

April 1, 1969

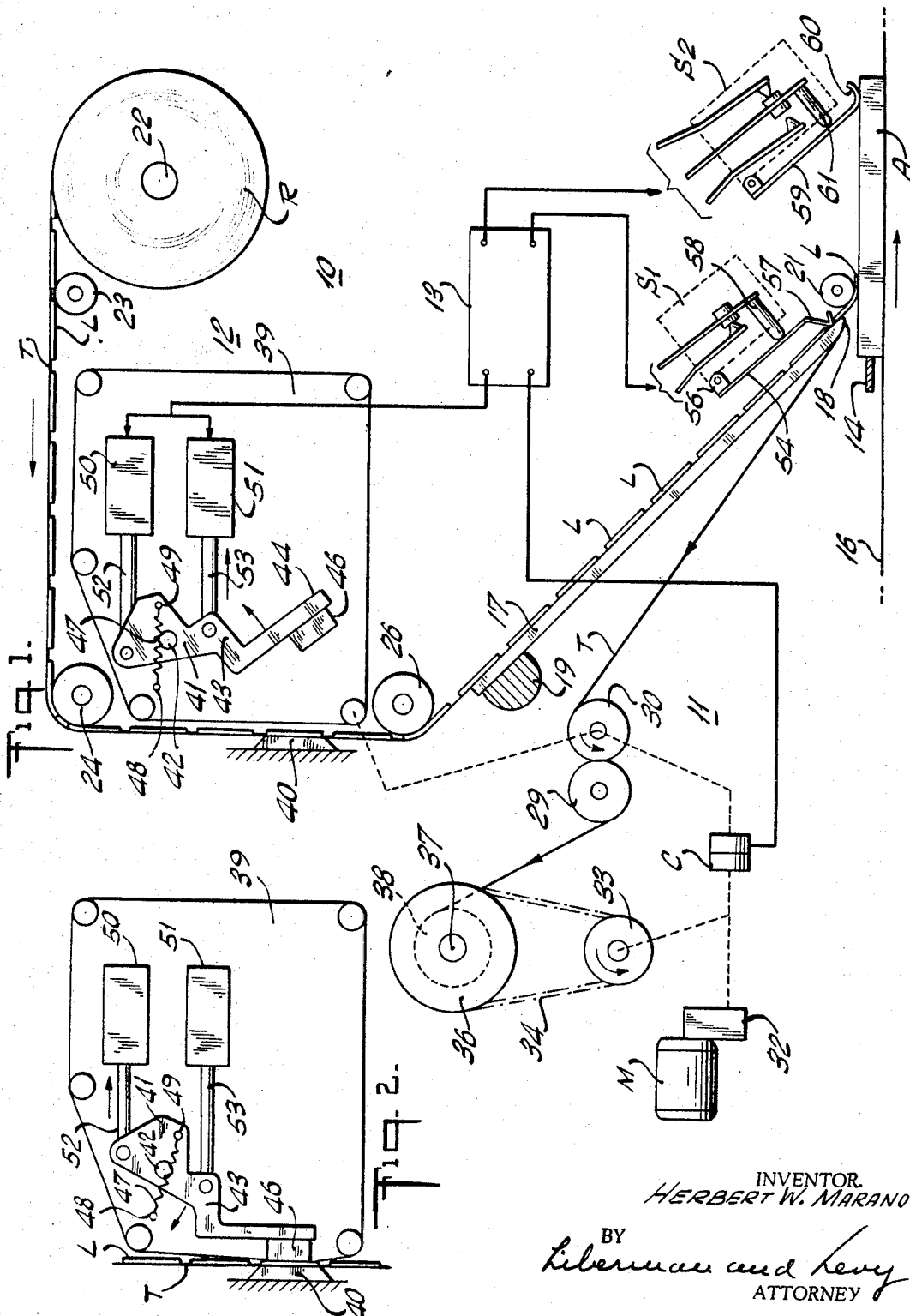
H. W. MARANO

3,436,294

TAPE-MOUNTED LABEL DISPENSING AND APPLYING APPARATUS

Filed May 7, 1964

Sheet 1 of 4



INVENTOR.
HERBERT W. MARANO

BY
Lieberman and Levy
ATTORNEY

April 1, 1969

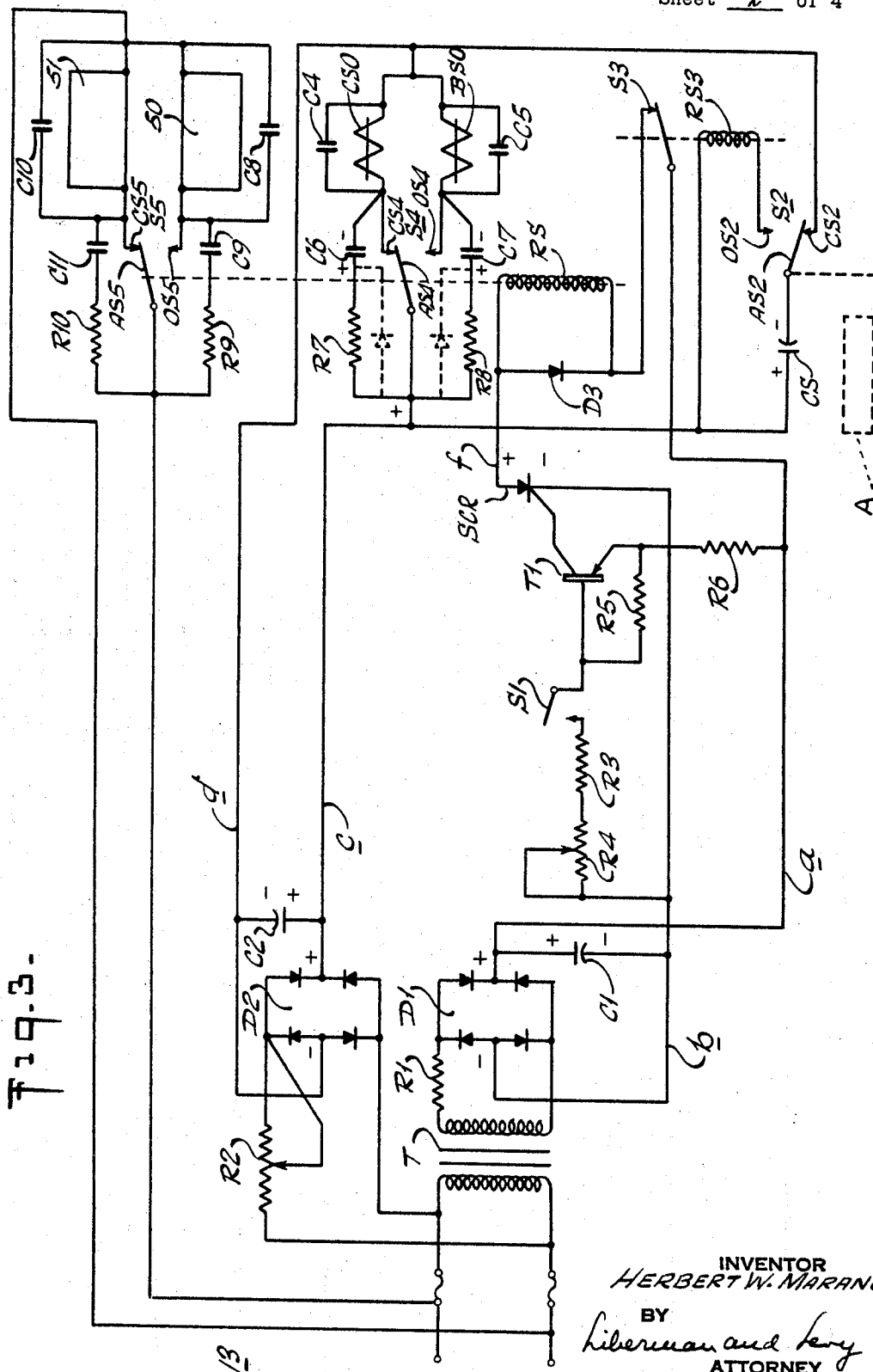
H. W. MARANO

3,436,294

TAPE-MOUNTED LABEL DISPENSING AND APPLYING APPARATUS

Filed May 7, 1964

Sheet 2 of 4



April 1, 1969

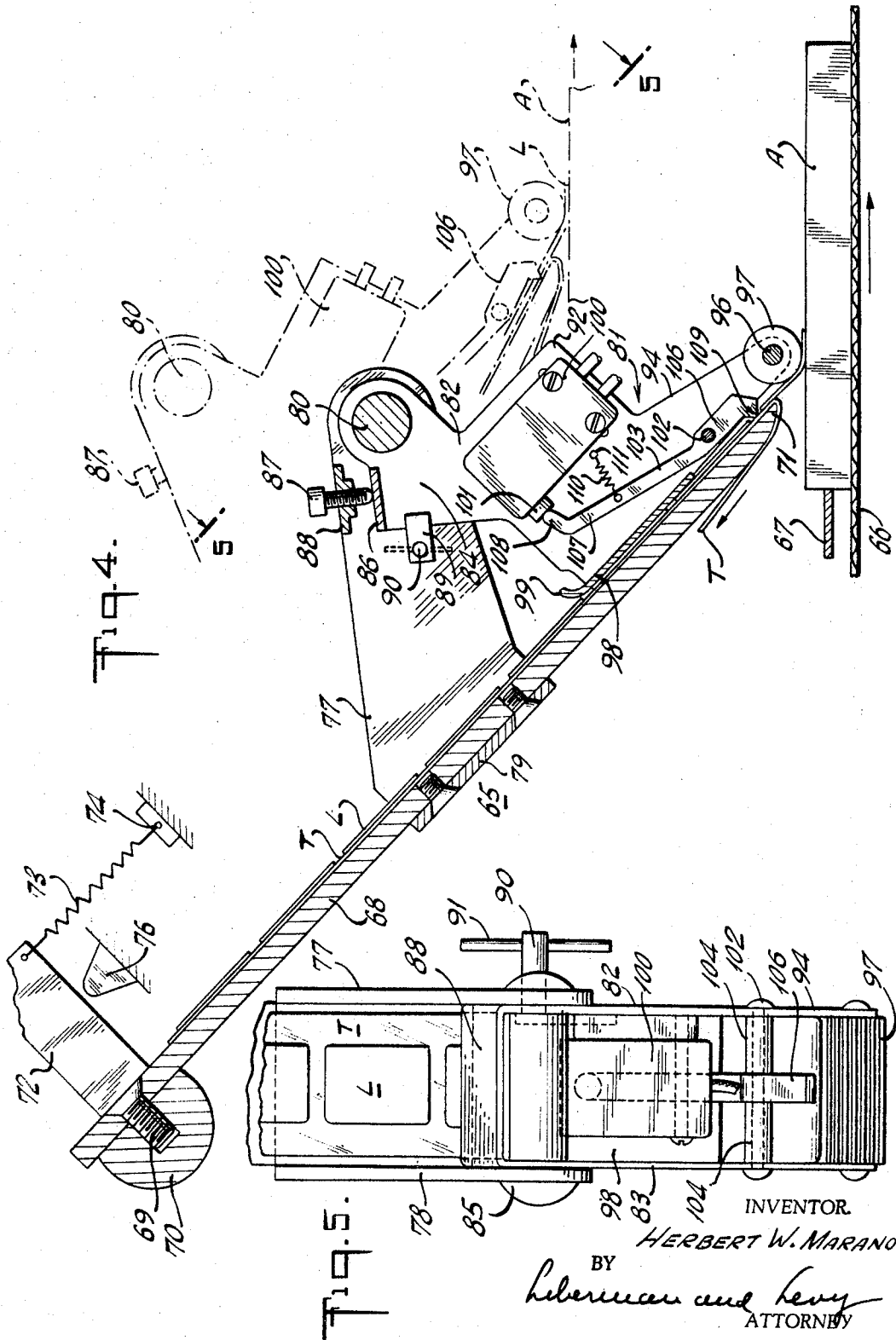
H. W. MARANO

3,436,294

TAPE-MOUNTED LABEL DISPENSING AND APPLYING APPARATUS

Filed May 7, 1964

Sheet 3 of 4



April 1, 1969

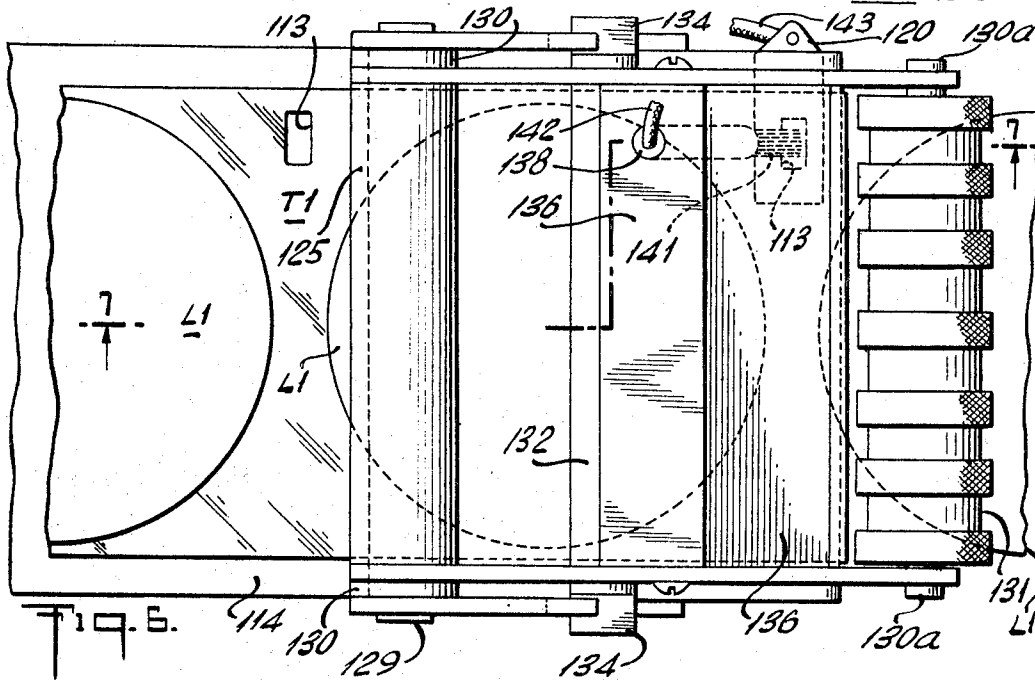
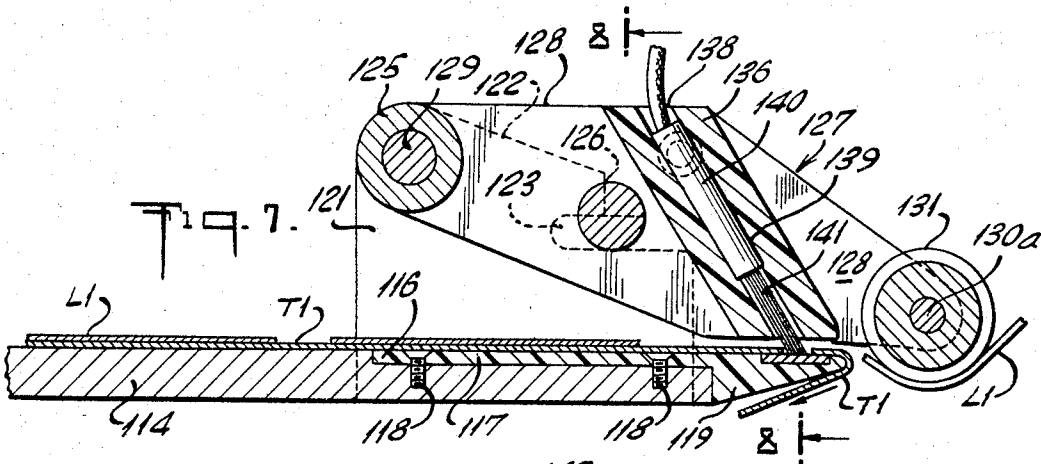
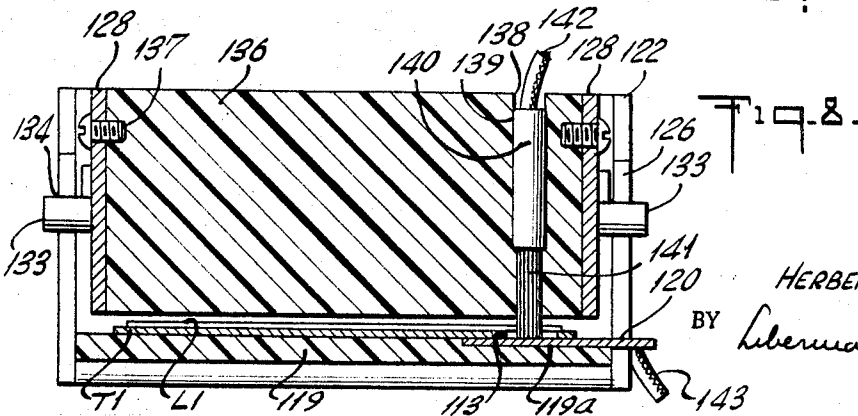
H. W. MARANO

3,436,294

TAPE-MOUNTED LABEL DISPENSING AND APPLYING APPARATUS

Filed May 7, 1964

Sheet 4 of 4



INVENTOR
HERBERT W. MARANO

BY *Liberman and Levy*
ATTORNEY

1

2

3,436,294

TAPE-MOUNTED LABEL DISPENSING AND APPLYING APPARATUS

Herbert W. Marano, Summit, N.J., assignor to Flinchbaugh Products, Inc., Red Lion, Pa., a corporation of Pennsylvania

Filed May 7, 1964, Ser. No. 365,658

Int. Cl. B65h 25/14; G05g 15/00; B32b 31/20

U.S. Cl. 156—351

13 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for applying pressure sensitive labels from a label carrying tape to moving objects includes an applicator arm terminating in a separator edge and a take-up roll drawing the tape around the separator edge, the take-up roll being connected through an electrically actuated clutch and brake to a drive motor. The clutch actuated coil is connected through a relay switch to a source of current, and the relay solenoid is connected through a silicon-controlled rectifier and an object sensing switch to a source of current. A label sensing element applies a control signal to the silicon-controlled rectifier through a transistor whose collector is connected directly to the silicon-controlled rectifier gate electrode. The object sensing switch is mechanically actuated and the label sensing switch may be mechanically or electrically actuated.

The present invention relates generally to improvements in labelling apparatus, and it relates in particular to an improved device for sensing and controlling the position of a label carried and forwarded by an advancing support band or tape.

Pressure-sensitive labels are commonly carried in spaced end-to-end fashion on a backing tape or band, the adhesive face of the label releasably engaging a face of the backing tape. It is common practice to advance the label carrying tape around a sharp edge so as to effect the separation of the label from the tape for the dispensing of a label or the application thereof to an article or package. In order to facilitate the dispensing or removal of a leading label, it is generally necessary that the leading label project forwardly of the separating edge and that its trailing end be engaged by the tape to support the label in a forwardly projecting cantilevered manner. This has posed the problems of accurately sensing the position of the leading label relative to the separating edge and continuously closely controlling the advance and stopping of the label-carrying tape in order precisely to support the leading label at an optimum position. The mechanisms and devices heretofore available and proposed possess many drawbacks and disadvantages. The sensing mechanisms are impractical and unreliable and subject to frequent malfunctioning, and the associated control systems are unstable, frequently unresponsive and often provide spurious responses with undesirable advances of the label-carrying tape, and otherwise they leave much to be desired.

It is thus a principal object of the present invention to provide an improved labelling apparatus.

Another object of the present invention is to provide an improved apparatus for dispensing and applying pressure sensitive labels from a band carrying such labels in an end-to-end arrangement.

Still another object of the present invention is to provide an improved apparatus for controlling the advance of a label-carrying tape to a dispensing area and to position successive labels accurately at a predetermined point relative to the dispensing area.

A further object of the present invention is to provide an improved circuit network response to a wide range of input signals for controlling the operation of a feed mechanism.

Still a further object of the present invention is to provide an apparatus of the above nature characterized by its ruggedness, accuracy, reliability and adaptability.

The above and other objects of the present invention will become apparent from a reading of the following description, taken in conjunction with the accompanying drawings, wherein

FIGURE 1 is a front, partially diagrammatic, elevational view of a label printing and applying apparatus embodying the present invention and illustrated in a label applying position;

FIGURE 2 is a front elevational view of the printing section illustrated in a print position;

FIGURE 3 is a schematic view of the improved control network associated therewith;

FIGURE 4 is a front elevational view of another form of label sensing and applying device constructed according to and embodying the present invention;

FIGURE 5 is a sectional view taken along line 5—5 in FIGURE 4;

FIGURE 6 is a fragmentary top plan view of another form of label sensing and applying device embodying the present invention;

FIGURE 7 is a sectional view taken along line 7—7 in FIGURE 6; and

FIGURE 8 is a sectional view taken along line 8—8 in FIGURE 7.

In a sense, the present invention contemplates the provision of a label applying apparatus comprising a label applicator member, means for advancing a label receiving article into registry with said applicator member, means for advancing a label to a predetermined position relative to said applicator member, means including a silicon-controlled rectifier responsive to the position of said label, and a switch connected in series with said silicon controlled rectifier and a source of current for controlling said label advancing means, and means responsive to the position of said article for actuating said switch. The silicon-controlled rectifier advantageously forms part of a novel, highly stable, control network including a preamplifier transistor having a first of its output electrodes connected directly to the control electrode of the silicon-controlled rectifier and its second output electrode connected through a negative feedback resistor to a current source terminal, and the base of the transistor is connected through a second resistor to said second output electrode. The input to the control electrode is advantageously derived by way of a variable resistance sensing device connected between the transistor base and a third resistor to the opposite terminal of the current source.

According to a preferred form of the present apparatus, there is provided a swingable applicator arm terminating in a transverse separator edge, and means including an electrically actuated clutch for advancing a label carrying tape forwardly along the applicator arm around the separator edge and thence rearwardly to a take-up roll. A swingable sensing finger is carried by the applicator arm and engages the upper face of the tape in the path of the labels and actuates a switch to its open or closed positions when in registry with a label or the space between successive labels, the switch actuating effecting a firing signal to the silicon-controlled rectifier. The clutch is connected to a source of energizing current through a relay switch, the actuating solenoid of which is connected in series with the output of the silicon-controlled rectifier. The switch connected in series with the silicon-controlled rectifier output is a relay switch having an actuating sole-

3

noid and there is provided a capacitor and a switch alternatively connecting the capacitor across a source of charging current or across the solenoid, and is actuated by the movement of an advancing article. A printing device is disposed along the path of the labels trailing the separator edge and is actuated concurrently with the braking of the drive clutch. An alternative form of sensing arrangement may be employed to advantage where the label carrying tape is provided with spaced openings along the length thereof indexing corresponding labels. A wiper electrode is carried by the applicator arm and directed thereto along the path of the index openings and into registry with a second electrode underlying the advancing tape rearwardly of the separator edge. This engagement is effected between the two electrodes upon registry therewith of a tape index opening. The electrodes are connected to effect a signal to the silicon-controlled rectifier upon mutual engagement thereof.

Referring now to the drawings, and more particularly to FIGURES 1 to 3 thereof which illustrate a preferred embodiment of the present invention, reference numeral 10 generally designates the improved apparatus which includes a label applying section 11, a label printing section 12 and a control network 13. Articles A, to which the pressure sensitive labels L are to be individually applied, are advanced through the labelling station in registry with the label applying means by any suitable conveyor, such as a plurality of longitudinally spaced transverse flights 14 supported and advanced by a pair of suitably motivated opposite parallel chains (not shown) and pushing longitudinally spaced successive articles or packages A along a horizontal support surface 16. Means are provided for sensing a package A at the labelling station and for sensing the position of a leading label for controlling, through network 13, the actuation of the label feed section 11 and the printing section 12 in the manner which will be hereinafter set forth. The pressure sensitive labels are carried in longitudinally spaced end-to-end arrangement by an elongated support tape T to which the labels L releasably adhere by means of the pressure sensitive cement coating the underfaces of the labels L. The label carrying tape T is packaged in a roll R with the labels L facing radially inwardly.

Label applying section 11 comprises a downwardly forwardly inclined swingable guide arm 17 having a flat top face and terminating at its bottom leading end in a transversely extending beveled sharp separator edge 18. The trailing end of guide arm 17 is affixed at its underface to a horizontal rockable shaft 19 which is spring urged clockwise to a predetermined position wherein the leading end of guide arm 17 is shortly above the path of conveyor flights 14. A transversely extending horizontal applicator roller or wiper 21 is mounted on guide arm 17 shortly forward of separator edge 18, with its underface in about the plane of the top face of guide arm 17.

The label carrying tape roll R is rotatably supported on a transverse spindle 22 above labelling section 11 and the label carrying tape T is led therefrom through printing station 12 and to labelling station 11 by an upper pair of front and rear guide rollers 23 and 24 respectively, and a lower guide roller 26 disposed in vertical alignment with the upper rear roller 24 and shortly rearwardly and tangent to the top face of guide arm 17. Positioned below the trailing end of guide arm 17 is a pair of horizontal rollers 29 and 30, spring-urged toward each other, at least one of the rollers preferably being rubber covered. Roller 30 is connected to and positively controllably intermittently driven by a suitably energized drive motor M by way of an electrically controlled clutch and brake assembly C. Roller 30 is connected to the output shaft of the clutch assembly C, the input shaft of which is coupled, through a speed reduction unit 32, to the drive shaft of motor M. Also connected to and continuously driven

4

by motor M through speed reduction unit 32 is a pulley 33 which is coupled by a slipping belt 34 to a pulley 36 provided with a spindle 37 carrying a tape takeup roll 38 which is slip driven to wind up the label depleted tape T intermittently fed thereto by rollers 29 and 30. The clutch and brake assembly C is electrically connected to the output of control network 13.

Printing assembly 12 includes a suitably supported vertical mounting plate 39 located within the path traversed by the tape T around guide rollers 23, 24 and 26 and a stationary platen 40 supported rearwardly of the line extending tangentially between vertically spaced rollers 24 and 26, and having a forwardly directed front face substantially lying along said tangential line. A vertical toggle lever 41 is mounted by means of a pivot pin 42 to the upper rear section of plate 39 for rocking about a transverse axis intermediate the ends of the lever 41. Directed rearwardly and integrally formed with lever 41 is a short leg 43 from which terminates a depending arm 44. A suitably inked printing platen 46 is mounted on the lower rear face of arm 44 and is in confronting engagement with stationary platen 40, sandwiching the label carrying tape T therebetween when lever 41 is swung to its clockwise print position as illustrated in FIGURE 2 of the drawing.

A helical tension spring 47 is connected between a stationary pin 48 located on plate 39 rearwardly and at about the level of pivot pin 42 and a pin 49 mounted on and intermediate the ends of lever 41 and forward of pivot pin 42. Thus, lever 41 and platen carrying arm 44 are alternatively urged to an advanced print position or a retracted position by spring 47 as lever 41 is rocked to either side of its equilibrium position. In order to advance and retract printing platen 46, there is provided a pair of longitudinally extending upper and lower solenoids 50 and 51 respectively which are electrically connected to the output of control network 13 and alternatively energized thereby. The upper or print solenoid 50 includes a longitudinally movable armature which is coupled by a rod 52 to the upper end of lever 41 and the lower or retract solenoid 51 likewise includes a longitudinally movable armature which is coupled by a rod 53 to the lower end of lever 41.

Mounted on and adjacent the leading end of guide arm 17 is a longitudinally extending, label sensing arm 54 terminating at its trailing end in an ear 56 which is pivotally coupled to guide arm 17 to permit the swinging of sensing arm 54 about a transverse axis. The leading end of sensing arm 54 is provided with a depending feeler element 57 which is resiliently urged into engagement with the upper surface of the label carrying tape T just rearwardly of the separator edge 18. A first, normally closed, microswitch S1 is also mounted on guide arm 17 and includes an actuating plunger 58 bearing on the upper face of sensing arm 54 resiliently to urge it to its depressed position. Switch S1 is so adjusted that when feeler 57 engages a label L, sensing arm 54 and plunger 58 are raised to open switch S1, and when the feeler 57 registers with a space intervening successive labels L, arm 54 and plunger 58 are allowed to drop and thereby close switch S1. As noted above, feeler 57 is disposed a short distance behind the separator edge 18.

A second, double throw, microswitch S2 is located adjustably along the path of advancing articles A forwardly of applicator arm 17, and includes a swingable sensing arm 59 hinged at its trailing end about a transverse axis and downwardly forwardly inclined to a downwardly convex leading end 60. Switch S2 is provided with a plunger 61 which bears on the upper face of sensing arm 59, whereby switch S2 is actuated to one or the other of its alternate positions in the presence or absence of a registering object A respectively. Switches S1 and S2 are connected to the input control terminals of network 13 which operates to advance tape T upon the actuation

of sensing arm 59 and thereafter to stop the tape advance upon the feeler registering with a space following a label L in the manner which will be hereinafter set forth.

Referring to FIGURE 3 of the drawings, which illustrates a novel control network 13 which may be employed to great advantage, for example, with the apparatus above described, there is included a step-down power transformer T whose primary winding is connected through suitable fuses to a line source of alternating current. The secondary winding of transformer T is connected through a dropping resistor R1 to opposite input corners of a solid state bridge rectifier D1. The opposite output corners of rectifier D1 are connected to positive and negative lines *a* and *b* respectively, across which is connected a filter capacitor C1. A second solid state bridge rectifier D2 has its opposite input corners connected through a variable current limiting resistor R2 to the alternating current source, and its opposite positive and negative output corners connected to lines *c* and *d* respectively, a filter capacitor C2 being connected between lines *c* and *d*.

A transistor T1 has its base connected to negative line *b* through the series connected switch S1, resistor R3 and rheostat R4. The emitter of transistor T1 is connected through a resistor R5 to the transistor base and through a resistor R6 to positive line *a*. The collector of the transistor T1 is connected directly to the control electrode of a silicon controlled rectifier SCR, the collector of which is connected directly to negative line *b*. The emitter electrode *f*, the signal controlled rectifier SCR, is connected in series with a relay solenoid RS and a normally closed relay switch S3 to positive line *a*. Relay switch S3 is actuated by a relay solenoid RS3 which is connected between the positive line *c* and the normally open contact OS2 of sensing switch S2. The normally closed contact CS2 of switch S2 is connected to negative line *d*, and switch arm AS2 thereof is connected through a relay solenoid energizing capacitor C3 to positive line *c*. Relay solenoid RS is shunted by a diode D3 oriented oppositely to the signal controlled rectifier SCR.

The network for actuating the brake and clutch assembly C includes a clutch actuating solenoid CS0 and a brake actuating solenoid BS0, each of which is shunted by a capacitor C4 and C5 respectively. A pair of double throw relay switches S4 and S5 is actuated by relay solenoid RS, switch S4 including a switch arm AS4, a normally closed contact CS4 and a normally open contact OS4, and the switch S5 including a switch arm AS5, a normally closed contact CS5 and a normally open contact OS5. The clutch solenoid CS0 has one terminal connected to the normally closed switch contact CS4 and, through series-connected capacitor C6 and resistor R7, to positive line *c*, and the brake solenoid BS has one terminal connected to negative line *d* and its other terminal connected to the normally open switch contact OS4 and, through series-connected capacitor C7 and resistor R8, to positive line *c*. Also connected to the positive line *c* is switch arm AS4.

Print solenoid 50 is shunted by a capacitor C8 and has one terminal connected to one terminal of the alternating current source and its other terminal connected to the switch normally open contact OS5 and to the other alternating current source terminal through the series-connected capacitor C9 and resistor R9. Retract solenoid 51 is shunted by a capacitor C10 and has one terminal connected to said one terminal of said alternating current source and its other terminal connected to the normally closed switch contact CS5 and to said other alternating current source terminal through the series connected capacitor C11 and resistor R10. Relay switch arm AS5 is connected to said other terminal of the alternating current source.

The values and designations of the circuit components

of the control network 13 are, for example, advantageously as follows:

C1	-----mfd	100
C2	-----mfd	20
C3	-----mfd	2
C4, C5	-----mfd	.25
C6, C7, C8, C9, C10, C11	-----mfd	.5
D1, D2, D3	-----	IN-2071A
R1	-----ohms	10
R2	-----do	400
R3	-----do	10K
R4	-----do	100K
R5	-----do	6.8
R6	-----do	1K
R7, R8, R9, R10	-----do	220
RS	-----ohm coil	120
SCR	-----	3RC15
T	-----v. output	12.6
TI	-----	2N382

Considering now the operation of the labelling and printing apparatus described above, in a ready condition awaiting the approach of an article A advanced by a flight 14, switch S2 is in its normal closed position, silicon controlled rectifier SCR is in a conducting state and solenoid RS energized. The energized solenoid RS advances associated switch arms AS4 and AS5 into engagement with the normally open contacts OS4 and OS5 respectively, thereby to energize brake solenoid BS and print solenoid 50. In the aforesaid condition, lever 41 and platen 46 are in their advanced print positions as in FIGURE 2, roller 30 is braked and tape T is stationary, with the leading label thereon being immediately anterior to feeler 57, and capacitor C3 is fully charged by being connected through closed switch CS2 between lines *c* and *d*.

As object A is advanced, it engages the undersurface of applicator roller 21, which bears downwardly on the top surface thereof by reason of the pressure of guide arm 17, and is rotated by the advancing article A. The article A then advances into engagement with sensing arm 59 to actuate the switch AS2 to the normally open contact OS2 whereby to switch capacitor C3 from the charging current to across solenoid RS3, to energize solenoid RS3 for a short predetermined time interval, and opening switch S3 a corresponding interval. The opening of switch S3 extinguishes the silicon controlled rectifier SCR, to return it to a controlled state, and de-energizes solenoid RS to effect return of switch arms AS4 and AS5 into engagement with normally closed contacts CS4 and CS5. The opening of contact OS5 and the closing of contact CS5 effects the de-energization of print solenoid 50 and the energization of retract solenoid 51 to swing platen 46 to its retracted position and permit the free advance of tape T. The opening of contact OS4 and the closing of contact CS4 effects the de-energization of brake solenoid RS and the energization of clutch solenoid CS thereby to effect the positive rotation of roller 30.

Tape T is thus advanced from roll R about guide rollers 23, 24 and 26, along the upper face of the guide arm 17, about separator edge 18, thence rearwardly about the upper and lower surfaces of rollers 30 and 39 respectively and through their bite, thence to take-up roll 38.

Labels L travel on the upper face of tape T as it traverses guide arm 17, and the leading label L engages feeler 57 to raise sensing arm 54 and open switch S1. It should be noted that capacitor C3 and solenoid RS3 and the voltage between lines *c* and *d* are of such values that solenoid RS3 is energized by capacitor C3 discharging therethrough for a time interval sufficient for the leading label L to advance to feeler 57, but less than the time of travel of the trailing edge of the leading label L to feeler 57. Upon de-energization of solenoid RS3 and the closing of switch S3, the silicon controlled diode is returned to a non-conducting condition controlled by way of

a signal to transistor T1 which is effected by the closing of switch S1.

The leading label L advances forwardly of the separator edge 18, being separated from the support tape T thereat as it sharply reverses its direction about separator edge 18, and is fed to the underface of roller 21. Roller 21 presses the leading portion of label L into firm adhesion with the surface of the advancing object A, which thereupon pulls the trailing end of the label L from the tape T. When the trailing end of the leading label L passes feeler 57, sensing arm 54 is depressed to effect the closing of switch S1 which applies a signal to the input of transistor T1 which, in turn, applies a firing signal to the control electrode of silicon controlled rectifier SCR and renders it highly conducting. Solenoid RS is thus energized to actuate switch arms AS4 and AS5 into engagement with normally open contacts OS4 and OS5. The opening of contact CS4 and the closing of contact OS4 deenergizes and energizes clutch solenoid CS0 and brake solenoid BS respectively, to stop tape advance at a position in which a label registers with stationary platen 40, and the opening of contact CS5 and the closing of contact OS5 deenergizes and energizes retract solenoid 51 and print solenoid 50 respectively, thereby to advance platen 46 and effect the printing of a registering label L. The apparatus is now in condition for a repetition of the above cycle.

The control network 13 is very stable and highly sensitive. It may be employed in many applications with a very wide range of input signals, and is characterized by its complete reliability and the absence of any spurious counts or actuations. It should be noted that energization interval of solenoid RS3 may be adjustable by providing a variable capacitor network for capacitor C3.

In FIGURES 4 and 5 of the drawings there is illustrated a label applicator mechanism 65 which may be employed to great advantage with the printer, tape advance system, and control network described above. Applicator 65 is disposed above an endless belt conveyor 66 provided with concurrently advancing transverse flights 67 for transporting successive articles A through the labelling station. Applicator 65 includes a downwardly forwardly inclined guide arm 68 affixed at its upper trailing end by means of screws 69 to the upper flat face of a suitably journaled transverse shaft 70, and is rockable with said shaft 70. Guide arm 68 terminates at its lower leading end in a sharp transverse separator edge 71. Projecting upwardly from the trailing end of guide arm 68 and radially relative to shaft 70 is an arm 72, the upper end of which is connected by helical tension spring 73 to a forwardly disposed stationary lug 74 to urge the leading end of guide arm 68 downwardly resiliently. An adjustable abutment 76 is disposed in the path of arm 72 to limit the lowermost position of guide arm 68.

A bracket is mounted on guide arm 68, which bracket includes a pair of transversely spaced parallel arms 77 and 78 directed upwardly and forwardly of the side edges of guide arm 68 intermediate its ends, and joined at their bottom by a cross plate 79 affixed by screws to the underface of the guide arm 68. Journaled between the upper ends of bracket arms 77 and 78 is a transverse axle pin 80 provided with enlarged heads 85 abutting the outer faces of bracket arms 77 and 78, to restrict the axial movement of pin 80.

A label sensing and applicator assembly 81 is supported by and depends from pin 80, and includes a pair of vertical parallel side plates 82 and 83 having upper sections 84 abutting the upper inner faces of bracket arms 77 and 78 respectively and provided with aligned apertures engaging the pin 80. A cross bar 86 joins the trailing ends of bracket upper sections 84 and is limited in upward movement by an adjusting screw 87 confronting the upper face of cross bar 86 and engaging a tapped bore formed in an ear 88 projecting inwardly from the upper edge of bracket arm 77. The clockwise

movement of assembly 81 about the pin 80 is adjustably limited by the screw 87. Assembly 81 is releasably locked in its depressed operative position, as limited by the screw 87, by any suitable locking mechanism which may include a latch element 89 mounted on the inner end of a shaft 90 journaled to bracket plate 77 and provided at its outer end with a finger piece 91. Latch 89 is manipulated by means of finger piece 91 alternately to shift latch element 89 into and out of locking engagement with the advanced assembly 81.

Each of plates 82 and 83 includes an integrally formed intermediate section 92 and a lower section 94 projecting forwardly of separator edge 71. A transverse shaft 96 is journaled between the leading ends of the lower plate sections 94 and rotatably supports an axially rigged or corrugated pressure roller 97 having a lower periphery slightly below the top face of guide arm 68 and shortly forward of separator edge 71. Extending between the bottom trailing edges of plates 82 and 83 is a guide plate 98 having an upwardly curved trailing end 99, and parallel to and spaced above and delineating with the confronting top face of guide arm 68 a low passageway for confining and guiding the label carrying tape T.

Mounted on the inner face of intermediate section 92 of plate 82 and suitably supported intermediate plates 82 and 83 is a microswitch 100 having a downwardly urged actuating plunger 101 depending from the bottom trailing end thereof, switch 100 being closed with the raising of plunger 101 and being urged to a normally open position with the lowering of plunger 101. A transverse axle 102 is supported between the opposite plate sections 94 rearwardly of the leading edge and shortly above the bottom edge thereof. A longitudinally extending sensing lever 103 is rockably supported by and intermediate the ends of axle 102, being restricted against transverse movement by opposite spacer sleeves 104 registering with the axle 102. Lever 103 includes a relatively short forwardly projecting arm 106 and a relatively long upwardly rearwardly inclined rear arm 107 terminating in an upwardly directed leg 108 engaging the bottom face of switch plunger 101. Depending from the leading end of arm 106 to a point shortly rearwardly of the separator edge 71 is a pointed sensing projection 109 having a rear edge upwardly rearwardly inclined relative to the guide arm 68. A tension spring 110 is connected between the arm 107 and a stationary pin 111 located above arm 107 resiliently to urge lever 103 clockwise, as viewed in FIGURE 4, and to urge plunger 101 to a raised, switch-closed position when projection 109 registers with a space on tape T which is not covered by a label L. However, with the advance of a successive tape-carried label L, the leading edge thereof bears on the inclined rear edge of projection 109 and cams it upwardly, thereby to swing lever 103 counter-clockwise permitting lowering of plunger 101 and closing of switch 100. It should be noted, by reason of the shortness of arm 106 and the length of the arm 107, that a small movement of feeler projection 109 results in a relatively large movement of leg 108 to afford a high sensitivity.

Switch 100 corresponds to switch S1, previously described, and there are associated with the label applicator 65 components, assemblies and networks corresponding to article sensing switch S2, the tape advancing mechanism including the motor M and the clutch brake assembly C, the printing section 12, and the central network 13. The operation of applicator 65 and the associated equipment is similar to that earlier described. In lacing applicator arm 68 with label-carrying tape T, latch element 89 is turned to its unlocked position, and the assembly 81 is swung upwardly. The tape T is then easily led along the top of guide arm 68, about separator edge 71, and thence rearwardly below the bottom of guide arm 68, and the assembly 81 is thereafter returned to its operative position and locked therein by manipulating latch element 89.

Referring now to FIGURES 7 to 9 of the drawing, which illustrate another form of label-sensing system embodying the present invention, employed with an aperture indexed label carrying tape, the subject tape is designated as T1 and carries along its top face pressure sensitive adhesive labels L1 in longitudinally spaced end-to-end arrangement. Formed along a longitudinal side border of tape T1 in transverse alignment with the spaces between successive labels L1, are indexing apertures 113 of rectangular outline. There is provided a flat downwardly forwardly inclined tape guide arm 114 supported in the manner of guide arm 68 as last described.

Formed in the top leading face of guide arm 114 is a transversely extending recess 116 in which nests a flat plate 117 of insulating material, secured to arm 114 by countersunk screws 118 and having a top face coplanar with the top face of the guide arm 114. Formed integrally with insulator plate 117 along the leading edge thereof is a transversely extending separator edge-defining prismatic section 119 which terminates in a sharp leading edge and includes a top face coplanar with the top face of plate 117, a bottom face downwardly rearwardly inclined from the top leading edge of the top face of section 119 to the bottom face of the guide arm 114, and a rear face abutting the front face of guide arm 114. A shallow groove 119a is formed in the top face of insulator section 119 along a side border thereof immediately rearwardly of its leading edge, and a metal contact plate 120 is inset therein and suitably affixed thereto, contact plate 120 projecting beyond the side edge of insulator section 119 and being coplanar with the top face thereof.

Projecting upwardly from the side edges of guide arm 114, shortly rearwardly of the separator edge section 119 and affixed to the guide arm 114, is a pair of opposite parallel vertical plates 121 having forwardly downwardly inclined top edges 122. A pair of opposite parallel horizontal latching grooves 123 are formed in plates 121 and extend inwardly from the forward edges thereof, the upper front edges of grooves 123 being joined to the plate upper edges 122 by short vertical edges 126.

A bracket assembly 127 is swingably supported by and between plates 121 and includes a pair of transversely spaced vertical parallel bracket plates 128 which are rigidly connected by a tubular cross piece 125 which rotatably engages a transverse shaft 129 suitably journaled to the upper trailing corners of plates 121. Bracket plates 128 are positioned transversely inwardly of the plates 121 by means of spacer collars 130 carried by shaft 129 between confronting plates 121 and 128. The lower leading corners of the bracket plates 128 project forwardly of the separator edge 119 and have journaled thereto a transverse shaft 130a which supports a peripherally grooved pressure roller 131, the bottom edge of which is disposed shortly forward of and slightly below the leading edge of separator edge section 119.

Extending between and journaled to bracket plates 128 between the top and bottom edges thereof is a cylindrical latching bar 132 terminating in half round latching sections 133 projecting beyond the outerfaces of bracket plates 128. The half round latching sections 133 have similarly directed, coplanar, diametrically extending flat faces 134. When the bracket assembly is in its locked operative position, as illustrated in the drawings, latching sections 133 register with the latching grooves 123, with the trailing halves of the latching section flat faces 134 engaging the top edges of the grooves 123. In order to unlock the bracket assembly 127 and permit its upward swinging, latch rod 132 is merely rotated 90° counterclockwise, as viewed in FIGURE 7 of the drawing, to effect disengagement of the latch sections 133 and latching grooves 123.

A block 136 of insulating material and of substantially parallelepiped shape is supported by and between bracket plates 128, being suitably secured thereto by screws 137. Insulator block 136 has a top face coplanar with the top

edges of bracket plates 128 and extends downwardly and forwardly to a flat bottom face disposed shortly above and parallel to the top face of separator edge section 119. A bore 138 is formed in block 136 adjacent to a side thereof and extends through the block 136 from the top to the bottom face thereof, parallel to and intermediate the front and rear walls of the block 136, and directed toward contact plate 120 along the path of the label indexing apertures 113.

Registering and coaxial with the bore 138 is a sensing or wiper electrode 139 including an upper metal sleeve 140 engaging and supporting a group of elongated fine resilient metal wires defining a flexible resilient brush 141. Electrode 139 is positioned in bore 138 at a level in which the brush 141 is in forwardly, slightly sprung, low resistance engagement with contact plate 120. Conductor leads 142 and 143 connect the electrode 139 and the contact plate 120 to the control signal input terminals of the control network 13 in place of switch S1 as earlier described.

Associated with the sensing assembly last described are the tape advance mechanism, printing section, article transport and sensing section and control network, operating and related in the manner earlier set forth. As tape T1 advances it passes between brush 141 and contact plate 120 to open the circuit therebetween corresponding to the opening of switch S1. However, when an index aperture 113 is advanced into registry with brush 141, the brush engages contact plate 120 to close the circuit between the contact plate 120 and electrode 139, corresponding to the closing of the switch S1. In all other respects, the operation of the apparatus last described is similar to that first described.

While there have been illustrated and described preferred embodiments of the present invention, it is apparent that numerous alterations, omissions and additions may be made without departing from the spirit thereof.

What is claimed is:

1. A label applying apparatus comprising a label applicator member, means for advancing a label receiving article into registry with said applicator member, means for advancing a label to a predetermined position relative to said applicator member, means including a solenoid for controlling said label advancing means, a silicon controlled rectifier including a control electrode and output electrodes, a switch connected in series with said solenoid and said silicon-controlled rectifier output electrodes and a source of current, means responsive to the position of said label for applying a control signal to said control electrode, and means responsive to the position of said label receiving article for actuating said switch.

2. A label applying apparatus comprising a label applicator member, means for advancing a label receiving article into registry with said applicator member, means for advancing a label to a predetermined position relative to said applicator member, means including a solenoid for controlling said label advancing means, a silicon controlled rectifier including a control electrode and output electrodes, a switch connected in series with said solenoid and said silicon-controlled rectifier output electrodes and a source of current, a transistor having a collector connected directly to said rectifier control electrode and an emitter and a base, means including a first resistor connecting said emitter to a source of current, a second resistor connecting said emitter to said base, means responsive to the position of said label for applying a signal to said base, and means responsive to the position of said article for actuating said switch.

3. A label applying apparatus comprising a label applicator member, means for advancing a label receiving article into registry with said applicator member, means for advancing a label to a predetermined position, relative to said applicator member, a silicon controlled rectifier including a control electrode and output electrodes, a normally closed switch, electrically actuated means for controlling said label advancing means connected in series

with said switch and said silicon controlled rectifier output electrodes to a source of current, means responsive to the position of said article for momentarily opening said switch, and means responsive to the position of said label for applying a signal to said control electrode.

4. A label applying apparatus comprising a label applicator member, means for advancing a label receiving article into registry with said applicator member, means for advancing a label to a predetermined position relative to said applicator member, a silicon controlled rectifier including a control electrode and output electrodes, a normally closed relay switch including an actuating solenoid, means for controlling said label advancing means connected in series with said switch and said silicon controlled rectifier output electrodes to a source of current, a capacitor, means actuated by said article for alternately connecting said capacitor across a source of charging current and across said actuating solenoid, and means responsive to the position of said label for applying a signal to said control electrode.

5. An apparatus for applying pressure sensitive labels from a label carrying tape comprising a longitudinally extending label applicator arm terminating in a label separating edge, means including a tape take-up roll for intermittently advancing a label carrying tape forwardly along the upper face of said applicator arm and about said separating edge and thence rearwardly, a drive motor, means including an electrically alternatively actuated brake and clutch connecting said take-up roll to said motor, a first sensing means responsive to a predetermined position of a leading of said labels relative to said separating edge, means for advancing a label receiving article along a path including a labelling station registering with the leading end of said applicator arm, a second sensing means responsive to an article positioned at said labelling station, a silicon controlled rectifier including output electrodes and a control electrode, means responsive to said first sensing means for applying a signal to said control electrode, a first relay switch connected through said clutch to a source of clutch actuating current and including an actuating solenoid, and a second switch responsive to said second sensing means and connected in series with said actuating solenoid and said rectifier output electrodes to a source of current.

6. The label applying apparatus of claim 5, wherein said second switch is a relay switch including a second actuating solenoid, and comprising a capacitor and means responsive to said second sensing means for alternately connecting said capacitor across a source of charging current and across said second solenoid.

7. The label applying apparatus of claim 5, wherein said signal applying means comprises a transistor including a first and second output electrodes and a control electrode, said first output electrode being connected directly to said rectifier control electrode, a first resistor connected between said second output electrode and a source of current and a second resistor connected between said transistor control electrode and said transistor second output electrode.

8. The label applying apparatus of claim 5, wherein said first sensing means includes a switch mounted on said applicator arm and including a swingable actuating arm registering with the path of said labels along the upper face of said applicator arm.

9. The label applying apparatus of claim 8, wherein

said actuating arm includes a trailing end connected to said switch and a leading end registering with said path of said labels and is pivoted at a point adjacent to said leading end, said arm terminating at its leading end in a downwardly directed leg having an upwardly rearwardly inclined rear face.

10. The label applying apparatus of claim 5, wherein said label carrying tape has longitudinally aligned label indexing apertures formed therein and said first sensing means comprises a brush electrode registering with the path of said indexing apertures.

11. The label applying apparatus of claim 5, comprising a printing member disposed along the path of said labels trailing said separator edge, and movable between an advanced and a retracted position, and actuated to an advanced position concurrently with the deactuation of said clutch.

12. A label applying device comprising a longitudinally extending applicator arm terminating in a leading separator edge, a pressure applying element supported by said arm forward of said leading separator edge, an electrically conducting first electrode disposed on the top face of said arm, an electrode support member disposed above said first electrode and having formed therein a downwardly forwardly inclined bore directed toward said first electrode, a flexible second electrode registering with said bore and engaging said first electrode, and means for advancing a label carrying band forwardly along the upper face of said arm between said first and second electrodes around said leading separator edge and thence rearwardly.

13. A label applying device comprising a longitudinally extending applicator arm terminating in a leading separator edge, an electrically conducting first electrode located on the top face of said arm, a bracket projecting upwardly from said arm, a forwardly directed leg hinged to said bracket, a transversely extending pressure roller supported by said leg forward of said separator edge, an electrode support member supported by said leg and having formed therein a downwardly forwardly inclined bore directed toward said first electrode, a flexible second electrode registering with said bore and engaging said first electrode, and means for advancing a label carrying band forwardly along the upper face of said arm between said first and second electrodes around said leading separator edge and thence rearwardly.

References Cited

UNITED STATES PATENTS

2,522,224	7/1950	Hedinger	156—384
2,920,780	1/1960	Hauschild et al.	156—361
3,108,032	10/1963	Carlson	156—361
3,231,446	1/1966	Satas	156—384
3,238,080	3/1966	Schulter	156—351

OTHER REFERENCES

Rutz et al. "A New Transistor With Thyatron-Like Characteristics," (1955).

EARL M. BERGERT, *Primary Examiner*.

T. R. SAVOIE, *Assistant Examiner*.

U.S. Cl. X.R.

317—148.5; 156—361, 384, 542