March 27, 1973 H. SCHALTEGGER 3,723,228

APPARATUS FOR PICKING UP LABELS FROM A SUPPLY STACK AND DIRECTLY APPLYING THE LABELS TO CONTAINERS

Filed Feb. 8, 1971 5 Sheets-Sheet 1

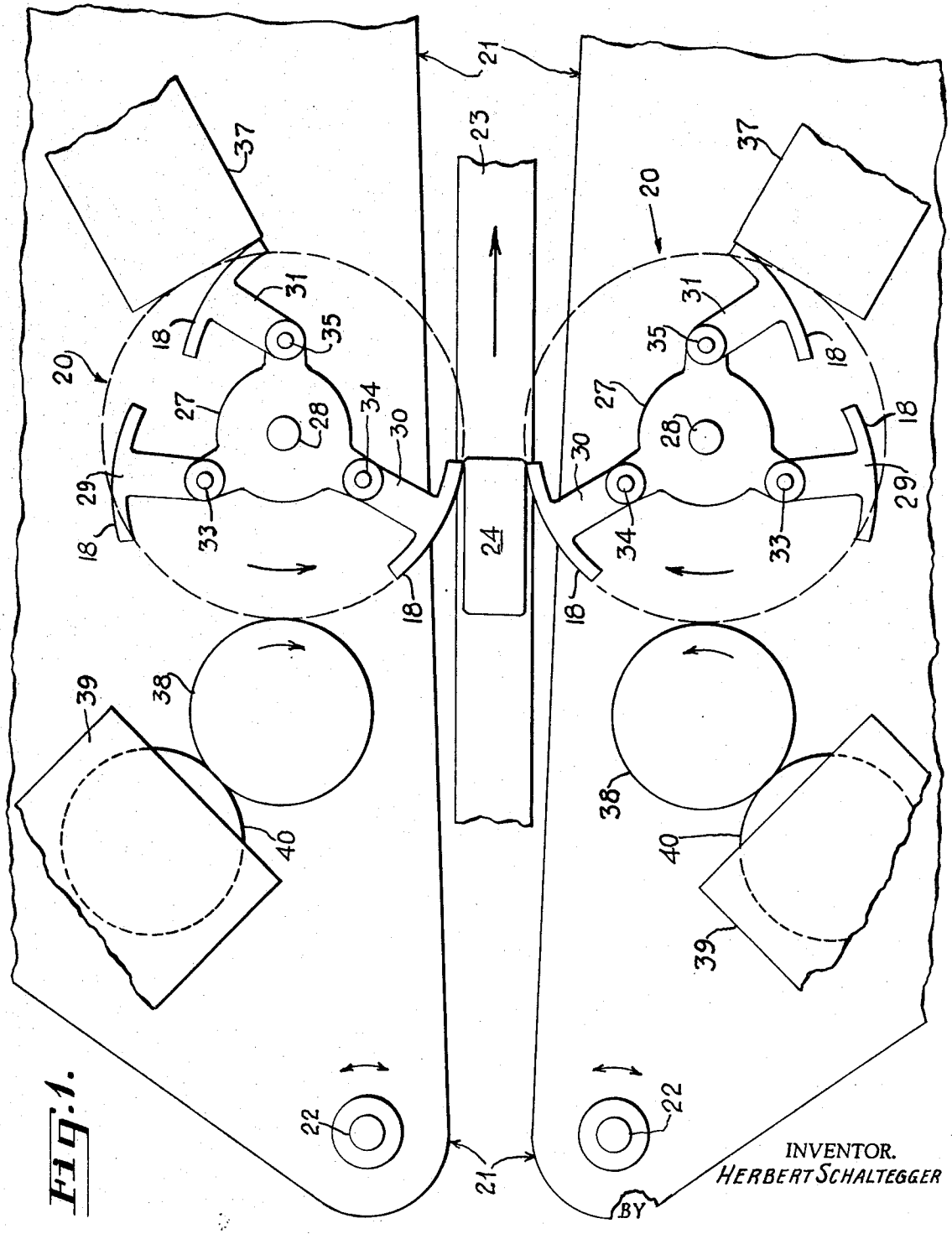


Fig. 1.

INVENTOR.
HERBERT SCHALTEGGER

BY

MATTERN WARE AND DAVIS
ATTORNEYS

March 27, 1973 H. SCHALTEGGER 3,723,228

APPARATUS FOR PICKING UP LABELS FROM A SUPPLY STACK AND DIRECTLY APPLYING THE LABELS TO CONTAINERS

Filed Feb. 8, 1971 5 Sheets-Sheet 2

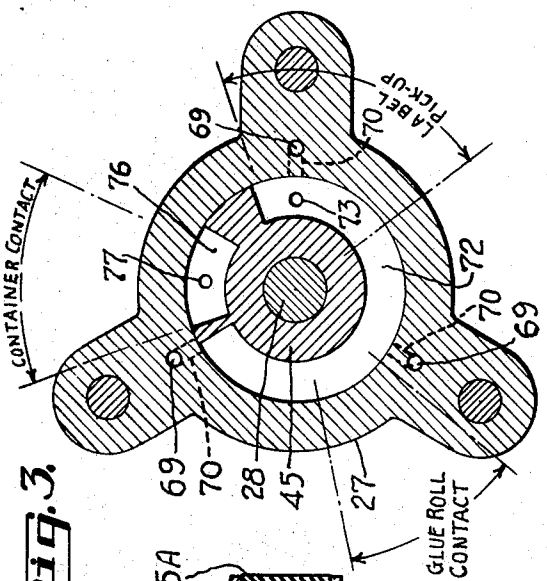


Fig. 3.

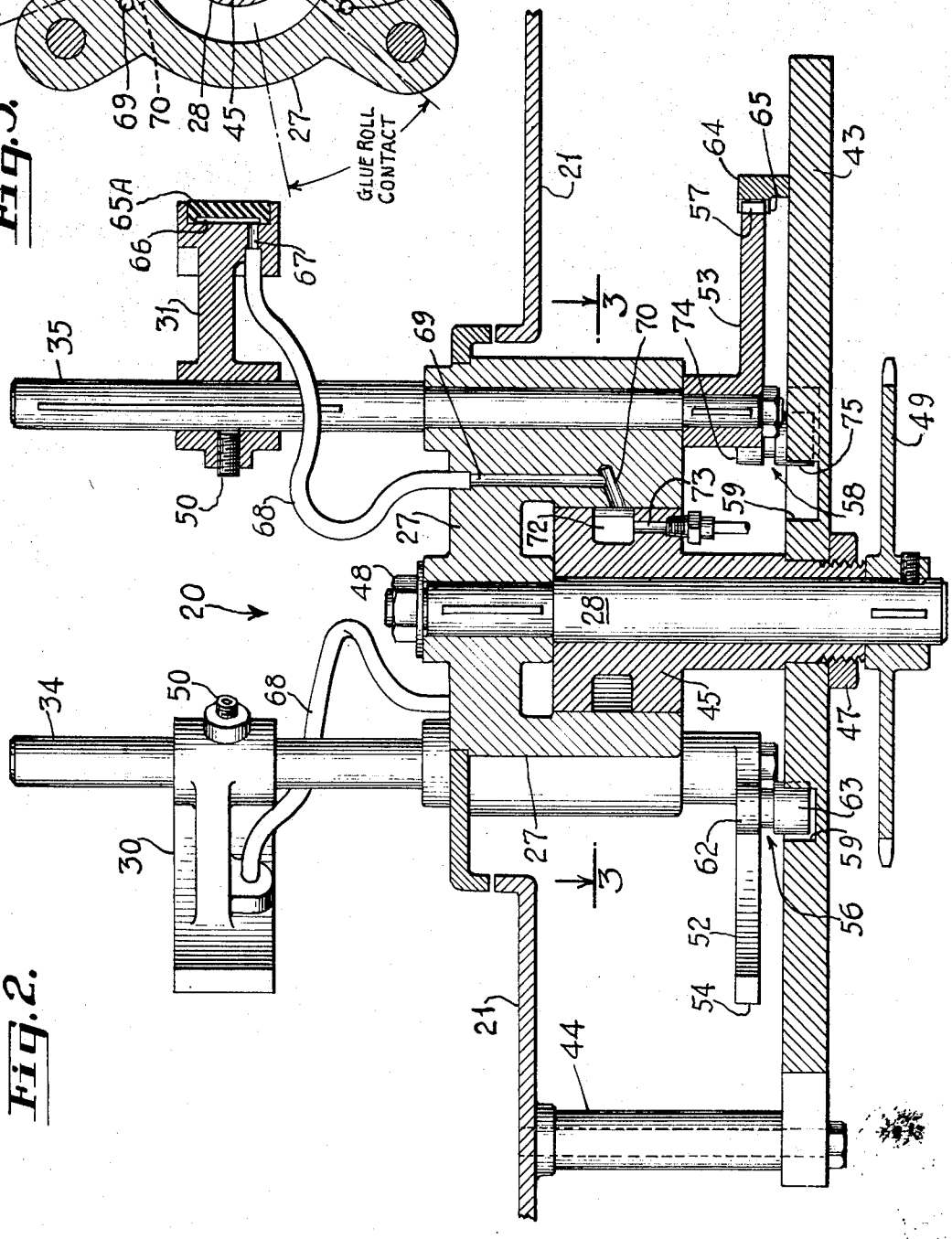


Fig. 2.

March 27, 1973 H. SCHALTEGGER 3,723,228

APPARATUS FOR PICKING UP LABELS FROM A SUPPLY STACK AND DIRECTLY APPLYING THE LABELS TO CONTAINERS

Filed Feb. 8, 1971 5 Sheets-Sheet 3

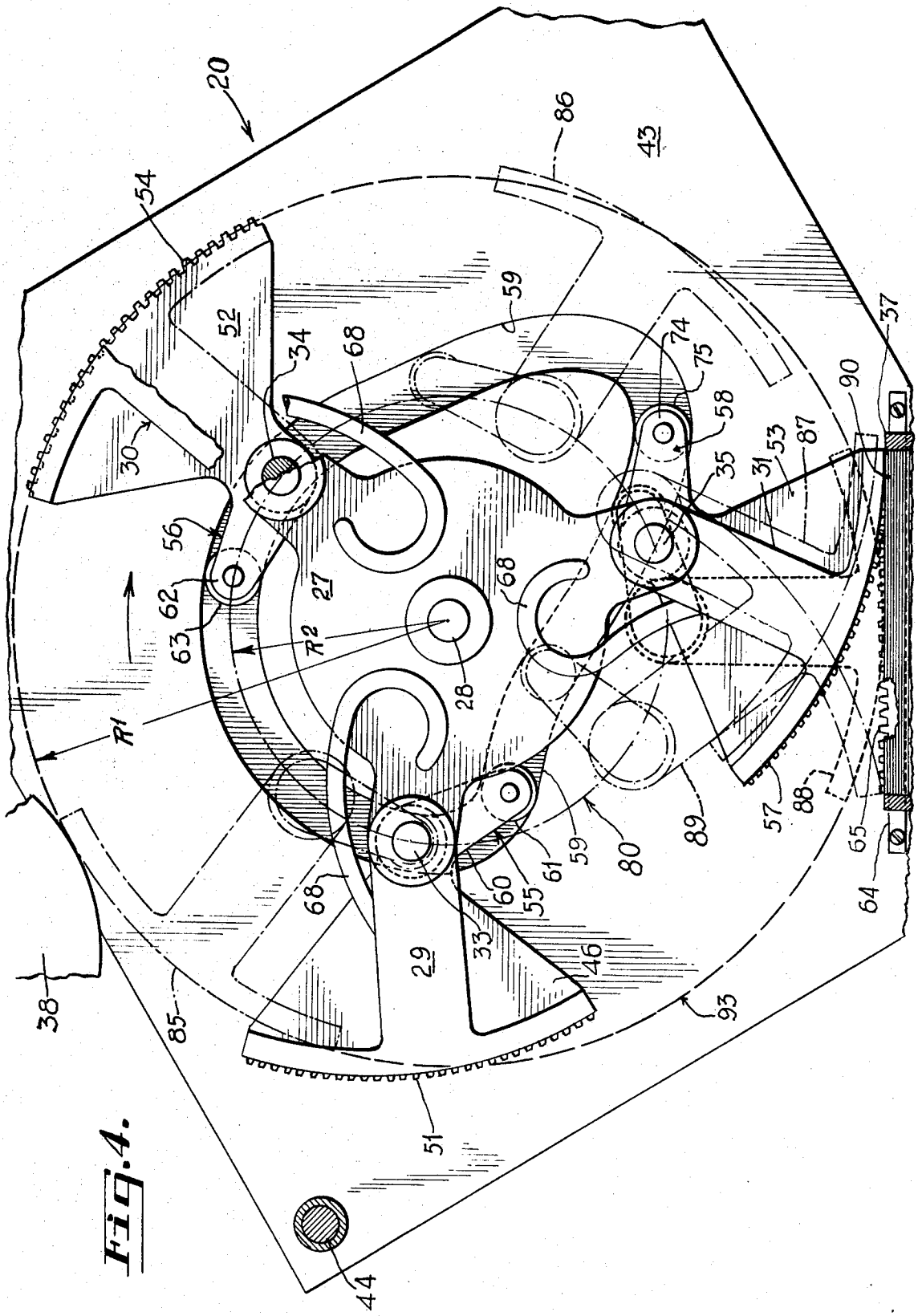


Fig. 4.

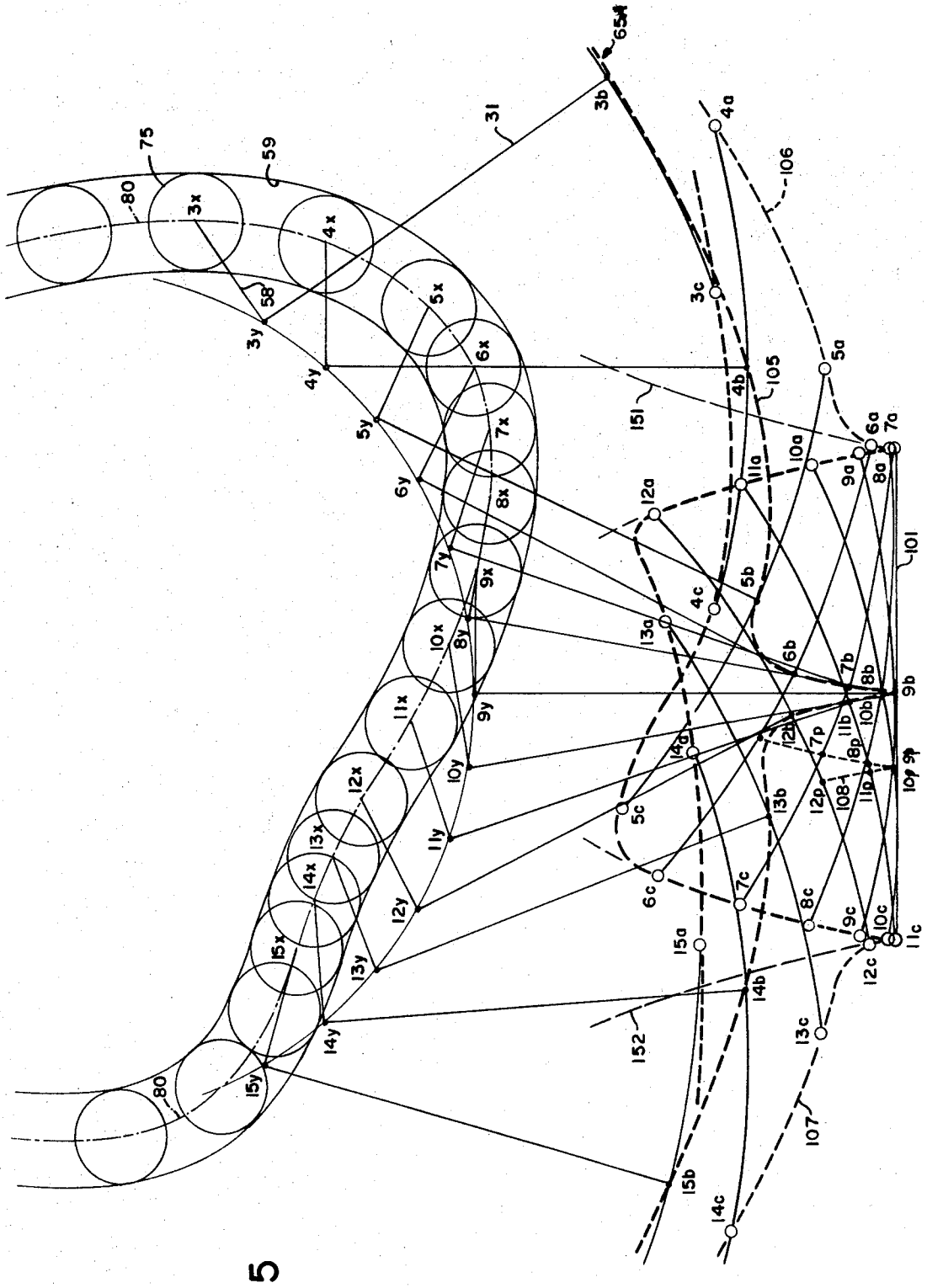

65
31
3b
4a
106
75
59
80
3x
4x
3c
58
5x
3y
6x
5a
4y
4b
105
151
5y
7x
6a
7a
6y
8x
10a
11a
9a
8a
12a
7y
9x
5b
101
4c
10x
8y
13a
6b
7b
8b
9b
11x
9y
10y
12b
11b
10b
14a
7p
8p
12x
11y
13b
5c
13x
14x
6c
7c
8c
9c
10c
11c
12y
15x
15a
13y
12c
14b
14y
152
13c
80
15y
107
15b
14c

FIG. 5

March 27, 1973 H. SCHALTEGGER 3,723,228
APPARATUS FOR PICKING UP LABELS FROM A SUPPLY STACK
AND DIRECTLY APPLYING THE LABELS TO CONTAINERS
Filed Feb. 8, 1971 5 Sheets-Sheet 5

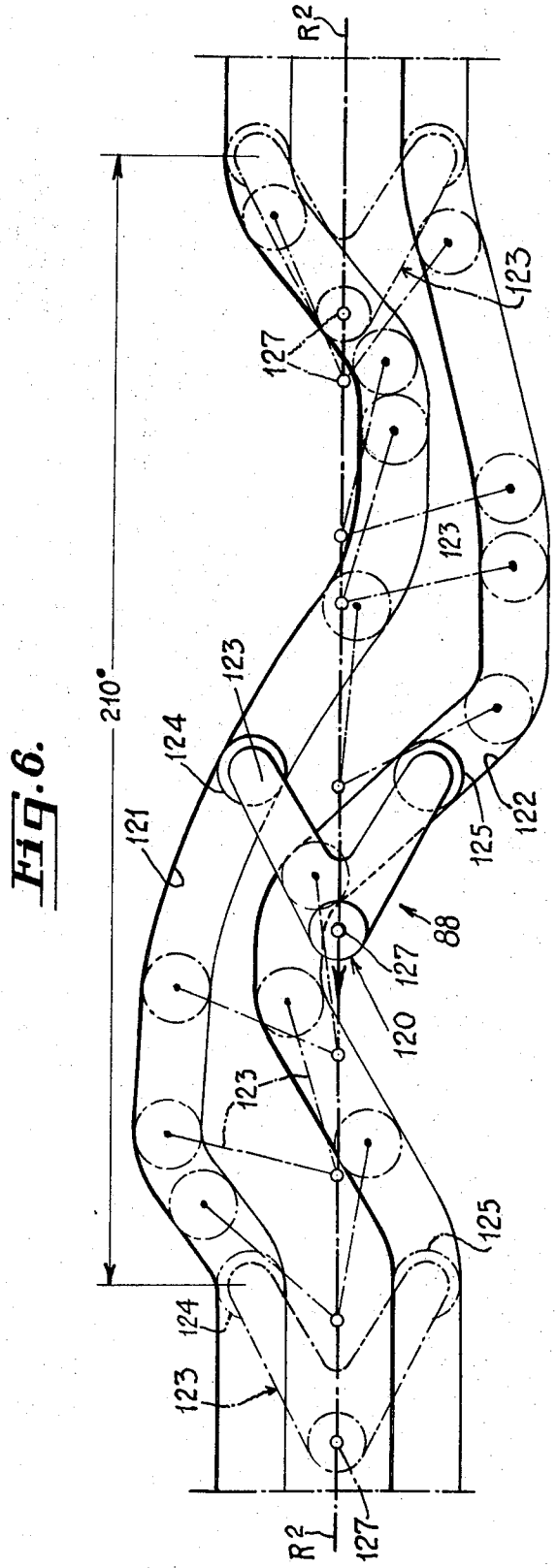


Fig. 6.

United States Patent Office 3,723,228
Patented Mar. 27, 1973

3,723,228

APPARATUS FOR PICKING UP LABELS FROM A SUPPLY STACK AND DIRECTLY APPLYING THE LABELS TO CONTAINERS

Herbert Schaltegger, P.O. Box 293,
New Milford, Conn. 06776

Filed Feb. 8, 1971, Ser. No. 113,174
Int. Cl. B65c 9/12
U.S. Cl. 156—568 16 Claims

ABSTRACT OF THE DISCLOSURE

In a container-labeling machine, a cycloidal motion-inducing cam controls the pivoting movement of rotating label-holding shoes, causing all of the points of each shoe to move along a cycloidal path as the shoe approaches, picks up a label and withdraws from a stationary label stack holder. The cycloidal cusp approach-retreat path of the label shoe approximates uniform rolling contact of each shoe with a fresh label, assuring the application of smooth, untorn, unwrinkled labels to each new container. The camming arrangement is further adapted to maintain the arcuate-shaped, peripheral surface of each label shoe coincident with a circle having its center point on the central axis of rotation as the label-holding shoe passes into contact with an adhesion-inducing apparatus and then applies the label to the container. The label is held in intimate contact with the shoe by vacuum, and the label is applied to the container by disconnecting the vacuum or by supplying a pressure to the shoe's holding surface which is greater than atmospheric pressure. In the preferred embodiment, the labeling machine comprises three label-holding shoes each of which continually rotates at a constant speed about a central axis while having its pivoted positions about a second rotating axis controlled by the camming arrangement.

This invention relates to labeling machines, and more particularly to high speed label applicators for the application of labels to various containers.

BACKGROUND OF THE INVENTION

Many varying types of labeling machines have been devised, and a typical conventional machine is disclosed in U.S. Pat. No. 3,450,591. Therein, a cam actuated gear arrangement controls the rocking movement of the label-holding surfaces as these surfaces individually remove a label from the stationary label holder. Also, this labeling machine seizes the labels from the label holder and secures the label on the holding surface by means of glue.

The major difficulty inherent in such apparatus is its inability to position the label-holding surfaces accurately during label pickup. This inaccurate positioning is inherent because of the gear arrangement used to rock the label-holding surface during label pickup. This inherent gearing backlash causes inaccurate rocking motion which produces sliding movement of the "rolling" surface over the label holder, causing the label to wrinkle or to tear. This problem is minimized by using glue as the medium for picking up and holding the label to the surface since the glue is capable of compensating for some sliding movement. However, using glue for label pickup requires a slow operation, since labels will often not stick to the surface when rolled over at high speed.

Another disadvantage inherent with the use of glue is the requirement for frequent cleaning of the label-holding surfaces, especially after any interruption of operation, since interruptions will cause the glue to dry on the pickup surface. Also, an additional transfer operation is required to remove the label from the holding surface and then transfer it to the container since the printed surfaces face outwardly when the label is secured by glue to the holding surface. This additional transfer requires a more complicated mechanism which incorporates such devices as turrent grippers to remove the labels from the holding surface and then transfer them to the container. Such apparatus generally requires very close tolerances for the parts from which it is made, thus increasing the overall cost of the labeling machine.

OBJECTS OF THE INVENTION

Therefore, it is a principal object of this invention to provide a labeling machine that is inexpensive, simple to operate, and efficient even at high speeds.

Another object of this invention is to provide a labeling machine of the above character that is capable of labeling almost an container regardless of size and shape.

Another object of this invention is to provide a labeling machine of the above character that is capable of handling inexpensive labels without wrinkling or tearing them, while also being able to coat the label with adhesive during the labeling operation.

A further object of this invention is to provide a labeling machine of the above character that requires no complicated mechanism to handle the labels nor requires any equipment that must be made with very close tolerances.

Other and more specific objects will be apparent from the features, elements, combinations, and operating procedures disclosed in the following detailed description and as shown in the drawings .

SUMMARY OF THE INVENTION

The labeling machine, disclosed herein, eliminates the problems inherent in the prior art equipment, by providing a substantially cycloidal motion-inducing camming arrangement which controls the movement of the label-holding shoe during the label pickup operation. Also, the labeling machine of this invention is provided with suction apparatus to assure positive retention of the label on the label shoe, and pressure apparatus to assure positive transfer of the label from the label shoe to the container. The camming arrangement comprises cam rollers, controllably connected to the constantly rotating, pivoting shafts of the shoes and housed in a cam track designed to assure the proper cycloidal movement of the label shoe as it approaches the stationary label hopper, picks up a label, and withdraws from the hopper.

The substantially cycloidal induced approach and retreat motion of the label shoe is exeremely important, since it assures a smooth and continuous rolling contact between the shoe and the hopper as the top label is removed therefrom. After a label has been picked up, the camming arrangement positions and maintains the label shoe with its arcuate-shaped label holding surface forming a sector of a circle that is greater in diameter than the circle formed by the rotating shafts and concentric therewith. In one embodiment, the label shoe passes over a glue roller which applies glue to the unprinted side of the label before the label shoe comes into contact with the container on which the label is secured.

Since labels are held on the label shoe by means of suction, labels can be picked up and applied to the containers at very high speed. Furthermore, no complicated mechanisms or apparatus requiring close tolerances are employed, while simple adjustments render the labeling machine adaptable to any container regardless of size or shape. Consequently, the labeling machine of this invention eliminates the problems inherent in the prior art systems while being simple to operate, accurate in applying labels, and operable at very high speeds.

This invention accordingly comprises the features, elements, combinations, and operating procedures hereinafter disclosed, and the scope of the invention will be indicated in the claims.

THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a schematic plan view of a container-labeling production line showing two labeling machines of this invention in the process of depositing labels on the front and rear of a single container;

FIG. 2 is a side elevation view, partially in cross-section, of a labeling machine of this invention;

FIG. 3 is a plan view of the same machine, taken along line 3—3 of FIG. 2;

FIG. 4 is a top plan view of the labeling machine of FIG. 2, showing the label shoes and its associated camming arrangement;

FIG. 5 is a schematic view detailing the motion of a single label shoe as it approaches the label hopper, picks up one label, and withdraws therefrom; and

FIG. 6 is a developed view of a second embodiment for the camming arrangement.

DETAILED DESCRIPTION

In FIG. 1, labeling machines **20** are shown mounted on adjustable deck plates **21**. Continuous conveyor belt **23** is positioned between deck plates **21** and carries containers **24** to be labeled. Deck plates **21** are laterally adjustable about pivot points **22** in order to assure proper contact between the labeling machines **20** and container **24**.

Labeling machine **20** comprises a rotating housing **27** which is keyed to a rotating central shaft **28** and carries three label shoes **29**, **30** and **31**, which are pivotably mounted to housing **27** by means of shafts **33**, **34**, and **35**. Shaft **28** rotates at a constant speed with shafts **33**, **34**, and **35** controllably rotating in a fixed circle about shaft **28**. Each of the label holding shoes **29**, **30** and **31** incorporate a curved label holding surface **18**.

Cooperating with each labeling machine **20** is a stationary label hopper **37** which holds the stacked labels to be picked up by the label shoes, and a glue roller **38** which applies the glue to each label. The labels are stacked in hopper **37** with the printed surface facing the label shoe. This allows the label shoe to present the unprinted surface to glue roller **38** and container **24** in a single operation. Cooperating with glue roller **38** are a glue supply tank **39** and a glue spreader **40**. Spreader **40** not only applies the glue to roller **38**, but also "doctors" roller **38** to maintain the desired glue thickness thereon.

The detailed construction of labeling machine **20** can best be seen in FIGS. 2, 3, and 4. Labeling machine **20** is secured to a deck plate **21** by means of an underlying supporting plate **43** and various depending supporting posts represented by a post **44**. Plate **43** is thus held in position below deck plate **21** and parallel thereto by means of posts **44**. A stationary hub housing **45** is secured to plate **43** by means of a nut **47**. Shaft **28** is rotatably journaled in stationary housing **45** and held in position by a bolt **48**, threaded on the upper end of shaft **28** surmounting the rotating housing **27**, which is keyed to shaft **28**. A sprocket wheel **49** is also keyed to shaft **28** and is used to controllably rotate shaft **28**.

Label pickup shoes **29**, **30** and **31** are mounted to shafts **33**, **34** and **35**, respectively. Shoes **29**, **30** and **31** are vertically adjustable along their respective shafts by means of set screws **50**. When the proper vertical adjustment has been made, set screws **50** are tightened and shoes **29**, **30** and **31** are thus fixedly mounted to their respective shafts. Shafts **33**, **34** and **35** are pivotably journaled in rotating housing **27** and have gear and cam

brackets **46**, **52** and **53** fixedly mounted at the base of each shaft. Bracket **46** comprises a gear tooth portion **51** and a cam follower roller assembly **55**. Bracket **52** comprises a gear tooth portion **54** and a cam follower roller assembly **56**. Similarly, bracket **53** comprises a gear tooth portion **57** and a cam follower roller assembly **58**. As will be described in more detail below, cam follower rollers assemblies **55**, **56**, and **58** cooperate with cam track **59** to controllably pivot shafts **33**, **34**, and **35** and the fixedly mounted label shoes **29**, **30**, and **31**. Also mounted to plate **43** is an optional upstanding bracket **64** which incorporates a gear tooth rack portion **65**. Bracket **64** is used to aid the movement of each label shoe during label pickup by engaging with the gear tooth sector portion of each bracket and help in guiding the movement of the pivoting shaft.

Each label pickup shoe comprises a cavity **66** along the label securing surface which is partially filled with an air pervious material **65A** such as felt, foam rubber, polymer foam, felted or matted synthetic fibers, or the like. Port **67** communicates with cavity **66** at one end while its other end has flexible tubing **68** connected thereto. The other end of flexible tubing **68** is connected to port **69** of rotating housing **27** which communicates at its other end with a port **70**. The open end of port **70** of rotating housing **27** communicates with a sector-shaped recess **72** of stationary housing **45**. Also connected to recess **72** is suction inlet port **73**, which is connected to suction supplying apparatus, not shown. Stationary housing **45** also incorporates an adjacent second sector-shaped cavity **76**, best seen in FIG. 3. Communicating with cavity **76** is compressed air inlet port **77** which is connected to a compressed air supply line, not shown.

Recess **72** and its associated suction means along with ports **70**, **67**, and **69** and flexible tube **68** assure that the label to be applied will be picked up and securely held on the label shoe face by vacuum until the label is to be deposited on the container. The suction apparatus which is connected to suction inlet port **73**, reduces the pressure throughout recess **72** and the ports and tubing which communicate with it. This in turn reduces the pressure in cavity **66** and provides a positive, clean arrangement for securing a label to the surface of the label shoe by atmospheric pressure, without resorting to such undesirable adhesives as glue.

In order to securely deposit the label on to the container at the desired moment, the pressure in cavity **66** is changed from one that is below atmospheric to one that is atmospheric or greater than atmospheric. This is accomplished by means of cavity **76**, compressed air inlet port **77** and the compressed air supply that is connected to port **77**. Cavity **76** is positioned at the angular point where the rotating label shoe comes in contact with the container, and cavity **76** extends through an arcuate distance that approximates the surface contact between the shoe and a container.

In operation, one of the inlet ports **70** of rotating housing **27** will pass out of communication with suction exposed cavity **72** and into communication with cavity **76** which is exposed to compressed air. Exposure of the tubing arrangement of each of label shoe to the compressed air cavity will cause the pressure in cavity **66** of each label shoe to be increased to one that is greater than atmospheric. Since surface **65A** comprises an air pervious material, the compressed air will force the label away from the label shoe and onto the container. It should be apparent that this arrangement provides a clean and efficient positive label pickup, label retention, and label transfer directly to the container.

FIG. 4 shows a top plan view of the labeling machine of FIG. 2 with the deck plate **21** removed, thereby clearly exhibiting cam track **59** in plate **43**. Since shafts **33**, **34**, and **35** are pivotably journaled in rotating housing **27**, these shafts rotate about shaft **28** at a constant speed in a circular path represented by dotted line **80**, having a

radius represented by R_2. As previously described, each pickup label shoe is fixedly secured to its respective pivoting shaft, and each shaft incorporates a bracket, keyed at the base of the shaft, and incorporating a gear tooth section and a cam roller assembly.

Cam roller assembly **55**, comprising an integral arm **60** and a cam follower roller **61**, has one end of arm **60** fixedly mounted to a bracket **46** which is keyed to shaft **33** and incorporates a gear portion **51**. Cam roller **61** is rotatably mounted to the other end of arm **60** and positioned for cooperation with cam track **59**.

Cam roller assembly **56**, comprising integral arm **62** and cam roller **63**, has one end of arm **62** fixedly mounted to bracket **52** which is keyed to shaft **34** and incorporates gear tooth portion **54**. Cam roller **63** is rotatably mounted to the other end of arm **62** in position for cooperation with cam track **59**.

Similarly, cam roller assembly **58**, comprising integral arm **74** and roller **75**, has one end of arm **74** fixedly mounted to bracket **53** which is keyed to shaft **35** and incorporates gear tooth portion **57**. Cam roller **75** is rotatably mounted to the other end of arm **74** and positioned for cooperation with cam track **59**.

In operation, cam roller assemblies **55**, **56**, and **58** control the pivoting movement of their respective shafts along with the consequent simultaneous pivoting movement of the label pickup shoes carried by those shafts. Through about 150° of the rotation of each label pickup shoe, the arcuate label holding surface of the shoe coincides with the circle represented by dotted line **93** having a radius of R_1. Circle **93** is concentric with circle **80**, and by positions of phantom label pickup shoe **85** and shoe **30** are representative of the shoe's circle-conforming position.

During the remaining 200° of rotation, the cam roller assemblies associated with each pivotable shaft cause each shaft to pivot angularly about its own central axis as each shaft constantly rotates about shaft **28** defining circle **80**. The pivoting movement of each shaft causes its associated pickup label shoe to pivot similarly. Since cam track **59** controls the movement of each cam roller assembly and the resulting movement of each label pickup shoe, cam track **59** is designed to cause each label pickup shoe to begin pivoting as it approaches stationary label hopper **90**, advance toward hopper **90** with each point on the surface of each shoe following a cycloidal cusp path until contact is made with the outermost label presented by hopper **90**, move away from hopper **90** along another cycloidal path, and then pivot back to the normal position described above. FIG. 4 illustrates these successive positions.

The beginning stages of each shoe's controlled pivoting movement is represented by phantom shoe **86**, while the final stages of the controlled pivoting motion is represented by shoe **29**. The cycloidal approach of each label pickup shoe is represented by phantom shoe **87** and shoe **31**, the cusp of the cycloidal with the central axis of the label shoe in contact with the central axis of the hopper **90** is represented by phantom shoe **88**, and the cycloidal retreat of the label shoe is represented by phantom shoe **89**.

In the preferred embodiment, every point on the surface of the label shoe approaches the stationary label hopper substantially along a cycloidal path, comes in contact with the hopper at the cusp of the cycloidal, and withdraws from hopper **90** substantially along a second cycloidal path. The cycloidal movement of each label pickup shoe as it approaches and withdraws from the label hopper assures a smooth and continuous rolling contact between the shoe's holding surface and the label to be picked up. With this smooth rolling contact, no lateral forces are placed upon the label and, therefore, no label wrinkling or label tearing occurs.

To provide further assurance of a smooth rolling contact between the label shoe and the label to be picked up, stationary gear teeth **65** of upstanding bracket **64**, shown in FIG. 2, mesh with the gear portion of the brackets which are keyed to the base of each pivoting shaft. While the cam roller and track arrangement induces a cycloidal motion to the label pickup shoes, the gear teeth arrangement provides a positive guide for the movement of the shoe across the label face while assuring the desired amount of contact between the soft, air pervious surface of the shoe and the label to be picked up. This cooperatively associated gear tooth arrangement, while helpful in providing smooth rolling motion of the shoe across the label, is an optional feature since the cam roller assembly can be designed to effectively control the desired smooth, rolling, cycloidal motion of the label shoes.

A schematic representation of the various stages of the cam controlled label shoe's approach and withdrawal from the stationary label hopper is presented in FIG. 5. In the preferred embodiment, essentially every point along the label contacting surface of the shoe approaches and withdraws from the stationary label hopper along a path that closely approximates a cycloid, while contacting the top label at the cusp of the cycloid. This cycloidal motion is substantially identical to the motion of all points on the periphery of a cylindrical container as the container rolls over the top label.

Assuming the cylinder has a radius of R' (FIG. 4), the points on the cylinder define a cycloidal path **151** (FIG. 5) as the cylinder approaches and passes the right edge of top label **101**. Similarly, the points of the cylinder define a cycloidal path **152** as the left edge of the label is approached and passed. This type of "rolling" motion is preferred, and far surpasses in effectiveness the prior art label pick-up shoe apparatus since substantially all skidding or sliding movement is eliminated and label wrinkling and tearing are consequently prevented.

For exemplary purposes, the guiding controlled movement of cam roller **75** in cam track **59** is depicted through twelve sequential steps in FIG. 5. The central axis of the cam roller **75** is represented by *"x,"* while the central axis of the angularly pivoting shaft **35**, shown in FIG. 4, is represented by *"y."* Since pivoting shaft **35** rotates about shaft **28** in a fixed radius, represented by R_2, axis *y* of FIG. 5 is positioned on circle **80**, whose radius is R_2, throughout the sequential steps. The label-holding surface **65A** of the label shoe is represented throughout the sequential steps by the arcuate shaped lines of FIG. 5 and is defined therein by the numerical step shown with *"a"* representing the leading edge, *"b"* representing the center, and *"c"* representing the trailing edge of the arcuate shaped surface. As fully described above, each arcuate line represents equal sectors of a circle which has a radius of R_1 forming label-holding surface **65A**.

The cycloidal path approach and withdrawal of the label-holding surface is best seen by referring to the center point of the arcuate surface. By following path **105** which connects center point *b* for positions **3** through **15**, the cycloidal approach and withdrawal with its cusp-shaped, single-point contact with the top label surface **101** can be clearly seen from position **65A** to **12***b* in FIG. 5. The cycloidal approach, single-point contact, and cycloidal withdrawal assures that no lateral forces will be generated and provides a clean, rolling type contact between the label-holding surface and labels of the label hopper.

Path **106** represents the leading edge *"a"* of the label holding surface as the shoe approaches the label hopper from position **4** through position **15**. As can be clearly seen from comparing path **106** with path **151**, the leading edge of the label shoe follows the cycloidal path from **6***a* to **12***a*. Prior to position **6**, the label shoe is being pivoted from its "normal" position to its label pick-up position. Similarly, after position **12**, the label shoe is being pivoted from its final label pick-up position back

to its "normal" position. The single-point contact between the leading edge *a* of the shoe and the top label **101** is made at point *7a*, which coincides with the cusp of the cycloid.

Similarly, the cycloidal motion of the other "trailing" edge of the label shoe, represented by "*c*," can be clearly seen by comparing path **107** with path **152**. Path **107** represents the path edge "*c*" of the label shoe follows from positions **3** to **14**. As with leading edge "*a*" of the label shoe, edge "*c*" follows the cycloidal path from positions **6** to **12**, while contacting top label **101** at position **11***c* at the cusp of the cycloid.

It is evident from FIG. 5 that every point on the label holding surface approaches and withdraws from the top label of the stationary label hopper along a cycloidal path, while contacting the top label at the cusp of the cycloid. This cycloidal motion at every point must occur since the camming arrangement causes the label shoes to follow a substantially perfect cycloidal path from position **6** to position **12** and the first cycloidal cusp, single-point contact is made at position **7** while the last contact is at position **11**. Consequently, all remaining cycloidal cusp, single-point contacts between the label shoes and the top labels must be made between positions **7** and **11**, when the label shoes are following the cycloidal path. The resulting effect of this cycloidal motion of every point is a "rolling" movement of the label holding surface across the top label of the label hopper.

Path **108** exemplifies the movement of a point "*p*" on the surface of the label shoe as it travels from position **6** to position **12**. As can be clearly seen, point *p* approaches and withdraws from the top label of the label hopper along a cycloidal path, while contacting the top label at a single point at the cusp of the cycloid. Regardless of the exact shape of a particular path which a particular point follows as it initially approaches, and finally withdraws from the top label of the label hopper, every point on the label holding surface of the label shoe will contact the top label of the label hopper at a single point on a path which is equivalent to or closely approximates the cusp of the cycloid.

In the preferred embodiment, the contacting points between the label holding surface of the label shoe and the top label of the label hopper lie in a single plane. However, because of manufacturing imperfections and wear during use, the contacting points might not all lie in the same plane. Such an occurrence will have no detrimental effect, since the constructions of the label hopper and the label holding shoe incorporate compensating factors. The air-pervious label holding surface of the label shoe is made of a soft pliable material, while the label hopper is provided with springs or other resilient label-biasing means to maintain the stacked labels at the top of the label hopper with sufficient air-film separation from each following label to assure easy label pick-up. The combination of these two features allows the contacting tangent rolling plane of the label shoe and the presentation plane of top label to "overlap" sufficiently to compensate for any inherent mechanical imperfection, while assuring positive label pick-up and holding.

Furthermore, the desired rolling contact between the label holding surface and the top label of the label hopper is assured by the inter-action between gears **57** and **65**, shown in FIG. 2. As previously described, the action of these optional gears provides another positive, controlling guide to assure non-skid rolling contact between the label holding shoe and top label.

As will be evident to one skilled in the art, various modifications can be made to this invention without departing from the concept herein disclosed. Examples of such variations include, without limitation, employing a connecting arm which is shorter than the one previously disclosed. This changes the shape of the kidney-shaped cam track, and allows it to become more circular. Depending upon the manufacturing costs involved in holding close tolerances on an irregularly shaped surface, the more circular track may be desirable.

Also, a camming arrangement, similar to the arrangement provided for label pick-up, can also be employed during label transfer. This type of label shoe pivoting with its resulting rolling contact would preferably be used for supplying labels to advancing and simultaneously revolving cylindrical containers to assure secure label transfer from the shoe to a substantial peripheral area of the container.

In FIG. 6, another variation for the cam roller assembly and cam track is shown. Instead of using a single cam roller, a single arm, and a single cam track, the forces generated on the cam roller and the arm can be substantially reduced by employing a cam roller assembly **120** which cooperates with cam tracks **121** and **122**. Cam roller assembly **120** incorporates V-shaped arm **123** and cam rollers **124** and **125** which are rotatably mounted at the end of V-shaped arm **123**. Cam roller **124** is mounted within cam track **121** while cam roller **125** is mounted within track **122**. Center point **127** is connected to the particular pivoting shaft to control its movement as described above. The use of two cam rollers and two cam tracks reduces the forces generated with the single cam roller and track arrangement, by allowing only the outside surface of each track to control the movement of the cam follower roller cooperatively associated therewith. It is evident that any shape of arm, such as a straight bracket, can be adapted for use with two or more cam rollers.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently obtained and, since certain changes may be made without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative so as to obtain the benefit of all equivalents to which the invention is fairly entitled.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Apparatus for picking up indicia-bearing labels from a stationary label supply stack and directly applying the labels to containers comprising:

(A) a cycle-driven, pivotal shoe having at least one curved label-holding surface;

(B) guide means moving the shoe along an advance-and-retreat path of movement and presenting the label-holding surface to the indicia-bearing surface of the label;

(C) means for securely retaining one label on the label-holding surface following contact between the surface and the label;

(D) means for applying glue to the non-indicia-bearing surface of the retained label before its direct transfer to the container; and

(E) said shoe being presented for directly applying the retained glue-coated label to the container

thereby eliminating the need for intermediate transfer of the label to a reorientation drum before application of the label to the container.

2. Apparatus for picking up labels from a stationary label supply stack and applying the labels to containers, comprising:

(A) a cycle-driven, pivotal shoe having at least one curved label-holding surface;

(B) a cam follower assembly integrally connected to the shoe and forming a unitary rigid structure therewith;

(C) a cam track cooperatively associated with the cam follower assembly to pivot the shoe's label-holding

surface with at least one point on the surface approaching the label supply stack along a substantially cycloidal cusp-shaped path, contacting the top label of the label supply stack substantially at the cusp of the cycloid without tangential skidding motion, and withdrawing from the label supply stack along the cycloidal cusp-shaped path;

(D) means for securely retaining one label on the label-holding surface following contact between the surface and the label;

(E) means for applying glue to the retained label before its transfer to the container; and

(F) said pivotal shoe being presented for directly applying the retained glue-coated label to the container.

3. Apparatus as defined in claim **2**, wherein the cam follower assembly comprises:

(a) a connecting arm integrally joined to the label-holding surface, and

(b) a follower roller rotatably mounted to the connecting arm and cooperatively associated with the camming surface.

4. Apparatus as defined in claim **3**, wherein said cam follower assembly incorporates at least two rollers rotatably mounted to the connecting arm.

5. Apparatus as defined in claim **2**, wherein the cam track is cooperatively associated with the cam follower assembly and shoe to pivot said shoe with every point on the label-holding surface thereof approaching the label supply stack along a substantially cycloidal cusp-shaped path, contacting the top label of the label supply stack substantially at the cusp of the cycloid and withdrawing from the label supply stack along the cycloidal cusp-shaped path.

6. Apparatus as defined in claim **2**, wherein the label-holding surface of said shoe means comprises a soft, pliable, air pervious material.

7. Apparatus as defined in claim **6**, wherein the retaining means comprises a tubing arrangement communicating with the air pervious material on said surface and connectable to a suction supply line, allowing the label to be securely held to the surface by means of atmospheric pressure.

8. Apparatus as defined in claim **6**, further comprising a tubing arrangement communicating with the air pervious material and connectable to a compressed air supply for a positive label displacement force during transfer of the label from the holding surface to the container.

9. Apparatus as defined in claim **2**, wherein the glue applying means comprises a glue supply roller adapted to spread glue onto a surface of the label prior to its transfer to the container.

10. Apparatus as defined in claim **2** further comprising:

(G) a gear sector bracket integrally connected with the label-holding surface; and

(H) a stationary toothed rack cooperatively associated with the gear sector bracket, providing a positive guiding controlled movement of the label-holding surface across the label supply stack during label pick-up.

11. Apparatus as defined in claim **2**, further comprising:

(G) a cycle-driven housing; and

(H) at least one supporting shaft, pivotably journaled in the housing and integrally connected to the cam follower assembly, while rigidly supporting the shoe means for presentation of the label-holding surface of the shoe means to the indicia-bearing surface of the label, to provide direct transfer of the label to the container without an intermediate transfer.

12. Apparatus as defined in claim **11**, wherein the shoe means is adjustably mounted to the supporting shaft.

13. Apparatus as defined in claim **2**, wherein the cycle-driven, pivoting shoe incorporates a pivoting axis sweeping a circular path about a rotation axis during each driving cycle.

14. Apparatus as defined in claim **13**, wherein the shoe's curved label-holding surface coincides with the path periphery of the cycle-driven shoe in non-pivoting tangent rolling juxtaposition with the periphery of said container at a label-applying station in the cycle of shoe-rotation where the peripheral tangent shoe velocity substantially matches the linear velocity of said container.

15. Label transfer apparatus for picking up and applying labels to containers, comprising:

(A) a cycle-driven, pivotal shoe having at least one curved label-holding surface;

(B) a cam follower assembly integrally connected to the shoe and forming a unitary rigid structure therewith;

(C) a cam track cooperatively associated with the cam follower assembly to pivot the shoe's label-holding surface with at least one point on the surface approaching at least one label transfer area along a substantially cycloidal cusp-shaped path, contacting the label transfer area substantially at the cusp of the cycloid without tangential skidding motion, and withdrawing from the label transfer area along the cycloidal cusp-shaped path;

(D) means for securely retaining one label on the label-holding surface;

(E) means for applying glue to the retained label before its transfer to the container; and

(F) said pivotal shoe being presented for directly applying the retained glue-coated label to the container.

16. Apparatus as defined in claim **15** wherein the cam track:

(A) produces the cusp-shaped path at a label pick-up area; and

(B) pivots the shoe's label-holding surface at a label-applying area forming a common tangent zone of the holding surface and the container which progresses across the container's external surface.

References Cited

UNITED STATES PATENTS

3,591,168	7/1971	Zodrow	156—571 X
2,626,074	1/1953	Vogt	156—571 X
2,520,628	8/1950	Elsner	156—571

PHILIP DIER, Primary Examiner

U.S. Cl. X.R.

156—571