels, said conveyor being adapted to bring successive articles to and past a label-receiving position beneath said platform edge, a label applicator adjacent to said edge and comprising a pair of label-grasping fingers positioned to receive labels in succession as they are advanced, said fingers being elongated in a direction parallel to said platform edge with their label-grasping ends facing in the direction of conveyor movement, said fingers being pivotable as a unit to swing the label-grasping ends between a raised label-receiving position and a depressed label-applying position, and means for effecting said pivotal movement.

7. An apparatus as defined in claim 6, wherein the upper finger is longer than the lower one so that the longer finger presses the label directly against the article as the applicator functions.

8. An apparatus as defined in claim 6, including means for obstructing the return movement of the lower finger as the applicator returns to the label-receiving position, thereby effecting a separation of the fingers into a label-receiving condition.

9. An apparatus as defined in claim 8, in which said obstructing means comprises a projecting ledge at said platform edge and a lateral projection on the lower finger adapted to encounter said ledge during the return swing of the applicator.

10. An apparatus as defined in claim 6, wherein said means for pivoting the applicator comprises an oscillatable shaft to which the fingers are attached at the ends opposite the label-grasping ends, and means for oscillating said shaft on its axis.

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