

July 4, 1972

R. A. WILMES

3,674,352

ELECTROSTATIC LABEL PRINTER

Filed June 22, 1970

5 Sheets-Sheet 1

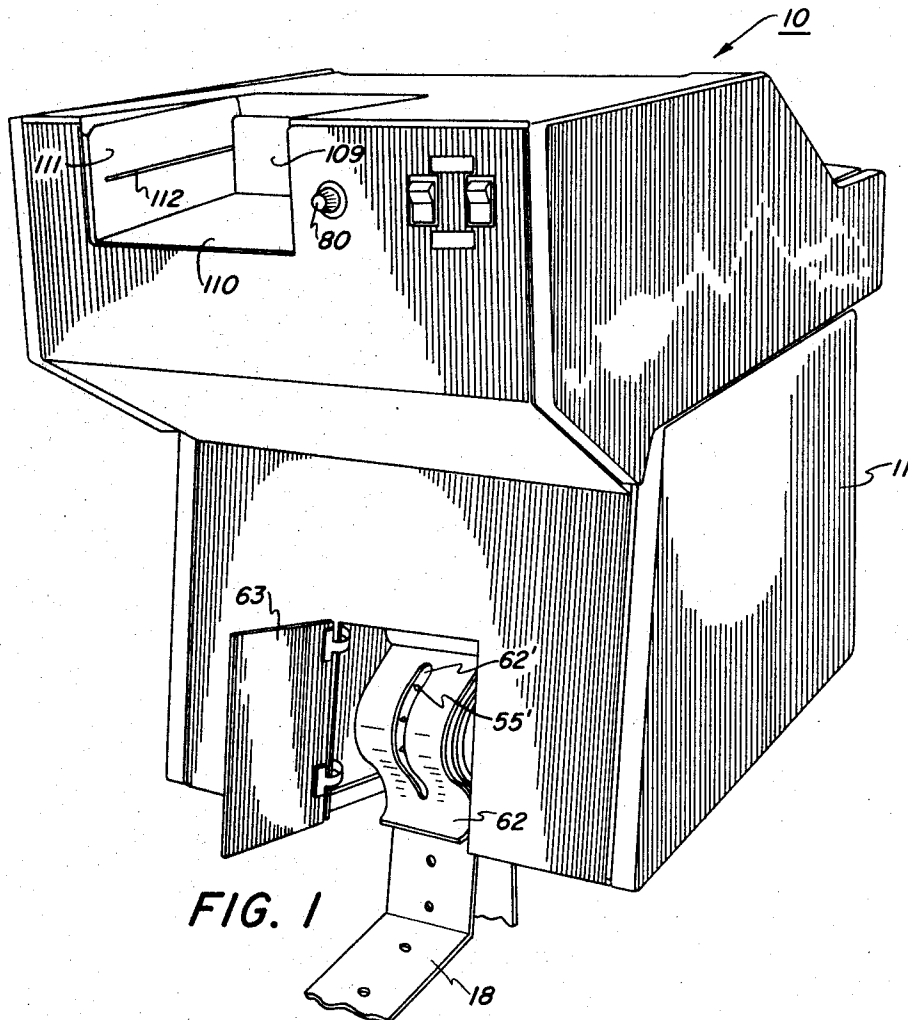


FIG. 1

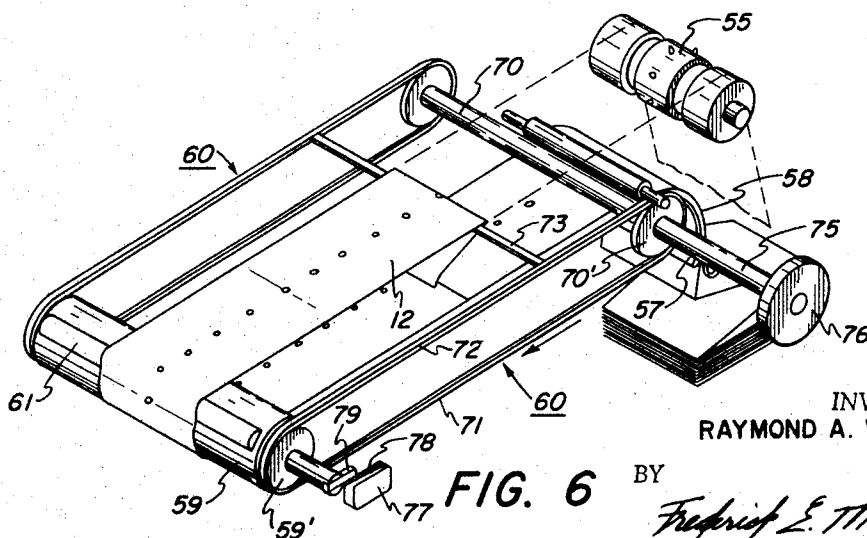


FIG. 6

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5 Sheets-Sheet 2

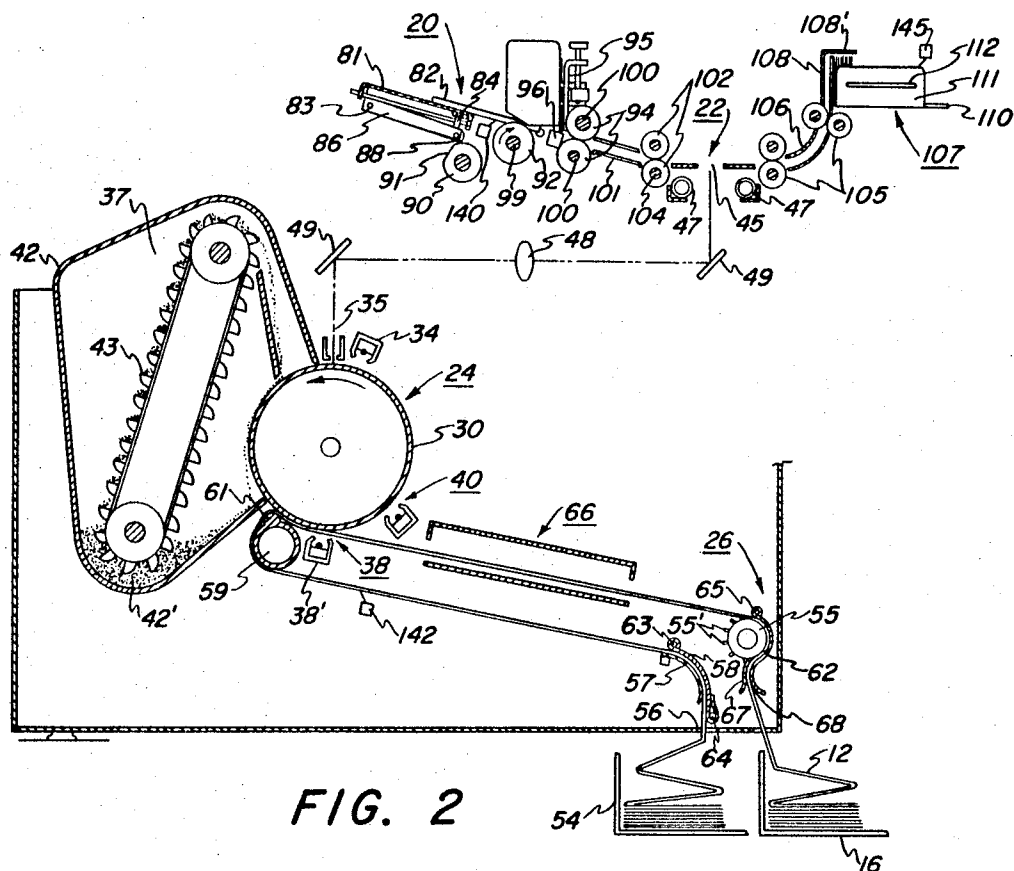


FIG. 2

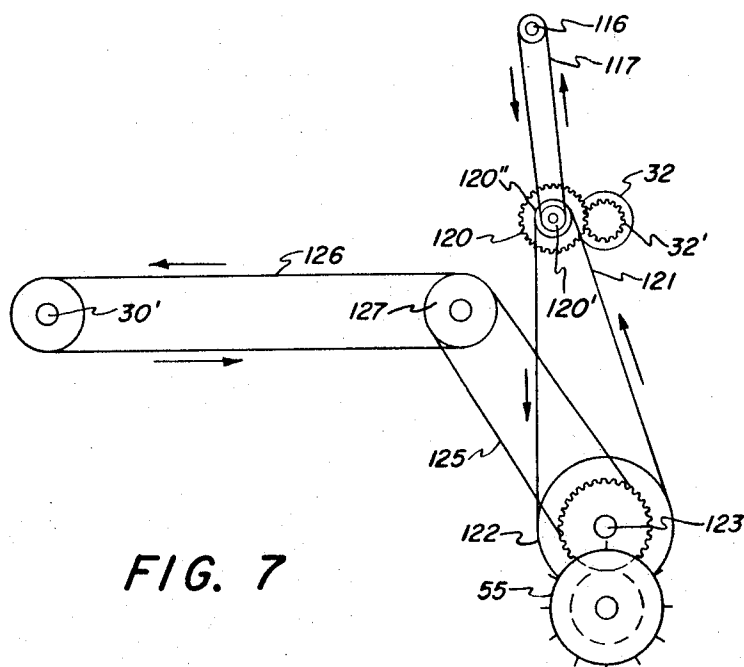


FIG. 7

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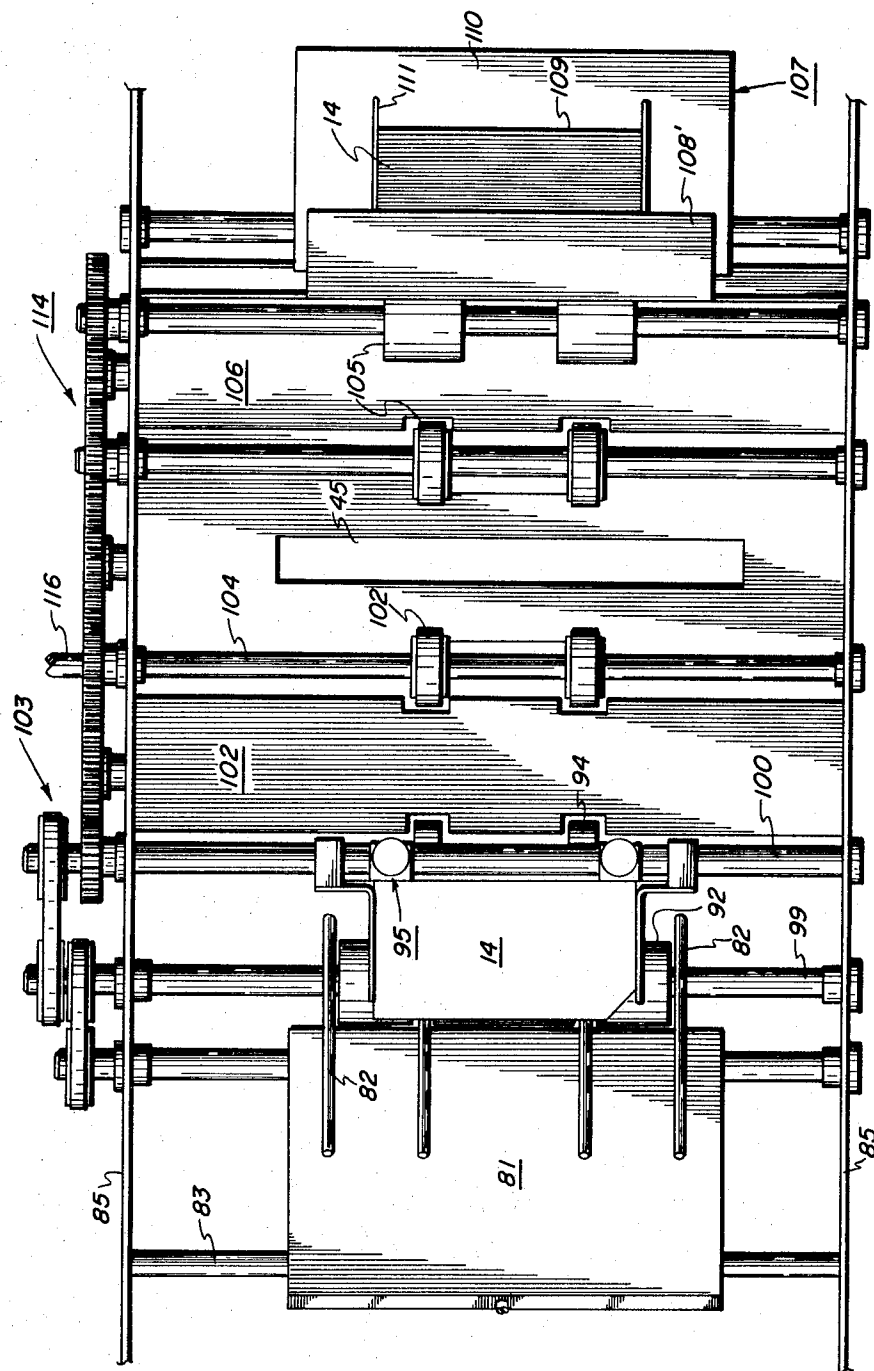


FIG. 3

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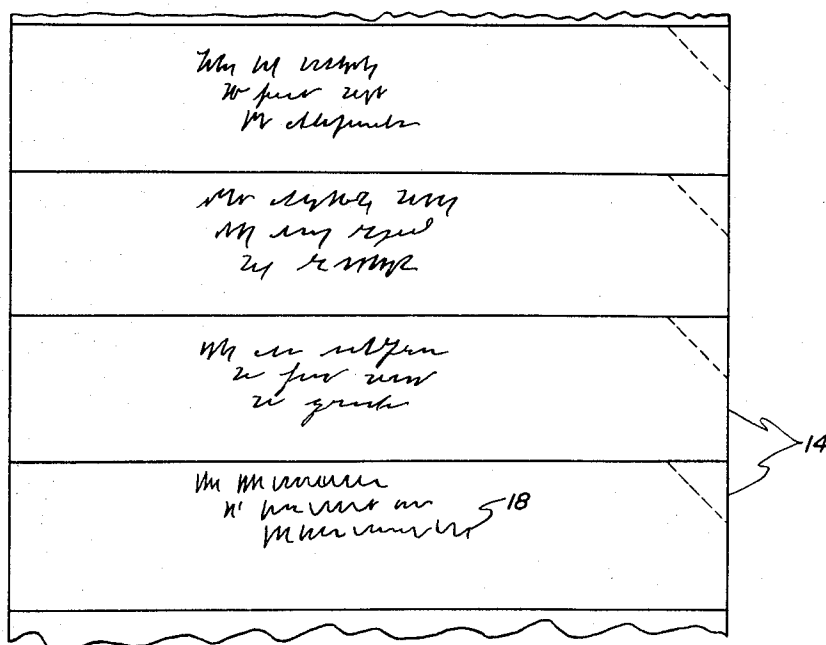


FIG. 4

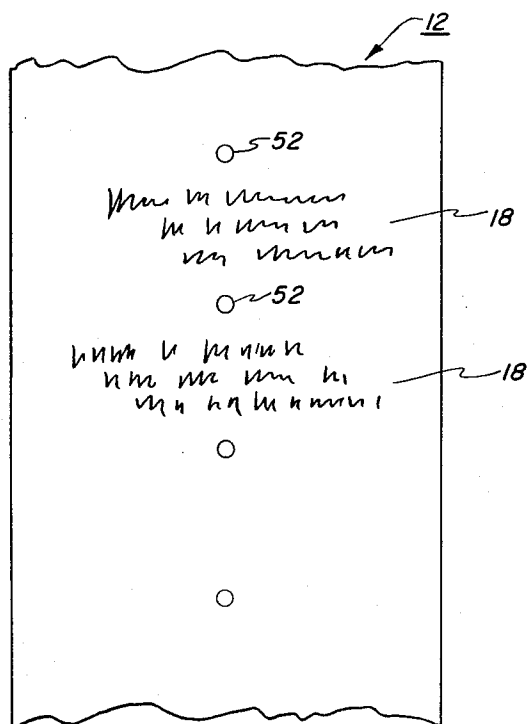


FIG. 5

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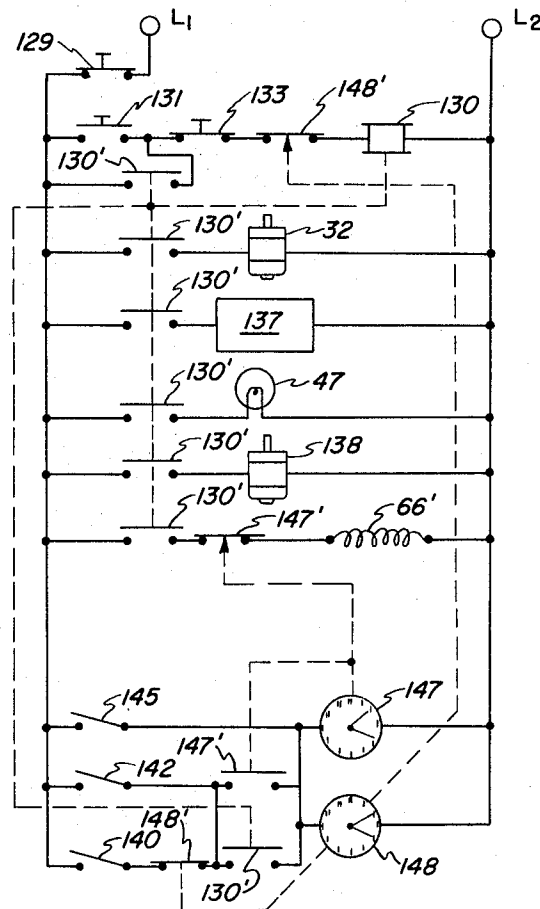


FIG. 8

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ELECTROSTATIC LABEL PRINTER

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Int. Cl. G03g 15/00, 15/20

U.S. Cl. 355—3

4 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for electrostatically printing label information, normally addresses, taken from individual master address cards on a web material for use as an addressing form, the apparatus including a photoconductive member, a scanning station, transport means for feeding the cards forward; means for developing latent images of the card information on the member; a transfer station, means to advance the web material to the transfer station; fixing means to fix the transferred image on the web material; and control means for said apparatus adapted when operated to stop, in predetermined sequence, first the fixing means and then the web material advance means whereby to avoid burning or scorching of the form by the fixing means, the control means being operable in response to interruption in the feed of cards past the scanning station, or interruption in the feeding of said web material, or overfilling of the address card collecting tray.

This invention relates to a label printing apparatus, and more particularly, to an apparatus for printing labels from individual address cards.

In addressing systems, the desirability of generating labels from inexpensive, easily manageable address formats such as cards, has long been recognized. One known method utilizes metal plates on which the address has been embossed. When used, each plate serves as a printing die, the plates being placed one at a time in a printing device to print or stamp out either onto the article itself or as a label, the address information. It is understood that where the address is printed out as a label, the label is thereafter transferred to the articles, normally by gluing.

While metal plates have certain advantages, they suffer from relatively high per unit cost and weight, the latter making storage of the plates for large customer lists both difficult and expensive. Further, plates of this type are relatively inflexible in that it is difficult to change or amend the address information without destroying the plate.

It is a principal object of the present invention to provide a new and improved label printing apparatus.

It is an object of the present invention to provide improved control for a label printer to protect the label copy, copy, normally paper against scorching or burning by the printer image fixing means.

It is an object of the present invention to provide an electrostatic label printer having control means to stop the printer in the event of a malfunction.

It is a further object of this invention to provide a control mechanism for a label copying machine effective to shutdown the machine in the event of a failure in the supply of master cards or breaking or exhausting of the label strip.

It is an object of the present invention to provide, in an apparatus for imaging labels on an endless web material from individual master cards, means to stop the apparatus when the card return tray is filled.

This invention relates to an electrostatic printing apparatus, the combination including means for feeding cards through the apparatus, the cards providing address

information to be copied; means for producing electrostatically images of the address information on a web material; means for advancing the web material in timed relationship with operation of the card feeding means and the image producing means; means for fixing images produced on the web material wherein the fixing means includes a source of heat, control means adapted on a control signal to stop the apparatus without burning or scorching of the web material by the fixing means heat source, the control means including timing means adapted to hold the apparatus operative for a first interval sufficient to permit the fixing means to fix the image from the last information card fed before the signal, the timing means being then effective to shutdown the fuser means heat source; following an additional second interval designed to enable the fuser means heat source to cool down so that burning or scorching of the web material is avoided, the timing means stopping the remainder of the apparatus including the web advancing means; and condition responsive means for generating the control signal in response to an operating condition of the apparatus.

Other objects and advantages will be apparent from the ensuing description and drawings in which:

FIG. 1 is a perspective view showing the label printer of the present invention from the label strip output side;

FIG. 2 is a schematic view of the label printer shown in FIG. 1;

FIG. 3 is the top view showing the address card feeding means for the label printer shown in FIG. 1;

FIG. 4 is a view showing the master address cards arranged in shingled form for scanning thereof;

FIG. 5 is a view showing a portion of the finished label strip;

FIG. 6 is a perspective view showing the strip threading mechanism of the label printer shown in FIG. 1;

FIG. 7 is a schematic diagram of the drive system for the label printer shown in FIG. 1; and

FIG. 8 is a wiring diagram for the label printer shown in FIG. 1.

Referring particularly to FIG. 1 of the drawings, there is shown the label printer, designated generally by the numeral 10, of the present invention. Label printer 10, which is encased in a suitable decorative and protective housing 11, serves to electrostatically print a continuous strip of labels 18 from individual master address cards 14 on a web material, normally paper. The finished label strip 12 may be conveniently stored fan fold fashion on output tray 16 for later use. Alternately, output tray 16 may be bypassed or dispensed with and label strip 12 fed directly to an automatic addressing machine (not shown) for immediate use.

Referring particularly to FIG. 4 of the drawings, master cards 14 comprise any convenient size card, paper, or other stock, on which xerographically recognizable information 18, usually name, street address, town, state and zip code number may be placed. Normally, the information 18 is typed on white or light colored cards 14 although it may be written, lettered, drawn, etc. Cards 14 may be any suitable size although standard size cards such as 3¼ inch by 7½ inch are preferred. Since the cards are larger than that required for the label information, a nominal label width (the space between perforations 52 in FIG. 5) being approximately one inch, the label information 18 is preferably arranged in the longitudinal center of the cards 14 and adjacent one edge thereof as shown in FIG. 4. To provide continuous labels, cards 14 are overlapped or shingled one upon the other prior to scanning thereof such that each succeeding card masks the unused portion of the preceding card, and so forth, as will appear more fully herein.

Label printer 10 includes feeding means 20 for master cards 14, a scanning station 22, an electrostatic printing section 24, and a strip advancing means 26.

Referring particularly to FIGS. 2 and 7 of the drawings, the electrostatic printing section 24 includes a suitable light sensitive or photoconductive member shown here as a drum 30 journaled for rotation in housing 11. Drum 30 turns in a direction shown by the solid line arrow, a suitable motor 32 being provided for this purpose. Drum charging means 34, exposure slit 35, developing means 37, transfer station 38, and cleaning station 40 are operatively arranged about the periphery of drum 30 in a manner known to those skilled in the art.

Developing means 37 is encased in a housing 42 containing a supply of pigmented material, commonly known as toner, in the lower portion or sump 42' thereof. A system of movable buckets 43 serve to carry the toner into operative contact with drum 30. It is understood that the electrostatic charges on the surface of drum 30 serve to attract the toner particles to drum 30 in a pattern corresponding to that of the image scanned.

Scanning station 22 includes a viewing slit 45 over which the master cards 14 are fed image side down by card feeding means 20. Suitable illuminating means such as lamps 47 are provided below slit 45. Lens 48 and mirrors 49 serve to transfer the latent image via exposure slit 35 to drum 30 in a manner known to those skilled in the art. Further description of the xerographic section may be found in U.S. Pat. No. 3,137,495.

As seen best in FIG. 5, strip 12 consists of an endless web or strip of material, normally paper, perforated at regular intervals 52 along its length. To avoid mutilation of the resulting labels, the distance between perforations 52 is made substantially equal to the label width, the address information 18 being printed therebetween. In use, the labels are separated, as by cutting, along the axis of perforations 52. A supply of blank strip material may conveniently rest in fan fold fashion on supply tray 54.

Strip advancing means 26 includes a driven sprocket wheel 55, teeth 55' thereof having driving engagement with perforations 52 in strip 12. Sprocket wheel 55 is driven by motor 32 as will appear.

As best seen in FIG. 2, blank strip material from supply tray 54 is drawn through an inlet opening 56 in the lower portion of housing 11 and over curved damper chute 57 toward drum 30. A curved tension or drag member 58 is disposed above chute 57, member 58 being pivotally supported by pin 63 so that member 58 tends to rest against chute 57 and in contact with the strip 12 being drawn thereover. A suitable weight 64 may be provided to hold member 58 against chute 57. As can be understood, member 58 imposes a drag on strip 12 as it is drawn forward by sprocket wheel 55 to prevent looseness or laxness in the strip supply.

A guide shaft 59 is disposed below drum 30 and ahead of the axis of rotation of drum 30, guide shaft 59 being rotatably supported by suitable journal means (not shown). Guide shaft 59 has a radially projecting cam-like guide 61 thereon. Guide 61 serves, when shaft 59 is in the position shown in FIG. 2, to guide strip 12 into physical contact with the lower surface of drum 30 just upstream of transfer corotron 38'. It will be understood that the tension imposed on strip 12 by drag member 58 tends to hold strip 12 away from drum 30. While the electrostatic field developed by corotron 38' tends to draw strip 12 into contact with drum 30, the tacking force generated by corotron 38' may be insufficient to overcome the strip tension imposed by drag member 58.

From transfer station 38, strip 12 passes through an image fusing or fixing device 66 to sprocket wheel 55. A curved holddown cover 62 is disposed over wheel 55, a slot-like opening 62' being provided in cover 62 to accommodate sprockets 55'. Cover 62 assures the requisite driving engagement between strip 12 and sprockets 55' and while directing the finished strip into output tray

16. Cover 62, the lower end of which extends below the base of housing 11, is pinned at 65 to permit cover 62 to be raised during threading of strip 12. A stationary guide 67 projects downwardly toward tray 16, cover 62 and guide 67 cooperating to form a passage 68 for guiding finished strip 12 into output tray 16. An access door 63 may be provided on housing 11 opposite sprocket wheel 55.

As can be understood, both the complexity of label printer 10 and operator safety considerations render automatic threading of label strip 12 highly desirable. Referring now to FIGS. 2 and 6, a chain pair 60 are supported on opposite sides of the path followed by strip 12 through printer 10 by means of sprockets 59', 70' carried by guide shaft 59, and operator shaft 70 respectively. Operator shaft 70 is suitably journaled in printer housing 11 adjacent sprocket shaft 55. As described heretofore, guide shaft 59 is arranged below and slightly ahead of drum 30, shaft 59 serving to guide strip 12 through an approximately 180° turn and into operative contact with drum 30. The location of shafts 59, 70 is such that the bottom and upper runs 71, 72 respectively of chains 60 substantially parallel the route followed by strip 12 through printer 10.

A clamp or draw member 73 is secured between chains 60. Member 73 comprises a relatively thin plate-like part. When threading strip 12, the strip is folded across the leading edge of member 73, preferably at one of the existing fan fold fashion junctures to permit member 73 to draw the strip 12 through printer 10. Operator shaft 70 is extended at 75 and hand wheel 76 secured thereto to permit shaft 70 together with draw member 73 and guide shaft 59 to be operated during strip threading.

To assure proper positioning of cam 61 on guide shaft 59 once the strip is threaded, a switch 77 is disposed adjacent shaft 59. Switch arm 78 is arranged in the path of movement of lug 79 on shaft 59, lug 79 being in substantial axial alignment with cam 61 while switch 77 is mounted within housing 11. During rotation of guide shaft 59, lug 79 thereof actuates switch 77 once during each revolution of shaft 59 whenever cam 61 is in proper operating position adjacent drum 30 (the position shown in FIG. 2). A light 80 is disposed on the exterior of housing 11, switch 78 serving when closed to complete a circuit to light 80 to provide visible indication to the operator when cam 61 is in proper operating position.

Card feeding means 20 includes a downwardly inclined, generally rectangular card table 81 with a plurality of spaced support bars 82 extending in the direction of card feed. Table 81 is journaled adjacent the rear thereof on a support rod 83 mounted in sides 85 of housing 11.

To rock table 81 and advance cards 14 as will appear more fully hereinafter, a drive arm 86 has one end journaled on support rod 83. At the opposite end, arm 86 carries a follower roller 88 adapted to ride on feed cam 90. Table 81 and drive arm 86 are adjustably interconnected by means of screw 84. Cam 90, which is driven by motor 32 at a speed greater than sprocket wheel 55 to assure the requisite shingling of cards 14 at scanning station 22, has an operating flat 91 thereon. As will appear, card feeding means 22 includes plural advance rolls 92 spacedly supported on driven shaft 99, table bars 82 being disposed opposite the space between rolls 92. This enables bars 82 to descend into the space between rollers 92 on disposition of follower roll 88 on cam flat 91 thereby lowering the effective height of table 81 and permitting the bottommost card to engage rolls 92 and be fed forward thereby into the nip of feed roller pair 94. As can be understood, rotation of cam 90 momentarily drops table 81 once during each revolution of cam 90.

To prevent cards 14 on supply table 81 from slipping forward into the nip of feed roller pair 94 and to limit feed to one card at a time, a pair of upstanding gates 95 are provided opposite the lower or discharge end of table 81. Gates 95 are preferably arranged for adjusting movement toward and away from a base 96 proximate the inlet

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to feed roller pair 94. Gates 95 cooperate with base 96 to form a reduced size passageway or throat through which one card at a time is fed forward into the nip of feed roller pair 94 by advance rolls 92.

Advance rolls 92 are spaced below the normal effective level of table 81 on driven shaft 99. The diameter of rolls 92 relative to the effective displacement of cam 90 is such that the effective level of table 81 with follower 88 resting on cam 90 is slightly above the surface of rolls 92 and feed of cards 14 from table 81 is prevented. With follower 88 on flat 91, the effective level of table 81 drops slightly below the apex of advance rolls 92 so that rolls 92 engage the bottommost card on table 81 to feed that card forward underneath gates 95 and into the nip of feed roller pair 94.

Advance roll drive shaft 99 and the support shafts 100 of feed roller pair 94 are driven from input shaft 116 through suitable speed multiplying gear and belt means 103 at a speed greater than the speed of drum 30 and sprocket wheel 55 as will appear.

Feed roller pair 94 carry the master cards forward between suitable guides 101 to shingling roller pair 102. Support shafts 104 of shingling roller pair 102 are driven from feeder input shaft 116 at a speed substantially equal to the speed of drum 30 and sprocket wheel 55, and slower than that of advance rolls 92 and feed roller pair 94. As a result, the relatively rapidly moving address cards 14 leaving feed roller pair 94 are slowed down by shingling roller pair 102 to a speed corresponding to the operational speed of drum 30 as the cards pass across viewing slit 45 of scanning station 22. At the same time, the reduction in the speed causes the next following card to ride up on the slowed card with the result that the cards are shingled or overlapped one upon the other. It is understood that the degree of card shingle or overlap is dependent upon the relative speeds of feed roller pair 94 and shingling roller pair 102. In the present invention, the relative speeds are chosen so that each master card overlaps the preceding card up to the desired label width, which in the exemplary arrangement described herein is approximately one inch.

Discharge pinch roll pairs 105 cooperate to carry the cards following scanning between guides 106 to card return tray 107. There, cards 14 leaving the downstream pinch roll pair 105 are stacked on edge, the cards passing under restack guide 108 and against backup plate 109 or the preceding card. To limit lifting movement of the cards 14 as they enter tray 107, the upper portion 108' of restack guide 108 is turned inwardly to overlap the top of tray 107. Card return tray 107 includes a base 110 and sides 111. Tray 107 is preferably open at the top to facilitate removal of the cards. The sides 111 of tray 107 may be adjustable to permit different size cards to be accommodated. To effect stacking of the returned cards in tray 14, backup plate 109 is supported for longitudinal movement by slots 112 in sides 111, it being understood that the cards 14 drive backup plate 109 backward as the stack size increases. If desired, a suitable bias or resistance means may be provided to resist backward movement of plate 109.

Discharge pinch roll pairs 105 are driven through suitable gear means 114 from drive shaft 116.

Referring to FIG. 7, the output pinion 32' of motor 32 is drivingly connected to a transfer gear 120. Transmission belt 117 is connected between transfer pulley 120' and input shaft 116 of card feeding means 20. A second transmission belt 121 connects transfer pulley 120'' with pulley 122 of power shaft 123. Shaft 123 is geared directly to sprocket wheel 55. Shaft 123 also serves to drive drum 30 at the same speed as sprocket wheel 55, transmission belts 125, 126 serving to drivingly interconnect power shaft 123 with drum shaft 30' via a transfer pulley 127.

In operation of printer 10, master cards 14 are placed information side down on card supply table 81, the information 18 being toward the rear (to the left as seen in FIG. 2). With operation of label printer 10, table 81 is

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intermittently lowered about support rod 83 by follower 88 of drive arm 86 riding on cam 90 to bring the bottommost card on table 81 into contact with the rotating advance rolls 92. Rolls 92, which turn in the direction shown by the solid line arrow in FIG. 2, feed each card forward under gates 95 and into the nip of feed roller pair 94. Roller pair 94 sustain the advance of the master cards 14 at relatively high speed toward shingling roller pair 102 and scanning station 22.

As each master card 14 enters the nip of shingling roller pair 102, the relatively slower speed of roller pair 102 slows each master card to a speed corresponding to the speed of drum 30. As a result, the next following card overrides or overlaps the first card and so forth so that the master cards 14 pass in shingled relation across slit 45 at a speed substantially matching that of drum 30. As explained heretofore, the relative speeds between feed roller pair 94 and shingling roller pair 102 is such that master cards 14 are overlapped by a predetermined amount, so that only the address information portion 18 of each card is scanned.

The image is transmitted by means of lens 48 and mirrors 49 through exposure slit 35 to the surface of the rotating drum 30. The resulting latent electrostatic image formed on drum 30 is first developed by developing means 37, the toner image being transferred to the moving strip 12 at transfer station 38. It is understood that both drum 30 and sprocket wheel 55 rotate at the same speed, wheel 55 serving to draw blank strip from supply tray 54 around cam 61 of guide shaft 59, past exposure station 58 and through the fixing device 66 to output tray 16.

As master cards 14 pass beyond viewing slit 45, they are fed by pinch roll pairs 105 to return tray 107 where they are stacked edgewise against backup plate 109. It is understood that the cards are manually removed from tray 107 for reuse or return to storage.

When threading strip 12, door 63 is opened and cover 62 raised to expose sprocket wheel 55. The leading edge of the strip is inserted through inlet 56 and between chute 57 and drag member 58 (drag member 58 may be raised slightly to facilitate insertion) and folded over draw member 73. It may be understood that member 73 is normally positioned along lower run 71 of chains 60 adjacent the end of chute 57.

Hand wheel 76 is then used to operate sprockets 70' and move chains 60 in the direction shown by the solid line arrow in FIG. 6 to draw strip 12 into printer 10 and over guide shaft 59, through transfer station 38, and the fixing device 66 toward sprocket wheel 55. As draw member 74 nears shaft 70, the leading edge of the strip is removed from draw member 74 and hand threaded under the raised cover 62 and over sprocket wheel 55 into output tray 16. In threading the strip over wheel 55, the protruding sprockets 55' are interengaged with openings 52 in the strip. When completed, cover 62 is lowered to the position shown in FIG. 2.

During threading of the label strip, guide shaft 59 together with cam 61 thereof is turned so that on completion of the threading operation, cam 61 may be out of position. To obviate this, following completion of the strip threading operation, guide shaft 59 is turned by means of hand wheel 76 to place cam 61 in the position shown in FIG. 2. This is signaled to the operator by means of light 80, the control switch 77 of which is closed by cam 79 whenever cam 61 is disposed in the proper operating position.

To protect strip 12 against burning or scorching by heat from the fusing device 66 on stopping of printer 10 and to protect printer 10 against various operating malfunctions, the control arrangement, shown in schematic outline in FIG. 8, is provided. Referring thereto, a control relay 130 is connected through normally open start switch 131, normally closed stop switch 133, and timer contact 148' across a suitable power source represented by leads L₁, L₂. Holding contact 130' of relay 130 parallels start

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switch 131. Power supply switch 129 may be provided in lead L₁ to permit power to printer 10 to be shut off.

The operating components of label printer 10, namely drive motor 32, lamp 47, the fusing device heat source represented by coil 66', the corotron power supply 137, and the motor 138 for driving developer belt 43' are each connected through individual contacts 130' of control relay 130 across leads L₁, L₂. As will be understood, energization of control relay 130 closes contacts 130' thereof to operate printer 10.

As seen in FIG. 2, a card feed responsive switch 140 is disposed adjacent the outlet of card feed table 81, the switch arm therefor protruding into the path of feed of cards 14. Switch 140 is normally held open by the passage of cards 14 thereover during operation of printer 10. On interruption in the feed of cards, switch 140 closes.

A strip feed responsive switch 142 is arranged adjacent the path of movement of label strip 12, the actuating arm for switch 142 protruding into the path of movement of label strip 12. During normal feed of strip 12, strip 12 holds switch 142 open. However, should strip 12 break or run out, switch 142 closes to shutdown printer 10 as will appear.

A card return oversupply switch 145 is supported adjacent return tray 106, the actuating arm therefor being disposed to intercept backup plate 108 as plate 108 approaches its point of maximum stacking travel. Contact of switch 145 with plate 108 closes switch 145.

Switch 140 is series connected through normally closed timer contact 148' and normally open control relay contact 130' with a pair of control timers 147, 148 across leads L₁, L₂. Switch 142 is connected through normally open timer contact 147' with timers 147, 148 across leads L₁, L₂ while switch 145 is connected with timers 147, 148 across leads L₁, L₂.

A normally closed contact 147' of timer 147 is disposed in the energizing circuit to the fuser coil 66' while a normally closed contact 148' of timer 148 is in series with control relay 130.

On start up of label printer 10, start switch 131 is momentarily depressed to complete, through stop switch 133 and timer contact 148', a circuit to control relay 130. Contacts 130' of relay 130 accordingly close to hold relay 130 energized and to complete circuits to motor 32, lamps 47, coil 66, corotron power supply 137, and developer drive motor 138.

With start up of motor 32, card feeding means 20 is operated to feed the master address cards 14 forward in shingled relation past scanning station 22 as described heretofore. At the same time, drum 30 and sprocket wheel 55 are rotated, the latter serving to advance strip 12 in unison with drum 30 past transfer station 38 and through the fixing device 66.

In the event of an interruption in the feed of cards 14, switch 140 closes to complete through contacts 148', 147' and 130', circuits to timers 147, 148. Following a first interval adequate to permit the image from the last address card fed by feeding means 20 imaged on strip 12 and fixed by the fixing device 66, timer 147 opens contacts 147' thereof to shutdown fuser 66. The remaining components of printer 10 however remain operative. It is understood that if the supply of cards 14 resumes prior to the tolling of timer 147 with consequent opening of switch 140, timer 147 is reset and the timed shutdown cycle for printer 10 is aborted.

Following a second additional interval adequate to permit the portion of strip 12 bearing the last label to reach tray 16 and permit fuser 66 to cool below a temperature at which strip 12, if stopped, might scorch or burn, timer 148 opens contacts 148' thereof to interrupt the circuit to control relay 130. Deenergization of relay 130 opens contacts 130' thereof to stop motor 32, lamps 47, corotron power supply 137, and developer motor 47 while resetting timers 147, 148. Label printer 10 is accordingly shutdown.

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Similarly, exhausting or breaking of the strip supply, closes switch 142 to actuate timers 147, 148 and shutdown printer 10 in the sequence and manner explained above. Should the number of cards 14 in restack tray 106 reach a point at which backup plate 107 closes switch 145, timers 147, 148 are again actuated to shutdown printer 10 in the sequence and manner explained.

It is understood that label printer 10 may be manually stopped at any time through opening of stop switch 133.

While the invention has been described with reference to the structure disclosed, it is not confined to the details sets forth; but is intended to cover such modifications, or changes as may come within the scope of the following claims.

What is claimed is:

1. In an electrostatic printing apparatus having means for feeding cards through the apparatus, the cards providing address information to be copied; means for producing electrostatically images of the address information on a web material; means for advancing the web material in timed relationship with operation of said card feeding means and the image producing means; and means for fixing images produced on said web material wherein the fixing means includes a source of heat, the improvement comprising

control means to stop said apparatus in stages in response to a control signal whereby to avoid burning or scorching of said web material by said fixing means heat source, said control means including first interval timing means to shutdown said fixing heat means heat source on the expiration of a predetermined first interval following said control signal sufficient to permit said fixing means to fix the image from the last information card fed before said signal, and second interval timing means to stop the remainder of said apparatus including said web advancing means on the expiration of a predetermined second interval following shutdown of said fixing means heat source designed to enable said fixing means heat source to cool down so that burning or scorching of said web material is avoided; and condition responsive means for generating said control signal in response to an operating condition of said apparatus.

2. The apparatus according to claim 1 in which said condition responsive means generates said control signal in response to interruption in the feed of said information cards.

3. The apparatus according to claim 1 in which said condition responsive means generates said control signal in response to a break in the supply of said web material.

4. The apparatus according to claim 1 in which said apparatus includes a card return tray for said cards, said card feeding means being adapted to feed said cards to said return tray following electrostatic imaging thereof; said control means serving to generate said control signal when said tray is substantially filled.

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70 SAMUEL S. MATTHEWS, Primary Examiner

R. P. GREINER, Assistant Examiner

U.S. Cl. X.R.

75 34—49; 355—6