United States Patent

Burton

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[45] **Apr. 11, 1972**

[54] LABEL IMPRINTING AND APPLYING MACHINE AND METHOD

[72] Inventor: **Robert Burton,** Philadelphia, Pa.

[73] Assignee: **Avery Products Corporation,** San Marino, Calif.

[22] Filed: **Jan. 9, 1970**

[21] Appl. No.: **1,719**

[52] **U.S. Cl.**.....**156/541,** 156/361, 156/384, 156/584

[51] **Int. Cl.**.....**B65c 9/18,** B32b 31/20

[58] **Field of Search**.....156/351, 285, 361, 363, 364, 156/384, 386, 387, 388, 385, 459, 468, 479, 344, 540, 541, 542, 584; 221/22

[56] **References Cited**

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Primary Examiner—Benjamin A. Borchelt
Assistant Examiner—James M. Hanley
Attorney—Leonard L. Kalish

[57] **ABSTRACT**

A label imprinting and applying machine and method for sequentially imprinting die-cut pressure-sensitive labels carried on a backing tape drawn from a roll thereof and for synchronously applying the so imprinted labels to articles or packages of merchandise to be labeled thereby, such machine including a tape-carried label supply, a tape bed, a printer disposed above the plane of the tape bed, including a vertically reciprocable plunger and a type-bearing printer head carried thereby and an impression pad therebeneath in the plane of the tape bed, and a type inker disposed above the tape bed, an angularly adjustable label peeler immediately adjacent the impression pad of the printer, around which peeler the tape extends, a tape take-up rearwardly of the label peeler for intermittently transporting the labels through the printer and past the peeler, a pneumatic label applicator having a suction head disposed in operative juxtaposition to the peeled label, for vacuum-engaging the payed-out label and applying it to an article or package of merchandise, a label sensor disposed above the tape bed in operative juxtaposition to the labels thereon for starting and stopping the tape take-up, and mechanical, electrical, magnetic and pneumatic means for cycling the label applicator in timed relation to the label payed-out from the peeler and electromechanical means for cycling the printer and the inker in timed relation to the label transport cycle, and means for adjusting the location of the label sensor longitudinally of the tape bed and means for adjusting the label peeler and the label applicator in a direction longitudinally of the tape bed, whereby the machine can be adjusted for label lengths ranging from a length substantially less than either of the two adjustments to a length more than twice the length of either of the two adjustments.

10 Claims, 35 Drawing Figures

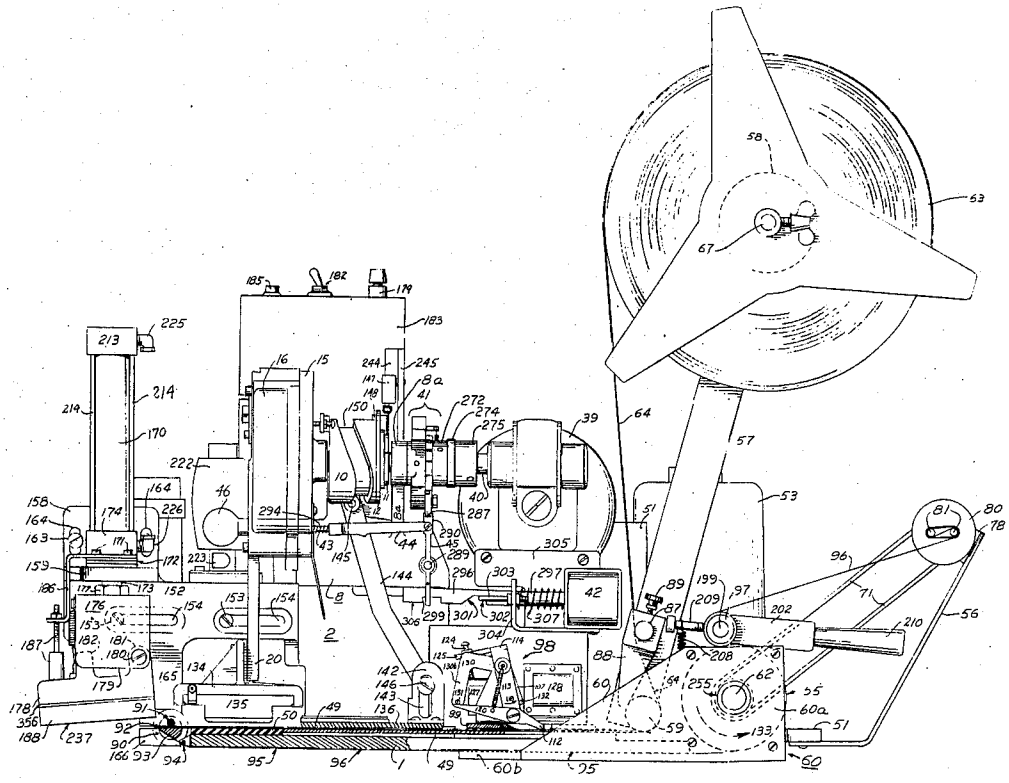
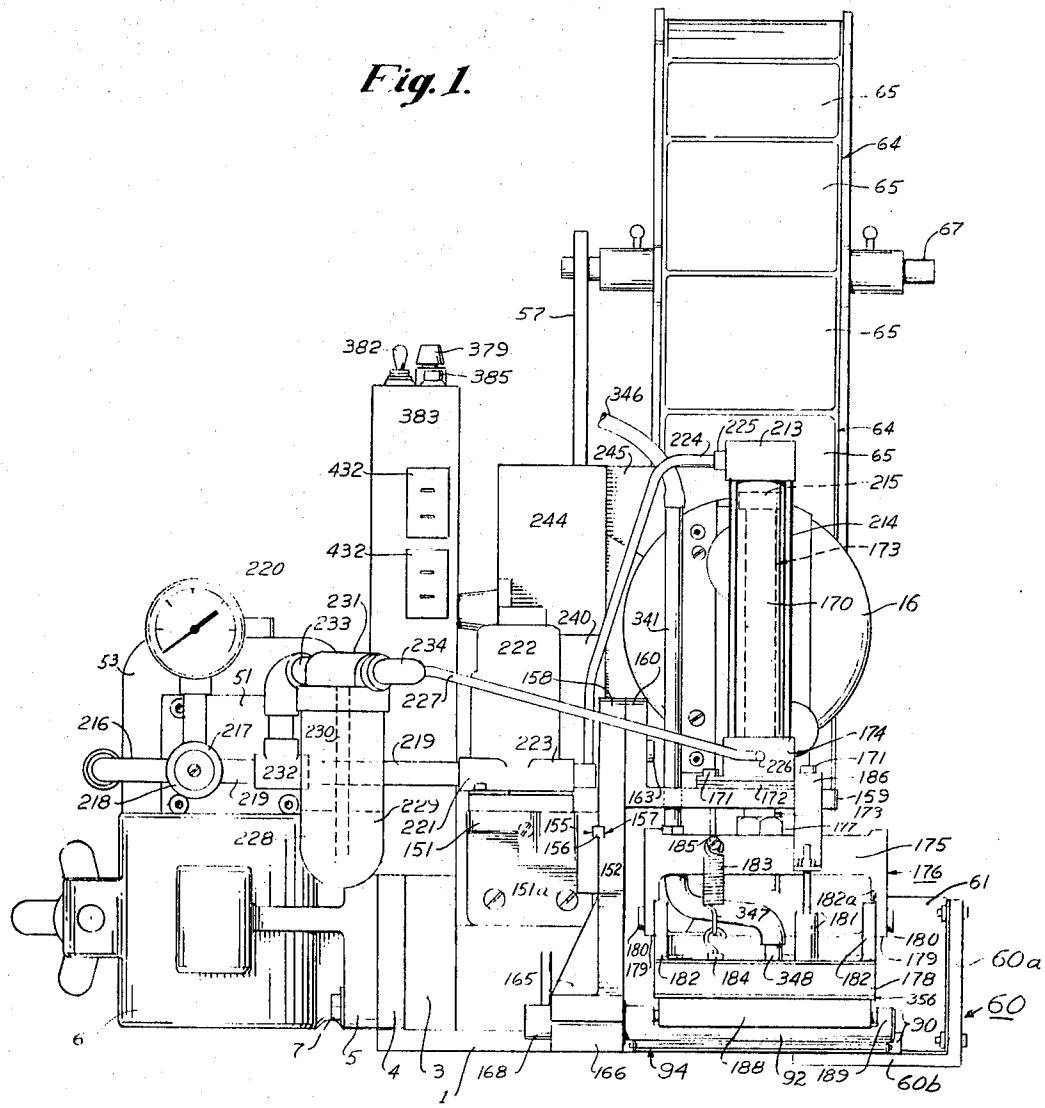


Fig. 1.



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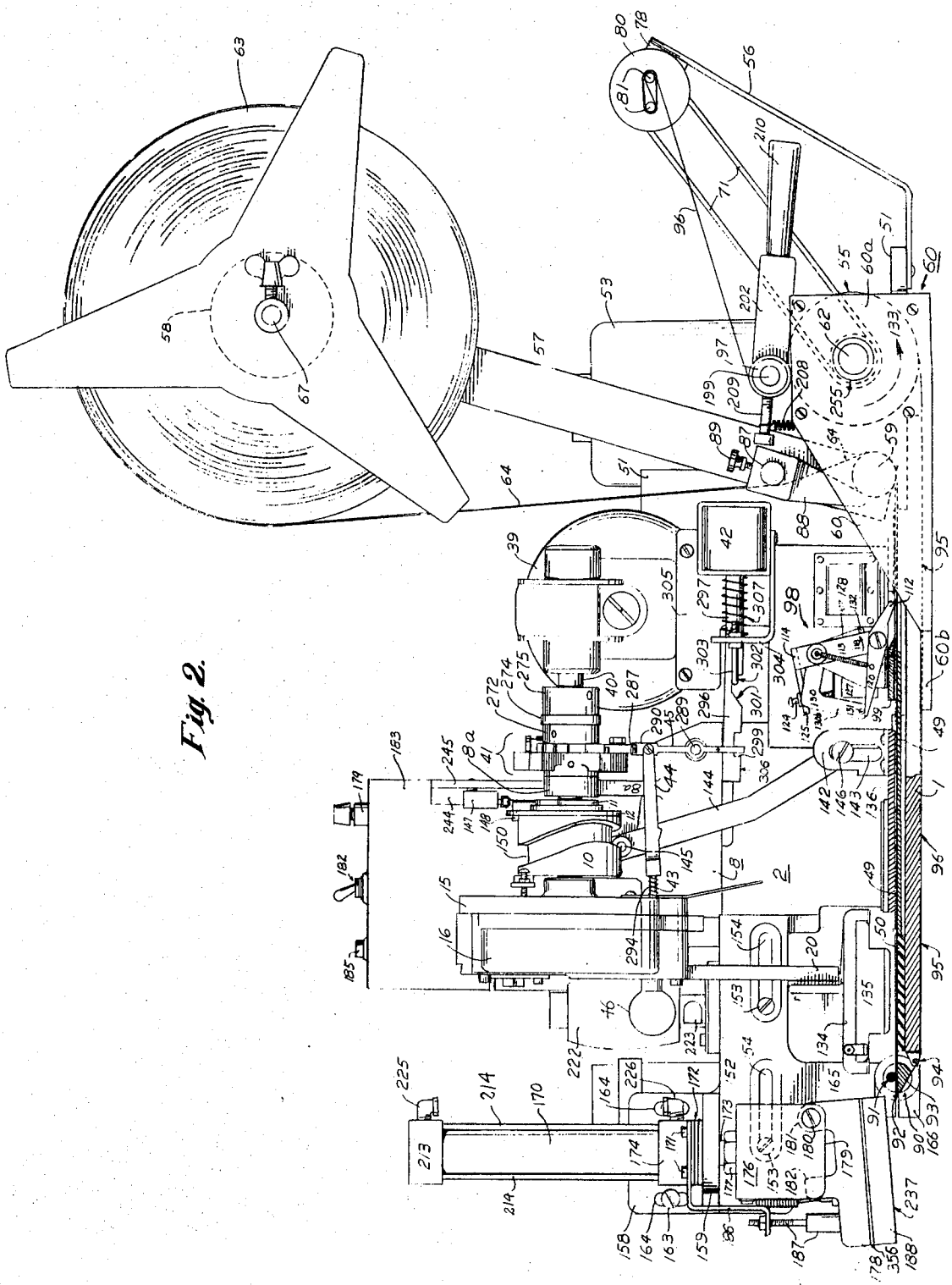


Fig. 2.

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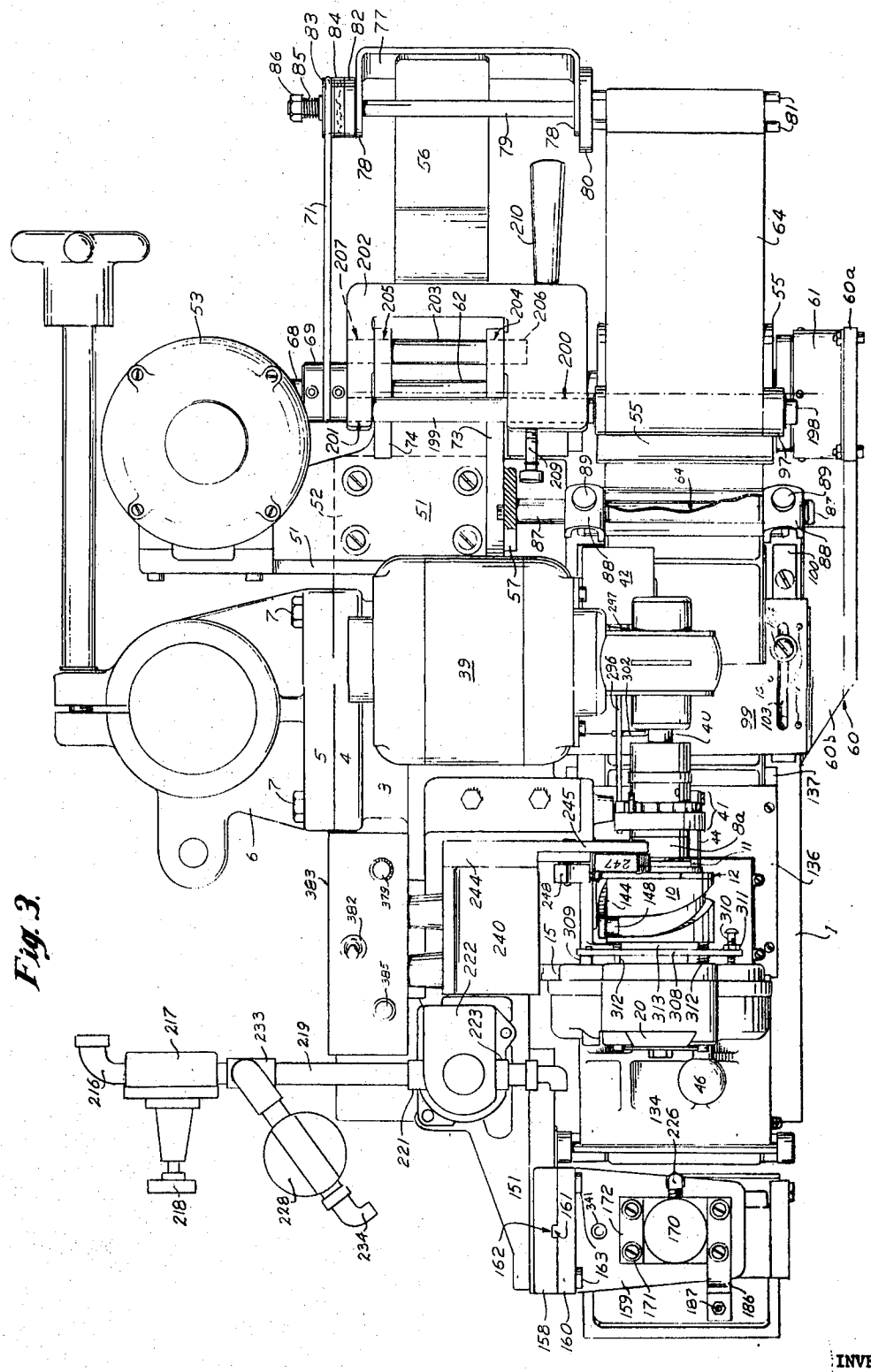


Fig. 3.

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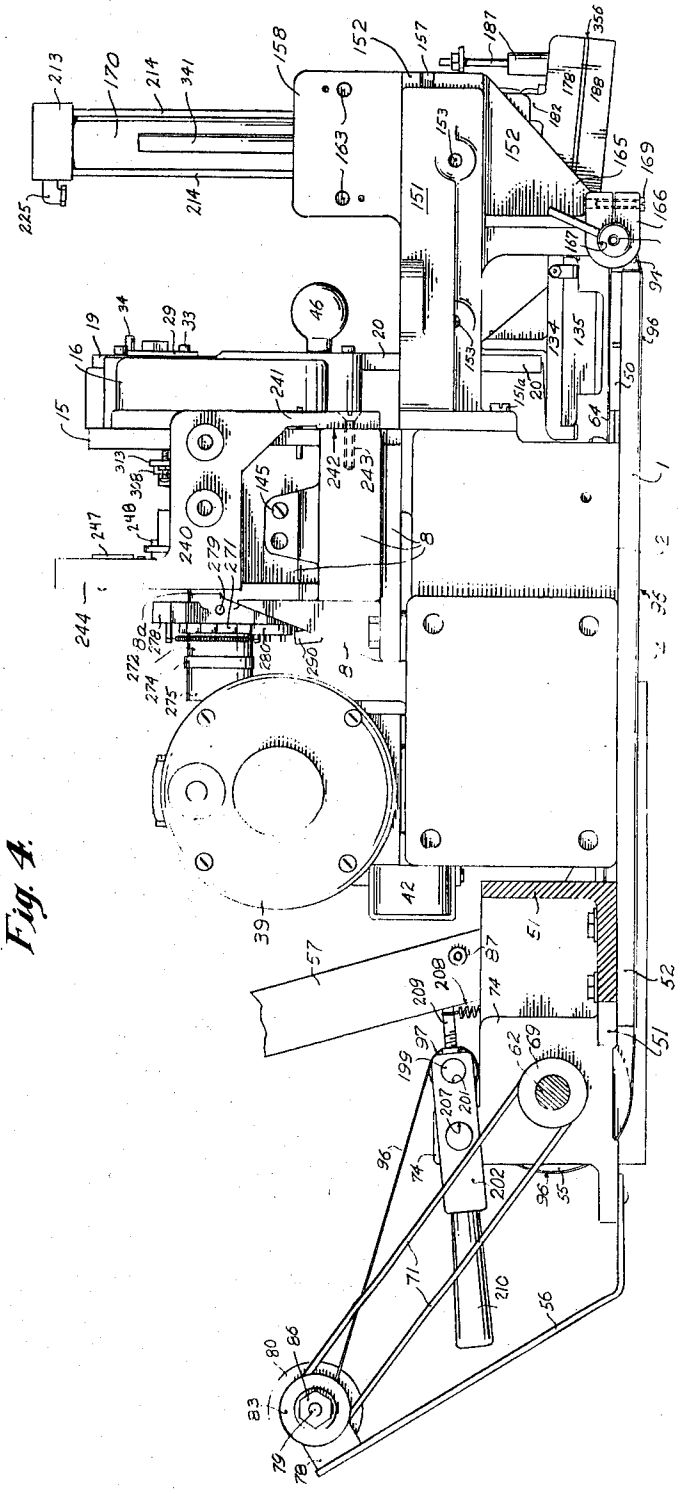


Fig. 4.

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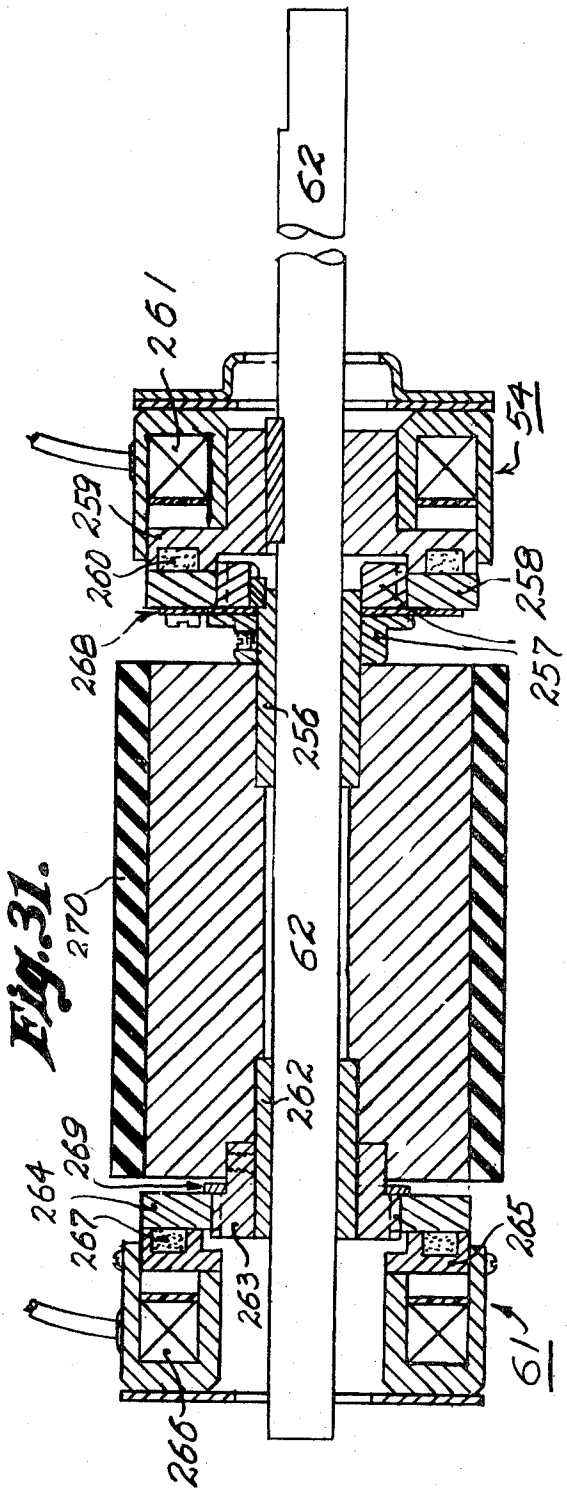


Fig. 31.

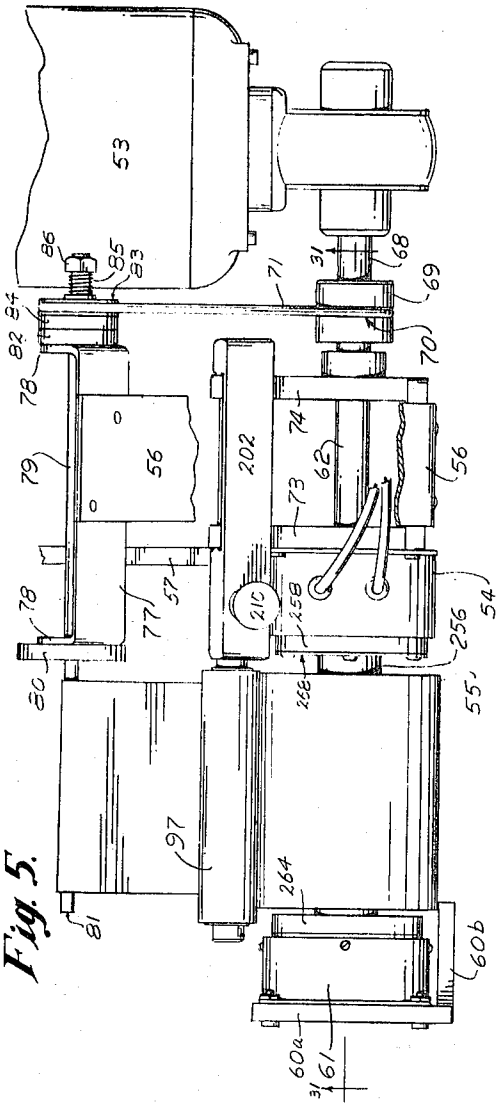


Fig. 5.

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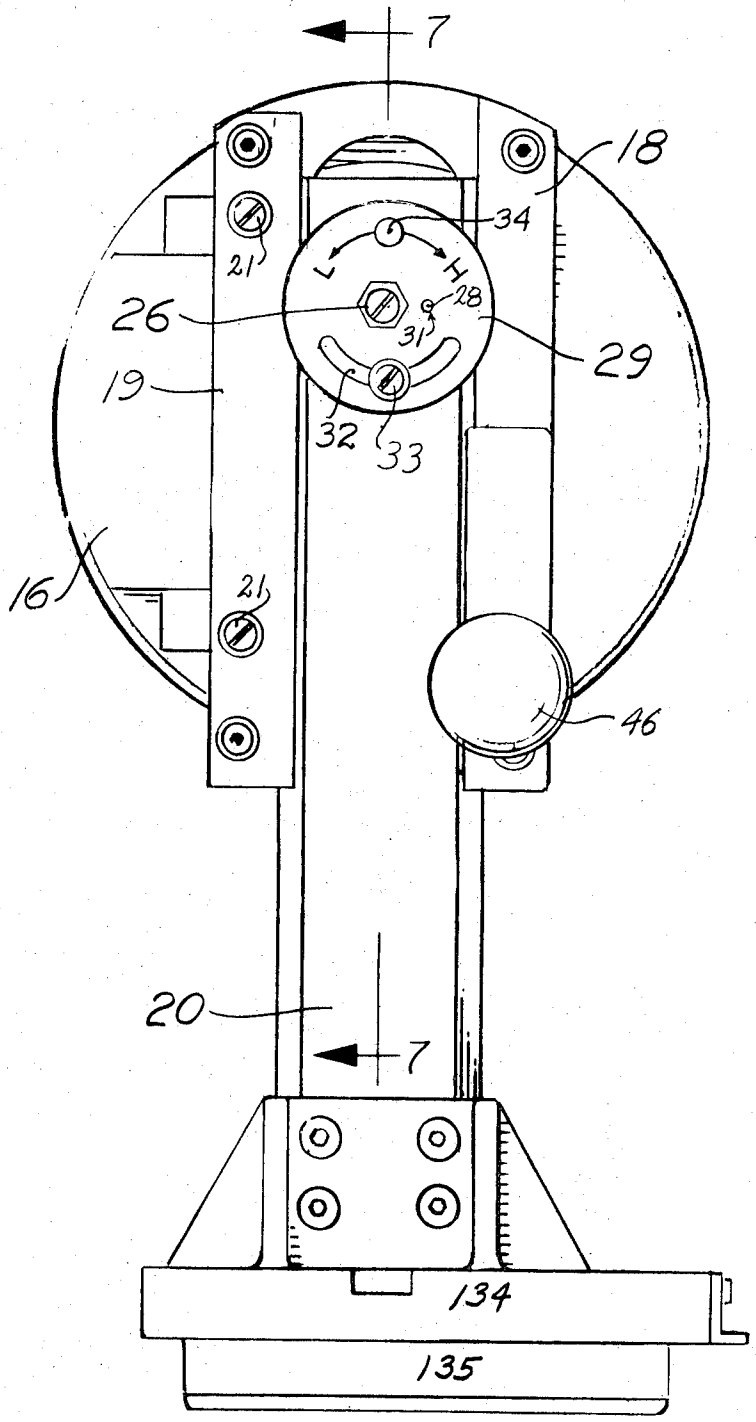


Fig. 6.

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Fig. 7.

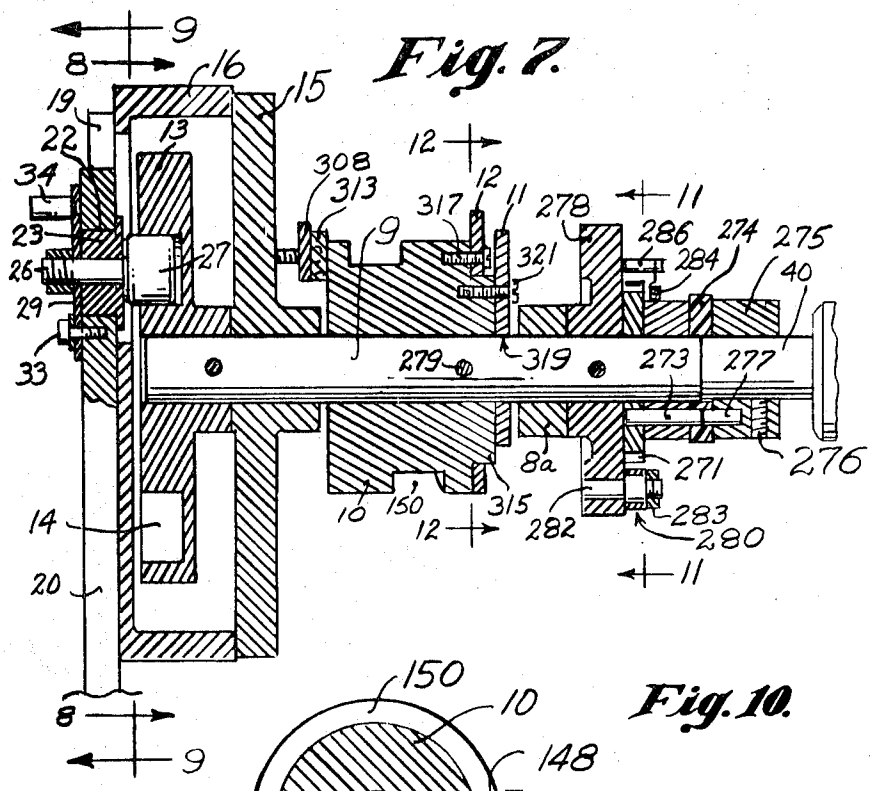


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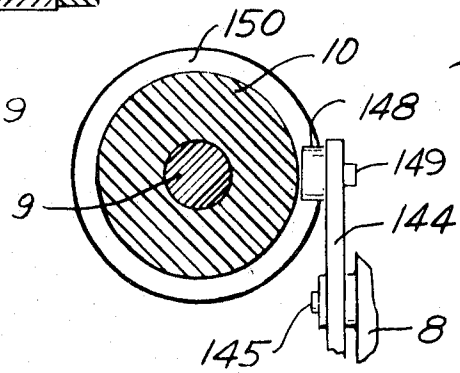
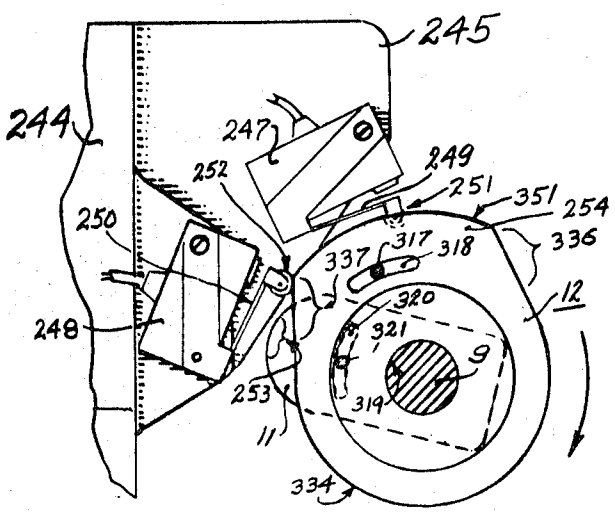


Fig. 12.



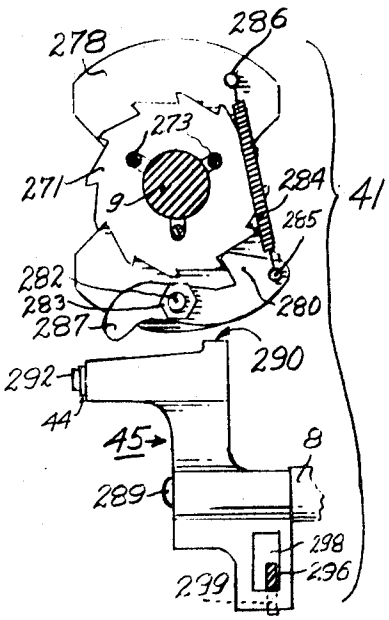
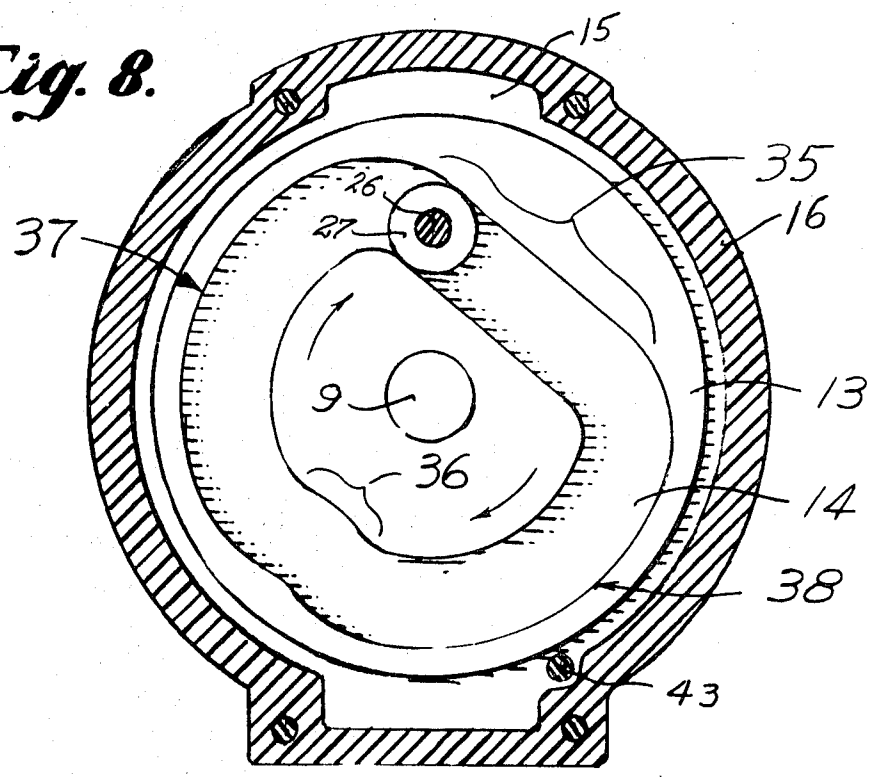


Fig. 11.

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Fig. 8.



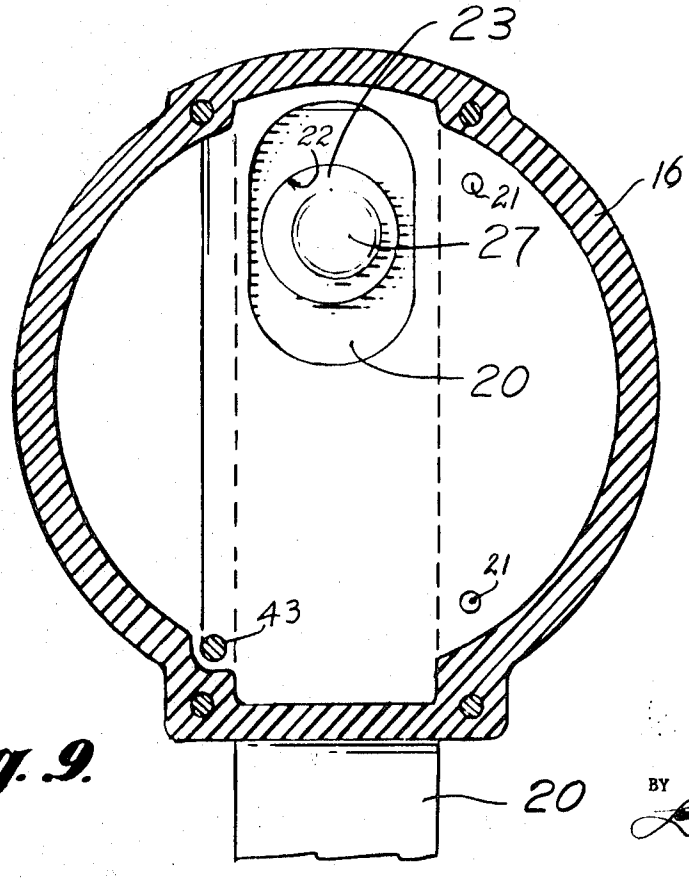


Fig. 9.

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Fig. 13.

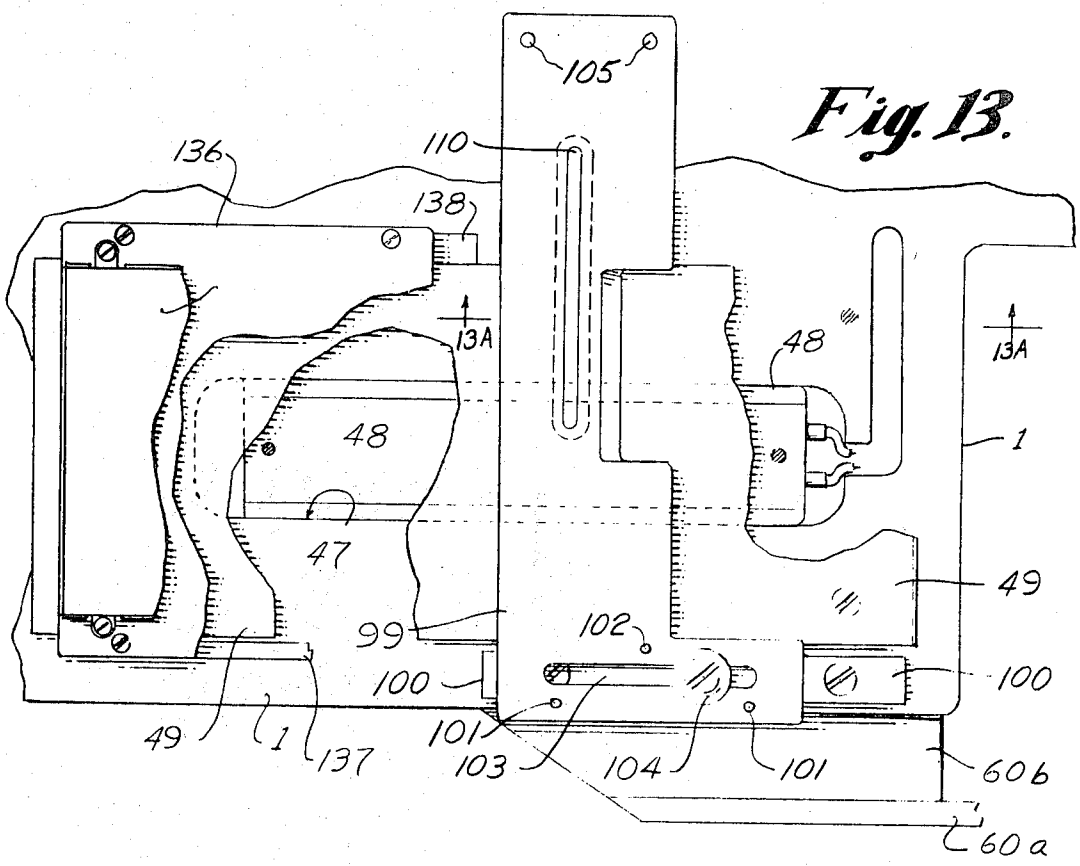
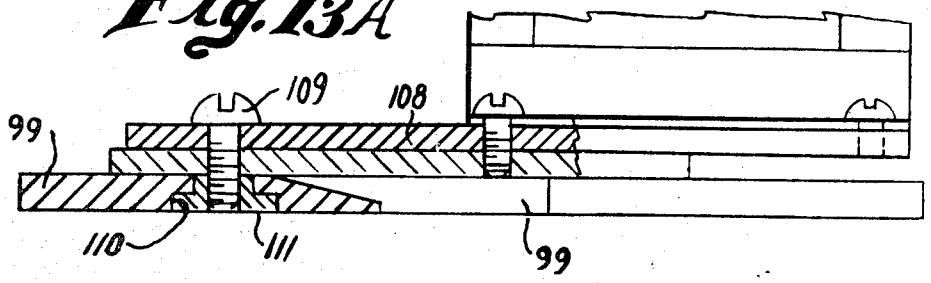


Fig. 13A



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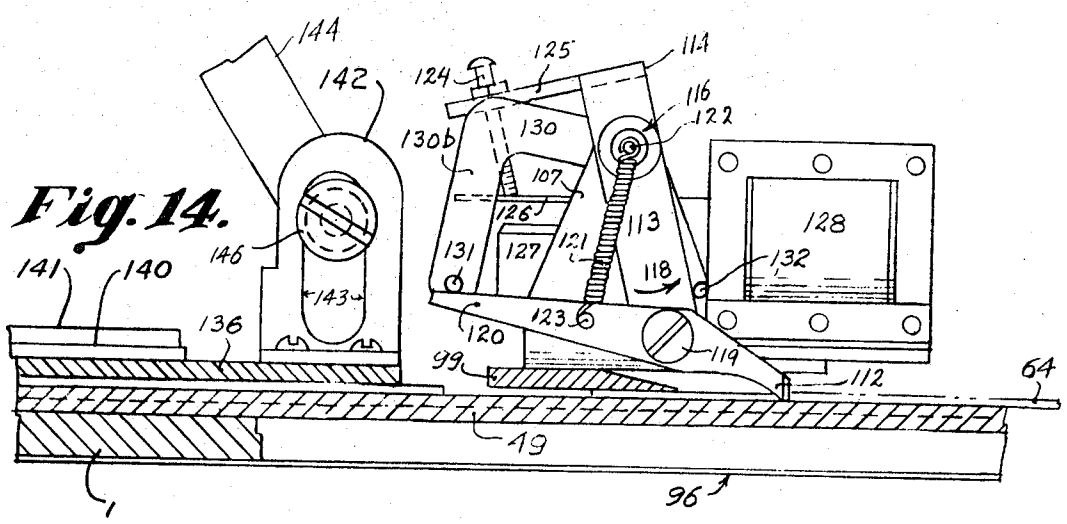


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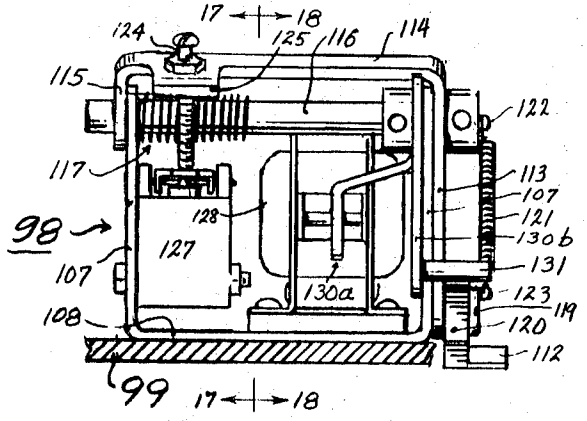


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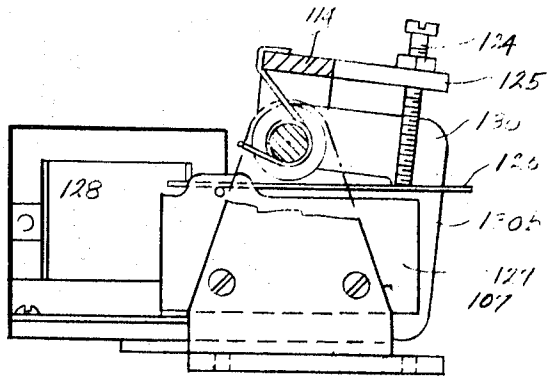


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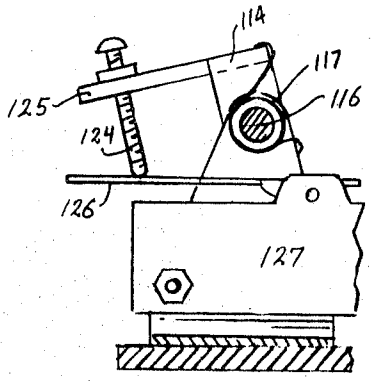


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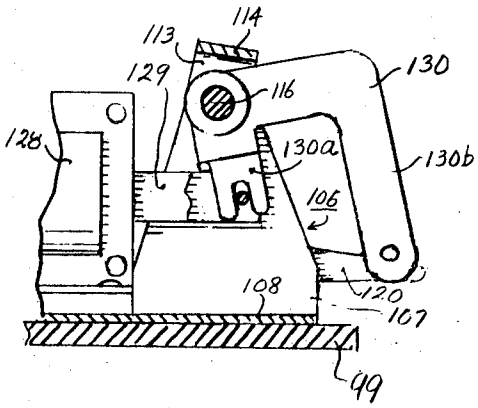
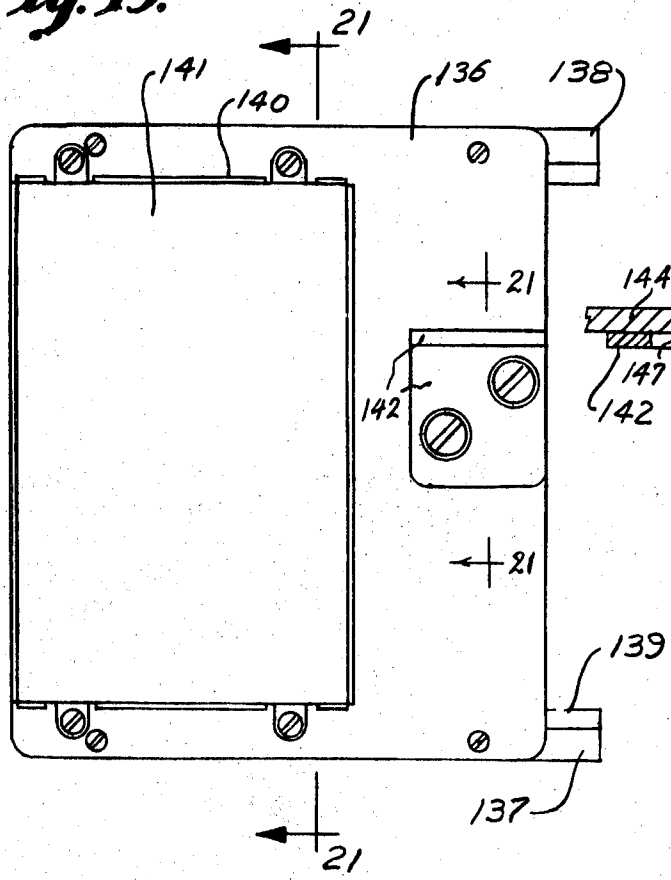


Fig. 18.

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Fig. 19.



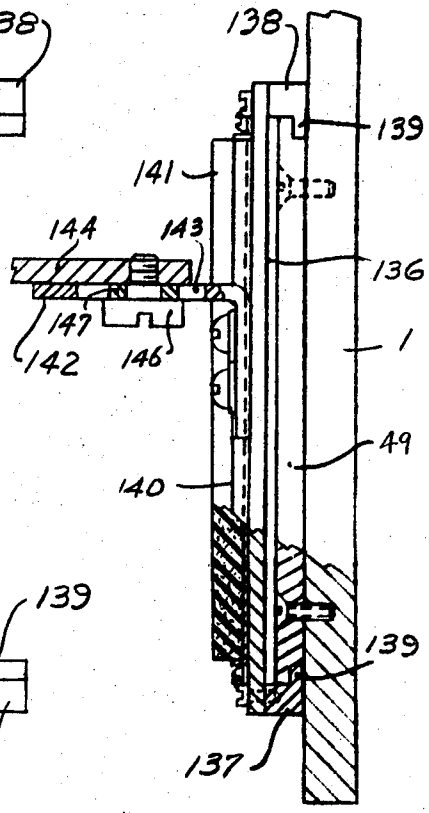


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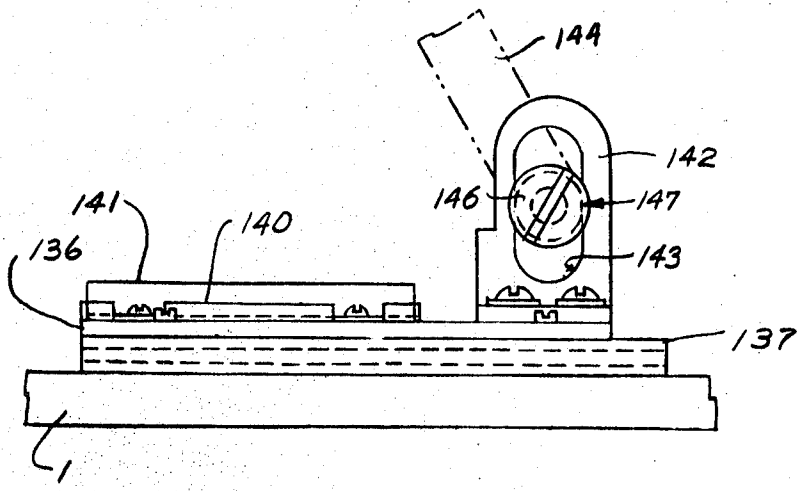


Fig. 20.

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Fig. 22.

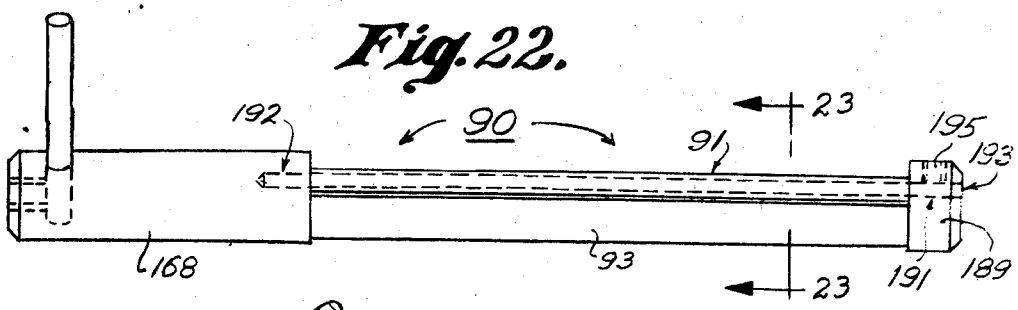
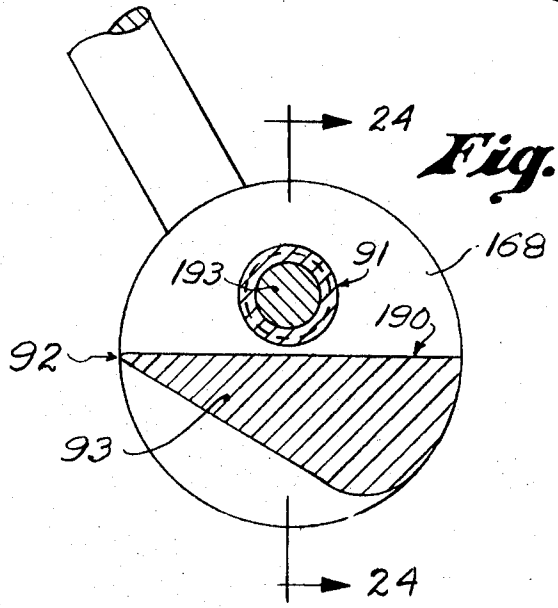


Fig. 23.



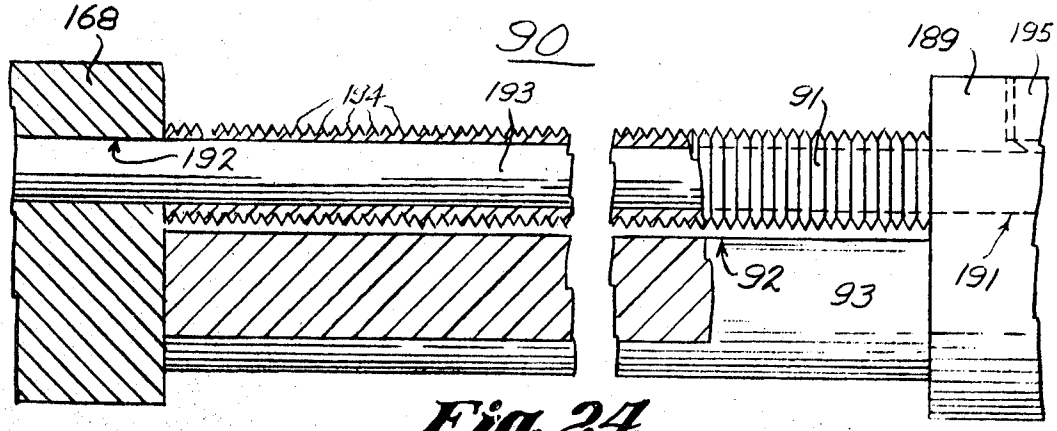


Fig. 24.

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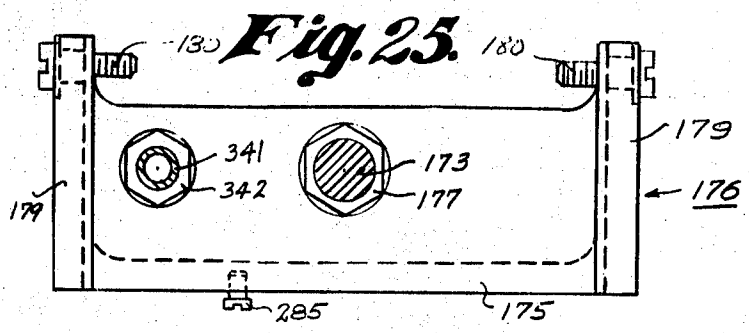


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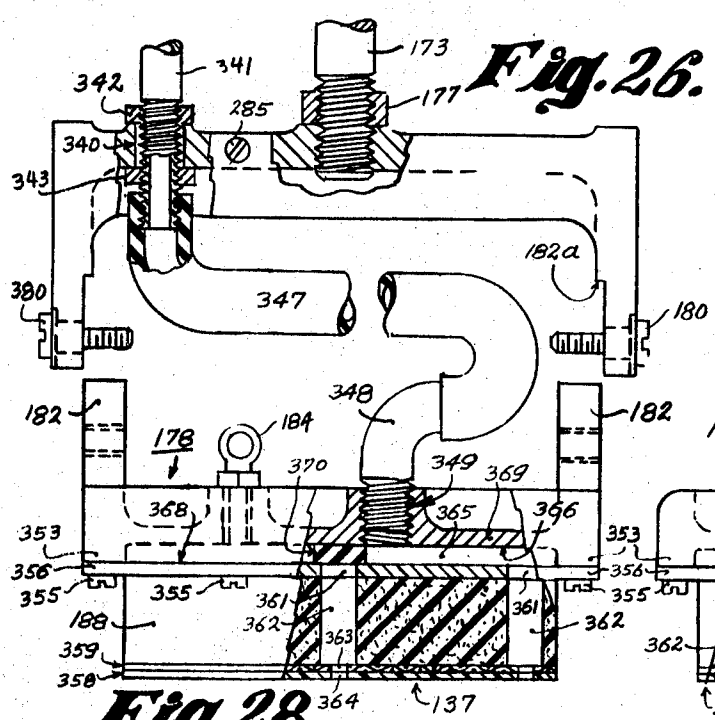


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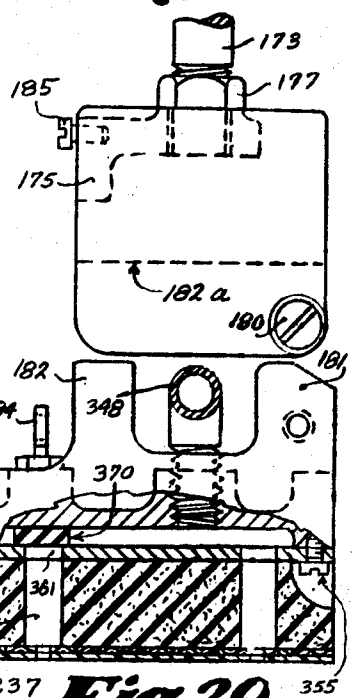


Fig. 27.

Fig. 28.

Fig. 29.

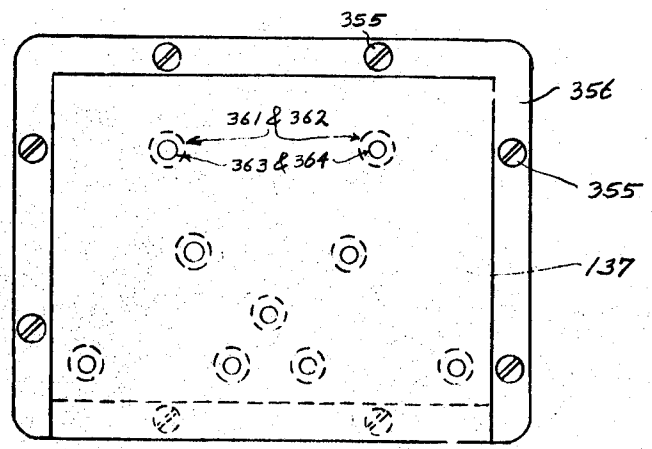
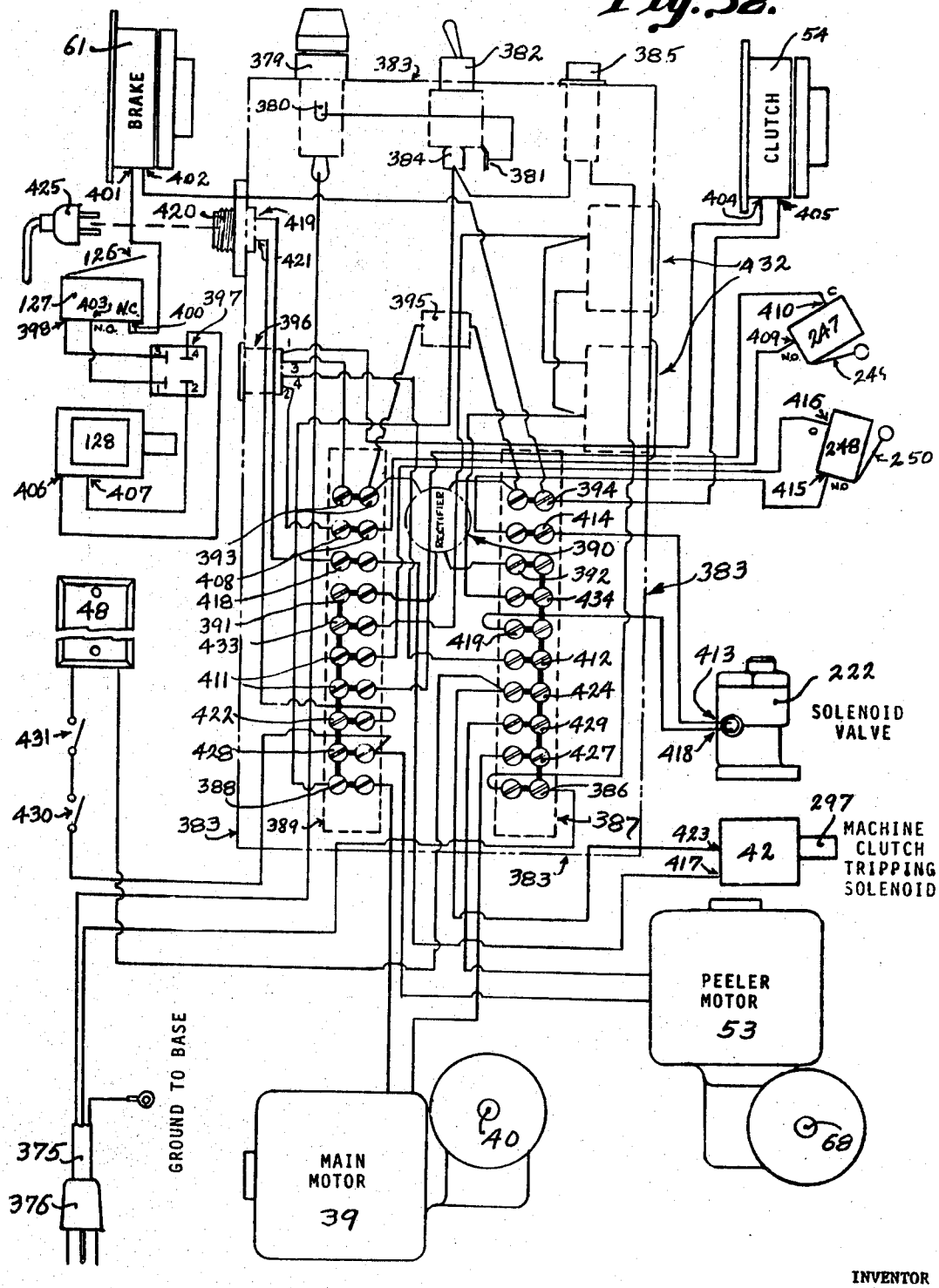


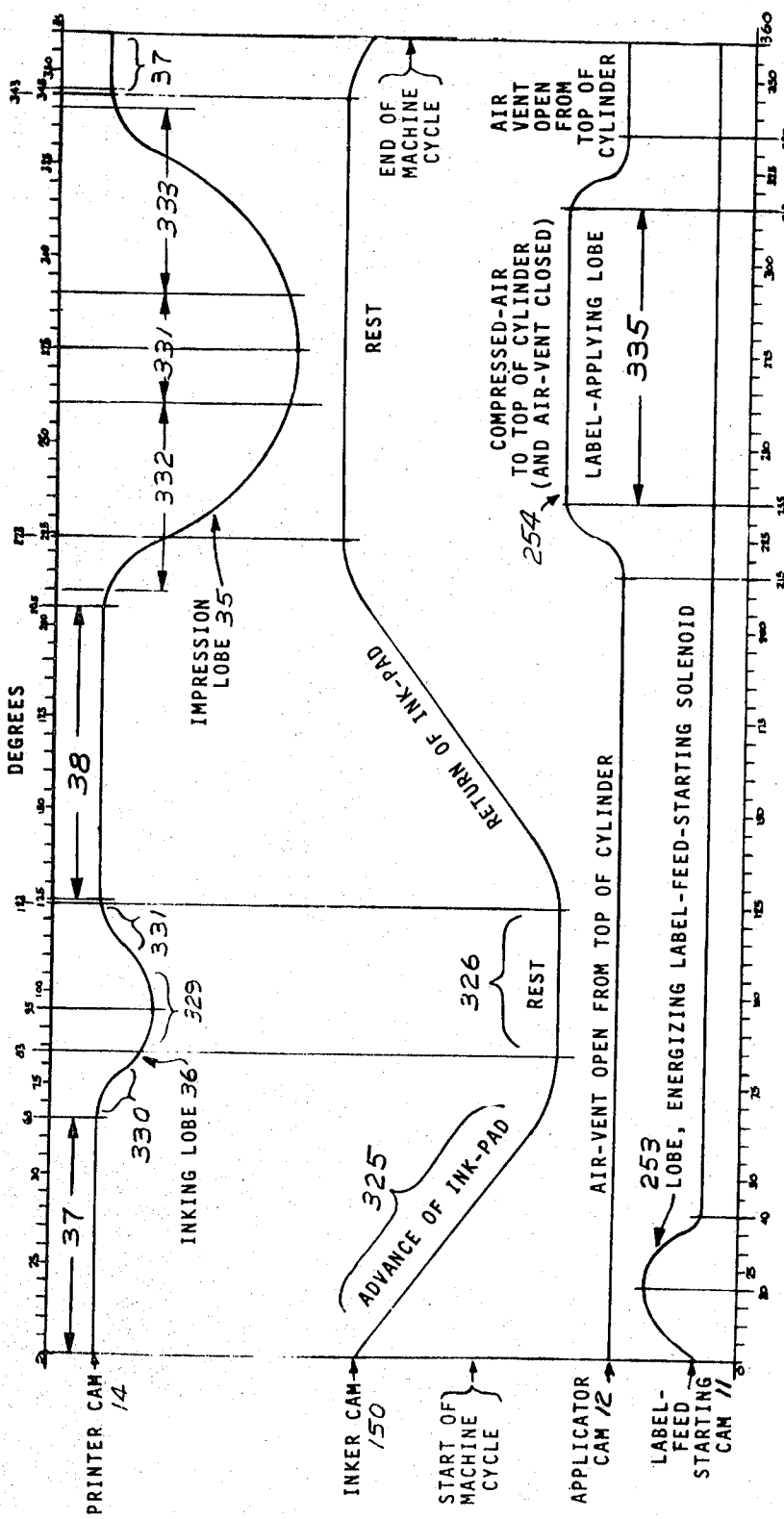
Fig. 30.

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Fig. 32.



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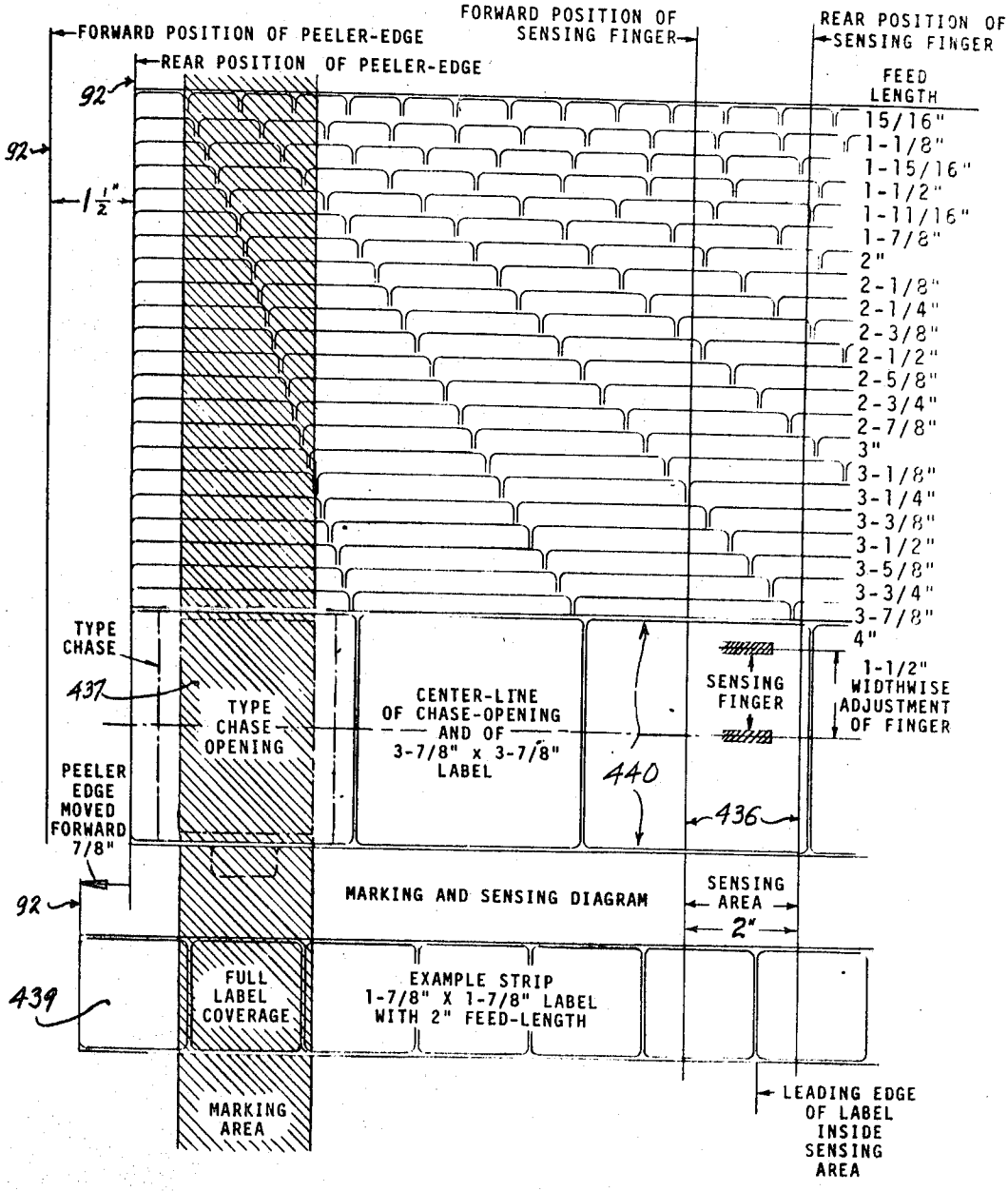


CAM TIMING CHART

Fig. 33.

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Fig. 34.



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LABEL IMPRINTING AND APPLYING MACHINE AND METHOD

THE FIELD, SUMMARY AND OBJECT OF THE INVENTION

The present invention relates to a machine for and method of imprinting upon die-cut pressure-sensitive labels carried on a backing tape (supplied from a roll thereof) any desired information or data, such as the price, size or contents of the merchandise package to be labeled, and intermittently feeding the so imprinted labels to a label applicator arranged to receive and hold the label and to apply it to the merchandise package or merchandise unit; the individual merchandise packages or units being either carried beneath the label applicator upon any suitable conveyer belt, or being manually placed beneath the label applicator, upon a suitable table attached to the column supporting the machine.

The present invention further relates to a machine and a method whereby a backing strip or tape carrying the die-cut pressure-sensitive labels spaced from each other a slight uniform distance, is fed from a supply roll to a tape bed, past a label sensor which is engaged by the leading edge of each label (in succession) while the tape is in motion and is thereby moved a short distance, such short motion of the sensor having the effect of stopping the tape take-up and hence stopping the motion of the tape, a printer above the plane of the tape bed and an inker therefor also above the tape bed, a label peeler just beyond the pay-out end of the tape bed, the peeler serving as a tape guide for reversing the path of travel of the tape, and an electromagnetically activated and de-activated motor-driven tape tape-up operated by the label sensor for intermittently starting and stopping the travel of the tape across the tape-bed at label length intervals, a pneumatically actuated label applicator having a suction head for engaging and holding a label as it is peeled from the tape, and means for intermittently operating the printer, the inker and the label applicator in timed relation to each other and in timed relation to the starting and the stopping of the motion of the tape.

The present invention further relates to means whereby labels of varying length may be accommodated and synchronized with the printer and with the label applicator, thereby providing for a wide range of label sizes which can be printed and applied by the machine.

The present invention further relates to means for varying the angle at which a label is disposed to the plane of the tape bed when the label is peeled and extended from the label peeler.

The object of the present invention is a reliable and relatively inexpensive intermittently operable label imprinting and applying machine of relatively simple construction, for imprinting and applying die-cut pressure-sensitive labels supplied on a roll of backing tape from which the imprinted labels are peeled after they have been imprinted, which machine goes through one complete cycle of imprinting and applying a label to merchandise to be labeled thereby, each time the machine is started or "tripped" either mechanically or electrically, and which machine will, at the beginning of each independent cycle thereof, deliver and apply a label which had been printed at the end of the previous cycle thereof and will move the next label into position for printing, and apply ink to the type of the printer during such label-applying portion of the cycle and will thereafter cause the printer to go through its printing stroke.

The further object of the present invention is a machine of a character stated, but which will accommodate a wide range of label sizes and which will permit the application of the imprinted labels to articles or packages of merchandise of varying sizes, shapes and consistencies, as, for instance, soft boxes or containers or hard boxes containing the merchandise, or soft goods wrapped in cellophane or other limp sheet material, without damage to the boxes or merchandise or the wrapping.

The further object of the present invention is to insure the delivery of the imprinted label to the applicator in such a way that the applicator will surely engage the label (and not lose it) before the label is applied to the merchandise.

BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWINGS

The following are brief descriptions of the accompanying drawings representing an embodiment of the invention.

FIG. 1 represents a front elevational view of the machine.

FIG. 2 represents a right side elevational view of the machine.

FIG. 3 represents top plan view of the machine but with the tape supply roll and its support omitted.

FIG. 4 represents a left side elevational view of the machine, but with the electric juncture box omitted.

FIG. 5 represents a fragmentary rear elevational view of the machine, showing the tape transport and its electromagnetic driving clutch and its electromagnetic brake and also showing the tape take-up and the drive therefor.

FIG. 6 represents a front elevational view of the printer plunger and printer head and the cap-like cam-enclosing housing member in which the plunger is reciprocably mounted.

FIG. 7 represents a vertical cross-sectional view, on line 7—7 of FIG. 6, of the main shaft bracket and of the main shaft and cams thereon and of the printer plunger and the cam-enclosing cap member in which the plunger is reciprocably mounted.

FIG. 8 represents a cross-sectional view on line 8—8 of FIG. 7.

FIG. 9 represents a cross-sectional view on line 9—9 of FIG. 7.

FIG. 10 represents a cross-sectional view through the cam groove of the inker-actuating box cam 10, and showing the upper end of the inker-actuating lever and the cam follower roller carried thereby.

FIG. 11 is a side elevational view of the single-revolution clutch on the main shaft; as viewed on line 11—11 of FIG. 7.

FIG. 12 is a side elevational view of the switch-operating cams 11 and 12 fixedly mounted on the main shaft; as viewed on line 12—12 of FIG. 7.

FIG. 13 represents a fragmentary top plan view of the tape bed 49 mounted on top of the main base-plate 1 of the machine and showing the sensor platform 98 above and extending across the tape bed; the tape bed being partly broken away to expose the heater recess 47 in the base-plate 1 and the heater 48 mounted therein.

FIG. 13A represents an enlarged vertical section on line 13A-13A of FIG. 13, and also showing the lower portion of the frame of the label sensor.

FIG. 14 represents a right side elevational view of the label sensor.

FIG. 15 represents a front elevational view of the label sensor.

FIG. 16 represents a left side elevational view of the label sensor, with the top portion of its left frame member partly broken away.

FIG. 17 represents a vertical section on line 17—17 of FIG. 15.

FIG. 18 represents a fragmentary section on line 18—18 of FIG. 15.

FIG. 19 represents a full-size top plan view of the inker slide.

FIG. 20 represents an elevational view of same.

FIG. 21 represents a section on line 21—21 of FIG. 19.

FIG. 22 represents a full-size front elevational view of the label peeler.

FIG. 23 represents a section on line 23—23 of FIG. 22 on a scale four times that of FIG. 22.

FIG. 24 represents a section on line 24—24 of FIG. 23 on the same scale as FIG. 23.

FIG. 25 represents a top plan view of the applicator bridge.

FIG. 26 represents a front elevational view of same.

FIG. 27 represents a side elevational view of the same.

FIG. 28 represents a front elevational view of the vacuum box and its bottom metal plate and the sponge pad and the bottom Mylar facing thereon, partly in section.

FIG. 29 represents a side elevational view of same, partly in section.

FIG. 30 represents a plan view of the bottom of the Mylar facing of the applicator pad and the projecting marginal edge portions of the metal plate at the bottom of the vacuum box.

FIG. 31 represents a vertical section through the tape transport shaft and roller and the electromagnetic clutch and brake thereof, taken generally on line 31—31 of FIG. 5.

FIG. 32 represents the electrical circuit or wiring diagram of the machine.

FIG. 33 is a cam timing chart of the machine.

FIG. 34 is a label marking and sensing diagram.

FIG. 24 represents a section on line 24—24 of FIG. 23 on the same scale as FIG. 23.

FIG. 25 represents a top plan view of the applicator bridge.

FIG. 26 represents a front elevational view of same.

FIG. 27 represents a side elevational view of the same.

FIG. 28 represents a front elevational view of the vacuum box and its bottom metal plate and the sponge pad and the bottom Mylar facing thereon, partly in section.

FIG. 29 represents a side elevational view of same, partly in section.

FIG. 30 represents a plan view of the bottom of the Mylar facing of the applicator pad and the projecting marginal edge portions of the metal plate at the bottom of the vacuum box.

FIG. 31 represents a vertical section through the tape transport shaft and roller and the electromagnetic clutch and brake thereof, taken generally on line 31—31 of FIG. 5.

FIG. 32 represents the electrical circuit or wiring diagram of the machine.

FIG. 33 is a cam timing chart of the machine.

FIG. 34 is a label marking and sensing diagram.

DESCRIPTION OF THE INVENTION

The following is a description of the embodiment of the invention shown in the accompanying drawing.

The machine has a horizontal bottom plate or base member designated generally by the numeral 1, which underlies all the below-mentioned frame members and supporting brackets. A main frame member 2 is superimposed on the bottom plate 1 and is secured thereto by means of headed bolts extending upwardly through suitable holes therein and threaded into corresponding tapped holes in the main frame member 2. The main frame member 2 includes a lateral extension 3 having a vertical coupling flange 4 thereon, to which the corresponding or complementary coupling flange 5 of the column bracket 6 is secured by means of bolts 7.

A main shaft bracket 8 is mounted on top of and bolted to the foreward portion of the main frame member 2, and has a vertically disposed journal stand or flange 8*a* at its rear or right-hand end as viewed in FIG. 2 and has a vertically disposed printer flange or face plate 15 at its front end. The cam-shaft 9 is journaled in the flange 8*a* and in the printer face plate 15, and has fixedly keyed or pinned thereto the inker-actuating barrel cam 10 and has adjustably secured thereto two switch-actuating cams 11 and 12 and has fixedly secured thereto the printer-actuating box type face cam 13 having a cam groove 14 in the front face thereof (see FIG.

To the front printer face plate 15 of the bracket 8, a cap-like plunger-supporting member 16 is detachably secured, generally enclosing the printer cam 13 and having a vertical plunger guide channel 17 (FIG. 3) formed in the front face thereof which is flanked by the guide rail 18 integral with the cap 16 and the non-integral gib-like guide rail 19 adjustably secured by headed screws 21. The guide rails 18 & 19 have facing inwardly divergent guide surfaces, between which guide surfaces a correspondingly shaped vertically reciprocable printer plunger 20 is slidably mounted (FIGS

A cylindrical eccentric-mounting hole 22 is extended horizontally through the printer plunger 20, near the upper end thereof. A cylindrical eccentric-carrying member 23 is journaled in the hole 22, with the integral retainer flange 24 thereof bearing against the inner flat vertical surface of the plunger 20. A stud-receiving hole 25 extends through the eccentric-carrying member 23, with its axis parallel to but spaced slightly (perhaps three thirty-secondth inch, more or less) from the axis of the member 23. Into such eccentric hole 25, the stud 26 of the cam follower roller 27 is mounted, with the outer threaded end of said stud extending beyond the outer face of said eccentric-carrying member 23. A keying pin or dowel pin 28 extends outwardly from the eccentric-carrying member 23 (FIG. 6). The cam-adjusting disc 29 having an eccentric hole 30 therethrough of the same eccentricity as that of the hole 25 and having a dowel-receiving hole 31 for receiving the dowel pin 28, is placed over the outer threaded end of the cam follower stud 26 and over the dowel pin 28, and a nut is threaded onto the outer threaded end of the stud 26, thereby firmly affixing the disc 29 to the eccentric-carrying member 23, with the rear face thereof bearing against the outer face of the plunger 20, thereby axially confining the eccentric-carrying member 23 within the printer plunger 20 (FIGS. 6 and 7).

An arcuate slot 32 is provided through the disc 29, centered about its center, and a headed screw 33 extends through the slot 32 and is threaded into a corresponding tapped hole in the plunger 20, whereby the disc 29 and the eccentric-carrying member 23 (to which the disc is affixed) can be secured in any desired angularly adjusted position thereof (within the range of adjustability) in relation to the plunger 20. A handle 34 is affixed to the disc 29, whereby the disc may be more conveniently rotated for the purposes of adjusting the cam follower 27 in relation to the plunger 20 and thereby adjusting the printing impression of the type carried by the printer head 134 secured to the printer-plunger 20.

The cam groove 14 of the printer cam 13 has a relatively long printing dwell 35 and a relatively short inking dwell 36, with the centers of said two dwells being 180° apart, and with the two intervening generally circular portions 37 and 38 of the cam groove 14 serving to maintain the printer plunger 20 in its raised position between the printing stroke and the inking stroke thereof.

To the lower end of the printer plunger 20, the printer head or type chase holder 134 is secured. Any suitable type chase 135 is removably mounted to the printer head 134 and detachably locked thereto by any suitable means; the chase, in turn, carrying interchangeable type pieces with the type faces thereof facing downwardly.

A gear-reduced electric motor 39 is mounted on the rearward portion of the main frame member 2, with its output shaft 40 in axial alignment with the main shaft 9 and connected thereto through a single-revolution type of clutch designated generally by the numeral 41, which clutch is activated, for each revolution, by the momentary energization of the solenoid 42 (as described hereinafter) or manually by means of the pull rod having a knob 46 at its front end and having its rear end connected to the pivoted clutch trip lever 45 through the link 44.

The bottom plate 1 is provided with an elongated opening 47 therethrough, in which an electrical heating element 48 is mounted directly beneath and secured to the tape bed 49, for heating the labels whenever and to whatever extent may be necessary to compensate for a drop in temperature or to compensate for the condition of the adhesive on the labels, so as to condition the labels for proper peeling and proper adhesion to the merchandise or to the merchandise packages (FIG. 13).

The relatively thin tape bed 49 is secured to the top of the bottom plate 1, directly above the opening 47. The tape bed 49 extends generally from the rear edge of the bottom plate 1, forwardly to the impression pad 50 which is secured to the frontmost portion of the bottom plate 1 and is formed of neoprene or the like, and is beneath the printer head 134 and type chase 135.

A bracket **51** is secured to the left rear end portion **52** of the bottom plate **1**, for supporting the tape transport motor **53**, the electromagnetic clutch **54** and the tape transport roller **55** and the tape rewind arm **56**, and also for supporting the label reel arm **57** on which the flanged reel **58** (for carrying the roll **63** of label-bearing tape **64**) as well as the idle roller **59** are operatively mounted. A juxtaposed bracket **60** is similarly mounted to the right rear end portion of the bottom plate **1**, for supporting the electromagnetic brake **61** and for journaling the corresponding end of the tape transport shaft **62**.

A roll **63** of label-carrying tape or backing tape **64** of glacine paper or like "release" type webbing is removably mounted on the reel **58**. The reel **58** is pivoted on the spindle **67**, which in turn is carried by the arm **57** secured to the aforementioned bracket **51**.

The gear-reduced motor **53** is mounted on the bracket **51**, with its output shaft **68** co-axial with the tape transport roller **55**. The outer sleeve-like portion of the roller **55** is made of a suitably firm rubber, neoprene or the like.

A shaft coupler **69**, having a V-groove **70** therein for driving the belt **71**, has one end thereof secured to the output shaft **68** of the motor **53** while the other end thereof is secured to the tape transport shaft **62**. The shaft **62** is journaled in the flanges **73** and **74** of the bracket **51** and extends through the electromagnetic clutch **54** and through the tape transport roller **55** and through the electromagnetic brake **61** and has its end (beyond the brake **61**) journalled in the vertical flange **60***a* of the bracket **60**.

A tape rewind arm **56** is secured to the bracket **51** and extends rearwardly therefrom, and supports a yoke **77**, through the flanges **78** of which the tape rewind shaft **79** extends, and in which such shaft is journaled.

The rewind shaft **79** has a disc **80** affixed thereto, from which the two pins **81** extend in operative alignment with the tape transport roller **55** (FIG. **3**).

A driven flange **82** is affixed to the other end of the rewind shaft **79** and a driving pulley **83** is revolvably mounted on the rewind shaft so as to idle thereon, and a felt disc **84** is operatively interposed between the driven flange **82** and the juxtaposed face of the driving pulley **83**. A helical compression spring **85** or other resilient compression member is interposed between the hub of the pulley **83** and a nut or other fastener means **86** on the end of the shaft **79**; such fastener means being detachably and adjustably secured to the outermost threaded end of the rewind shaft **79** so that by adjusting the fastener **86** the amount of pressure between the felt disc **84** and the driven flange **82** and the pulley **83** may be varied so as to vary the slippage and the coupling force therebetween, whereby the amount of rewind torque maintained on the rewind shaft **79** through the belt **71** and the continuously revolving shaft coupler **69** may be adjusted to any desired optimum value.

The label-carrying tape **64**, having a succession of uniform-size pressure-sensitive labels **65** thereon, with uniform spacings therebetween, passes downwardly from the roll **63** past the guide rod **87**, on which are mounted two tape guides **88** flanking the tape **64** and each adjustably secured along the rod **87** by means of set screws **89**. The tape guides **88** are so adjusted on the rod **87** as to neatly confine the tape **64** to a position in operative alignment with the label printer and the label applicator.

The label-carrying tape **64** then passes around the idle roller **59** which is pivotally mounted to the reel arm **57**; the guide roll **59** being so disposed that the upper surface of the tape bed **49** is in a plane tangent to the bottom of the roller **59**.

The label-carrying tape **64** passes from beneath the idle roller **59** to the top of the tape bed **49** and extends therealong and rests thereon, from the rearmost end of the tape bed to the front end thereof, from whence the label-carrying tape **64** extends over the impression pad **50** of the printer and from there onto and around the label peeler designated generally by the numeral **90**, where it passes beneath the hold-down roller **91** of the label peeler blade **93**, and then around the front edge **92** of the label peeler blade **93**, and then beneath the idle roller **94** and rearwardly along the retreat path **95**, after the labels have been peeled from the backing tape **64**, one at a time during the intermittent label-feeding motions of the tape (FIGS. **1, 2, 3, 4, 22, 23** and **24**).

After extending rearwardly along the retreat path **95**, beneath the bottom plate **1** of the machine, the label-free tape **96** extends beneath and along and in frictional engagement with the rear half of the tape transport roller **55** and thence beneath and along the forward half of the pinch roller **97**, and thence rearwardly to the rewind pins **81**, around which the label-free backing tape **96** is wound for subsequent disposal.

The label peeler **90** includes the peeler blade **93** having an integral clyindrical trunion-like end portion **168** at the left end thereof (by which the blade **93** and the entire label peeler **90** are supported) and having a similar but shorter cylindrical end portion **189** integral therewith at its right end, co-axial with the trunion-like end portion **168**. The trunion-like left end **168** of the peeler blade **93** is revolvably mounted in the horizontal cylindrical bore **167** of the split clamp **166** at the lower end of the lower extension **165** of the applicator arm **152** (which arm **152** is horizontally adjustable in a fore-and-aft direction on the supporting bracket **151**). By tightening the headed screw **169** thereof, the split clamp **166** is tightened about the trunion-like blade-supporting end portion **168**, thereby locking the peeler blade **93** in any desired angularly adjusted position thereof for its optimum label-peeling attitude.

The upper surface **190** of the peeler blade **93** is in a diameteral plane of the cylindrical blade ends **168** & **189**, in which the axis of angular adjustment of the blade lies. The peeler edge **92** of the blade **93** has a slight radius (of the order of 0.010 inch, more or less).

A through-hole **191** is provided in the cylindrical end **189** of the label peeler **90**, parallel with the axis thereof, and an axially aligned blind hole **192** is provided in the cylindrical supporting trunion **168** of the label peeler **90**. A pivot rod **193**, having the tube-like or sleeve-like hold-down roller **91** revolvably mounted thereon, is extended through the hole **191** and into the blind hole **192**, and is locked in position by a set-screw **195**. The spacing of the center of the holes **191** and **192** from the axis of the end members **168** & **189** is such that the V-shaped edges of the annular ribs **194** of the revolvably mounted sleeve-like hold-down roller **91** will be spaced from the upper surface **190** of the peeler blade **93** at a distance just slightly greater than the combined thickness of the backing tape and the label adhered thereto. Thus, the revolvable sleeve **91** constitutes a hold-down roller, which keeps the tape and the portion of the label adhered thereto parallel with the upper surface **190** of the peeler blade **93**, notwithstanding that such upper surface **190** may be tilted upwardly slightly (by the aforementioned angular adjustment of the peeler blade), thereby insuring the correct peeling of the label from the tape in all adjusted positions of the peeler blade. The V-shaped annular ribs of the roller **91** prevent smearing of the ink on the labels.

The label sensor designated generally by the numeral **98** (FIGS. **2** and **13** to **18**) is mounted on the sensor platform **99**, which constitutes a bridge just slightly above the label-bearing backing tape **64** on the tape bed **49**, and extends across the entire upper tape path. The outer end of the platform **99** rests on a guide rail **100** which is secured to the bottom plate **1** by suitable screws. Two outer dowel pins **101** and one inner dowel pin **102** extend downwardly from the outer end of the sensor platform **99**, alongside the outer and inner vertical surfaces (respectively) of the guide rail **100**, with a neat sliding fit therewith, and serve to guide the platform **99** at a right angle to the guide rail **100**. An elongated slot **103** is provided in the outer end of the sensor platform **99**, and a headed lock-screw **104** extends therethrough and is threaded into the guide rail **100** and serves to lock the platform **99** at any desired location along the guide rail **100**, as may be required to adjust the label sensor for the different label lengths.

The inner end of the platform **99** is provided with a pair of screws **105** which serve as feet for the inner end of the plat-

form and these screw-like feet rest on the upper surface of the bottom plate **1**, so as to maintain the platform **99** generally horizontally and with sufficient clearance above the labels **65** on the tape **64**.

A sensor-supporting yoke **106**, having a pair of generally parallel vertical flanges **107**, has its bottom plate **108** adjustably secured to the platform **99** for adjustment transversely of the label tape, by means of the pair of headed screws **109** which extend through clearance holes in base-plate **108** of the sensor yoke **106** and through the slot **110** in the platform **99** and are threaded into tapped holes in the nut-like plate or bar **111** beneath the platform **99**. By this means, the sensor assembly may be adjusted so as to bring the sensor finger **112** thereof approximately to the transverse mid-point of the label regardless of the width of the label, or to place such sensor finger in registration with any other portion of the label (see FIG. 13A).

A pendant lever **113** has a lateral extension **114** at the top thereof which extends across the two flanges **107** of the sensor yoke **106** and has a short pivot arm **115** at the inner end thereof. A pivot shaft **116** extends through corresponding pivot holes in the flanges **107**, and the pendant lever **113** and the pivot arm **115** are pivotally mounted by the shaft **116** (FIG. 15).

A torsion spring **117**, mounted on the pivot shaft **116**, is operatively interposed between the cross-bar **114** and the inner stationary flange **107** of the yoke **106**, so as resiliently to urge the pendant arm **113** in a rearward direction indicated by the arrow **118** (see FIGS. **15** to **17**).

The sensor finger **112** is pivotally mounted to bottom of the arm **113** by means of the pivot screw **119**, and has a forwardly extending arm **120**. A helical tension spring **121** having its upper end thereof stationarily anchored at **122** to the shaft **116** and having the lower end thereof anchored at **123** to the arm **120**, serves resiliently to urge the sensing finger **112** in a downward direction, so as to maintain it in contact with the upper surface of the label **65** and also to cause the top of the finger **112** to enter into the gap between the successive labels so as to be engaged by the advancing leading edge of the next label and to be moved forwardly thereby; such forward motion of the finger **112** and the corresponding forward swinging of the arm **113** (against the force of the spring **117**) serving to raise or retract the screw-adjustable switch control member **124** carried by the arm **125**, so as to recede upwardly from the switch arm **126** of the micro-switch **127**, thereby to open the circuit of the clutch **54** and to close the circuit of the brake **61** and thereby to stop the label-feeding motion of the label-carrying tape **64**.

The solenoid **128** has its movable armature **129** operatively connected with the inner arm **130***a* of the bell-crank lever **130** pivoted on the shaft **116**. The outer arm **130***b* of said bell-crank lever **130** carries a pin **131** which extends laterally therefrom into operative juxtaposition to the upper surface of the arm **120** of the sensor finger **112**, whereby the energization of the solenoid **128** will cause the arm **120** of the sensor finger **112** to be depressed and will cause the sensor finger to be raised upwardly, clear of the label **65**. When the sensor finger **112** is so raised clear of the label **65**, the pendant arm **113** is swung rearwardly in the direction of the arrow **118** by the aforementioned torsion spring **117**, until it comes to a stop against the stop pin or screw **132**. Such rearward swinging of the arm **113** causes the screw-adjustable switch operator **124** to be moved downwardly into contact with the switch arm **126**. The consequent depression of the switch arm **126** opens the brake circuit and closes the clutch circuit and thereby causes the tape transport roller **55** to rotate in the direction of the arrow **133** (FIG. 2) and to move the label-carrying tape **64** on top of the tape bed **49** in a forward direction until the sensor finger **112** drops into the next gap between the successive labels **65** and is engaged by the forwardly moving leading edge of the next label and is thereby caused to move forwardly and to swing the arm **113** forwardly, thereby again opening the clutch circuit and closing the brake circuit, and so again stopping the forward motion of the label-carrying tape **64**.

An inker slide **136** bridges across the entire tape path (on the tape bed **49**) and has its outer and inner ends secured to runners **137** and **138** which ride on the bottom plate **1** and have inwardly extending flanges **139** which extend beneath the rabbetted edges of the tape bed **49**, as indicated in FIGS. **2** and **3** and **19** to **21**, so as to guide the inker slide **136** in a path parallel to the tape bed, with suitable working clearance between it and the top of the labels **65** carried by the tape **64** resting on such bed.

A pad tray **140** secured to the top of the slider **136**, and an inking pad **141** is disposed within said tray.

To the rear end of the inker slide **136**, a cam arm **142** is secured, having a vertical slot **143** therethrough.

An inker lever **144** is pivoted to the main shaft bracket **8** about the pivot **145** (FIGS. **2** and **4**). To the lower end of the lever **144** a pivot screw **146** is secured, on which a roller-like sleeve is revolvably mounted; such sleeve extending into the slot **143** (with suitable working clearance therein) so that the oscillation of the lefer **144** will cause the inker slide to be reciprocated to and fro between its rearward inoperative position to its forward inking position beneath the type chase **135**. The upper end of the inker lever **144** is provided with a cam follower **148** rotatably mounted on the pivot member **149** carried by the lever **144** (FIG. **3**). The cam follower **148** extends into the cam groove **150** of the barrel cam **10** fixedly mounted on the cam-shaft **9**, so that during an appropriate portion of each revolution of the cam-shaft **9**, the inker slide **136** (with the inking pad **141** thereon) is moved forwardly to a position beneath the printer head **134**, while the latter is suitably raised by the printer cam **13**, and is held there while the printer head is moved through its inking stroke and is then moved rearwardly to its retracted position.

The peeler and applicator support arm **151** is fixedly secured to the front of the main frame member **2** by headed screws **151***a*, and extends forwardly therefrom in a horizontal direction. To the fixed support arm **151**, the horizontally adjustable peeler and applicator supporting arm **152** is adjustably secured by means of the headed screws **153** which extend through horizontal slots **154** in the arm **152** and are threaded into tapped holes in the fixed support arm **151**. A horizontal guide channel or groove **155** is provided in the face of the support arm **151**. Into this groove a generally rectangular key bar or guide bar **156** is mounted and secured therein by a pair of screws. The juxtaposed face of the adjustable arm **152** is provided with a similar groove or channel **157** into which the projecting half of the key bar **156** extends, so as to keep the arm **152** in accurate horizontal alignment with the fixed arm **151**, in all positions of adjustment thereof.

To an upper extension **158** of the horizontally adjustable arm **152**, the applicator bracket **159** is adjustably secured, for vertical adjustment thereon. The applicator bracket **159** has a vertical flange **160** from which a vertically extending key rail **161** projects rearwardly. The key rail **161** extends into a corresponding vertical groove or channel **162** in the extension **158** for keeping the bracket **159** in vertical alignment when the vertical position of the bracket **159** is adjusted in relation to the arm **158**. The bracket **159** is secured in any desired adjusted position (within the range of adjustment provided therefor) by headed screws **163** which extend through vertical slots **164** in the flange **160** and are threaded into corresponding tapped holes in the vertical extension **158** of the arm **152**.

A lower extension **165** of the arm **152** carries a split clamo **166**, in whose horizontal cylindrical bore **167** the left cylindrical end **168** of the peeler blade **93** is operatively mounted. The blade **93** is adapted to be adjusted about the axis of its ends **168** and **189** by turning the end **168** within the bore **167** and then tightening the split clamp **166** by means of the headed screw **169**.

Upon the bracket **159**, the pneumatic cylinder **170** is operatively mounted and secured in place by means of two pairs of screws **171** extending through flanges **172** at the lower cylinder head **174** and threaded into the corresponding tapped holes in the bracket **159**.

The piston rod **173** projects downwardly from the lower cylinder head **174** (through a stuffing gland in said head) and has its lower end screw-threaded into the cross-member **175** of the applicator bridge **176**, and is locked thereto by the lock-nut **177**.

The vacuum block **178** is nested between the two downwardly extending arms or flanges **179** of the applicator bridge **176** and is pivoted thereto by means of the pivot screws **180**. The pivot screws are shoulder type screws, with their threaded ends threaded into corresponding tapped holes in the opposite pivot ears **181** of the vacuum block **178**.

A pair of opposite guide members **182** extend upwardly from the upper surface of the vacuum block **178** and are neatly nested between the flanges **179** of the applicator bridge **176**, so as to give the vacuum block **178** further guidance in relation to the applicator bridge **176** and to limit the upward swinging of the vacuum block **178** about its pivot screws **180** by the abutment of the upper ends of the guide members **182** against the downwardly facing shoulders **182***a* between offset portions of the flanges **179** as shown in FIG. 1; such upward swinging of the vacuum block taking place when the label applicator is in its down position or in its label-applying position.

A helical tension spring **183** is operatively interposed between a spring anchorage **184** on the vacuum block and a spring anchorage **185** on the applicator-bridge, tending to pull the vacuum block upwardly in relation to the applicator bridge and thus tending to swing the vacuum block into a horizontal position.

A bracket **186** is secured to the cylinder-supporting bracket **159** and carries a screw-adjustable deflector rod or member **187** in operative alignment with the free front end of the vacuum block **178**, so that when the applicator bridge and its vacuum block are raised upwardly, to their uppermost position where the vacuum block (and its flexible vacuum pad **188**) are in operative alignment with the peeler blade **93** and ready to receive the next label, the vacuum block is deflected downwardly at a suitable slight angle by means of the deflector rod **187**, so as to place its label-receiving bottom surface of the vacuum pad **188** in proper alignment with the label as it is being projected outwardly from the peeler blade **93** or from the portion of the tape **64** passing over the peeler blade, thereby to insure the proper vacuum engagement and retention of label on the bottom of the resilient vacuum pad **188** carried by the vacuum block **178**. This angularity or slight inclination of the bottom of the vacuum pad **188** can be varied or adjusted to its optimum position by adjusting the deflector rod **187**.

The pinch roller **97**, which presses the label-free tape **96** against the tape transport roller **55**, is revolvably mounted on the free or overhanging right-hand portion **198** of the pivot rod **199**. The pivot rod **199** extends through a pair of aligned horizontal rod-mounting holes **200** and **201** in the legs of the generally U-shaped pinch roller yoke **202** (FIGS. **2** to **5**). The yoke **202** is, in turn, pivotally supported by the flanges **73** and **74** of the bracket **51** by the pivot rod **203** which is journaled in bearing holes **204** and **205** in said flanges **73** and **74** (respectively) and extends into corresponding pivot-mounting holes **206** and **207** in the legs of the U-shaped yoke **202**, and is fixed in said legs by a suitable set-screw. A helical tension spring **208** is operatively interposed between the set-screw **209** threaded into the right-hand leg of the U-shaped yoke **202** for locking the pivot rod **199** in the legs of the U-shaped yoke, and a lower spring anchorage (not shown) on the bottom plate or base-plate **1** of the machine. The spring **208** resiliently urges the free ends of the legs of the U-shaped yoke **202**, and hence the pivot rod **199**, downwardly (about the axis of the yoke pivot **203**), thereby resiliently to press the pinch roller **97** in the direction of the tape transport roller **55**. A handle **210** is provided on the base of the U-shaped yoke **202**, extending rearwardly therefrom. By pressing the handle **210** downwardly, the pinch roll **97** is raised upwardly, so as to permit the threading of the label-free tape **96** between the pinch roll **97** and the tape transport roller **55**.

The pneumatic label applicator cylinder **170** has its lower end sealingly nested in the lower cylinder head **174** and has its upper end sealingly nested in the upper cylinder head **213**. The two cylinder heads (**174** and **213**) are tied together and pressed against suitable sealing means therein and bearing against the ends of the cylinder **170**, by means of four tie rods **214** whose lower headed ends are recessed in the lower cylinder head **174** and whose upper threaded ends are engaged by nuts threaded thereonto and nested in recesses in the upper cylinder head **213**.

A double-acting piston **215** is affixed to the upper end of the piston rod **173**, with any suitable sealing means between the periphery thereof and the inner cylindrical surface of the cylinder **170**.

Compressed air at a suitable pressure is provided from any suitable source through the pipe **216** to the inlet side of any suitable pressure-regulating valve of pressure regulator **217**. A suitable pressure-adjusting knob **218** on the regulator **217** serves to adjust the pressure of the air delivered by the regulator **217** to the pipe-line **219** connected to the outlet side thereof. A pressure gauge **220** likewise connected to the outlet or regulated pressure side of the regulator **217**, serves to indicate the pressure of the air on the downstream or delivery side of the regulator **217**. The pipe-line **219** is connected to the inlet **221** of the solenoid valve **222** mounted on the forwardly extending fixed horizontal applicator support arm **151**.

The solenoid valve **222** includes two valve seats with air passages therethrough, one for the through-passage of compressed air from the inlet **221** to the outlet **223** thereof and the other for the passage of air from the outlet **223** thereof to a vent opening in the housing. The solenoid valve **222** includes two movable valve members operatively juxtaposed to the aforementioned two valve seats, both valve members carried by the same valve stem and so arranged that when one valve member is seated on its valve seat the other is unseated in relation to its valve seat. In its normal or de-energized condition a spring and the upstream compressed air entering through the inlet **221** and acting on the through-passage valve member cause the valve stem (and the two valve members carried thereby) to be moved in the direction seating the through-passage valve member and unseating the venting valve member. When the solenoid is energized, its armature moves the valve stem in the opposite direction, thereby to unseat the through-passage controlling valve member and to seat the venting valve member. The solenoid valve **222** may be any suitable conventional three-way solenoid valve of this type, namely, one which is normally in its closed and venting position, as, for instance, Model No. 1613A2001 of Ross Operating Valve Company of Detroit, Mich.

The outlet **223** of the solenoid valve **222** is connected by any suitable tubing **224** to the inlet **225** of the upper cylinder head **213**, thereby to deliver compressed air between the closed upper cylinder head **213** and the upper surface of the piston **215** whenever the solenoid is energized, and to vent the compressed air from between the upper cylinder head **213** and the piston **215** whenever the solenoid is de-energized. The air inlet **226** of the lower cylinder head **174** is directly connected, through any suitable tubing **227**, to the regulated compressed air in the pipe-line **219**, through the lubricator chamber **228** containing a pool of lubricating oil **229**, through which the upstream compressed air is bubbled by having the upstream side of the compressed air connected to the bubbling tube **230** which extends downwardly from the upstream side of the head **231** of the lubricator into the oil **229**. The upstream inlet **233** of the lubricator **228** is connected to the pipe-line **219** through the T fitting **232** as indicated in FIG. **1**. The compressed air above the pool of oil **229** communicates with the outlet **234** of the lubricator which is connected through the tubing **227** to the air inlet **226** of the lower cylinder head **174**.

By this means, the compressed air (at the regulated pressure) is continuously maintained between the lower cylinder head **174** and the lower surface of the piston **215** (surrounding the piston rod **173**), and the compressed air (at the regulated

pressure) is alternately delivered to and vented from the space between the upper cylinder head **213** and the piston **215** in timed relation to the tape-feeding cycle and printing cycle of the machine, in the manner hereinafter described. As the effective area of the lower surface of the piston **215** is less than the effective area of the upper surface thereof by an amount equal to the cross-sectional area of the piston rod **173**, the continuously maintained compressed air bearing against the lesser lower surface of the piston **215** is overcome by the compressed air at the same pressure intermittently delivered into the space between the upper surface of the piston **215** and the upper cylinder head **213**. Thus, when the compressed air is delivered to the upper cylinder head **213**, the piston **215** and the piston rod **173** and the label applicator bridge or yoke **176** (and the vacuum head **178** pivoted thereto and the vacuum pad **188** carried by the latter) are moved downwardly through their label-applying stroke until the vacuum pad **188** (with label held on the bottom surface thereof by a vacuum) is pressed against the package, article or merchandise to which the label is to be applied, and such downward movement is stopped by the resistance of the package, merchandise or article being labeled; the regulated air pressure being so adjusted and the vertical height of the applicator being so adjusted as not to damage such package, merchandise or article being labeled.

Thus, whenever solenoid of the valve **222** is energized and the compressed air is thereby delivered to the cylinder-head **213**, the label applicator as a whole is moved downwardly through its label-applying stroke. When however the solenoid of the valve **222** is de-energized, the compressed air above the piston **215** is vented to the atmosphere by the solenoid valve **222**, and the compressed air constantly maintained beneath the piston **215** moves the piston **215** and the entire label applicator upwardly to its uppermost position determined by vertical adjustment of label applicator by means of the screws **163** passing through the slots **164**; which uppermost position is so adjusted as to bring the lower surface **237** of the resilient vacuum pad **188** into operative alignment with the delivery position of the label being peeled by the peeler blade **93** and delivered to the lower surface **237** of the resilient vacuum pad **188**.

A switch-mounting bracket **240** having a downwardly extending front flange **241**, is secured to front vertical face **242** of the main shaft bracket **8**, by suitable screws **243** (FIG. **4**). The switch-mounting bracket **240** also has an upwardly extending arm **244** at the rear thereof, having a lateral extension **245** to which the micro-switches **247** and **248** are secured in operative juxtaposition to the switch-operating cams **11** and **12** (respectively) on the main shaft **9** (FIGS. **3** and **12**).

The switch-operating arms **249** and **250** of the micro-switches **247** and **248** (respectively) carry cam follower rollers **251** and **252** (respectively). The cam follower roller **251** of the micro-switch **247** is in operative alignment with the periphery of the cam **11**, while the cam follower roller **252** of the micro-switch **248** is in operative alignment with the periphery of the cam **12** (FIGS. **2, 3, 7** and **12**).

The micro-switch **247** is normally open and is operatively connected to the solenoid **128** of the labeled sensor **98**, so that when the arm **249** of the switch **247** is deflected for a very brief period by the short dwell **253** of the cam **11**, the finger **112** of the label sensor **98** will be raised clear of the leading edge of the label bearing thereagainst, thereby permitting the torsion spring **117** to swing the inverted U-shaped yoke (including the arm **113** and the switch operator arm **125**) in a counter-clockwise direction indicated by the arrow **118** (as viewed in FIG. **14**); thereby causing the switch-operating arm **126** of the two-circuit micro-switch **127** to be depressed by the adjustable switch- operating rods **124** (carried by the arm **125**) so as to "open" one contact thereof and "close" the other contact thereof.

The contact of the micro-switch **127** which is opened by the depression of the arm **126** thereof is operatively connected in the electrical circuit of the electromagnetic brake **61** while the other contact thereof which is closed by the depression of the arm **126** thereof is operatively connected in the electrical circuit of the electromagnetic clutch **54** (FIG. **32**). Hence, when the arm **126** of the micro-switch **127** is depressed by the raising of the label-sensing finger **112** clear of the leading edge of the label **65** bearing thereagainst (by the energization of the solenoid **128** through the switch **247** and cam **11**), the electromagnetic brake **61** is de-energized and thereby released, and at the same time the electromagnetic clutch **54** is energized and thereby closed or activated, thereby operatively connecting the constantly rotating drive shaft **62** to the tape transport roller **55** so as to drive said roller in the direction of the arrow **133** (FIG. **2**) until the label-sensing finger **112** drops into the gap between the trailing edge of the label **65** which was last advanced forwardly beneath the finger **112** (by the rotation of the tape transport roller **55**) and the leading edge of the next label **65** on the backing tape **64**, and until such leading edge has engaged the sensing finger **112** and has moved it forwardly the slight fixed distance required to swing the aforementioned switch-operating yoke (**113, 114, 115** and **125**) in a clockwise direction (in FIG. **14**) an amount sufficient to permit the switch-operating arm **126** of the micro-switch **127** to rise to its position in which its clutch contact is open and its brake contact is closed, whereupon the electromagnetic clutch **54** (FIG. **5**) will be de-energized and the electromagnetic brake **61** energized, so as almost instantaneously to stop the rotation of the tape transport roller **55**; such stopping point being that at which the frontmost label has been delivered into operative alignment (and vacuum engagement) with the bottom surface **237** of the vacuum pad **188**.

This stoppage of the tape transport by the upward rise of the switch arm **126** of the micro-switch **127**, is timed according to the length of the label **65** being applied, by moving the sensor platform **99** forwardly or rearwardly to the appropriate position, and then locking it in place by the lock-screw **104**.

The above-described forward travel of the upper horizontal span of the label-bearing backing tape **64**, a distance equal to the distance between the leading edges of two immediately successive labels **65** (on the tape **64**), takes place at the beginning of the operating cycle of the machine, namely, immediately after the single-revolution clutch **41** has been activated or "tripped" (either manually or electromagnetically), and such tape travel causes the frontmost label (which has been imprinted during a terminal portion of the last previous machine cycle) to be peeled from the tape **64** by the label peeler **90** and to be projected into its receiving and vacuum engagement position in relation to the vacuum pad **188** of the label applicator (FIG. **33**).

Immediately after the completion of such forward travel of the label-bearing backing tape **64** (namely, immediately after the frontmost label has been peeled by the label peeler **90** and delivered to and engaged by the bottom surface **237** of the vacuum pad **188**), the dwell **335** of the lobe **254** of the cam **12** engages the follower roller **252** of the micro-switch **248**, thereby closing such micro-switch and keeping it closed for the length of the dwell **254**. The micro-switch **248** is operatively connected in the electrical circuit of the solenoid of the solenoid valve **222**, thereby to close the venting valve thereof and to open the through-passage valve thereof between its inlet **221** and its outlet **223**, thereby causing compressed air to be delivered to the top of the cylinder **170**, above the piston **215**, during the entire time the dwell **254** is passing beneath the follower roller **252** of the micro-switch **248**, thereby moving the piston **215** and the entire label applicator downwardly through its label-applying stroke; the duration of such stroke corresponding generally to the length of the dwell **335** of the cam **12** and its timing (in relation to the other events of the machine cycle) being determined by its angular setting in relation to the cam-shaft **9**.

When the trailing end of the dwell **335** of the cam **12** has passed the cam follower roller **252**, the micro-switch **248** is opened (by its self-contained spring) and solenoid valve **222** is consequently de-energized, thereby closing the through-flow

valve passage thereof (between its inlet **221** and its outlet **223**) and opening the venting valve passage thereof, whereby the compressed air in the cylinder **170** above the piston **215** is vented to the atmosphere and the compressed air constantly maintained beneath the piston **215** raises the piston and the label applicator upwardly to their uppermost positions in which the bottom label-receiving surface **237** of the vacuum pad **188** is again in operative alignment with the peel delivery position of the next label **65** to be peeled from the backing tape **64** and to be projected into receiving and the vacuum-engaging alignment with the bottom surface **237** of the vacuum pad **188** at the beginning of the next operating cycle of the machine. The arrival of the piston **215** and the label applicator in their uppermost position, coincides with the end of the machine cycle, namely, the completion of one revolution of the cam-shaft **9** and its stoppage at the end of its 360° turn by the single-revolution clutch **41** described hereinafter (FIG. **33**).

The electromagnetic clutch **54** may be any suitable conventional type, as, for instance, Style No. 3SM (2–20–2524) of the Stearns Electric Corporation, of Milwaukee, Wisconsin. The electromagnetic brake **61** may likewise be any suitable conventional type, as, for instance, Style No. 3SMB (2–12–2521) of Stearns Electric Corporation.

The right-hand end of the drive shaft **62** of the tape transport roller **55** is journaled in a bearing bushing **255** mounted in the vertical flange **60***a* of the bracket **60**, whose horizontal portion **60***b* extends beneath main horizontal frame member **1** and is bolted thereto (FIG. **2**). The inner or left-hand terminal portion of the drive shaft **62** is journaled in similar bearing bushings (not shown) in the vertical flanges **73** and **74** of the bracket **51**.

The drive shaft **62** extends through the electromagnetic clutch **54** and through the tape transport roller **55** and through the electromagnetic brake **61**.

Two similar bearing bushings or sleeves **256** and **262** are press-fitted (or otherwise affixed) into the central bore of the tape transport roller **55** (or they may be otherwise fixedly secured in said bore by set-screws, keys or the like) and have their outer ends projecting outwardly beyond the ends of the roller **55** for a suitable distance, for receiving the hub members **257** and **263** (respectively) mounted thereon. The bearing bushings **256** and **262** are journaled on the drive shaft **62** and are freely revolvable thereon.

The clutch armature mounting hub **257** is mounted on and fixedly secured to the outer free end of the roller-mounting sleeve **256** by set-screws and a key. The armature disc **258** of the electromagnetic clutch **54** is slidably mounted on the hub **257** and is splined thereto so that it may move axially in relation thereto while fixed thereto against rotation relative thereto.

The rotor **259** of the clutch **54** has an annulus-shaped disc **260** of friction material recessed in the face thereof, juxtaposed to the armature disc **258**. The rotor **259** is affixed to the drive shaft **62** by a key and set-screws, so that it always rotates with the drive shaft **62**. The rotor **259** rotates in close proximity to the stationary electromagnetic winding **261** so that whenever said winding is energized it magnetizes the rotor **259** (though not in contact therewith), and the so magnetized rotor **259** thereby attracts to its frictional annulus **260** the armature **258**, thereby causing the shaft **62** to drive the tape transport roller **55**. A leaf spring **268** is operatively interposed between the hub **257** and the armature **258**, so as to retract the armature **258** from the rotor **259** for a slight clearance with the frictional annulus **260** thereof whenever the winding **261** is de-energized; such spring being weak enough to be overcome by the magnetic attraction between the armature **258** of the rotor **259** when the latter is magnetized by the energization of the winding **261**.

The brake armature mounting hub **263** is mounted on the outer free end of the roller-mounting sleeve **262** and is secured thereto by a key and set-screws. The brake armature disc **264** of the electromagnetic brake **61** is slidably mounted on the hub **263** and is splined thereto so as to permit the armature disc **264** to move axially a small distance in relation to the hub **263** while still being keyed thereto against the rotation relative to the hub.

The brake **61** has a stator **265** which is similar to the rotor **259** of the clutch **54** but is stationary in the housing of the brake **61**, and (like the rotor **259** of the clutch **54**) the stator **265** is magnetized whenever the winding **266** of the brake is energized, thereby drawing the brake armature disc **264** to the frictional annulus **267** nested in the stator **265**. A leaf spring **269** is operatively interposed between the brake armature disc **264** and the hub **263**, so that when the armature **264** is not attracted by the stator **265**, the armature will be retracted a slight distance from the frictional annulus **267** of the stator **265**.

The metallic body of the tape transport roller **55** is covered with an outer cylindrical sleeve **270** of rubber or Neoprene or other suitably resilient and frictional material of suitable firmness, to provide a good frictional engagement between the tape transport roller and the label-free tape **96** to be intermittently propelled thereby.

The single-revolution clutch designated generally by the numeral **41** (FIGS. **2**, **3**, **7** and **11**) includes a ratchet wheel **271** which is pinned to the coupling hub **272** by means of the pins **273** which also extend into the non-metallic coupling disc **274**; the coupling hub **272** being revolvably mounted on the end of the cam-shaft **9** and pinned to the non-metallic coupling disc **274** intermediate the coupling hub **272** and the coupling hub **275**, which latter is affixed to the output shaft **40** of the electric motor **39** by means of set-screws **276**. The coupling hub **275** is likewise pinned to the intervening non-metallic coupling disc **274** by the pins **277** (FIGS. **7** and **11**). Hence, the ratchet wheel or disc **271** is continuously rotated by the output shaft **40** of the motor **39** irrespective of whether the cam-shaft **9** is rotating or is stationary. A clutch disc **278** is mounted on the cam-shaft **9** immediately adjacent to the ratchet wheel **271** and is affixed to the shaft **9** by a pin or set-screws **279**. A pawl **280** is pivotally mounted to the one lobe of the clutch disc **278** by means of a pivot screw **282** and nut **283**, beneath and in vertical alignment with the ratchet wheel **271**. The claw of the pawl **280** is resiliently urged in the direction of the teeth of the ratchet wheel **271** by means of a helical tension spring **284** operatively interposed between the spring anchorage **285** on the pawl and the spring anchorage **286** on the opposite lobe of the clutch disc **278**. The pawl **280** has a deflector arm **287** extending therefrom on the opposite side of the pivot **282**. The normally vertical trip lever **45** is pivotally mounted to the frame member **8** by means of the pivot **289**, beneath and in vertical alignment with the pawl **280**.

The trip lever **45** has a trip projection **290** at its upper end. When the trip lever **45** is in its vertical position (as indicated in FIG. **2**) then the trip projection **290** thereof engages the deflector arm **287** of the pawl **280** when the deflector arm reaches the trip-projection **290** in its orbit about the axis of the cam-shaft **9** (in the direction of the arrow **291**) in the activated or clutching condition shown in FIG. **11**. Such engagement of the deflector arm **287** by the trip projection **290**, causes the deflector arm **287** to be deflected upwardly or in the direction of the ratchet wheel **271** and hence causes the claw of the pawl **280** to be retracted from and clear of the tooth of the ratchet wheel, thereby de-activating the clutch **41**. When the trip lever **45** is momentarily tilted from its vertical position (shown in FIG. **2**) in a counter-clockwise direction, by an amount just sufficient to move the trip projection **290** of the trip lever **45** to the left of the ratchet wheel **271** (FIG. **2**) and hence clear of the deflector arm **287** of the pawl **280**, then the pawl **280** at once has its ratchet-engaging claw drawn towards the ratchet wheel **271** by the spring **284** and into operative driving engagement with the next tooth of the continuously revolving ratchet wheel **271**, thereby again forming a driving engagement between the continuously revolving ratchet wheel **271** and the clutch disc **278** which is pinned to the cam-shaft **9**.

As the pawl **280** is pivotally carried by the clutch disc **278**, it will orbit about the axis of the cam-shaft **9** until the deflector arm **287** thereof again comes into contact with the trip projection **290** and is deflected by such contact so as to disengage the claw of the pawl **280** from the ratchet wheel; such disengagement taking place after just 360° of turning of the cam-shaft **9**.

The connecting rod **44** has its rear end pivotally connected to the trip lever **45** (at **292**) and has its front end connected to the manually operable pull rod **43** which is slidably mounted in a horizontal hole extending through the cam-housing plate **15** and cap **16** and has a knob **46** affixed to the outer end thereof. The helical compression spring **43** is operatively interposed between the front end of the connecting rod **44** and the rear wall of the cam-housing disc **15** so as constantly to urge the trip lever **45** (and its trip projection **290**) into their vertical position shown in FIG. **2**, in which the clutch **41** is de-activated by the engagement of the deflector arm **287** with the deflector projection **290** of the trip lever **45**.

By pulling the knob **46** forwardly for an instance, the trip projection **290** of the trip lever **45** is moved leftwardly of the pawl deflector arm (FIG. **2**) so as to clear said deflector arm, thereby activating the clutch **41** by the consequent engagement of the claw of the pawl **280** with a tooth of the continuously rotating ratchet wheel **271**. The immediate release of the knob **46** causes the spring **43** to move the trip projection **290** rearwardly into alignment with the orbit of the pawl deflector arm **287**, so that the clutch **41** is de-activated at the end of a 360° turn of the cam-shaft **9**, when the deflector arm **287** is again engaged and deflected by the projection **290**.

For the electrical activation of the clutch **41**, a trip bar **296** is provided, having its rear end pivotally connected to the horizontally reciprocable armature plunger **297** of the electromagnetic solenoid **42** by a horizontal pivot screw (not shown) which passes through the vertically slotted front end of the armature plunger **297** and through the rear end of the trip bar **296** disposed in such vertical slot. The bar **296** passes loosely through the slot **298** in the lower end of the trip lever **45** and rests freely on the lower edge of said slot **298**. The vertical rearwardly facing shoulder **299** of said trip bar **296** causes the bar operatively to engage the lower end of the trip lever **45** and to deflect it in a counter-clockwise direction about its pivot **289** whenever the bar **296** is pulled rearwardly (or in a right-hand direction as shown in FIG. **2**) by the energization of the solenoid **42** which draws the armature plunger **297** into the core thereof and thus pulls the bar **296** rearwardly. Such counter-clockwise turning of the trip lever **45** causes the trip projection **290** to move leftward (or forwardly) of the pawl deflector arm **287** (FIG. **2**) so as to clear said pawl deflector arm **287** and thus activate the clutch **41** in the same manner as when the trip lever **45** is similarly deflected in a counter-clockwise direction by momentarily pulling the connector rod **44** forwardly by knob **46**. The trip bar **296** is provided with a camming surface **301** which is engaged by the horizontal cam-lifting cross-arm **302** of the rod **303** affixed to the flange **304** of the solenoid-mounting bracket **305**. When the trip bar **296** has been pulled rearwardly by the armature **297** of the solenoid **42** just sufficiently to activate the clutch **41**, the cam surface **301** rides up on the stationary cam-lifting cross-arm **302** and thereby lifts the trip bar **296** about its horizontal pivotal connection with the armature **297**, and thereby raises the tripping shoulder **299** of the trip bar **296** upwardly until the bottom edge **306** of the trip bar **296** clears the lower edge of the slot **298** and thus permits the spring **43** to deflect the trip lever **288** in a clockwise direction (FIG. **2**) to its original vertical position in which the trip projection **290** is placed into alignment with the pawl-deflecting arm **287**; thereby to de-activate the clutch **41** at the end of a 360° turn of the cam-shaft **9**. A helical compression spring **307** surrounds the armature plunger **297** and is operatively interposed between the stationary housing of the solenoid **42** and the pivot pin or pivot screw which connects the vertically slotted front end of said plunger with the intervening rear end of the trip bar **296**, thereby moving the trip bar **296** forwardly as soon as the solenoid **42** is de-energized, so as again to bring the tripping shoulder **299** of the bar **296** to the front of the lower end of the trip lever **45** and into a position where it is ready to deflect the trip bar the next time the solenoid **42** is energized.

A horizontal brake bar or plate **308** is operatively juxtaposed to the front flat face of the box cam **10** and has the inner end thereof mounted to a stepped stud **309** carried by and extending rearwardly from the cam-housing plate **15** (which cam-housing plate is an integral part of the upper frame member **8**); the smaller free end of said stud extending through an appropriate clearance hole in the inner end of the bar **308**. The outer end of the bar **308** has an adjustment screw **310** threaded therethrough and locked in any adjusted position by the nut **311**; the free end of the screw **310** bearing against the rear surface of the cam-housing plate **15**. Two horizontal guide pins **312**, anchored in the plate **15**, extend through corresponding clearance holes in the bar plate **308**, and so serve to keep the plate in appropriate alignment with the flat front face of the cam member **10** (FIGS. **2** and **3**). The brake plate **308** has a hard fiber or other suitable frictional plate **313** affixed to the rear face thereof. The brake shoe **313** of hard fiber or the like is affixed to the brake plate **308** and is pressed against the flat front face of the cam member **10** with a pressure which is determined by the adjustment of the screw **310**. The so constituted brake bears constantly against the flat front surface of the cam member **10** and thereby serves to bring the cam-shaft **9** to a quick stop as soon as the clutch **41** is de-activated, and so prevents the cam-shaft **9** from rotating beyond the 360° between the activation and de-activation of the clutch **41** due to the momentum of said cam-shaft and of the cams carried thereby and of the elements operated by said cams.

The two switch-operating cams **11** and **12** are adjustably affixed to the cam member **10**; the cam member **10** being in turn fixedly pinned to the cam-shaft **9**. The cam member **10** has a cylindrical cam-mounting hub integral therewith and co-axial with the axis thereof. The applicator cam **12** has a central opening **316** therethrough which neatly fits on the hub **315** with a close running fit. A headed locking screw **317** extends through the arcuate slot **318** in the cam **12**, and is threaded into a tapped hole in the body of the cam member **10**, as indicated in FIGS. **7** and **12**. By this means, the angular relationship and position of the applicator cam **12**, in respect to the cam-shaft **9**, may be adjusted (within the range of adjustability provided by the length of the slot **318**), so as to being the label-applying stroke of the piston **215** and of the label applicator carried thereby, to the optimum timed relationship with the tape feed.

The tape feed tripping cam **11** has a central opening **319** therein which is journaled directly on the cam-shaft **9** (as indicated in FIGS. **7** and **12**) and is provided with an arcuate slot **320**. A headed locking screw **321** extends through the slot **320** and is threaded into a correspondingly tapped hole in the body of the cam member **10**, thereby to lock the cam **11** in any desired adjusted position in relation to the cam-shaft **9** and in relation to the other related elements of the machine (within the range of adjustability provided by the length of the slot **320**).

The angular and timed relationships of the camming surfaces of the printer cam **13**, inker cam **10**, tape feed trip cam **11**, and applicator cam **12** are shown in the cam-timing chart constituting FIG. **33** of the drawings, wherein the horizontal length of the chart represents a 360° turn of the cam-shaft **9** and hence represents one complete operative cycle of the machine, and the pertinent points along such 360° turn are indicated by degree marks and degree figures. The left-hand side of the cam-timing chart, marked 0, indicates the start of the machine cycle, namely, the point at which the cam-shaft **9** is started into motion from its prior stand-still position.

The bottom cam line designated by the numeral **11** represents the tape feed tripping cam **11** and shows that its

short switch arm deflecting lobe **253** is located at the starting portion of the operating cycle of the machine. Hence, almost immediately after the rotation of the cam-shaft **9** is commenced (by the deflection of the trip lever **45** of the clutch **41**), the lobe **253** of the cam **11** deflects the switch arm **249** of the tape feed tripping micro-switch **247**, which thereby energizes the solenoid **128** which consequently raises the label-sensing finger **112** upwardly to clear the thickness of the label **65** on the tape **64** and thereby starts the forward feeding motion of the label-carrying tape **64**, which motion is stopped when the finger **112** drops into the next gap between the successive labels **65** and its engaged and moved forward a slight distance by the leading edge of the next label, in the manner hereinabove described.

Generally simultaneously with such commencement of the tape feed motion, the forward or advancing motion of the inker slide **136** (and ink pad **141**) is commenced by the portion of the cam groove **150** (of the box cam **10**) represented by the inclined line **325** of the cam groove **150** of the box cam **10**, as shown on the cam-timing chart. The inclined ink pad advancing portion **325** of the cam groove **150** is immediately followed by a short dwell **326** (in said groove **150**) which is just long enough to permit the type faces (not shown) in the type chase carried by the printer head **134** to become adequately inked by contact with the inking pad **141**. The dwell **326** is followed by the inclined return portion **327** of the cam groove **150**, which returns the inker **136** to its retracted position. The inclined inker-retracting portion **327** of the cam groove **150** is followed by the dwell **328**, which keeps the inking pad in the retracted position until the commencement of the next machine cycle.

The cam groove **14** of the printing cam **13** has a circular printer-retracting dwell **37**, the major part of which is at the commencement of the machine cycle and only a small part of which is at the end of the machine cycle, as shown in the cam-timing chart (FIG. **33**) and in FIG. **8**.

A central portion **329** of inking lobe **36** of the printer cam **14** extends through about 20° (more or less), and effects the inking contact between the type faces and the resilient surface of the inking pad **141**. The inking portion **329** of the cam **14** is preceded by an inclined cam surface **330** which lowers the printer head **134** from the upper dwell **37** to the inking portion **329**, and is followed by a similar inclined surface **331** which raises the printer head to its upper position of the dwell **38**. The printing lobe **35** and cam groove **14** intervenes the two raised dwells **37** and **38**. A central portion **331** of the printing lobe **35** extends through about 20° to 30° (more or less) and effects the printing contact between the type faces in the type chase **135** carried by the printing head **134** and the upper surface of the label **65** carried by the tape **64** and backed up by the slightly resilient impression pad **50**. The print impression portion **331** of the printing lobe **35** is preceded by the inclined down-stroke portion **332** and is followed by the inclined up-stroke portion **333** of the printing lobe **35**; the down-stroke portion **332** moving the printer head from the raised dwell **38** to the print impression position **331**, and the up-stroke portion **335** raising the printer head from its print impression position **331** to the minor portion of the upper dwell **37** at the end of the stroke, where it remains at the end of the machine cycle and where it also remains through about the first 65° (more or less of the next machine cycle.

The position of the inking lobe **36** of the printer cam groove **14** corresponds generally to the position of the inking dwell **326** of the cam groove **150** of the box cam **10**, so that the inking pad **141** is stationary in its inking position from a point in time just prior to the contact therewith of the type faces until a time just shortly after the type faces have receded from contact with the inking surface of the pad **141**; thereby preventing objectionable accumulation of ink on the edges of the type faces or the smearing of the ink across the type faces.

The circular raised dwell **38** of the printer cam **14** is operatively juxtaposed to the inker-retracting inclined portion **327** of the inker cam groove **150**, thereby keeping the printer head in its raised position while the inker is being retracted from beneath the printer head **134**.

The printer lobe **35** of the printer cam groove **14** is in operative juxtaposition to the inker-retracted dwell **328** of the inker cam groove **150**, so that throughout the printing motion of the printer head **134** (responsive to the printing impression lobe **35** of the cam groove **14**) the inking pad **141** is stationary in its retracted position. The slight lowering and raising of the type faces due to the slight fall and rise of the central impression portion **331** of the printing lobe **35** accommodates the slight resiliency of the surface of the label **65** (and of the impression pad **50** therebeneath) and so assures a good print impression.

As shown in the cam-timing chart (FIG. **33**) and in FIG. **12**, the label applicator cam **12** has its major circular portion **334** sufficiently receded from the cam follower roller **252** of the applicator switch **248**, to make no contact with the roller **252** whatsoever. The applicator cam **12** has a single lobe **254**, whose applicator dwell surface or periphery **335** closes and keeps closed to the contact of the applicator switch **248**. The applicator dwell **335** is flanked by the inclined approach portion **336** and inclined receding portion **337** of the cam **12**. The dwell **335** of the applicator cam **12** is juxtaposed (timewise) to the printing lobe **35** of the printer cam groove **14**, so that the printing of the frontmost label **65** (on the tape **64**) and the application of the last previously printed and peeled label are generally simultaneous with each other during a terminal portion of the machine cycle.

The applicator bridge **176**, shown in FIGS. **1, 2, 25, 26** and **27**, has an off-center vertical hole **340** extending therethrough, in which the lower end portion of a rigid vertical suction pipe **341** is mounted and held in place by the upper and lower nuts **342** & **343** threaded thereonto and locked against the upper and lower surfaces of the horizontal web **344** of the bridge **176**. The suction pipe **341** extends through a vertically aligned clearance hole **345** in the horizontal applicator-mounting bracket **159**.

The upper end of the suction pipe **341** is operatively connected to a continuously operating electric motor driven vacuum pump (not shown) through a flexible hose (not shown) for constantly maintaining adequate suction in the pipe **341**. A flexible suction hose **347** is operatively attached to the lower end of the suction pipe **341** and has its other end connected to a nipple **348** threaded into a threaded hole **349** in the vacuum box **178** (which vacuum box is beneath and is pivotally mounted to the applicator bridge **176** in the manner hereinabove described, and which vacuum box is shown separately in FIGS. **26** and **27**.

The downwardly extending rectangular peripheral flange **353** of the vacuum box **178** has a series of spaced-apart vertical tapped holes **354** therein for receiving the threaded stems of headed screws **355** which secure the bottom metallic plate **356** to the flange **353** of the vacuum box **178**.

The metallic bottom plate **356** has a number of ¼ inch holes **361** therethrough, suitably distributed thereover, and has a resilient sponge-like vacuum pad **188** adhesively secured to the lower surface thereof; the periphery of the pad **188** being spaced inwardly from the periphery of the metallic plate **356** sufficiently to clear the heads of the screws **355**. The pad **188** is of a closed cell sponge of suitable "yield" and resiliency, formed of rubber, Neoprene or other suitable elastomer, as, for instance, "Rubatex." To the lower face of the pad **188** a thin sheet **358** of fabric-backed Mylar is adhesively secured, with its fabric backing **359** intervening the Mylar sheet and the lower surface of the sponge pad **188**.

In registration with each of the suction holes **361** in the metallic plate **356**, a similar ¼ inch hole **362** is provided through the sponge pad **188**. Smaller holes **363** of about one-eighth inch in diameter (more or less) are provided through the backing-fabric **359** and ⅛inch holes **364** are provided through the Mylar sheet **358**, in registration and co-axial with the holes **361** and **362** in the metallic plate **356** and sponge pad **188**, respectively.

The holes 361 in the metallic plate 356 (and the registering holes 362, 363 and 364 therebeneath) are so distributed that one or more holes 364 in the Mylar sheet will be operatively juxtaposed to the upper surface of each of the many different sizes of labels 65 which the machine is adapted to dispense and apply. For the smallest label, one suction hole may be sufficient for suction engagement of the label by the applicator, while for larger labels two, three, four and as many as eight suction holes may be juxtaposed to the upper surface thereof for suction engagement by the applicator. The distribution pattern of the holes is such as to provide the required number of suction holes in operative juxtaposition to each of the several sizes of labels. The holes which are not needed for a particular size label are blanked out or stopped off by ½ inch diameter resilient gasket-like discs 370 of five thirty-seconds inch in thickness, which discs are placed in the vacuum chamber 365 between the lower surface 366 of the upper wall 367 of the vacuum block or box 178 and the upper surface 368 of the metal plate 356, in operative or shut-off alignment with the unneeded holes is accomplished by unscrewing the screws 355 and removing the metallic plate 356 (and the sponge pad and fabric and Mylar attached thereto) and remounting and attaching the plate 356 after the shut-off discs 370 have been put into their desired blanking or shut-off positions.

The packages to which the pressure-sensitive labels 65 are to be applied is supported on any suitable platform or moving belt (or the like) a distance beneath the label applicator just sufficient for the sponge-supported label to be pressed against the package at or near the end of the down-stroke of the applicator; this distance being such that the sponge pad 188 will be suitably compressed over its entire area or over a part or parts of its area when it presses the adhesive face of the label against the package. The extent of such compression of the sponge pad 188 is adjusted (by varying the aforementioned vertical location of the package in relation to the bottom of the applicator in its down position) so as to cause the sponge to yield and deform sufficiently to conform to the shape and irregularities of the package and to cause the label to follow up any yielding of the surface of the package to which the label is to be applied; without damaging the package or article being labelled, while still ensuring an adequate adhesion of the label. To this end, the yieldability of the sponge pad 188 may be varied both by its overall vertical thickness as well as by size of the cells thereof and by the thickness of the walls of such cells.

The electrical circuits of the machine are shown in the wiring diagram of FIG. 32. The three-wire electrical supply cord 375, extending from the three-prong plug 376, has one wire thereof directly connected to the terminal 378 of the fuseholder 379, whose other terminal 380 is connected to the terminal 381 of any suitable switch 382 (as for instance a toggle switch) on top of the electric control box or juncture box 383. The output terminal 384 of the switch 382 is connected to the indicator light 385 whose other terminal is connected to the grounding terminal 386 carried by the grounding terminal strip 387 (of insulating material), so that the indicator-light 385 will be lighted whenever the switch 382 is in its "on" position. The terminal 384 of the switch 382 is also directly connected to the terminal 388 on the supply terminal strip 389 (of insulating material). The AC terminals of a full-wave bridge type rectifier 390 are connected across the AC supply terminal 391 and the ground terminal 392. The DC terminals of the rectifier 390 are connected to the terminals 393 and 394, to which the latter terminals of the protective diode 395 are also connected.

The electromagnetic brake 61 and the electromagnetic clutch 54 are connected to the direct current terminals 393 and 394 through the single-pole double-throw micro-switch 127 (forming a part of the label sensor 98) in the manner hereafter described. The DC output terminal 393 of the rectifier 390 is connected to terminal No. 3 of the four-prong socket 396 mounted through the wall of the control box 383. From terminal No. 3 of the socket 396, the direct current is supplied to the terminal No. 3 of the four-prong plug 397 (when the plug is inserted into the socket). Terminal No. 3 of the plug 397 is in turn connected to the common terminal 398 of the micro-switch 127. The normally closed output terminal 400 of the micro-switch 127 is connected to the input terminal 401 of the electromagnetic brake 61, whose grounding terminal 402 is connected to the DC ground terminal 394 in the control box 383. The normally open output terminal 403 of the micro-switch 127 is connected to the No. 1 prong of the four-prong plug 397, through which it is connected to the No. 1 terminal of the four-prong socket 396, which in turn is connected to the input terminal 404 of the electromagnetic clutch 54 whose ground terminal 405 is connected to the DC ground terminal 394 in the control box 383. Hence, when the arm 126 of the micro-switch 127 is depressed or deflected by the switch-operating member 124 of the label sensor 98, the electromagnetic brake 61 is de-energized and the electromagnetic clutch 54 is energized so as to feed the tape 64, and when the switch arm 126 is raised to its original position upon the retraction of the member 124 of the label sensor 98, the brake 61 is energized and the clutch 54 is de-energized, so as to stop the feed motion of the label-carrying tape 64 after it has moved forwardly a distance equal to the length of the label plus the clearance between two adjacent labels.

The terminals numbered "2" and "4" of the four-prong plug 397 are connected across the terminals 406 and 407 of the tape feed tripping solenoid 128 of the label sensor 98, which is thereby connected to the terminal No. 2 and No. 4 of the four-prong socket 396. The terminal No. 2 of the four-prong socket 396 is connected to the AC supply terminal 408 which in turn is connected to the output terminal 409 of the normally open single-pole single-throw tape feed tripping micro-switch 247 whose input terminal 410 is connected to the AC supply terminal 411. Terminal No. 4 of the four-prong socket 396 is connected to the AC ground terminal 412. By this means (including the prong and socket terminals numbered 2 and 4), the tape feed tripping solenoid 128 of the label sensor 98 is energized for a brief moment whenever the arm 249 of the micro-switch 247 is deflected by the short switch-deflecting portion 253 of the lobe of the tape feed tripping cam 11 (FIGS. 12 and 32), thereby starting the label-feeding motion of the tape 64.

The AC solenoid valve 222 has its electrical input terminal 413 connected to the AC terminal 414 which is in turn connected to the output terminal 415 of the normally open single-pole single-throw applicator micro-switch 248. The other electrical terminal 416 of the micro-switch 248 is connected to the AC supply terminal 411. The other electrical terminal 418 of the solenoid valve 222 is connected to the AC ground terminal 419. Hence, whenever and so long as the arm 250 of the micro-switch 248 is deflected by the circular dwell 335 of the lobe 254 of the applicator cam 12, the solenoid valve 222 is energized so as to close the venting valve thereof and to open the through-passage valve thereof connecting its inlet 221 with its outlet 223, thereby to permit the passage of the compressed air into the top of the cylinder 170 above the piston 215, thereby to move the piston and the applicator label bridge 176 and the vacuum box 178 downwardly through their label-applying stroke. When the micro-switch 248 is again opened, (namely, when the switch-actuating dwell 335 of the lobe 254 of the cam 12 has passed the cam follower roller 252 of the arm 250 of the switch 248), the solenoid valve 222 is de-energized and the compressed air supply valve passage therethrough is closed and the venting valve passage thereof is opened so as to shut off the supply of compressed air to the upper end of the cylinder 170 and to vent the compressed air above the piston 215 to the atmosphere, thereby enabling the compressed air in the lower end of the cylinder 170 (below the piston 215) to move the piston and the applicator upwardly into their original label-receiving position.

The terminal 417 of the solenoid 42 (which trips the cam-shaft clutch 41 so as to turn the cam-shaft 9 through one revolution) is connected through the terminals 418 to the terminal 419 of a two-prong socket 420 mounted through the wall of the control box 383. The other terminal 421 of the socket 420 is connected to the AC supply terminal 422. The other terminal 423 of the solenoid 42 is connected to the AC ground terminal 424. A two-prong plug 425 is inserted into the socket 420, and any suitable machine-tripping switch may be wired to the plug 425, as, for instance, manually operable push-button type switch at the front of the machine or a foot pedal operated switch, or a package-contacted micro-switch mounted in operative juxtaposition to the path of the packages on a conveyer belt passing beneath the applicator, or a switch operated by a photo-electric cell governed by a beam of light alternately cut off and admitted by the passage of the packages or articles to be labeled and arranged similarly to energize the solenoid 42; each of such alternative switches being arranged to be closed only long enough momentarily to retract the armature 297 of the solenoid 42 to deflect the trip lever 45 for the instant necessary to activate the clutch 41 and to start the cam-shaft rotating.

The main electric motor 39, which drives the cam-shaft 9 through the clutch 41, has one terminal thereof connected to the AC supply terminal 388 and has the other terminal thereof connected to the AC ground terminal 427, thereby to be continuously operated so long as the switch 382 is in its "on" position.

The label feeding and peeling motor 53 has one terminal thereof connected to the AC supply terminal 428 and has the other terminal thereof connected to the AC ground terminal 429 so as likewise to be operated continuously so long as the switch 382 is in its "on" position.

The label heater 48 (FIG. 13) has one terminal thereof connected to one of the AC supply terminals (as, for instance, terminal 428) through any suitable manually operable on-off switch 430. A thermostatic switch 431 may also be placed into the same supply line into which the switch 430 is wired, with its temperature-sensing element in operative juxtaposition to the tape bed 49, so as automatically to turn the heater 48 on and off so as to maintain the tape bed at the optimum temperature required for best application of the labels; such thermostatic switch 431 being preferably of the adjustable type so that its temperature-setting may be varied.

Electrical convenience outlets 432 may be provided on the side of the electrical control box 383, connected to the AC supply terminal 433 and to the AC ground terminal 434.

FIG. 34 shows various lengths of labels 65 in operative juxtapositon to the location and range of adjustability of the label-sensing finger 112 of the label sensor 98 and in operative juxtaposition to the longitudinal dimension of the available printing area determined by the size of the type chase, which area is designated as 437, and in operative juxtaposition to the location and range of adjustability of the edge 92 of the peeler blade 93; such range of adjustability being designated by the numeral 438.

In the lowermost portion 439 of FIG. 34, a tape 64 is shown, carrying 1 ⅞×1 ⅞ inch labels 65 with ⅛ inch spacings between labels and requiring a 2 inch tape-feed. This illustrates a full printing coverage of the label.

The portion 440 of FIG. 34 shows 3⅞×3 ⅞ inch labels 65 on the backing strip 64, in relation to the printing area 437, and shows the manner in which such printing area may be centered on such label; such label requiring a 4 inch tape-feed.

Above the area 440, are fourteen fragmentary portions of fourteen different lengths of labels, each successively shorter and each having successively shorter feed lengths. The feed lengths of each of these labels is marked in the right-hand column under the heading of "feed lengths." The length of each label is approximately one-eighth inch shorter than the feed length; one-eighth inch being taken up by the gap between successive labels. However, this gap may be varied.

The following are the steps for adjusting the machine for any one of the aforementioned feed lengths or label lengths.

If the labels are pre-printed and hence the type chase is removed from the printer head, or if for any other reason the labels are not to be imprinted, then the peeler edge 92 of the peeler blade 93 may be positioned anywhere within its range of adjustment (provided by the screws 153 and slots 154, FIG. 2), but preferably as close inwardly as may be possible while still bringing the leading edge of the label within the label-sensing area 436. This will vary according to the length of the label. Thereupon the tape 64 is so positioned as to bring the leading edge of the frontmost label thereon to the peeler edge 92 of the peeler blade 93. Thereafter, the label-sensing platform is moved from its frontmost position towards the rear until the finger 112 thereof drops into the next gap between adjacent labels and is engaged by the then stationary leading edge of the next label and the arm 113 thereof is thus moved forwardly slightly to a position in which the arm 126 of the micro-switch 127 rises to its position in which the clutch terminal 403 thereof is open and the brake terminal 400 thereof is closed (FIG. 32). When in this position, the label-sensing platform 99 is locked in place by means of the screw 104 (FIGS. 13 and 14).

If the label is to be imprinted, then the type set into the type chase 135 is first appropriately distributed within the chase for the desired format of the printed matter, and then the tape 64 is moved until the printed matter is located within the area of the label in which the so selected printing is desired.

With the tape in this position, the label peeler 90 (together with the entire label applicator) is moved into the position in which the peeler edge 92 of the peeler blade 93 is directly beneath and in vertical alignment with the leading edge of the frontmost label 65, and the label peeler 90 and the entire label applicator are than locked in this position by tightening the two screws 154 (FIG. 2).

The label-sensing platform 99 is again moved from a front position towards the rear until the label-sensing finger 112 drops into the next gap between adjacent labels and the arm 113 is moved forwardly by the engagement of the finger 112 by the leading edge of the label until the arm 126 of the micro-switch 127 rises to its position in which the clutch-activating contact 403 thereof is open and the brake-activating contact 400 thereof is closed, and the label-sensing platform 99 is locked in this position by tightening the screw 104.

Having shown and described an embodiment of the invention, I claim the following:

1. A label-applying machine for intermittently feeding die-cut labels on a backing tape and peeling one label at a time from said backing tape and applying the so peeled label to an article to be labeled, such machine including a cam-shaft, an electric motor for driving the cam-shaft, and a single-revolution clutch intermediate said electric motor and said cam-shaft and arranged operatively to connect said shaft to said motor through one revolution of the shaft each time such clutch is activated, a tape bed, means for supporting a roll of backing tape having spaced-apart pressure-sensitive labels thereon in operative alignment with the rear end of said tape bed, a label peeler in operative alignment with the front end of said tape bed, a tape rewinder, means for guiding the label-free backing tape from said label peeler to said tape rewinder, tape-transporting means intermediate said label peeler and said tape rewinder, for intermittently drawing the label-free backing tape from said label peeler and thereby intermittently drawing the label-bearing backing tape from the supply roll thereof across said tape bed and across said label peeler, a label sensor disposed in operative juxtaposition to the label-bearing portion of the backing tape on said tape bed and arranged to be engaged by the leading edge of each label, in succession, as the backing tape is intermittently moved by said tape transport means, and said label sensor being arranged to stop the tape transport means when so engaged and moved forward by the leading edge of each label, in succession, and said label sensor being arranged to start said label-transporting means when disengaged from the leading edge of a label, means carried by the said cam-shaft for disengaging said label sensor from the leading edge of the label at the beginning of

each cycle of said cam-shaft, thereby to start into motion said tape transport means, a pneumatic label applicator in operative alignment with said label peeler and including pneumatic means for cycling said label applicator through its label-receiving and label-applying cycle, and vacuum means at the label applying end of said label applicator for receiving and vacuum-engaging the label as it is peeled from the backing tape by said label peeler, and means carried by said cam-shaft for controlling the application and venting of compressed air to and from said pneumatic applicator to cause it to move through its label-receiving and label-applying cycle.

2. A label imprinting and applying machine for imprinting die-cut labels on a backing tape and peeling one label at a time from said backing tape and applying the so peeled label to an article, such machine including a cam-shaft, an electric motor for driving the cam-shaft, and a single-revolution clutch intermediate said electric motor and said cam-shaft and arranged operatively to connect said shaft to said motor through one revolution of the shaft each time such clutch is activated, a printer including a printer head bearing type, a guide for guiding said printer head through alternating to-and-fro inking strokes and printing strokes, means operatively interposed between the printer head and the cam-shaft for alternately moving the printer head through an inking cycle and through a printing cycle, an impression pad in operative alignment with said printer head, an inker reciprocably mounted in a travel path extending over the impression pad and into operative alignment with the printer head and with a suitable clearance between the inker and the impression pad when in superimposed position and said travel path extending to a retracted position in which the inker is fully retracted from its printer-aligned position, means intermediate the cam-shaft and said inker for moving the latter through its inking cycle in timed relation to the cycles of the printer head, a tape bed generally co-planar with the impression pad and extending rearwardly therefrom and beneath said reciprocably mounted inker with clearance therebetween for the free passage of the label-bearing backing tape between the inker and the tape bed, means for supporting a roll of backing tape having spaced-apart pressure-sensitive labels thereon in operative alignment with the rear end of said tape bed, a label peeler in front of the impression pad and in operative alignment therewith, a tape rewinder, means for guiding the label-free backing tape from said label peeler to said tape rewinder, tape-transporting means intermediate said label peeler and said tape rewinder for intermittently drawing the label-free backing tape from said label peeler and thereby intermittently drawing the label-bearing backing tape from the supply roll thereof across said tape bed and across said impression pad and across said label peeler, a label sensor disposed in operative juxtaposition to the label-bearing portion of the backing tape on said tape bed and arranged to be engaged by the leading edge of each label, in succession, as the backing tape is intermittently moved by said tape transport means, and said label sensor being arranged to stop the tape-transporting means when so engaged and moved forward by the leading edge of each label, in succession, and said label sensor being arranged to start said label-transporting means when disengaged from the leading edge of a label, means carried by the said cam-shaft for disengaging said label sensor from the leading edge of the label at the beginning of each cycle of said cam-shaft, thereby to start into motion said tape transport means, a pneumatic label applicator in operative alignment with said label peeler and including pneumatic means for cycling said label applicator through its label-receiving and label-applying cycle, and vacuum means at the label-applying end of said label applicator for receiving and vacuum-engaging the label as it is peeled from the backing tape by said label peeler, and means carried by said cam-shaft for controlling the application and venting of compressed air to and from said pneumatic applicator to cause it to move through its label-receiving and label-applying cycle.

3. A label-applying machine for intermittently feeding a label at a time from a supply thereof to a pneumatic label applicator and thereby intermittently applying the labels to an article to be labeled, said machine including a cam-shaft, an electric motor for driving the cam-shaft and a single-revolution clutch arranged operatively to connect the shaft to the motor through one revolution of the shaft each time the clutch is activated, a pneumatic cylinder having a piston therein and a piston rod extending therefrom, a label applicator head carried by the free end of the piston and including a vacuum chamber and a resilient vacuum pad on the label applicator head facing the article to be labeled and in operative communication with said vacuum chamber and having suction holes causing said pad to engage a label presented to it by such suction, means for intermittently admitting and venting compressed air into and from the cylinder to cause the piston therein to move the label applicator head through a label-applying stroke and through a head-retracting stroke, said means including a pneumatic valve operatively interposed between the cylinder and a source of compressed air and a cam on said cam-shaft for controlling said valve, label supply means and means for intermittently feeding a label at a time from said label supply means into operative juxtaposition to the vacuum pad of the label applicator head while the latter is in its retracted position.

4. A label-applying machine according to claim 3, in which the air admitting and venting means includes a three-way solenoid valve and an on-off switch in its electric circuit, and in which the air-controlling cam is in operative juxtaposition to said on-off switch and activates the same.

5. A label-applying machine according to claim 3, in which the label-feeding means includes a label feed cam on the cam-shaft arranged to cause the feeding of a label to the suction pad of the label applicator head when the latter is stationary in its retracted position.

6. A label-applying machine according to claim 4, in which the label-feeding means includes a label feed cam on the cam-shaft arranged to cause the feeding of a label to the suction pad of the label applicator head when the latter is stationary in its retracted position.

7. A label-applying machine according to claim 3, in which the label supply means is a roll of release-webbing having slightly spaced-apart pressure-sensitive labels thereon, and including a tape bed for supporting the label-bearing webbing, and including a label peeler in operative alignment with the front end of said tape bed, a webbing rewinder, means for guiding the label-free webbing from said label peeler to said webbing rewinder, webbing-transporting means intermediate said label peeler and said webbing rewinder, for intermittently drawing the label-free webbing from said label peeler and thereby intermittently drawing the label-bearing webbing from the supply roll thereof across said label peeler, a label sensor disposed in operative juxtaposition to the label-bearing portion of the webbing on said tape bed and arranged to be engaged by the leading edge of each label, in succession, as the webbing is intermittently moved by said webbing transport means, and said label sensor being arranged to stop the webbing transport means when so engaged and moved forward by the leading edge of each label, in succession, and said label sensor being arranged to start said webbing-transporting means when disengaged from the leading edge of a label, a cam carried by the said cam-shaft for disengaging said label sensor from the leading edge of the label at the beginning of each cycle of said cam-shaft, thereby to start into motion said webbing transport means.

8. A label-applying machine according to claim 3, in which the label applicator head is pivoted in relation to the piston rod and is arranged to be tilted towards the label fed towards the vacuum pad thereof when the label applicator head is in its retracted position.

9. A label-applying machine including a tape bed, means for supporting a roll of release-webbing having slightly spaced-apart pressure-sensitive labels thereon in operative alignment

with the web-receiving end of the tape bed, a label peeler in operative alignment with the label-issuing end of the tape bed, said label peeler including a peeler blade having a generally planar upper surface and a peeler edge along the label-issuing side thereof, said blade being pivotally mounted about an axis generally in the plane of its said upper surface and at a right angle to the longitudinal travel path of the webbing, means for locking said blade in any desired position of angular adjustment about its said axis, said label peeler also including a hold-down roller revolvably mounted to said peeler blade about an axis parallel to the mounting axis of the blade intermediate the receiving edge and the issuing edge of said upper planar surface and so spaced from said upper planar surface of the blade that the periphery of said hold-down roller will be spaced from said surface a distance equal to the combined thickness of the webbing and the label plus a suitable slight working clearance.

10. A label-applying machine according to claim **9**, in which the label peeler is adjustably mounted in relation to the issuing end of the tape bed so as to be movable in a plane parallel to the plane of the tape bed for optionally changing its fore-and-aft spacing in relation to the issuing end of the tape bed.

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