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Ellner

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[54] **STRIP MATERIAL DISPENSER FEED-OUT CONTROL**

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[52] **U.S. Cl.** **101/227**, 101/228

[51] **Int. Cl.** **B41l 15/14**

[58] **Field of Search** 101/226, 227, 224, 101/225, 219–223, 228, 181; 335/207

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[57] **ABSTRACT**

A device for controlling the length of feed-out of strip material and for regulating the cut-off of the strip material in accordance with the printing of information thereon includes a printing cylinder or drum which engages the strip material as it is fed and imprints it with legend or code. The drum is arranged to rotate in engagement with the surface of the strip material and to transfer an impression thereon during the rotation. Means are associated with the drum for regularly energizing switch means to stop the feed of the strip material and to actuate or permit a cutting device or knife to sever the strip material in lengths corresponding to the desired length as set by the impression printed thereon by rotation of the printing roller. The knife is advantageously actuated and the feed rollers are disengaged by a solenoid which is controlled by a switch operated by rotation of the drum and which is deenergized to permit the movement of the knife through a cutting path under the influence of a return spring to sever the strip material. For this purpose the printing drum carries one or more magnets which trip a switch during the rotation thereof by magnetic action. The device includes feed rollers which engage the strip material and feed it through a dispensing path and these rollers are driven by a motor which is controlled by rotation of the printing roller.

1 Claim, 7 Drawing Figures

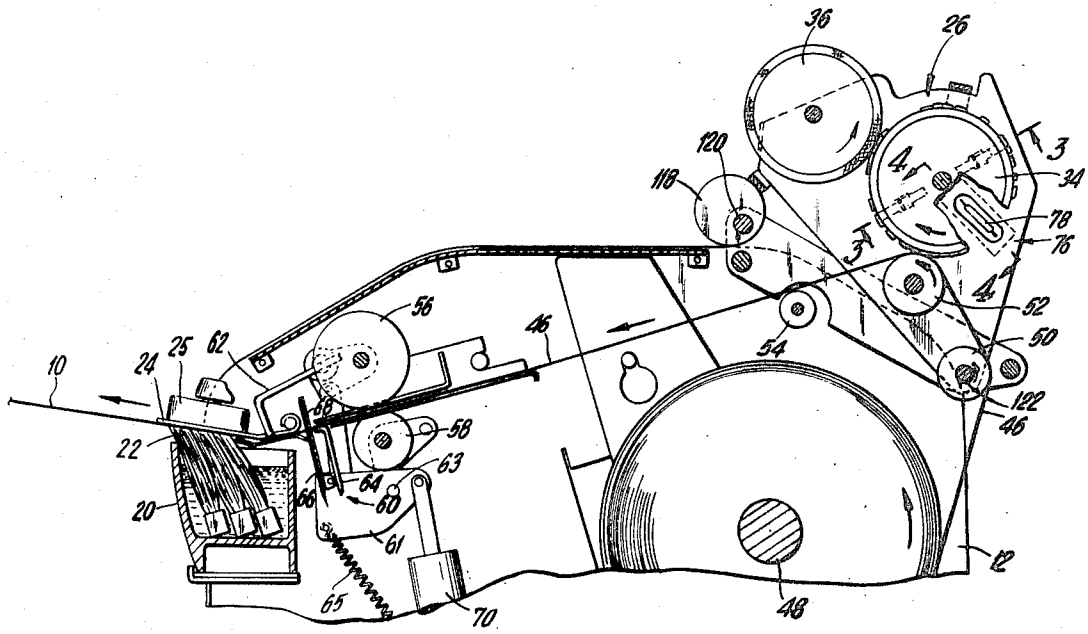
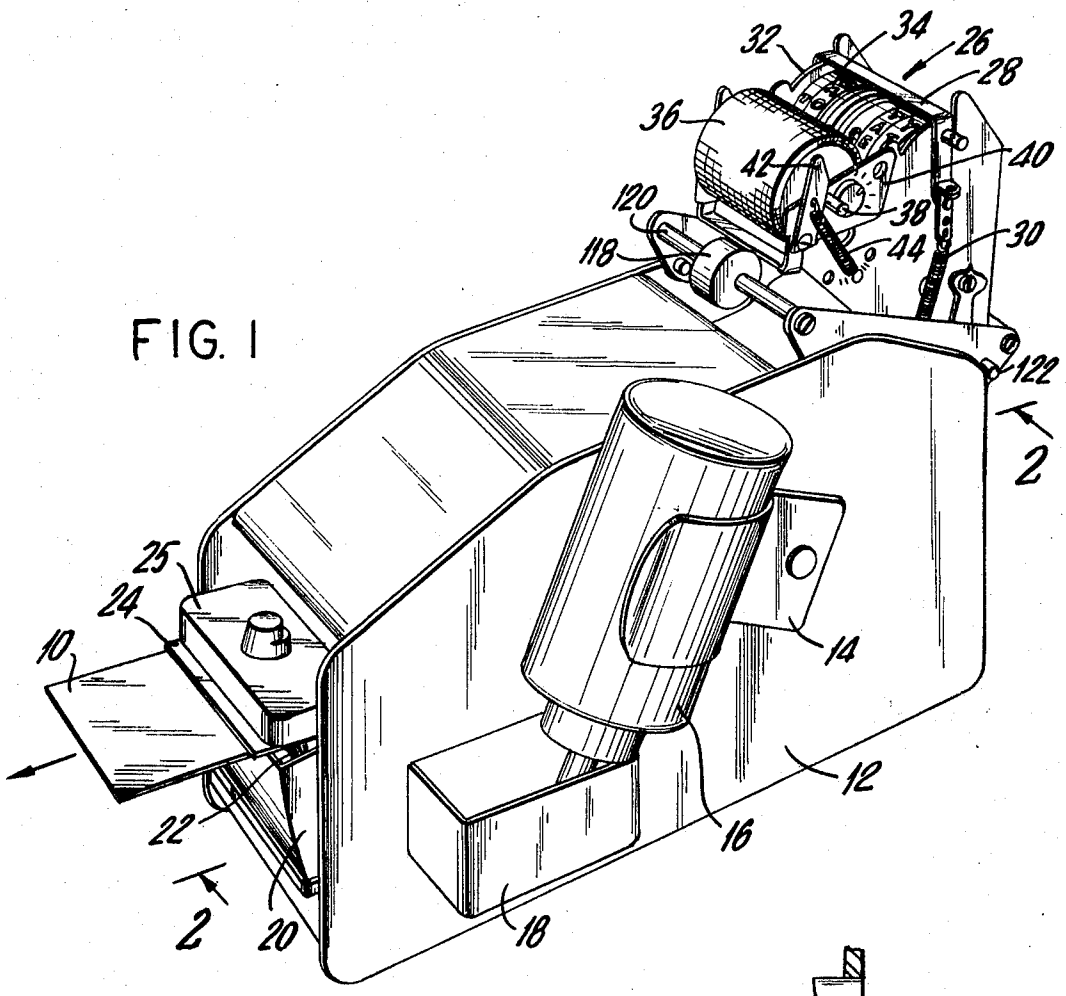


FIG. 1



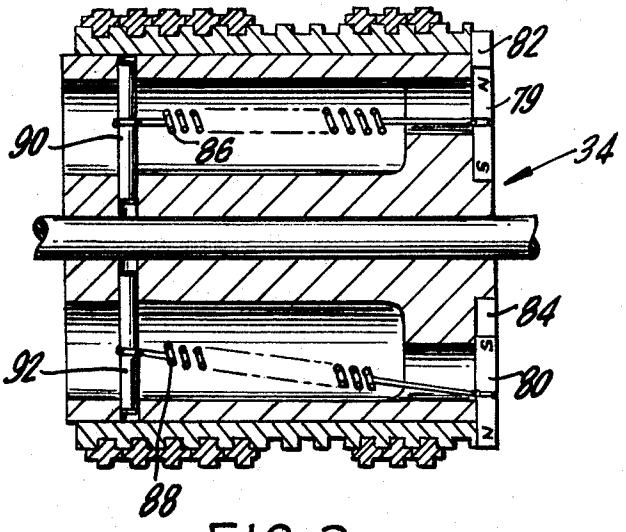


FIG. 3

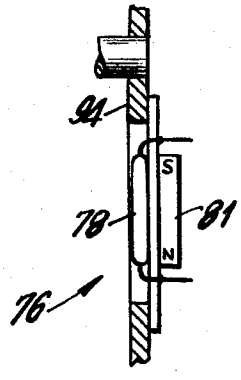


FIG. 4

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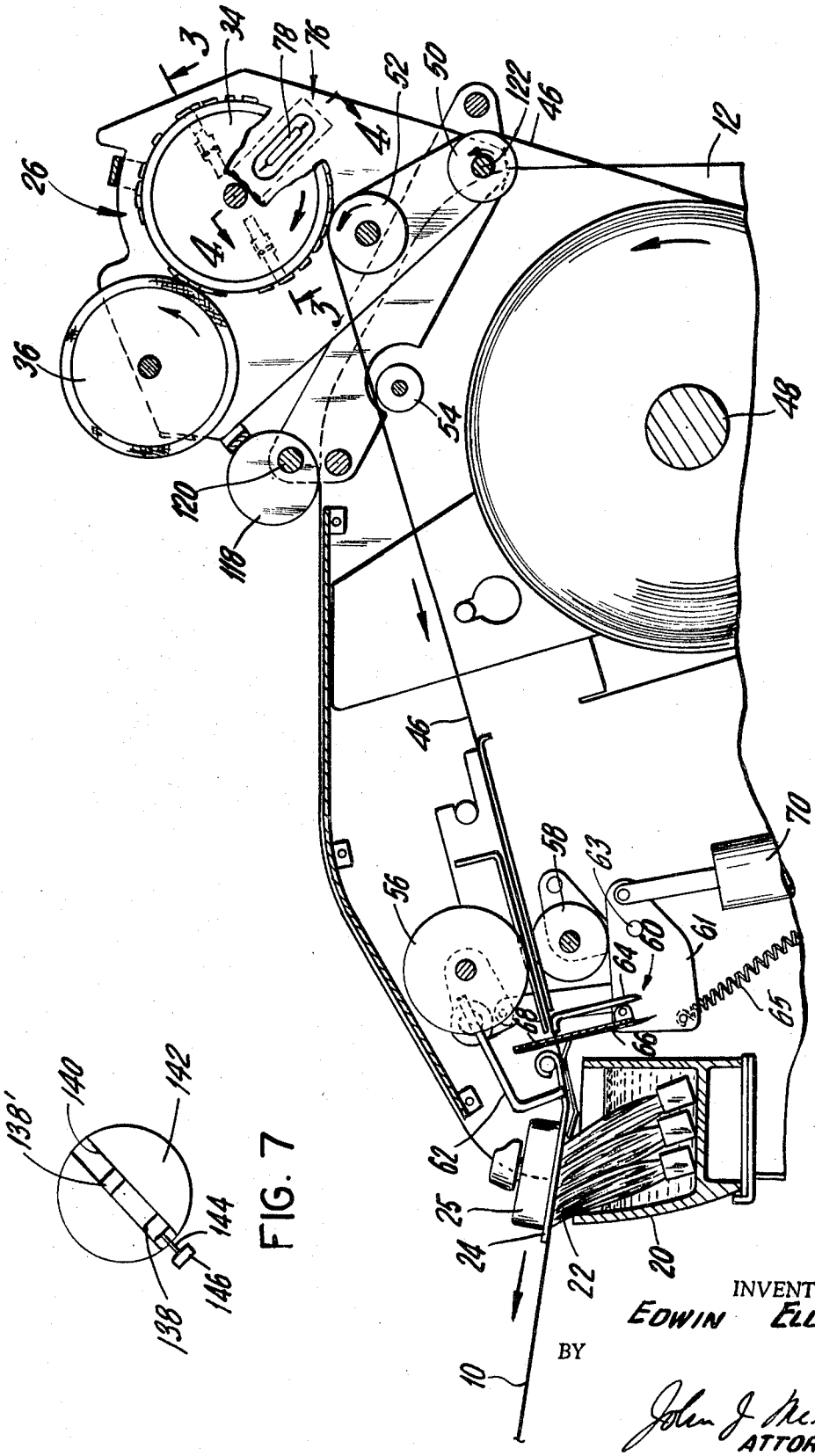


FIG. 2

FIG. 7

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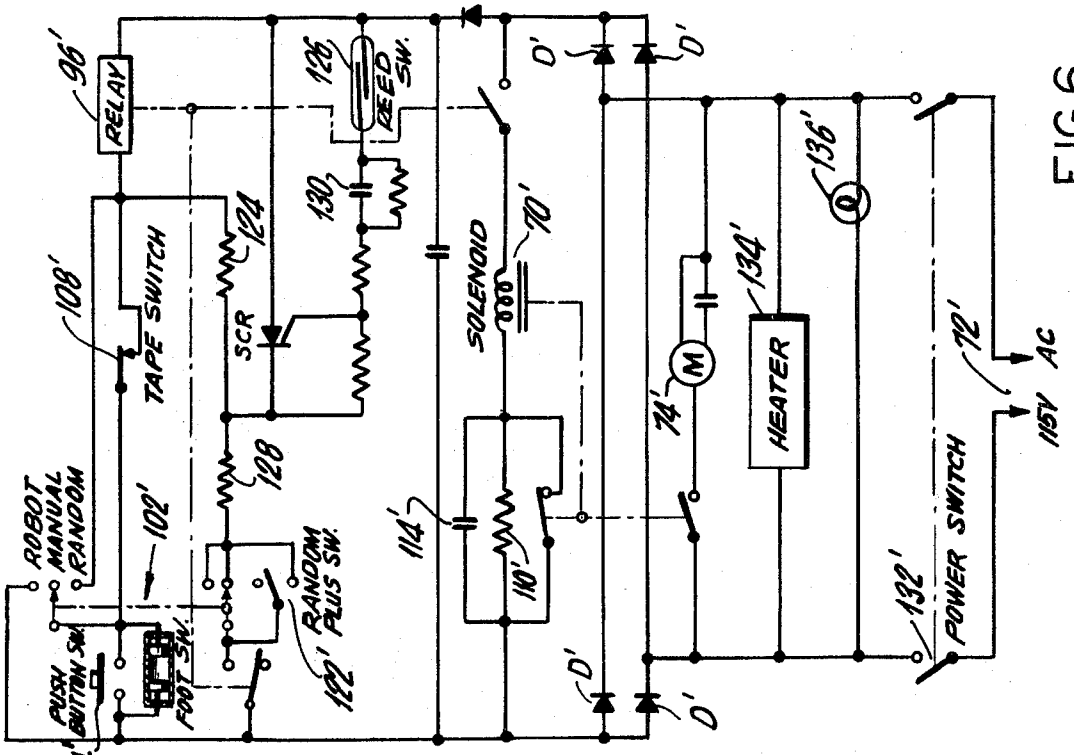


FIG. 6

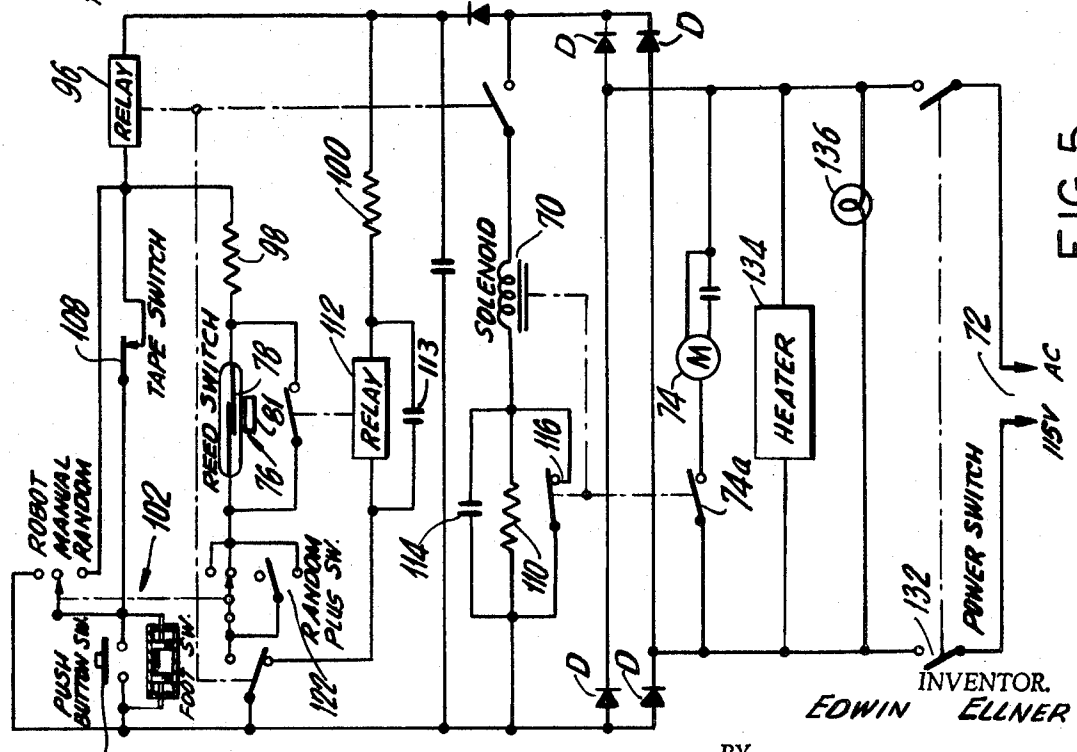


FIG. 5

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STRIP MATERIAL DISPENSER FEED-OUT CONTROL

SUMMARY OF THE INVENTION

This invention relates in general to devices for feeding predetermined lengths of strip material and in particular to a new and useful device having means for imprinting strip material and for regulating the feed-out and cut-off of this strip material in accordance with the impression imprinted thereon.

The invention provides a practical device for imparting a code or other impression onto strip material and for dispensing the strip material in defined lengths corresponding to the length of the impression which is imprinted thereon. In the known designs of devices of this nature the position of the cut-off relative to the printed matter is determined by detecting photoelectrically a printed registration mark which is usually located at the desired point of cut-off. The tap would be either preprinted or printed as dispensed by means of a coder or printer which is attached to the dispending machine. This design is generally satisfactory where relatively long lengths of tape are to be used for sealing cartons but it has certain disadvantages when short lengths of from 3 inches to 10 inches are desired for labels. The photo-electric system for measuring the registry is disadvantageous inasmuch as it is relatively expensive and is difficult to arrange for initial operation.

In accordance with the present invention there is provided an arrangement for controlling the position of the imprinted tape relative to a cut-off knife which operates in accordance with the rotational position of the printing drum. The length of the dispensed tape is equal to the circumference of the printing drum or a fraction thereof. In the preferred form the invention includes switch actuating means which is oriented for actuation every time the drum moves to a certain position. For this purpose the drum advantageously includes a magnet which moves by a switch member and actuates the member upon each revolution of the drum or a portion of a revolution thereof. The arrangement is such that the magnet may be easily shifted or one or more magnets may be arranged in an effective actuating position or moved to an ineffective position on the drum as desired.

The invention also provides an improved switch operating circuit for starting the motor to drive the feed rolls for dispensing the tape and for actuating the cutting knife, for example by actuating the solenoid to move a cutting knife through the path of feed of the strip material to position it in a cutting position at which it can be pulled down by a spring to cut the tape. The drive motor is energized after the solenoid has been energized to engage the feed wheels which are rotated by the drive motor. The arrangement provides a more gradual acceleration of the strip material in order to reduce slippage of the tape under the print roll. The drive for the tape is advantageously maintained at a relatively constant speed despite line voltage and load variations in order to maintain the accuracy of the cut-off.

Accordingly it is an object of the invention to provide an improved device for regulating the length of strip material which is fed from the dispenser in accordance with the length of printing impression which is imparted thereto as it is fed.

A further object of the invention is to provide a device for printing and for feeding strip material and for cutting it off in predetermined lengths which includes a cutter which is actuated by operation of a switch in accordance with the rotational position of a printing roller.

A further object of the invention is to provide a printing roller device for imprinting strip material which includes control means associated therewith for example in the form of magnets which may be positioned, selectively in an operative or an inoperative position, around the circumference of the roller and which are individually capable of operating a switch in a control circuit for regulating the feed and cut-off of the strip material.

A further object of the invention is to provide a device for imprinting predetermined lengths of strip material and for dispensing these lengths and which is simple in design rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be had to the accompanying drawing and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is front perspective view of a dispensing device and printer for dispensing and printing strip material such as labels constructed in accordance with the invention;

FIG. 2 is a longitudinal sectional view taken along the line 2—2 of FIG. 1;

FIG. 3 is a section taken along the line 3—3 of FIG. 2;

FIG. 4 is a section taken along the line 4—4 of FIG. 2;

FIG. 5 is a schematic diagram of the electrical control circuit for controlling the feed of strip material and the severance of the material into predetermined lengths;

FIG. 6 is a view similar to FIG. 5 of another arrangement of control circuit; and

FIG. 7 is a side elevational view of a printing roller of another embodiment of an actuating device;

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular, the invention embodied therein comprises a device for dispensing predetermined lengths of strip materials such as labels 10 which includes a housing 12 upon which is mounted a bracket 14 bearing a container 16 for a moistening material such as glue or water which is positioned to engage into a reservoir 18 associated with a moistening pan 20. The moistening pan 20 carries moistening brushes 22 which wipe the underside of the labels 10 as they are dispensed below a pressure plate 24.

Mounted adjacent the rear portion of the top of the housing 12 is a printing mechanism or coder generally designated 26 which is shown as including a retaining bracket 28 which is biased downwardly by a spring 30 to engage over a curved top edge 32 above a printing roller 34. An ink roller 36 engages with the surface of

the print roller 34 and it includes a shaft 38 which is held downwardly on a bracket 40 by means of an arm 42 which is biased by a spring 44.

As is best seen in FIG. 2, a continuous length of strip material 46 is stored on a supply reel 48 and it is directed over a guide roller 50 and a counter roller 52 which is arranged beneath the printing roller 34. As the strip material 46 moves over the counter roller 52, it receives the impression from the printing roller 34 and then it is guided over another guide roller 54 through a feed path extending between a top feed roller 56 and a lower feed roller 58. The strip material 46 is advanced by the rotation of the feed rollers 56 and 58 past a cutting mechanism generally designated 60 and over the moistening brushes 22 and beneath the pressure plate 24 and heater 25.

The device includes a sensing mechanism in the form of a finger or sensor 62 which rests on the surface of the strip material and determines when the label 10 has been removed by an operator after it has been severed. If it has been removed, it conditions the control circuit to permit the next feed-out operation.

The cutting mechanism 60 includes a fixed or lower shear 64 and a movable upper shear 66 which includes a cutting edge 68 which is advanced through the plane of the strip material 46 during each operating cycle to cut the strip material into individual lengths or labels 10. For this purpose, the movable shear 66 is connected to a solenoid 70 which is operated on direct current derived from the rectifiers D which are connected to an alternating current 115 volts source 72 as shown in FIG. 5. The solenoid is operated on direct current in order that its operation is extremely accurate and there is no time delay such as would occur with ac operation. For example, if the solenoid is deenergized with ac operation at a time when the voltage is maximum there would be a ¼ cycle delay before the voltage is low enough to cause the drop-out of the solenoid which would cause an error of ⅛ inch feed of the strip material or more.

Only the feed roller 56 of the two feed rollers 56 and 58 is driven by a motor 74 and one of these feed rollers, for example, the bottom feed roller 58, is moved into and out of engagement with the strip material 46 during each operating cycle under the control of the solenoid 70. For this purpose, means (not shown) are provided for mounting the roller 58 so that it can be raised upwardly and downwardly during its operation. In the embodiment illustrated, the label 10 is provided with a gummed undercoating which is moistened when it moves over the moistening bursh es 22 and is dispensed from the machine. The label 10 may be removed from the dispenser by engagement thereof by an operator and the finger 62 will sense whenever the label has been removed so that a new cycle of feeding may be effected.

The ink roller 36 is advantageously of a type which is porous and which is saturated with ink which is transferred from its surface onto a printing roller 34 during the rotation of these rollers. The printing roller 34 transfers the ink impression to the strip material 46 as it is advanced therebeneath and over the counter roller 52.

In accordance with the invention, the printing roller 34 has means for creating a signal when its surface reaches a predetermined position and which is connected electrically to the feed and cutting means for the strip material in order to provide an accurate control of the length of the material which is fed and cut so that it is commensurate with the length of the impression which is imprinted onto the strip material 46 during each revolution of the printing roller 34. The control means for controlling the feed and the cut-off is generally designated 76 and it includes an actuator for actuating a switch 78 which, in the embodiment illustrated, may be a reed switch. In the preferred arrangement, the reed switch 78 is energized or actuated by an actuator which is positioned in accordance with the rotational position of the printing roller 34 and which advantageously comprises one or more magnets, for example, two, 79 and 80 as indicated in FIG. 3.

Magnets 79 and 80 are carried in respective diametrically opposite slots, or recesses, 82 and 84 both located at one end of the printing roller 34. Each magnet is held in position and biased into the associated recess by an associated spring 86 and 88 respectively which have their opposite ends secured upon associated pins 90 and 92. The magnet 79 is shown in an inoperative position at which it is moved down to the lower end of the recess 82 so that it is remote from the circumference of the printing roller 34. The magnet 80 is in an operative position wherein the magnet is substantially flush with the surface of the cylinder 34, and thus is in a position at which it will activate the reed switch 78. A biasing magnet 81 (FIG. 4) holds the contacts of the reed switch 78 closed. The reed switch 78 is attached to a side frame member 94 and is activated every time an operatively positioned magnet passes it. The actuation of the reed switch is effective to actuate the cutter means 60 to determine the point of cut off of the label strip 10. If a single magnet is used, the length of tape dispensed is equal to the circumference of the printing drum. To obtain shorter lengths two or three magnets, equally spaced, may be employed to obtain tape whose length is one-half to one-third of the circumference respectively.

When the solenoid 70 is actuated, it pivots lower plate 61 about a pivot 63 as it moves downwardly as shown in FIG. 2 and it lifts the cutting knife 68 upwardly along with the finger 62 and tensions return spring 65. In addition, it raises roller 58 to engage with roller 56 to feed the strip material 46 and also starts the motor 74 by closing switch 74*a* to drive these rollers. In addition, the solenoid has a contact (not shown) which opens the switch 116 (FIG. 5) to put resistor 110 in series with the solenoid coil to prevent overheating and also causes the solenoid to drop out faster. The cutting knife 60 is moved downwardly to cut the tape 46 by the return spring 65 when the solenoid 70 is deenergized and the feed is also stopped by dropping roller 58 at the same time.

Circuit means are associated with the reed switch 78, the solenoid 70, and the motor 74 in order to provide for actuation of the cutter 60 and to drive the feed rollers 56 and 58 or to stop the drive as necessary to effect the desired cut-off of the strip material 46. One embodiment of the circuit means is shown in FIG. 5, and this arrangement requires either a normally closed reed switch 78 or a normally opened reed switch 78 which is acted upon by the biasing magnet 81. In this arrangement, the magnets 80 or 79 are oriented so that they will open the contacts when they arrive in an operative position. To do this, the magnet 80, which is shown in the operative position must buck the field of the biasing

magnet when it arrives at the operating position in order to release the contacts. The biasing magnet **81** is located directly adjacent switch **78** alongside the wall **94** and it is oriented to hold the contacts of the reed switch in an engaged position. When the magnet **80** moves past this biasing magnet **81**, a sharp operating action is produced which adds to the accuracy of the device and which causes actuation of the solenoid **70** and the motor **74** in a defined sequence.

In order to make the machine suitable for forming labels such as the label **10**, a higher degree of accuracy is required than for carton sealing. In order to obtain the added accuracy, the solenoid **70** and a relay **96** are operated on DC current and thus avoid the variable delay that occurs with AC operation, sometimes referred to as one-quarter cycle error. In addition, the holding currents of the relay and the solenoid are reduced to a minimum, after their initial closure, by switching resistors **98** and **110** into series connections with their coils. This reduces the drop-out time when they are deenergized, and also improves the accuracy.

The motor **74** is energized after the solenoid **70** has been energized and the feed wheels **56** and **58** have been engaged. This provides a more gradual acceleration of the strip material **46** which reduces slippage of the material under the print roller **34** and lessens any possibility of printing error.

A further feature for reducing the error in the cut-off location and the arrangement of the printing on the strip material is the use of a drive which maintains a relatively constant feed despite line voltage and load variations. Due to the inertia of the moving parts there is an unavoidable delay, between the time the signal to stop and cut the tape is generated, and the actual execution of this operation. By presetting the mechanism this delay can be compensated at one particular speed. Any variation in speed causes an error. In this embodiment, an induction motor is used for the motor **74** but a governed universal motor, synchronous motor or any other constant speed drive would achieve the same result.

As shown in FIG. **5**, a selector switch generally designated **102** may be arranged in either the manual, automatic, or random position. When it is in the manual position, initiation of the push button switch will energize the relay **96** providing no tape has been left under the heater **25** at the location of the sensor arm **62** and which would have caused the arm to be held in a raised position. When the arm **62** is in a raised position, it prevents the closure of the tape switch **108**. One set of the relay contacts of relay **96** lock relay **96** in through the resistor **98** and another set energizes the solenoid **70**. This opens one set of contacts which places the resistance **110** in series with the solenoid and closes another set which energizes the motor **74**. It also raises the upper shear **66** which causes the raising up of the sensor arm **62** to open the tape switch **108** which disconnects the push button from the circuit.

When the printing drum **34** has rotated to a position where one of the magnets associated therewith, for example, the operative magnet **80** approaches the reed switch **78**, the relay **96** drops out. This in turn disconnects the solenoid **70** and the motor **74** and the cycle is terminated, cutting the tape by means of the solenoid return spring.

A relay **112**, in conjunction with capacitor **113** and resistance **100**, is delayed in the opening of its contacts. Before the start of the cycle, it is in an energized state and its contacts provide a parallel path to the reed switch **78**. In certain circumstances, such as after a new roll of tape has been installed or during random operation of switch **102**, the printing drum may be left in the position where the magnet **79** or **80** actuates the reed switch. In this event, when the machine is operated the relay **96** disconnects the coil of the relay **112** from the line but its contacts remain closed long enough for the solenoid **70** to energize and the printing cylinder **34** to rotate the magnet out of the operating range. The contacts then open permitting the cycle to proceed in the usual manner.

In order to position the printed matter in close registration with the cut-off means **60**, there is provided a cam **118** which is rotatably mounted on a shaft **120** and which may be located in a selected position. This pivots the printing mechanism **26** about a shaft **122** which alters the distance from the printing roller **34** to the shear or cutting mechanism **60**. This provides a fine adjustment of the registration which can be effected while the machine is in operation.

Operating with the robot control is the same as the manual operation except that the push button switch is shorted and the tape switch **108** takes over the function of initiating the machine automatically when label **10** is removed. Switching to the random mode, rearranges the circuit so that the relay **96** which controls the solenoid **70** and the motor **74** is directly responsive to the push button. Tape of any length may then be dispensed.

After the machine has been operated in a random mode the first operation in the robot or manual mode will produce a fractional length of tape depending on where the previous random operation was terminated.-relative to the printed matter. This undesirable feature can be eliminated by putting the random plus toggle switch into the on position. After release of the push button when in the random mode of operation the machine will continue until the next operation of the reed switch **78** and thus always maintains the registration between the printed matter and the cutting operation.

In the circuit system shown in FIG. **6**, teh principal difference from that shown in FIG. **5** is the method of deenergizing the relay **96'** at the end of an operating cycle. In this operation the SCR shorts accross the relay **96'** and a resistance **124** when the normally opened reed switch **126** is operated. The biasing magnet **81** is not required because the contacts do not have to be closed. The resistance **124** is many times the value of the coil resistance of the relay **96'** and therefore greatly reduces the drop-out time to provide the necessary accuracy. The resistance **128** limits the current to a safe value while the SCR conducts. The capacitor **130** provides a.c. coupling from the reed switch so that the machine may be initiated regardless of the drum position at the start of each cycle.

Each circuit also includes a power switch **132** and a heater **134**. A pilot lamp **136** is connected with the control circuit in parallel.

In the embodiment shown in FIG. **7**, the control means for stopping the feed of the strip material **46** and for cutting it includes a slide **138** and a slide **138'** carried in a slideway **140** of a printing cylinder **142** which is similar to the printing cylinder **34** of FIG. **2**. The slide **138** is moved out to an operative position where it engages, during each revolution, with a switch actuating

button 144 of a switch 146 which operates in the same manner as switch 78 of the embodiment of FIG. 2.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A strip material dispenser comprising a reel supply of strip material, feed roller means for feeding said strip material from said reel supply and for projecting it out for dispensing, a printing cylinder rotatably mounted adjacent said strip material which is being fed off said reel supply and having a periphery engageable with the surface thereof for printing an impression on said strip material, a knife movable across the path of said strip material for severing said strip material after it has been printed, knife actuating means connected to said knife to move said knife to sever said strip material, means including a magnet and a magnetically operable switch, one of which is positioned adjacent said printing cylinder and the other of which is rotated therewith to sense the rotational position thereof, said switch being connected to said knife actuating means to permit movement of said knife actuating means in order to cut the strip material in accordance with the impression left thereon by said printed roller as determined by the position of said printing roller as determined by the coming of said switch and said magnet into close proximity, said magnet be carried on said printing cylinder at a predetermined location, said switch being located alongside said cylinder and being operable by said magnet, means defining a groove on said cylinder carrying said magnet, said magnet being movable along said groove from an operative to an inoperative position, a spring engaged with said magnet and holding said magnet in a selected position said spring being flexible to permit shifting of said magnet to another position, said magnet being shiftable in a radial direction and being operative when it is located adjacent to the periphery of said printing cylinder.

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