

Sept. 1, 1964

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3,146,699

APPARATUS FOR PRINTING ON TUBES, BARS AND THE LIKE

Filed Oct. 16, 1961

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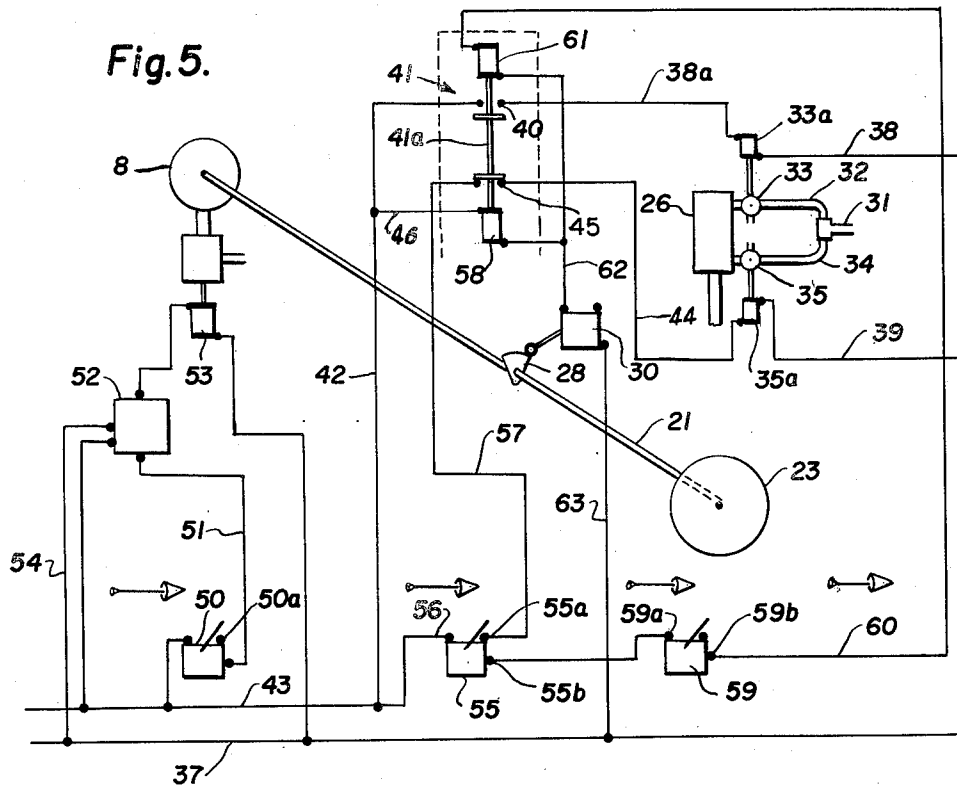


Fig. 7.

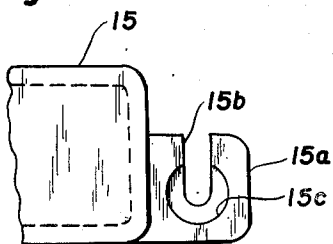
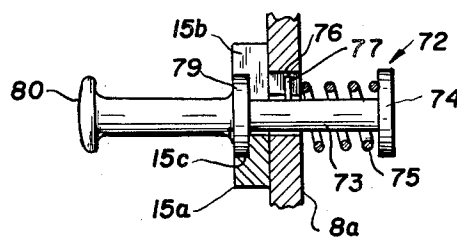


Fig. 8.



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APPARATUS FOR PRINTING ON TUBES, BARS AND THE LIKE

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Filed Oct. 16, 1961, Ser. No. 145,073

9 Claims. (Cl. 101—35)

This invention relates to printing apparatus, and is for an offset printing apparatus for printing on tubes, bars, rods and similar elongated objects. It is especially useful for imprinting identifying markings on elongated objects where the printing runs lengthwise of the work piece, such as a trade-mark, the maker's name, the country of origin, and like indicia.

While the invention may be used for the marking of continuous or very long lengths of tubing or the like, it is particularly useful for printing on cut lengths of the product to be marked. It will be herein specifically described in connection with the marking of lengths of tubing or pipe, but this is only by way of illustration and not by way of limitation.

In the plant where tubing is made, it may be cut into lengths, usually some uniform predetermined length, and the pieces are carried endwise on roller conveyors from one location to another, the pieces following one another in spaced end-to-end relation. This invention provides a printer for printing a legend as above outlined one or more times along each such length of pipe or tubing. However, the invention as herein embodied so operates that the printing will begin at a predetermined distance past the leading edge of the pipe, and will start with the first letter or character of the legend, and then repeat the legend as many times as the length of pipe permits, but will stop printing sufficiently in advance of the trailing end of the pipe or tube that an incomplete or partially complete imprint will not appear at that end. Thus the first imprint is complete and each succeeding one on the same tube is complete. This is advantageous in that when the pipe is printed, each marking is complete from beginning to end. If either end of the pipe is provided with threads or a coupling, the printing does not begin or end on the threads or coupling and the printing blanket of the offset printer is not mutilated by contact with the threads or coupling, or by impact with the leading ends of the pipe lengths.

According to my invention the printing apparatus comprising the ink fountain and dip roll, printing roll and printing blanket, are carried by a support positioned "over the line," that is, above the line of travel of the pipe lengths. They are driven from a common driving means, such as a motor. The printer is pivotally supported at one end above the line and means are provided for lowering the printer about the pivot to bring the blanket roll against the object to be marked only after the leading edge of the work piece has passed the printer. When the printer is so lowered, the periphery of the blanket roll rides on the work piece. A switch built into the printer assures that contact of the blanket roll with the work piece or tubing to be marked will be first made in advance of the ink impression carried on the blanket roll so that the blanket is in contact with the work piece before any printing takes place. A limit switch controlled by the pipe to be marked causes the printer to be lifted away from the work before the trailing end moves under the blanket roll, but the printer will be so lifted only at the end of a complete legend.

A principal object of the invention is therefore to provide a printer which will print only complete legends on successive lengths of product to be marked, and the

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legends will be spaced from both ends of each such length.

A further object is to provide such a printer that will be entirely automatic in its operation, and be capable of marking pieces traveling at relatively high rates of speed.

A further object of the invention is to provide a machine for this purpose in which the ink reservoir may be readily removed and replaced without the use of tools.

These and other objects and advantages are secured with my invention, as will be readily seen by those skilled in the art from the following detailed description in conjunction with the accompanying drawings. In the drawings:

FIG. 1 is a schematic view showing the printer arranged along a conveyor;

FIG. 2 is a side elevation of the printing unit;

FIG. 3 is a top plan view thereof;

FIG. 4 is an end view of the unit shown in FIG. 2;

FIG. 5 is a schematic wiring diagram for the control of the printer;

FIG. 6 is a schematic fragmentary view of the printer operated micro-switch arrangement for timing the raising and lowering of the printer;

FIG. 7 is a fragmentary front elevation of a portion of the ink pot; and

FIG. 8 is a fragmentary transverse vertical section in the plane of line VIII—VIII of FIG. 2 showing the locking pins for holding the ink fountain in place.

Referring to the drawings, and first to FIG. 1, there is schematically indicated at 2 a power-driven roller conveyor with a succession of rolls 3 having a V-shaped peripheral groove. The rolls are driven to propel the pipe P in the direction of the arrow. This type of conveyor is common in pipe and tube plants, and per se is not novel. The printer itself is designated generally as 4. It has a supporting frame structure 5 with a hub or sleeve 6 at one end through which passes a supporting shaft 7 on which the frame pivots. This shaft, which is transverse to the travel of the pipe, is mounted in a fixed supporting frame (not shown) with the printer in line over the conveyor.

The printer has power driving means, here represented as an air motor 8 having a pulley 9 about which passes a belt 10, the belt passing around a larger pulley 11. The pulley 11 is fixed on a transverse shaft 12 passing through the supporting frame. Carried on the shaft 12 immediately adjacent the pulley 11 is a gear wheel 13. On the opposite end of the shaft 12 is a dip roll 14 that revolves in an ink reservoir or fountain 15.

The gear wheel 13 meshes with a larger gear wheel 16 on the end of a second transverse shaft 17. The opposite end of the shaft 17 carries a type roll 18, on the periphery of which is a replaceable series of printing dies 19 constituting the marking or legend to be printed. Usually, but not necessarily, the type extends around the greater portion of the periphery of the wheel, but with a free area between the beginning and the end of the legend. The gear wheel 16 also meshes with another gear wheel 20 on a third transverse shaft 21, gears 16 and 20 being of the same diameter, so that they operate at the same speed. On the opposite end of shaft 21 is a blanket roll 22 on the periphery of which is a printing band 23.

When the printer is driven, the dies on the type roll roll against a film of ink spread over the periphery of the rotating dip roll, and the inked printing dies then revolve against the printing band or blanket 23, making a reverse imprint on the printing band, as is well understood in offset printing. The printing blanket then re-

volves on the piece to be marked, and the inked imprint on the printing band is transferred to the work piece.

In the present invention the forward end of the printer frame has a lug 24 to which is attached the free end of a piston rod 25, this rod having a piston that operates in a cylinder 26 that is suspended from a fixed support above the conveyor, this support being partially indicated at 27. When pressure fluid is admitted to the top of the cylinder, the piston is forced down to lower the printer frame to a level where the blanket of the blanket roll will ride on the work piece that is traveling along on the conveyor beneath it. When pressure is admitted to the opposite end of the cylinder 26, the printer is raised out of printing position, the printer thus moving down and up in a vertical arc about the transverse supporting shaft 7. Solenoid actuated valves mounted on or near the printer control the supply of pressure fluid to the cylinder.

On the inner face of the gear wheel 20 there is an arcuate cam surface or element 28 that is normal to the face of the gear on which it is carried. On the printer frame there is a mounting member or frame 29 in which is a micro-switch 30 having a button which is depressed when the cam 28 is carried around by the gear to engage it, and which releases to open the switch when the cam clears it, the switch being of a well-known construction. The arrangement of the cam and switch is clearly seen from the schematic detail in FIG. 6.

Referring now to the diagram in FIG. 5, 31 represents a fluid pressure supply line having a branch 32 leading to a normally closed solenoid operated valve 33, this valve being a three-way valve that connects to the top of the cylinder 26. In the normal closed position the valve is closed to the high pressure fluid supply and vents the cylinder. The fluid pressure supply line has a second branch 34 leading to a similar three-way solenoid operated valve 35 which is normally open to high pressure fluid and vents the lower end of the cylinder only when it is closed. Solenoid for valve 33 is designated 33a, and for the valve 35 as 35a.

Solenoid 33a has one terminal connected to a wire 37 through wire 38, wire 37 being one of two lines leading to a current source. Likewise one terminal of solenoid 35a is connected through wire 39 to the same line. The other terminal of solenoid 33a is connected through wire 38a to one of a pair of contacts 40 of a latching relay 41. The other contact of this pair is connected through wire 42 to the other current supply line 43. The armature 41a of the relay closes the circuit across this pair of contacts when relay coil 61 is energized. The other terminal of solenoid 35a is similarly connected through wire 44 with one of a second pair 45 of latching relay contacts. The other contact of this pair is connected through wire 46 to wire 42 and the current supply line 43. The armature 41a normally closes the circuit across contacts 45 to hold the solenoid valve 35 in an open position where fluid under pressure flows to the lower end of cylinder 26 to keep the piston in this cylinder raised and hold the printer in its elevated position.

In FIG. 1, and in the diagram, there is schematically shown a limit switch 50 in the path of travel of the tube or work piece as it approaches the printer, but well in advance of the printer. When the leading end of the tube strikes this limit switch, a circuit is established from current supply line 43, wire 51, limit switch contact 50a and an electric timer 52 to a solenoid valve 53 that is normally closed to open said valve and admit air under pressure to the air motor 8. The circuit from the other side of this solenoid valve 53 is through wire 54 to the current supply line 37. Depending on the setting of the timer, air is thus supplied to the air motor to bring the peripheral speed of rotation of the blanket roller up to about the linear speed of the pipe or tube moving along the conveyor. This is a desirable arrangement, but where pieces to be marked follow in close succession, a manual

valve may be substituted so that the motor runs continuously.

In the next portion of the circuit there is a second limit switch 53 in the path of travel of the tube or other work piece, also located in advance of the printer, having two contacts 55a and 55b. This switch is connected through wire 56 to current supply line 43. The switch is normally closed on contact 55a, and a wire 57 leads from this contact to one terminal of one of the electromagnets of the latching relay 40, said electromagnet being designated 58, and its function is to move the latching relay to the normal position where a circuit is closed across the pair of contacts 45 for controlling the solenoid valve 35 and holding it in the open position. A second wire leads from the limit switch contact 55b to the permanent connection 59a of a second limit switch 59 located as shown in FIG. 1 under the printer. It also is in line with the travel of the pipe or other article to be marked along the conveyor, and is so positioned that the leading end of the pipe will have passed beyond the blanket roll of the printer before the switch is operated. This switch, as shown in the diagram, is in a normally open position, but when it is engaged by the leading end of the article to be marked, a circuit is closed from 59a to contact 59b. All of the limit switches are of a type which are operated from a normal position by engagement with a leading end of the pipe and are held by the pipe in the position to which they are moved, but spring back to normal position when the trailing end of the pipe clears the switch.

A wire 60 leads from the contact 59b to one terminal of the electromagnet 61 of the latching relay. When this magnet is energized, it breaks the circuit across the contacts 45 and establishes a circuit across the contacts 40 of the latching relay to operate the solenoid valve 33 to open it and thereby effect a lowering of the printer to admit air to the top of the cylinder 26 and lower the printer into printing position. The other terminal of the latching relay coil 61 and the other terminal of the latching relay coil 58 are both connected to a wire 62 leading to the micro-switch 30, this switch being normally open, and from the micro-switch 30 there is a wire 63 that connects to the other current supply line 37. It will thus be seen that the two coils 58 and 61 of the latching relay are connected in parallel to one side of the current supply line 43, and that they are connected in parallel to the wire 62 and each is in series with the micro-switch 30 on the printer, and through this micro-switch connected to the other side of the current supply source. It will also be seen that the limit switch 59 is in series with the limit switch 55, and that the latching relay coil 61 is in a circuit wherein the limit switches 55, 59 and micro-switch 30 are in series.

The operation of the printer may now be followed. Normally the printer is elevated by the cylinder and piston 26 out of printing position by reason of the fact that the circuit across the latching switch contacts 45 is normally closed, holding the solenoid valve 35 in position to admit air pressure to the lower end of the cylinder 26. The object P moving along the conveyor actuates the limit switch 50 to drive the air motor and set the printer into operation so that the blanket will be traveling at approximately the same peripheral speed as the linear speed of the article to be marked, as explained above. The tube or other article to be printed upon then strikes the limit switch 55, opening the circuit through contact 55a and wire 57 to the latching relay coil 58, but since the relay is a latching relay, the de-energizing of the coil 58 does not at this time result in the opening of the circuit across the contacts 45. At the same time that the coil 58 is de-energized, the limit switch 55 makes contact with the contact 55b, closing a circuit to limit switch contact 55a. When the leading end of the piece P strikes the limit switch 59, which is normally open, a circuit is established from contact 59a to 59b to the latching relay coil 61,

and the circuit is then complete to one side of the micro-switch 30. When the blanket roll rotates to a position to bring the cam 28 into operating engagement with the micro-switch, the circuit is then completed across the micro-switch to the other side of the current supply line, and the latching relay coil 61 is energized to close the circuit across the contacts 40 and break the circuit across the contacts 45 and thereby activate the solenoid valves 33 and 35 to drop the printer to the printing level. Since the leading edge of the work piece has already passed beneath the blanket roll of the printer before the limit switch 59 is operated, such lowering of the printing frame will occur only after the leading edge of the piece is beyond a position where it can be printed upon.

The cam 28 is so positioned with relation to the imprint-receiving area of the blanket roll that the micro-switch 30 will be closed only when the impression carried on the blanket roll is in a predetermined position with respect to the leading end of the work piece. It is so located that by the time the cylinder is operated to lower the printer to printing position, a free area of the blanket roll will first contact the work, and then as the blanket roll rotates the legend will be transferred from the inked area of the blanket roll to the article P.

By having the air motor brought up to speed before the printer is lowered, there will be no undue wear of the printing blanket, as would be the case if the blanket roll were stationary and the printer was rotated by contact with the work piece. By having the limit switch 59 beyond the blanket roll, the blanket roll is protected from being damaged by contact with the leading end of the piece, as would be the case if the printer were lowered to printing level before the leading edge of the piece had passed beyond the point of contact with the printer. Finally, the printing begins with the first letter or character of the legend to be printed, and not at some intermediate point. This is assured by the proper positioning of the cam 28 in relation to the position of the type on the type roll, which rotates at the same speed as the blanket roll.

When the trailing end of the article being marked clears the limit switch 50, the circuit will be broken to the air motor for driving the printer, but the cut-off may be timed so as to not immediately stop the air motor, but to permit it to run for a predetermined time interval. When the trailing edge of the pipe or other article to be marked clears the limit switch 55, the circuit through the limit switch to contact 55b will be broken and a circuit established with contact 55a of the limit switch. This will connect one side of the coil 58 with one side of the power supply source 43 to de-energize the coil 61. However, the coil 58 will not be energized until the cam 28 has been rotated to a position where a circuit is closed across the micro-switch 30. When the circuit is closed across the micro-switch 30, latching relay coil 58 is energized to break the circuit across contacts 40 and establish normal circuit conditions across contacts 45. It will be seen, however, that this operation of the latching relay cannot occur until the blanket roll is again in a predetermined position, i.e., between the end of one legend and the beginning of the next. The limit switch 55 is far enough ahead of the printer that the printer can complete the legend before the printer is lifted in response to the limit switch by the trailing end of the piece being printed upon.

It will thus be seen that the invention provides a printer which is raised and lowered for each successive piece to be marked, and that the raising and lowering is controlled by the movement of the piece to be printed upon through the operation of the limit switches, but is timed by the micro-switch and the cam 28 so that the lowering takes place in such manner that the legend being printed will begin with the initial character of the legend, and the raising of the printer can take place only after the printing of the legend has been completed, and always

in advance of the trailing end of the piece. The printing will be continuous, however, during the time that the printer is lowered, so that on any length of pipe there will be a succession of the legends that are to be printed thereon, but with no incomplete legends. The length of successive pieces may vary, but no length shall be shorter than the length of the legend plus some space at each end. By using small type and a short legend the machine may be used to mark even short work pieces. For pieces of great length, such as so-called continuous tubing, the machine need not be changed in any way.

An incidental advantage of the invention is that the printing blanket cannot be damaged by threads or couplings or thread protectors that may be applied to either end of the pipe, since the printer will be raised when either end of the pipe or object being printed upon moves under the blanket roll.

The amount of ink applied by the inking roll 14 to the type is largely regulated by a doctor blade 70 mounted on the ink fountain and adjusted by means of a screw 71 to vary the pressure against the periphery of the roll 14 and thereby change the thickness of the film of ink on the surface of the roll. The particular doctor blade arrangement here illustrated forms no part of the present invention.

In use, it is often necessary to remove the ink fountain 15 either for cleaning or for substituting ink of a different color. The printer in the present invention has an ink fountain with attaching means that enable it to be quickly removed and reapplied. As shown in the drawings, the ink fountain 15 sets flat against the side of the printer frame, and depending from this frame, as best seen in FIGS. 4 and 8, there is a flange or rib 8a. The ink pot 15 has a lug 15a extending from each end thereof at the bottom, and these lugs set against the rib 8a. Each lug has an upwardly-opening vertical slot 15b therein, and the area of the lug around the lower end of the slot 15b is countersunk or counterbored, providing a socket 15c. There is a holding pin assembly designated generally as 72 engaging each of the countersunk areas or cavities 15c for holding the ink pot in position. The structure of these assemblies is best seen in FIG. 8 where the pin has a shank portion 73 that slidably passes through a hole in the rib 8a, and there is a nut 74 at the inner end thereof. A compression spring 75 is confined between this nut and the surface of the rib 8a to urge the pin toward the right as viewed in FIG. 8. On the rear face of the rib 8a there is a radial slot or keyway 76 and there is a radial pin or key 77 on the shank of the pin 73. On the outer end of the pin 73 is an enlarged cylindrical terminal portion 79, the diameter of which is such that it fits snugly in the counterbore 15c in the lug. At the outer end of the cylindrical portion 79 there is a finger knob 80. To remove the ink pot the operator merely needs to turn the knobs 80 until the radial pin 77 registers with the keyway 76, and then pull the knobs toward him against the compression of the spring 75 until the inner end of the enlargement 79 clears the counterbore 15c in the lug 15a. Then by turning the knob the radial key 77 can be rotated to a position where it no longer registers with the keyway 76, and the pin will be locked in this position. The ink fountain can then be dropped down with the slots 15b clearing the shank portion 73 of the locking pans. To apply the inking fountain, the pins are locked in the withdrawn position as described, the inking fountain is raised into position by bringing the slots 15b up around the shank 73 of the pins, and then the knobs 80 are rotated until the pin 77 registers with the keyway 76 and the spring 75 acts to draw the pin toward the right as viewed in FIG. 7, bringing the base of the enlargement 79 into the counterbore 15a to thereby lock the ink fountain in position. The knobs 80 may then be again rotated to prevent accidental removal of the reservoir. Thus the printer is provided with an inking fountain that can be readily interchanged by an operator without resorting to

the use of tools or wrenches, as is usually the case.

While I have shown and described certain specific embodiments of my invention, it will be understood that modifications and changes may be made therein; that an electric motor may be used in place of an air motor, and other mechanisms than a piston and cylinder used for raising and lowering the printer can be utilized, all within the contemplation of the appended claims.

I claim:

1. The combination with a printer movable vertically from a normal raised position to a lowered printing position, the printer having a revolving printing roll for contacting the surface of an article to be printed and means for driving the same with a conveyor below the printer for moving elongated articles to be printed upon in succession endwise beneath the printer, of means for raising and lowering the printer comprising an electrically-operated latching relay movable between two positions and power means controlled by the latching relay to effect the raising and lowering of the printer, an electric switch means operated by the printer in predetermined relation to the rotation of the printing roll to close only when the roll is in a selected position and to open after a predetermined arc of rotation of said roll, limit switch means along the conveyor in position to be operated by the pieces to be marked to control the latching relay, and a circuit for the latching relay in which the limit switch means and the printer-operated switch are in series whereby operation of the latching relay is timed to the position of the printing roll and the travel of the piece to be marked.

2. The combination with a printer and a conveyor as defined in claim 1 wherein there is another limit switch in the path of travel of articles movable along the conveyor for controlling said means for driving the printing roll.

3. The combination as defined in claim 1 wherein the limit switch means comprises two limit switches, one being positioned a predetermined distance in advance of the printer and one being located beyond the position where the printing roll makes contact with the articles to be printed upon, the first one being movable to a first position to effect operation of the latching relay for lowering the printer when contacted by the leading end of an article to be marked and to a second position to effect operation of the latching relay to raise the printer when the article clears said first switch, the second limit switch being in series in the circuit between the said first position of the first limit switch and the printer-operated switch, said second limit switch being movable by contact with the leading end of a piece to be marked from a normal open to a closed position.

4. The combination as defined in claim 1 wherein the limit switch means comprises two limit switches, one being positioned a predetermined distance in advance of the printer and one being located beyond the position where the printing roll makes contact with the articles to be printed upon, the first one being movable to a first position to effect operation of the latching relay for lowering the printer when contacted by the leading end of an article to be marked and to a second position to effect operation of the latching relay to raise the printer when the article clears said first switch, the second limit switch being in series in the circuit between the said first position of the first limit switch and the printer-operated switch, said second limit switch being movable by contact with the leading end of a piece to be marked from a normal open to a closed position, said means for driving the printing roll comprising a motor, and a third limit switch adjacent the conveyor in the path of travel of articles therealong and located ahead of both of said first and second limit switches for controlling the operation of said motor, said last-named limit switch being movable by contact with the leading end of a piece to be marked from a normal open position to a closed position to effect the starting of the motor.

5. The combination as defined in claim 1 wherein the

limit switch means comprises two limit switches, one being positioned a predetermined distance in advance of the printer and one being located beyond the position where the printing roll makes contact with the articles to be printed upon, the first one being movable to a first position to effect operation of the latching relay for lowering the printer when contacted by the leading end of an article to be marked and to a second position to effect operation of the latching relay to raise the printer when the article clears said first switch, the second limit switch being in series in the circuit between the said first position of the first limit switch and the printer-operated switch, said second limit switch being movable by contact with the leading end of a piece to be marked from a normal open to a closed position, said means for driving the printing roll comprising a motor, a third limit switch adjacent the conveyor in the path of travel of articles therealong and located ahead of both of said first and second limit switches for controlling the operation of said motor, said last-named limit switch being movable by contact with the leading end of a piece to be marked from a normal open position to a closed position to effect the starting of the motor, and a timer in parallel with said last-named limit switch for continuing the operation of the motor for a period of time after said last-named limit switch moves to open position.

6. The combination with a printer movable vertically from a normal raised position to a lowered printing position, the printer having a revolving printing roll for contacting the surface of an article to be printed and means for driving the same, a conveyor below the printer for moving elongated articles to be printed upon in succession endwise beneath the printer, of means for raising and lowering the printer comprising an electrically-operated latching relay movable between two positions and power means controlled by the latching relay to effect the raising and lowering of the printer, an electric switch means operated by the printer in predetermined relation to the rotation of the printing roll to close only when the roll is in a selected position and to open after a predetermined arc of rotation of said roll, limit switch means along the conveyor in position to be operated by the pieces to be marked to control the latching relay, a circuit for the latching relay in which the limit switch means and the printer-operated switch are in series whereby operation of the latching relay is timed to the position of the printing roll and the travel of the piece to be marked, said latching relay having two electromagnets for moving it, said limit switch means comprising a first limit switch positioned a predetermined distance in advance of the printer and a second limit switch beyond the printing roll, the first limit switch being movable by contact with the end of a work piece to a first position to close a circuit to one of said electromagnets of the latching relay through which to effect lowering of the printer when contacted by the leading end of an article to be marked and to a second position to effect operation of the latching relay where it is in circuit with the other of said electromagnets through which to effect operation of the latching relay to raise the printer when the article clears said first limit switch, both of said electromagnets for the latching relay being in series with said printer-operated switch, the second limit switch being in series in the circuit between the first position of the first limit switch and the printer-operated switch, said second limit switch being movable by contact with the leading end of an article to be marked from a normal open to a circuit-closing position.

7. Apparatus for printing on elongated objects comprising a printer having a power-driven printing roll, a conveyor for moving articles to be marked lengthwise under the printer, a fluid pressure operated mechanism comprising a cylinder and piston for lowering and lifting the printer relatively to the conveyor to move the printing roll into and out of printing position, a pair of electromagnetically-operated valves for controlling the flow of operating fluid to the cylinder to effect the lowering or lifting

of the printer, a two-position latching relay movable from a normal position where it is connected to energize the electromagnetically-operated valve to raise the printer to a second position where it is connected to the electromagnetically-operated valve for lowering the printer, said latching relay having a first electromagnet to move it to position to effect lowering of the printer and a second electromagnet to move it to the other position where it energizes the electromagnetically-operated valve to effect lifting of the printer, a limit switch in the path of movement of articles on the conveyor movable to a first contact by engagement with the leading end of an article to be marked and which returns to a second contact when the trailing end of the article has cleared the switch, the said first limit switch contact position being in circuit with the first said electromagnet of the latching relay and said second limit switch contact being in circuit with the second electromagnet of the latching relay, a micro-switch in the printer, cam means rotatable with the printing roll for closing the micro-switch at a predetermined time in the rotation of the printing roll, the said micro-switch being connected in series with each of said latching relay electromagnets and their respective limit switch contacts whereby the operation of either electromagnetic valve is effected in predetermined relation of the piece on the conveyor to be marked and at a predetermined time in the rotation of the printing roller.

8. Apparatus for printing on elongated objects as defined in claim 7 wherein there is a second normally open limit switch in the path of travel of articles on the conveyor positioned a predetermined distance beyond the printing roll and which is moved to closed position by engagement with the leading end of an article to be marked, said second limit switch being connected in series between the first said contact of the first limit switch and the micro-switch whereby the operation of the latching relay to effect the lowering of the printer can take place only after the leading end of a piece has passed beyond the printing roll, the first limit switch being far enough in advance of the printer to assure at least one complete revolution of the printing roll in contact with the piece

being marked before the circuit is established through said first limit switch to the second electromagnet of the latching relay whereby the beginning and end of each marking will be complete on the article.

9. The combination with a conveyor for moving a succession of articles beneath a printer, of a printing unit movable from a raised position downwardly toward the conveyor into a position for engaging articles on the conveyor, means for effecting said up and down movement, electrical means for controlling the operation of said last-named means, the printer having a printing roll for contacting the articles to print thereon, said electrical means including a circuit and a pair of electromagnetic devices in the circuit, one of which controls the lowering of the printer and one of which controls lifting thereof, limit switch means in said circuit in the path of movement of the articles along the conveyor movable between two positions in the first of which it is moved by each article into circuit with the electromagnetic means for lowering the printer and in the other position of which it is in circuit for the electromagnetic means for raising the printer, said limit switch means being operable to the first position by initial contact with the article to be marked and to the other position when the article has cleared it, means for driving the printing roll, limit switch means in the printer which is operated by the printer in predetermined relation to the rotation of the printing roll to circuit-closing position and which at other times is in circuit-opening position, said last-named switch being connected in series with said article-operated limit switch means in each of its two positions whereby to effect the lowering and raising of the printer in predetermined relation to the position of the article on the conveyor and in predetermined relation to the position of the printing roll.

References Cited in the file of this patent

UNITED STATES PATENTS

2,424,606	Engler	July 29, 1947
2,880,669	Hirschey	Apr. 7, 1959
2,932,250	Kanitz	Apr. 12, 1960