

Sept. 23, 1969

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3,468,739

AUTOMATIC LABELLING MACHINE

Filed Sept. 12, 1966

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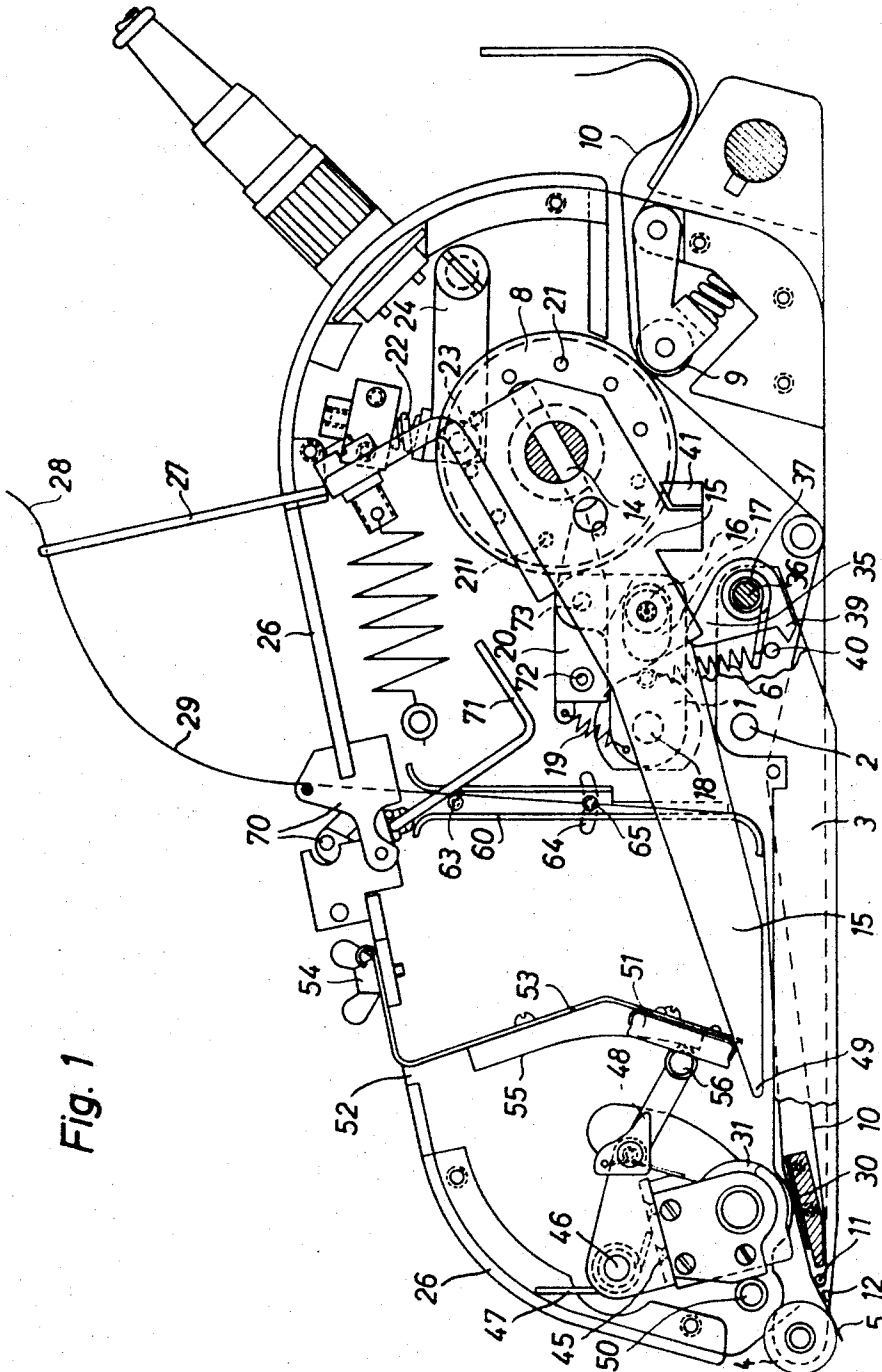


Fig. 1

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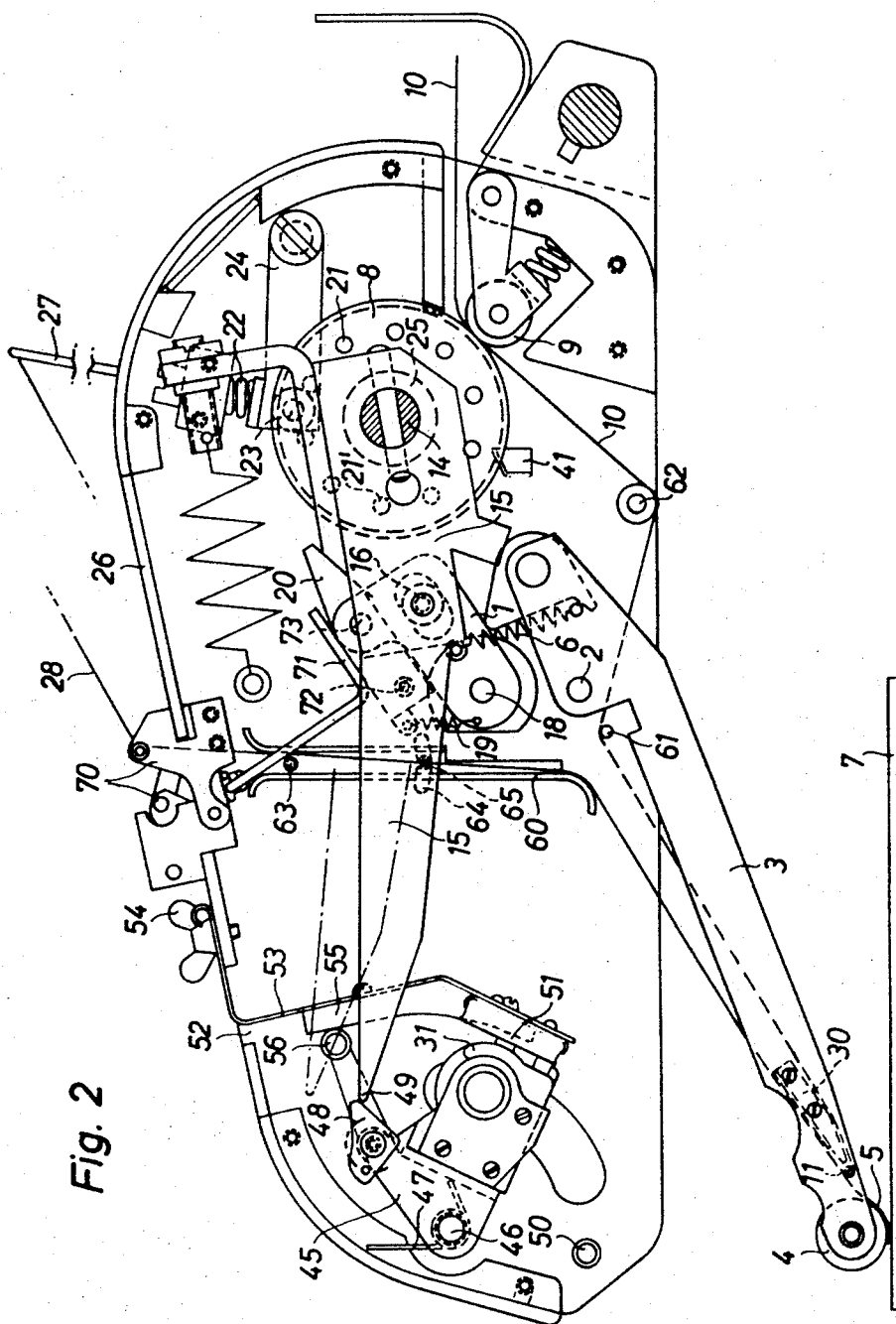


Fig. 2

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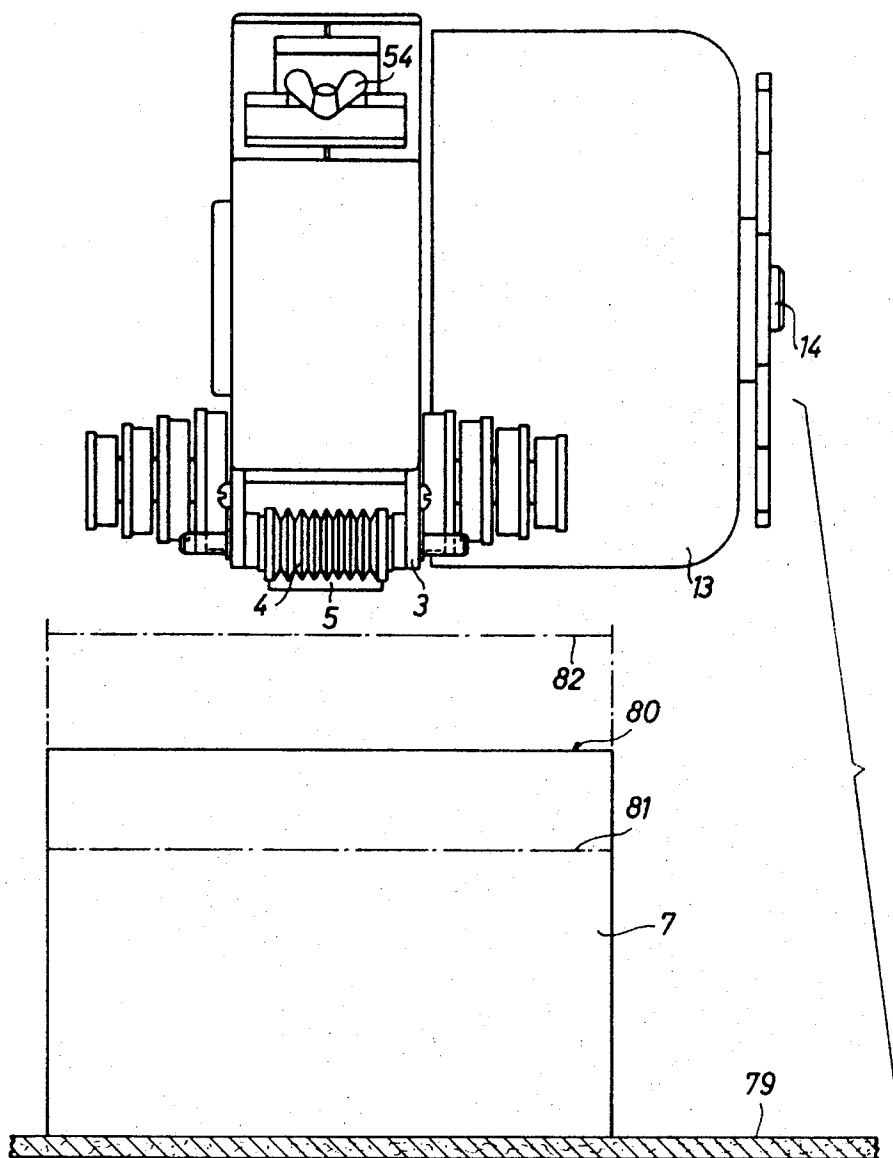
3,468,739

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4 Sheets-Sheet 3

Fig. 3



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4 Sheets-Sheet 4

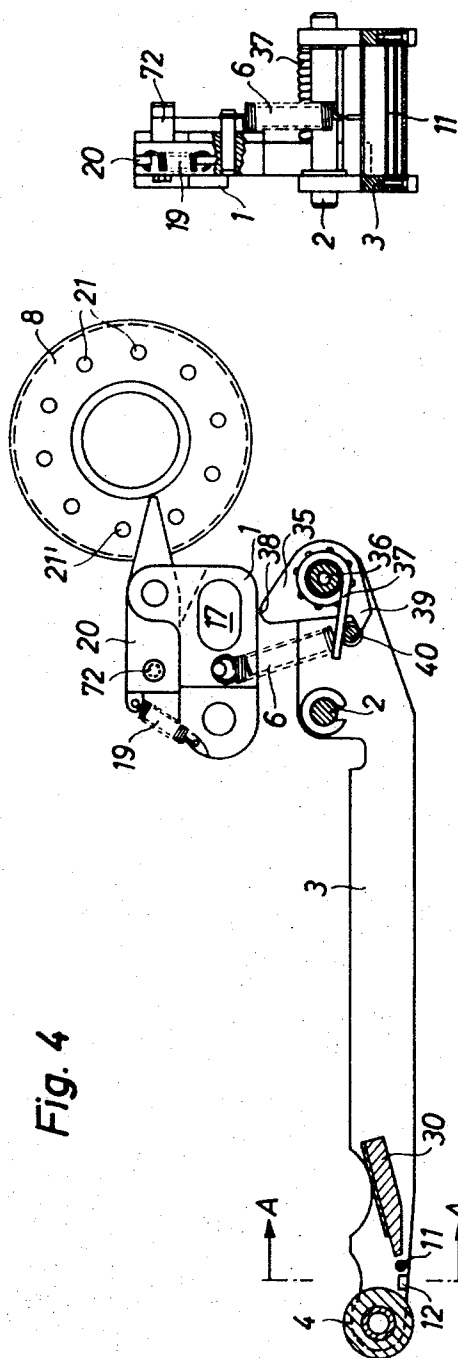


Fig. 4

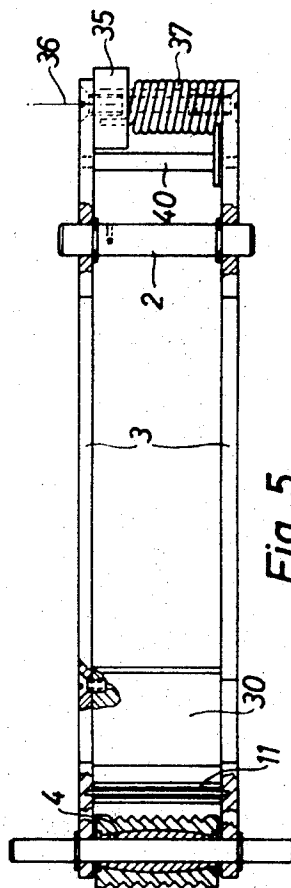
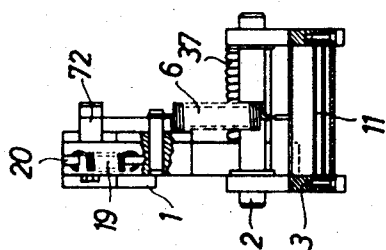


Fig. 5

Fig. 6



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AUTOMATIC LABELLING MACHINE

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M 66,620

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15 Claims

The invention concerns apparatus for applying self-adhering labels, particularly price labels, to articles which are moved past the machine by a conveying means such as a belt.

Among known labelling machines are machines comprising an advancing means for moving a label-carrying strip, a dispensing arm adapted to pivot towards the articles to be labelled, with a deflection means for the carrier strip and a resilient label-pressing roll arranged behind the deflection means at the free end of the dispensing arm, and further comprising a drive which acts intermittently on the advancing means and which is controlled by a sensing device which responds to the articles moved by the conveying means and requiring labelling. These known machines have the disadvantage of being very expensive and having a relatively low labelling performance. In such machines the dispensing arm, in a pendulum-like arrangement, and the label-applying roll are permanently in the path along which the articles move. When a mechanical or optical sensing means responds to an article, the label-conveying means are set in motion to advance a label; the label which is positioned in front of the deflecting edge and still adhering to the carrier strip is freed from the latter, simultaneously pushed below the pressure roll and rolled onto the article. With this system the labels cannot be applied to an exact spot on the article and in addition the speed of conveyor belt depends on that of the label conveying means.

Manually operated machines for printing and rolling on labels are known, in which a printed label is made ready under a resilient pressure roll in such a way that a blow-like movement followed by a pulling movement will apply the prepared label to the article. In such apparatus the adhesive labels are mounted on a carrying strip and printed by a suitable attachment before being placed at the location where they are applied; the strip carrying the labels is intermittently pulled round a deflecting edge and advanced through the length of one label by an advancing means so that the labels are there released from the strip by virtue of their stiffness. The resilient pressure roll is so mounted that the labels being released from the carrying strip are placed in front of the roll with their rear edges still lightly adhering to the carrying strip or joined to the next label by perforations or else lightly held by a supporting member located behind the deflecting edge.

An object of the invention is to provide a low-cost but high-performance labelling machine to accomplish the exact labelling of a variety of articles including those of very different sizes.

According to the invention the above object is attained in that when a machine of the invention is in the position of rest the dispensing arm is kept in the inward position against the force of a spring by a movable stop coupled to the drive, a label is, in a known manner, kept in the dispensing position in such a way that it is placed in front of the pressure roll with its rear edge still adhering lightly to the label-carrying strip, to the subsequent label or to a supporting means located behind the deflection means, and when the sensing means respond to the arrival of an article at a predetermined location, the drive moves the stop so that the dispensing arm is free to swing out, and the stop

and dispensing arm are then returned to the starting position.

It is an advantage for the movable stop to be constructed in the form of a lever adapted to pivot about a shaft parallel with the pivot of the dispensing arm, and for the free end of the lever to be joined to a feed pawl which engages a feed roller when the lever is swung back into the position of rest and which turns the feed roller through an angle required to advance the label-carrying strip the length of a label. The drive is preferably in the form of a magnetic actuator which, in response to the closing of a switch in the actuator circuit by the sensing means, lifts the lever off the dispensing arm against the action of a strong spring and reopens the switch which was closed by the sensing means. A pneumatically operated cylinder could be used as the drive instead of the magnetic actuator.

Thus when a machine constructed according to the invention is at rest or in the non-energized state there is always a label in the dispensing position in front of the resilient pressure roll. When the sensing means report an article to be labelled and the magnet of the actuator consequently pulls in, the dispensing arm will swing abruptly out and roll on the prepared label. As the magnet is turned off in the process, the strong restoring spring provides for the movement of the labels and the swinging in of the dispensing arm, so that another label is immediately brought into the dispensing position. Since the swinging movement of the lever required to move the labels is considerably less than the movement actually carried out, the dispensing arm can label articles in which the labelling surfaces are at different distances from the pressure roll in the position of rest. The longer the dispensing arm and/or the greater the distance between the pressure roll and the spindle of the dispensing arm, the more the articles can differ in height. It may therefore be an advantage to make the length of the dispensing arm adjustable.

Further, according to the invention, a backing plate is provided in the dispensing arm in front of the deflection pulley in order to press the label lying on the backing plate against a printing attachment when the dispensing arm is swung into the position of rest. To produce an even pressure a resilient portion is provided on the dispensing arm in contact with the pivotable lever; this portion resiliently urges the backing plate against the printing attachment when the lever has moved into the position of rest defined by a stop.

Other features of the invention are set out in the claims. The description that now follows explains an example of the invention which is illustrated in the drawings. In these:

FIGURE 1 is a partially sectioned side view of the labelling machine in the position of rest;

FIGURE 2 is a partially sectioned side view of the machine when a label is being applied;

FIGURE 3 is a front elevation of the machine;

FIGURE 4 is a side view of the dispensing arm in the position of rest, the pivotable lever with its feed pawl and the feed roller;

FIGURE 5 is a plan view of the dispensing arm;

FIGURE 6 is a view taken on the line of section A—A in FIGURE 4.

A labelling machine constructed in accordance with the invention and which is to be mounted over a conveyor belt is shown in a position of rest in FIGURE 1. FIGURE 2 shows the same machine or apparatus in a dispensing position in which the response of means which mechanically or optically sense the articles to be labelled results in a lever 1, acting as a movable stop means, being pivoted so that the dispensing arm 3, pivoting about shaft 2, together with the label 5 which is ready in front of the resilient pressure roll 4, is moved by spring 6 against the article 7 to be labelled. The advancing or feed means

for the label-carrying strip 10, comprising a drivable transporting or feed roller 8 and a resilient opposed roller 9, is driven in such a way that when the machine is in the position of rest as in FIGURE 1 and when the dispensing arm 3 has been pivoted out as in FIGURE 2 a label 5 is ready in front of the pressure roll 4. The rear edge of the label 5, in a known manner, still adheres lightly to the elongated carrier strip 10, to the following label or to a holding means provided between deflection means shown in the form of the deflection pulley 11 and the pressure roll 4. As shown in FIGURE 3, drive means are provided in the form of a D.C. magnet 13, the shaft 14 of which makes an axial movement of about 3 mm. and a rotary movement of about 25° on energization of the magnet. Non-rotatably fixed on the shaft 14 of the magnet is a driving arm 15 provided with a pin 16 which engages in a guide 17 in the lever 1. The lever 1 is adapted to pivot about the spindle 18 and has a feed pawl 20 joined to its free end. When the lever 1 swings back from the dispensing position shown in FIGURE 2 into the rest position shown in FIGURE 1 this pawl is blocked and turns the feed roller 8 through an angle such that the carrier strip 10 is advanced through a predetermined increment equal to the length of one label. A spring 19 pulls the pawl 20 back when it has snapped into its operative position.

Cylindrical pins 21 are provided on the roller 8, parallel and concentrically with the axis of rotation of roller 8 and at an angular spacing such that when the lever 1 is swung back the roller 8 advances or feeds the carrier strip 10 through a predetermined increment equal to the length of one label. In order that the strip 10 can always be fed or advanced by equal lengths a resilient detent or stop roll 23 subject to the pressure of a spring 22 is provided. The stop roll or detent is mounted on a pivotable stop lever 24 and is resiliently urged toward pins 21 to fix the feed roller in the correct positions by engaging pairs of adjacent pins 21. The roller 8 is mounted on a bushing 25 surrounding the shaft 14 of the magnetic actuator. Fixed on the driving arm 15 is a looped yoke or stirrup 27 projecting from the housing 26, to remove the load from the advancing means 8, 9. At each swinging movement of the arm 15 the yoke or stirrup 27 draws the label strip 28 from a supply reel in such a way that the strip is fed loosely into the labelling machine. Thus it is not necessary for the feed or advancing means 8, 9, which operate with great precision, to move the often heavy weight of the supply reel in advancing the carrying strip 10 through the apparatus since—as shown in FIGURE 1—a loose loop 29 of the strip of labels is always provided by the return movement of the yoke or stirrup 27 during the rotation of the roller 8.

In the dispensing arm 3 a backing plate 30 is provided in front of the deflection pulley. When the arm 3 swings into the FIGURE 1 position of rest this plate presses the label lying on it against a printing attachment 31. The strip 28 of labels and/or the carrying strip 10 are guided so that the position of the dispensing arm 3 has little or no influence on the position of the labels in relation to the deflection pulley 11 and backing plate 30.

In order that a clear-cut and always constant pressure can be applied to each of the labels in spite of the strong force of the return spring acting on the magnet and/or the shaft 14 thereof or the driving arm 15 and in spite of the difference in the pivoting movements of the dispensing arm 3, the arm 3 is provided with resiliently yieldable means permanently in contact with the lever 1, i.e., both when the lever 1 is snapping back and when the machine is in the position of rest. The resiliently yieldable means is shown in the form of a cam 35 which is mounted in the arm 3 for pivoting about a spindle 36 parallel with the shaft 2 of the arm 3. A spring 37 urges the crest 38 of the cam 35 against the lever 1, and when the lever 1 swings out upwards a projection 39 on the spring 37 forces the cam 35 against a stop 40 (see FIGURE 4). As

shown in FIGURE 1 the spring 37 presses the dispensing arm 3 and its backing plate 30 against the printing attachment 31 while the driving arm 15 is up against a stop 41. The stop 41 thus takes up the bias of the strong return spring.

The printing attachment 31, made up of a plurality of type wheels, is mounted in a rocker arm 45 which is adapted to pivot about a shaft 46 parallel with the shaft 2 of the dispensing arm into the printing position shown in FIGURE 1 or the inking position in FIGURE 2. The rocker arm 45 is biased by a return spring 47 toward the printing position in which it is in contact with the stop 50. A catch 48 is mounted on the rocker arm 45 so that it projects into the path along which the end 49 of the driving arm 15 moves. When the arm 15 is raised by the actuation of the magnetic actuator its end 49 will strike the catch 48, blocking in this direction, and will pivot the arm 45 and printing attachment 31 into the inking position shown in FIGURE 2. Before the driving arm 15 has reached its highest position—shown in dotted lines in FIGURE 2—its end 49 slides over the catch 48 so that the rocker arm 45 drops back into the printing position by the action of the return spring 47. This ensures that the printing attachment 31 is always in the printing position before the dispensing arm 3 is pushed back into its position of rest by the lever 1.

The printing attachment 31 is inked by means shown in the form of an inking pad 51. This is supported by a resilient carrier 53 which can easily be exchanged through the aperture 52 in the housing and which can fixed to the housing 26 by means of a wing nut 54. On the carrier 53 is a cam guide 55 which cooperates with a pin 56 fixed to the rocker arm 45 in such a way that the inking pad 51, which is substantially at a tangent to the path along which the printing attachment 31 moves, does not come down onto the types of the attachment 31 until the rocker arm 45 has reached the inking position shown in FIGURE 2 and the end 49 of the arm 15 slides over the catch 48. As soon as the rocker arm 45 drops back into the printing position by the action of the return spring 47 the inking pad 51 is lifted off the printing attachment 31.

The strip 28 of labels is guided in the apparatus by a plate 60 to near the shaft 2 of the dispensing arm and thereafter is guided over the backing plate 30 to the deflection pulley 11. The strip 10 carrying the labels is guided by the pulley 11 over a spindle 61 near the shaft 2 of the dispensing arm, and over a guiding roll 62 to the advancing rollers 8, 9. For precise adjustment of the printing and dispensing position of the labels 5 the guiding plate 60 can be pivoted a few degrees about the axis 63 and secured by means of a screw 65 mounted in a slot 64.

To make the advance of the labels coincide exactly with their length, the rolling distance at the periphery of the roller 8, determined by the arrangement of pins 21 on roller 8, is somewhat longer than the length of the labels, and a bandtype brake 70, directly controlled by the labels, is arranged in front of the guiding plate 60 to clamp the strip 28 of labels fast when the labels 5 moving into the dispensing position and the label moving onto the backing plate 30 have reached the correct position. The rollers 8, 9 of the advancing means pick up the carrying strip 10 only with enough force to prevent the tearing strength of the strip 10 from being exceeded. This produces a slipping effect between the rollers 8, 9 and the strip 10. The brake 70 is released by a lever 71 projecting into the path along which the feed pawl 20 moves. Mounted on the pawl 20 is a roll 72 which raises the lever 71 and releases the brake 70 when the rotary magnet 13 lifts the driving arm 15, and thus the lever 1, and when the pawl 20 springs over a pin 21' on the roller 8 against the action of the spring 19 and is pivoted about the spindle 73. The arrangement is such that the pawl 20 springs over the following pin 21' even after a slight pivoting movement on the part of the driving arm 15, the lever 1 and thus the dispensing arm 3. This ensures that even if the arm 3 only

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carries out small pivoting movements the brake 70 will be released and the label strip will be transported a predetermined increment equal to the length of one label.

The machine works as follows: An electrical pulse released by the mechanical or optical sensing means causes the magnet 13 to pull in. The following then happens:

(I) Driving arm 15 is moved upwards.

(A) The lever 1 is raised and frees the dispensing arm 3 so that the latter, together with the printed label 5 in the dispensing position, can swing out against the article 7 to be labelled. At the same time the spring 6, which is fixed to the lever 1 and engages the arm 3, keeps the cam 35, acted on by springs 37, in contact with the lever 1 until the resilient pressure roll 4 strikes the articles to be labelled. Then the label 5 is rolled onto the article with rising tension in the spring 6 and consequently increased pressure from the resilient roll 4.

(B) Right at the beginning of the pivoting movement the transporting pawl 20 strikes against a pin 21' on the feed roller 8, rotates about spindle 73 against the action of spring 19 and causes roll 72 to strike against lever 71, thereby releasing the brake 70.

(C) The looped yoke 27 fixed to the driving arm 15 pulls more of the label strip 28 off the supply reel.

(D) With the dispensing arm 3 already swinging out, the end 49 of the driving arm 15 abuts the catch 48 on the rocker arm 45 and lifts the printing attachment 31 into the inking position. The inking pad 51 supported by the resilient carrier 53 is applied to the types of the printing attachment 31.

(E) The end of the driving arm 15 slides over the catch 48 so that the rocker arm 45 is pivoted back into the printing position by the spring 47. In the course of this movement the pin 56 fixed to the rocker arm 45 presses against the cam guide 55 fixed to the resilient pad support 53 so that the pad 51 is lifted off the attachment 31 right at the beginning of the movement.

(F) With the driving arm 15 in its highest position the electric current for energizing the magnet 13 is interrupted so that all components are returned to the starting or rest position by the action of a strong spring.

(II) The driving arm 15 is swung down.

(A) The lever 1 is swung down and presses onto the resiliently biased cam 35, whereby the dispensing arm 3 is swung back inwards until the arm 15 meets the stop 41. The label on backing plate 30 is applied to the printing attachment 31 by the raising of cam 35 by the action of spring 37.

(B) The pawl 20 again abuts the pin 21'. As the pawl 20 is blocked in this direction it turns the roller 8, thus bringing an already printed label into the dispensing position. The movement of the label is over before the dispensing arm 3 has been swung in. The band-type brake 70 controlled directly by the strip 28 of labels clamps the said strip fast in the correct position.

(C) The end 49 of the driving arm 15 strikes the catch 48 on the rocker arm 45. The catch 48 is tilted away and after the passage of the arm 15 is returned to the starting position by spring force.

The labelling machine described is designed so that—as shown in FIGURE 3—with the same adjustment of the machine it is possible to label articles 7 conveyed on a belt 79 if their tops 80 have a minimum spacing of about 1 cm. and a maximum spacing of about 5 cm. from the resilient pressure roll 4 and from the label 5 in the dispensing position. The minimum spacing 81 and maximum spacing 82 are indicated in dotted lines.

It is to be understood that the above detailed description of an embodiment of the invention is provided by way of example only. Various details of design and construction may be modified without departing from the true spirit and scope of the invention as set forth in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Apparatus for applying self-adhering labels to articles as the articles are advanced by a conveyor along a path passing the apparatus, the labels being carried upon an elongated carrier strip, said apparatus comprising:

advancing means for moving the carrier strip through the apparatus;

a dispensing arm having a free end and being mounted for pivotal movement between a rest position wherein said free end is outside the path of said articles and a dispensing position wherein said free end is in said path;

a resilient label-pressing roll mounted at the free end of said dispensing arm;

deflection means for guiding the carrier strip to a position adjacent the label-pressing roll and placing a label in juxtaposed relationship with said roll;

resilient biasing means normally urging the free end of the dispensing arm toward the dispensing position;

stop means cooperatively engaging said dispensing arm and mounted for movement between a first position wherein the stop means restrains the dispensing arm to retain the free end thereof at said rest position and a second position wherein the dispensing arm is allowed to pivot in response to the resilient biasing means to move the free end thereof to said dispensing position; and

drive means coupled to said stop means for actuation in response to the arrival of an article at a given location with respect to the apparatus to move said stop means from said first position to said second position and release the dispensing arm for pivotal movement to allow the free end thereof to swing into said dispensing position and for actuation in response to the arrival of the stop means at said second position to return said stop means to the first position thereof and the free end of the dispensing arm to the rest position.

2. The apparatus of claim 1 wherein:

said advancing means includes a feed roller for advancing the carrier strip;

said dispensing arm is mounted for pivotal movement about a fixed axis;

said stop means comprises a lever mounted for pivotal movement about an axis parallel to said fixed axis; said apparatus including:

a pawl mounted for pivotal movement with the lever and engageable with said feed roller during pivotal movement of the stop means from said second position back to said first position to rotate the feed roller through a predetermined angle to advance the carrier strip through a predetermined increment equal to the length of a label carried thereby.

3. The apparatus of claim 2 wherein:

said feed roller includes a series of pins adjacent the periphery thereof and extending along axes aligned parallel to and concentric with the axis of rotation of the roller and at an angular spacing corresponding to the length of each label, said pawl being engageable with each of said pins in succession to rotate the feed roller; and

a detent resiliently urged into contact with an adjacent pair of said pins when the feed roller is at rest, said detent being mounted for movement from between said pair of pins against the resilient urging in response to rotation of the feed roller by engagement of the pawl with a further pin.

4. The apparatus of claim 1 wherein:

said dispensing arm is mounted for pivotal movement about a fixed axis;

said stop means comprises a lever mounted for pivotal movement about an axis parallel to said fixed axis; and

the resilient biasing means normally urging the free end of the dispensing arm toward the dispensing position includes a spring attached at one end thereof to said

dispensing arm and at the other end thereof to said lever.

5. The apparatus of claim 1 wherein:

said stop means comprises a lever mounted for pivotal movement between said first and second positions; and

said drive means includes a spring biased magnetic actuator coupled with said lever; and including means for energizing said magnetic actuator against the spring bias thereof in response to the arrival of an article at said given location to pivot the lever from said first position to said second position and for de-energizing said magnetic actuator upon the arrival of the lever at said second position to allow the spring bias to return the lever to said first position and thereby bring the free end of the dispensing arm to the rest position.

6. The apparatus of claim 5 wherein the elongated strip is supplied to the apparatus from a reel supply and said apparatus includes means coupled to the magnetic actuator for drawing a length of said strip from the reel supply in response to actuation of the magnetic actuator.

7. The apparatus of claim 5 including:

a drive shaft coupled to the magnetic actuator such that upon actuation of the magnetic actuator, said drive shaft is rotated through a predetermined angle; and a drive arm carried by said drive shaft for movement through said predetermined angle, said drive arm being coupled to said lever for pivoting said lever between the first and second positions thereof.

8. The apparatus of claim 7 wherein the elongated strip is supplied to the apparatus from a reel supply and said apparatus includes a looped yoke fixed to said drive arm for engaging the strip and drawing a length of said strip from the reel supply in response to actuation of the magnetic actuator and rotation of the drive shaft.

9. The apparatus of claim 7 including a bushing surrounding a portion of the drive shaft, and said advancing means including a feed roller mounted on said bushing for rotation independent of said drive shaft.

10. The apparatus of claim 1 wherein said deflection means includes a deflection pulley mounted on said dispensing arm adjacent the label-pressing roll, said apparatus including:

a backing plate mounted on said dispensing arm and juxtaposed with the deflection pulley such that the strip is guided by the deflection pulley over the backing plate; and

printing means mounted in a predetermined position in said apparatus relative to said backing plate such that upon the arrival of the free end of the dispensing arm at said rest position, the backing plate will press the strip, and a label carried thereon, against said printing means.

11. The apparatus of claim 10 wherein said stop means comprises a lever mounted for pivotal movement and including resiliently yieldable means interposed between the dispensing arm and the lever such that said backing plate is resiliently pressed against the printing means by virtue of said resiliently yieldable means when the free end of the dispensing arm is in said rest position.

12. The apparatus of claim 11 wherein the dispensing arm is mounted for pivotal movement about a fixed and said resiliently yieldable means includes:

a cam having a crest and mounted upon the dispensing

arm for rotation about an axis parallel with said fixed axis;

a stop fixed to the dispensing arm; and

a spring resiliently biasing the cam toward said stop and the crest of said cam toward said lever such that said crest contacts said lever to locate the dispensing arm relative to the lever and said spring allows resilient movement of the dispensing arm relative to the lever when the free end of the dispensing arm is in said rest position.

13. The apparatus of claim 10 wherein:

said dispensing arm is mounted for pivotal movement about a fixed axis; and

said printing means is mounted for pivotal movement about an axis parallel to said fixed axis between a printing position juxtaposed with said backing plate when the free end of the dispensing arm is in the rest position and an inking position spaced away from said printing position in response to actuation of said drive means.

14. The apparatus of claim 13 wherein said drive means includes:

an actuator;

a drive shaft coupled to the actuator for rotation through a predetermined angle in response to actuation of the actuator; and

a drive arm carried by said drive shaft for movement therewith through said predetermined angle along a given path; and said apparatus includes

a return spring biasing said printing means into said printing position; and

a rocker arm mounted for pivotal movement and lying in the path of the drive arm for being engaged and pivoted by the drive arm during movement thereof along said path, said rocker arm being associated with the printing means such that upon such pivotal movement of the rocker arm said printing means is driven from the printing position to the inking position in response to movement of the drive arm along said path and is returned by said return spring to said printing position prior to the completion of the travel of the drive arm through said predetermined angle.

15. The apparatus of claim 14 including:

an inking pad mounted essentially tangent to the path of travel followed by the printing means as the printing means is driven from the printing position to the inking position; and

means for applying said inking pad to said printing means at said inking position in response to said pivotal movement of said rocker arm.

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U.S. Cl. X.R.

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