ABSTRACT

A card imprinting machine having a means for both automatically setting the edge guides for the cards in accordance with the desired margin for indicia to be imprinted thereon from a side edge of the card, and for simultaneously causing the printing head to automatically rotate for printing at a desired margin from the leading edge of each card passing through the printing couple.

22 Claims, 12 Drawing Figures
CARD IMPRINTING MACHINE

This invention relates generally to card imprinting machines and more particularly to a machine having a means for automatically setting the side and bottom edge margins for the cards to be imprinted.

In the rotary press printers heretofore used for imprinting cards with indicia fed through the machine, the normally pre-set edge margins for the cards must be reset for each additional card size so that the desired side and lower edge margins for greeting cards, for example, will be maintained for all sizes. The printing roll itself needed to be therefore manually rotated in accordance with proper indexing so as to set the printing head for printing at the desired margin for the leading edge of the cards. Moreover, the side edge guides needed to be adjusted for different card sizes to insure the proper edge margin for the various card sizes. Such operations have proven not only unduly time-consuming but the edge spacing accuracy of the print will also difficult to maintain.

Most card imprinters currently in use, moreover, easily permit the cards to jump and become misaligned as they are conveyed from the feed rolls toward printing couple. The dwell interval for the cards has also created problems for these machines in that the dwell is insufficient and not easily adjustable for accurate printing.

It is therefore the principal object of the present invention to provide a card imprinting machine characterized by a manually operable dial means for setting both the side edge and leading edge margins for indicia to be imprinted on the cards and further, having means responsive to such dial means for automatically causing the printing head to be set from the neutral initial position to a set angular disposition in relation to the impression roll depending on the desired leading edge margin as set by the dial means and back again to the neutral initial position.

Another object of this invention is to provide such a machine as further having means responsive to the dial means, and simultaneously with the setting of the printing head, for automatically locating the cards laterally depending on the desired side edge margin as set by the dial means.

A further object of the present invention is to provide such a machine wherein the automatic setting means includes a first compressed air cylinder operatively connected with a compressor and means operatively connected with this first cylinder for engaging the printing feed roller on which the printing head is mounted for rotating same between the neutral initial position and the set angular position upon actuation of the cylinder.

A still further object of this invention is to provide such a machine wherein the printing feed roller is automatically locked in its neutral-initial position after which it is released and rotated into its set angular position in accordance with the dial setting, the printing feed roller again being locked in this set position before being rotated for printing.

A still further object of this invention is to provide such a machine wherein a second air cylinder is associated with the first cylinder and means are operatively engaged with the manual dial for limiting the second cylinder piston rod to thereby accurately control the angular disposition for the printing feed roller in accordance with the leading edge margin as set by the dial.

A still further object is to provide such a machine wherein a third air cylinder is provided and operatively connected with the other cylinders to set the side edge margin for the cards while being conveyed toward the printing couple, a means also being associated with this third cylinder to limit its piston rod in accordance with the dial setting.

A still further object is to provide such a machine wherein fourth and fifth cylinders are operatively connected with the other cylinders for laterally adjusting the side edge guides for the stacked cards and means operatively connected with the dial for limiting the piston rods of each of the fourth and fifth cylinders to thereby adjust the side edge margin for printing in accordance with the dial setting.

A still further object of this invention is to provide such a machine wherein means are provided for insuring that the printing feed roller will always stop at the set angular disposition as determined by the dial setting at the end of a feed operation and thereby maintain a set angular disposition for subsequent card feeding.

A still further object of the invention is to provide such a machine wherein the dwell period for each card is a maximum 180° rotation of the printing feed roller at which time the impression roll is lowered and stops for each card as actuated, this lowered position of the impression roll being maintained throughout continuation of the printing feed roller at such time as no cards are being fed.

A still further object of this invention is to provide such a machine wherein an automatic card counter is provided for counting each card passing through the printing couple for a single dial setting, the card counter being automatically returned to its starting position at the time the printing feed roller is moved into its neutral-initial position and before again being angularly set in accordance with the manual dial.

Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a left-side elevational view of the machine in accordance with the present invention;
FIG. 2 is a right-side elevational view of the machine in accordance with the present invention;
FIG. 3 is a top plan view of the machine of FIGS. 1 and 2;
FIG. 4 is a sectional view taken substantially along the line 4–4 of FIG. 3 and showing the route of travel for each card through the machine;
FIG. 5 is a detail view showing the stop means for limiting the piston for the second air cylinder which causes the printing feed roller to rotate between its neutral-initial position to its set angular disposition and back again into its neutral-initial position, taken along the line of 5–5 of FIG. 1;
FIG. 6 is an elevational view showing the details of the printing feed roll and the impression cylinder as taken along the line 6–6 of FIG. 1;
FIG. 7 is a side elevational view showing the details of the locking mechanism for the printing feed roll after being set in its angular disposition, and further showing the details of the mechanism for moving the impression cylinder intermittently away from the printing feed roll, as taken along the line 7–7 of FIG. 6;
FIG. 8 is a side elevational view showing the details of the mechanism for both rotating the printing feed roll and locking it in its initial-neutral position, as taken along the line 8—8 of FIG. 6.

FIG. 9 is a plan view showing the details of the fifth and sixth cylinders with their stop means for limiting their pistons to control the movement of the side edge guard plates for the stack of cards as taken along the line 9—9 of FIG. 1.

FIG. 10 is a side view showing those features of FIG. 2, slightly enlarged, of the details of the mechanism used in maintaining the impression roll in its lowered position away from the feed roll;

FIG. 11 is a schematic view showing the air lines and the electrical circuitry for the machine; and

FIG. 12 is a view taken along the line 12—12 of FIG. 3 showing operation of the counting mechanism for the imprinted cards.

Turning now to the drawings wherein like reference characters refer to like and corresponding parts throughout the several views, the overall machine generally designated 20 may be seen most clearly with reference to FIGS. 1, 2 and 3. A manually-operable dial wheel 21 is mounted on a shaft 22 which is, in turn, mounted for rotation between a pair of spaced side plates 23 of the machine. The dial wheel is provided with numbers, for example, 1 to 16 on its periphery (see FIG. 3) with each of these numbers corresponding to a predetermined marginal setting for the indicia to be printed on the cards. Such indicia may be the name and address or only the name of the sender which normally appears at the lower right at the inside page of Christmas greeting cards.

A sprocket chain 24 extends about a sprocket wheel 25 mounted at one end of shaft 22, the chain 24 also extending about a sprocket wheel 26 mounted at one end of a shaft 27, supported on plate 23 and having a bevel gear 28 on its free end. Another sprocket chain 29 extends about a sprocket wheel 31 mounted at the other end of shaft 22, the chain 29 also extending about a sprocket wheel 32 mounted at one end of a shaft 33. Chain 29 is further in engagement with a sprocket wheel 34 mounted at one end of a shaft 35 with an idler sprocket wheel 36 mounted for rotation on its shaft 37 for maintaining the necessary spacing between each run of the chain. Shafts 33, 35 and 37 are mounted for rotation between additional side plates 38 secured to plates 23 of the machine (see FIG. 9).

By means of the various sprocket chains and sprocket wheels as above described, it can be seen that rotation of dial wheel 21 causes the operatively interconnected shafts 22, 27, 33 and 35 to rotate accordingly and, because each of their corresponding sprocket wheels are of identical size, each of these shafts will rotate the same degree.

Rotation of each of these shafts also causes rotation of a stop means for controlling the marginal setting in accordance with dial wheel rotation. The first of such stop means is generally designated 39 and is constructive in the form of a cylinder 41 (see FIG. 1) mounted on its shaft 42 for rotation between a pair of support arms 43 secured to a vertical structural element 44 of the machine. A bevel gear 45 is provided at the lower end of shaft 42 in intermeshing engagement with bevel gear 28.

A second limit stop means generally designated 46 in the form of a cylinder 47 (see FIG. 3) is mounted on shaft 22 for rotation therewith. Likewise, a third limit stop means generally designated 48 includes a cylinder 49 (see FIG. 9) mounted on shaft 35 for rotation therewith, and a fourth limit stop means, generally designated 51 includes a cylinder 52 mounted on its shaft 33 for rotation therewith. Accordingly, manual rotation of dial 21 will likewise cause rotation of each of the first, second, third and fourth limit stop means is provided with a series of stop elements 53 mounted on the periphery of each of the cylinders 41, 47, 49 and 52 at a predetermined distance from one end of each cylinder for setting the side edge and leading edge margins for each card in a manner to be hereinafter described. The location of elements 53 on each of its cylinders is determined by the marginal setting to be made for the cards in accordance with rotation of dial 21 to one of its sixteen setting numerals.

An air pressure source such as an air compressor 54 (see FIG. 11) is operatively connected with a first compressed air cylinder 55 via an air line 56 so that when compressed air is ported through this line, piston rod 57 of the cylinder 55 extends. Rod 57 therefore moves into contact with the pin of a spool valve 58 thereby permitting air to be ported via valve 59a therein and through air line 61 into a second compressed air cylinder 62 for retracting the piston rod 66 thereof. Air through lines 61 on each of third, fourth and fifth air cylinders, 63, 64, 65 respectively, causes their respective piston rods 67, 68, 69 to extend. It should be noted that air is not ported into cylinders 62, 63, 64 and 65 until plunger 57 shifts one-way valve 59 out of the path of line 61. Also, plunger 66 is connected to spool valve 77 at 79 so that, upon retraction of plunger 66, one-way valve 78 is resiliently shifted into line 71. Air is exhausted from each cylinder 62, 63, 64 and 65 through lines 71 thereof to EXHAUST. Air also exhausts from cylinder 55 via its line 71 through a spool valve 77 (as shown in its position of FIG. 11 and to be hereinafter more fully described).

The above-described operation takes place for an "open" or neutral position setting for the leading edge and side edge margins to be hereinafter more fully described. To effect this "open" position, an "open" switch 74 is closed, after a switch 133 is also closed to be hereinafter more fully described, for closing an electric circuit to thereby move a solenoid 75 which shifts its associated valve 75a into a position interconnecting air lines 56 and exhaust lines 71 on opposite sides thereof, opposite to that shown in FIG. 11.

To effect a "closed" or set marginal position for the cards to be imprinted, actuation of a "closed" switch 76 closes an electric circuit for causing a solenoid 77 to shift its associated valve 77a a position shown in FIG. 11. Compressed air is therefore fed from source 54 through air line 71 for each of the five cylinders. However, since plunger 66 had been retracted during the "open" operation, one-way valve 78 remains in the path of line 71 thereby preventing air from entering first cylinder 55. Air through lines 71 of the remaining cylinders causes plunger 66 to extend and plungers 67, 68, 69 to each retract. Air exhausts through these cylinders through their lines 61 to EXHAUST. Meanwhile, extension of plunger 66 shifts two-way valve 78 into the path of line 71 against the bias of the spool valve coil spring, thereby permitting air to pass therethrough and into first cylinder 55 for retracting its plunger 57.

Air also exhausts from this cylinder through line 56 to EX-
HAUST. The plungers of the second, third, fourth and fifth cylinders are therefore actuated first before plunger 57 retracts. The reason for this delay between actuation of the first and remaining cylinders, during both the "open" and "closed" operation, will be more clearly seen later on in the description.

Of course, each of the air lines on each cylinder is located on opposite sides of a plunger or piston rod head, not shown for purposes of clarity.

A vertically disposed rack gear element 81 (see FIGS. 1 and 5) as at 82 at the free end of piston rod 66 of second cylinder 62. Spool valve 77 is secured to rack element 81 by means of a plate 83, a small lever 84 also being pivotally mounted on plate 83 as at 85, and being maintained in a normally horizontal position by means of a stop pin 86. Lever 84 bears against the spool valve 77 button and is limited in its upward movement by a pin element 79 on rack 81 a short distance above lever 84. This pin 79 is schematically shown in FIG. 11 as a connection between plunger 66 and valve 77. Rack 81 lies adjacent the periphery of the cylinder 41 of the first limit stop means 39 so that, when rod 66 of the second compressed air cylinder 62 is extended, end 87 of lever 84 makes contact with one of the stop elements 53 which had been moved into such position by rotation of cylinder 41 through rotation of dial 21 in accordance with the desired marginal setting. Extension of rack 81 is limited by pin element 79 bearing against end 87. Upward pivoted movement of bar 84 at such time depresses the valve 77 button for shifting two-way valve 78a into the path of line 71, shown in FIG. 11, during the "close" operation.

A main rotary shaft 88 (see FIG. 3) is mounted for rotation between side plates 23 and has a printing feed roller 89 mounted thereon for rotation independent thereof. Roller 89 includes a pair of spaced rolls 91 (see FIG. 6) interconnected by means of a cylinder 92 with spaced printing head supports 93 mounted on cylinder 92 between which printing head plates 94 are suppor for the printing of names and addresses, or the like, on to each of the cards fed through the machine. A thumb screw 90 (FIG. 3) on one of the supports 93 serves to hold plates 94 in place. A toothed wheel 95 and 95' are each mounted about shaft 88 to the outer side of respective rolls 91.

Printing feed roller 89 is rotated on shaft 88 from its neutral or initial position to its angular position for the intended marginal setting, by the rotation of a pinion gear 96 mounted on a locking means 97 which serves to operatively interconnect the roller 89 with pinion 96 through toothed wheel 95. This locking means comprises a locking lever 98 pivotally mounted between its ends as at 99 on a support block 101 mounted on shaft 88 and rotation thereon. Lever 98 is biased into engagement with one of the teeth of wheel 95 by means of a compression spring 102 which is seated in a depression 103 of the block and bears against the underside of lever 98.

Pinion gear 96 is arranged for intermeshing engagement with the teeth of rack gear element 81 so that, upon extension and retraction of piston rod 66 of the second compressed air cylinder 62, the pinion gear and its interconnected locking means 97 are made to rotate in the direction of arrow D and arrow B, respectively, as shown in FIG. 8. Locking lever 98 is moved into and out of engagement with the teeth of wheel 95 by means of a cam element 104 as lever 98 bears against an arcuate inner surface 105 of element 104 pivotally mounted at one end as at 106 to the machine. The upper and forward end of element 104 is interconnected with a transfer rod 107 by means of links 109 (see FIG. 8) which are pivotally mounted on an arm 108 fixedly mounted on rod 107. The first compressed air cylinder 55 is mounted on one of the plates 23 of the machine and the free end of its piston rod 57 is pivotally secured to an arm 111 which is, in turn, fixedly mounted to rod 107.

Therefore, when piston rod 57 is extended, a closing of the "open" switch 74, rod 107 is rotated in the direction of arrow A as shown in FIG. 8, thereby pivoting cam element 104 about its pivot point 106 from a position shown in solid lines in FIG. 8 to its position shown in phantom in that Figure.

As pointed out above, when the piston rod 57 of the first compressed air cylinder 55 is extended during the "open" position, air is ported through lines 61 to the second compressed air cylinder 62 to thereby retract its piston rod 66 thereby causing the rack element 81 to move upwardly, pinion gear 96 is caused to rotate in the direction of arrow B as shown in FIG. 8 thereby causing the interconnected locking means 97 to be similarly rotated. During such rotation of the locking means, and while the cam element 104 is moved away from support block 101, lever 98 moves out of contact from arcuate surface 105 of cam 104. Accordingly, spring 102 moves lever 98 into locking engagement with one of the teeth of toothed wheel 95. Printing feed roller 89 is now locked on shaft 88 so that it may be rotated to its initial or neutral position and unlocked by lever 98 after which it will be rotated to its intended angular position in accordance with the setting determined by rotation of the dial wheel, and locked in this position in a manner to be hereinafter described. It should be noted that arcuate surface 105 is always in contact with locking lever 98 when cam element 104 is in its position shown in solid lines in FIG. 8, i.e., before transverse rod 107 has been rotated in the direction of arrow A. Accordingly, when lever 98 contacts this arcuate surface 105, the cam element 104 serves to pivotally move lever 98 out of engagement with the teeth of wheel 95. FIG. 6 shows such a position for locking lever 98. On the other hand, movement of cam element 104 to its position shown in phantom in FIG. 8 causes arcuate surface 105 to be moved out of contact from lever 98 thereby permitting it to lock with toothed wheel 95.

It should be noted that transverse rod 107 must be rotated upon extension of piston rod 57 so as to move cam element 104 away from block 101 and allow locking lever 98 to inter-engage with toothed wheel 95 before piston rod 66 of the second compressed air cylinder 62 is retracted to its elevated position. Therefore, with roller 89 coupled to pinion gear 96 in such manner, retraction of piston rod or plunger 66 moves rack 81 upwardly and rotates pinion gear 96 in the direction of arrow B thereby rotating roller 89 to its initial position on shaft 88. Spool valve 58 (see FIG. 2) is so mounted on the machine so as not to be contacted by arm 111 until it has been pivoted to its position shown in phantom in this Figure which is at the fully extended position of piston rod 57. Accordingly, compressed air is ported via two-way valve 59a into compressed air cylinder 62 causing its piston rod 66 to retract into its elevated position as described above.
The main rotary shaft and printing feed roller 89 must be rotated together to set the angular disposition of the printing head plates 94 in proper relation to impression roll 112 which, as will be pointed out hereinafter, is mounted at its opposite ends for movement toward and away from roller 89. Its angular position is initially determined by rotation of dial wheel 21 to its numerical setting which corresponds with a desired marginal edge to be set for imprinting indicia on each of the cards fed through the machine. Rotation of dial wheel 21 therefore causes cylinder 41 of the first limit stop means 39 to rotate about its longitudinal axis until one of the stop elements 53 is brought into vertical alignment with pin element 79 mounted on rack 81. If, for example, the leading edge margin for the indicia to be imprinted is to be one inch, dial 21 is rotated to one of the sixteen numerals which is known to correspond with a 1 inch margin. Rotation of the dial to such numeral rotates cylinder 41 until one of the stop elements 53, calculated to limit extension of rod 66 for a one inch margin, is rotated in alignment with pin 79 of rack 81.

The “closed” switch 76 is then actuated to close the electric circuit to solenoid 75 whereupon the parts of valve 77a thereof are shifted so as to interconnect lines 56, 71 and 71, 56 on opposite sides thereof in the position shown in FIG. 11. Compressed air is then fed by compressor 54 through line 71, and, by reason of one-way valve 78 having shifted into the path of line 71 during the “open” operation by plunger 66, is prevented from entering cylinder 55. In the meantime, air is ported through lines 71 and into each of the remaining cylinders 62, 63, 64 and 65. Piston rod 66 of cylinder 62 is therefore extended and piston rods 67, 68 and 69 of respective cylinders 63, 64 and 65 are retracted with air exhausting from cylinders 62, 63, 64 and 65 through thin respective lines 61 to EXHAUST. Extension of rod 66 shifts valve 77 into its position shown in FIG. 11 so that the two-way valve 78a thereof permits air to be ported to cylinder 55 for retracting its piston rod 57.

Referring to FIG. 5, it can be seen that pin 79 on rack 81 moves downwardly during extension of plunger 66 whereupon lever 84 pivots toward valve 77 thereby effecting the aforesaid shift of two-way valve 78a into the path of line 71. Extension of plunger 66 and its connected rack 81 (see FIG. 8) causes pinion 96 to rotate in the direction of arrow D thereby rotating printing feed roller 89 about shaft 88, roller 89 still being coupled to pinion 96 via locking lever 98 of locking means 97. Roller 89 is rotated into its intended angular position with respect to impression roll 112 by reason of limit stop element 53 which had been moved into alignment with pin 79 and against which pin 79 now rests.

After printing feed roller 89 has been rotated into its set angular position on shaft 88, it must be uncoupled from pinion 96 and connected to shaft 88 for rotation therewith so that indicia may be imprinted from printing head plates 94 on to each card at a margin from the leading edge thereof as determined by the setting on dial 21. Locking lever 98 is moved out of engagement from toothed wheel 95 as piston rod 57 of first air cylinder 55 retracts upon completion of extension of piston rod 66. Accordingly, arm member 111 on plunger 87 is pivoted downwardly to its position shown in solid lines in FIG. 2 thereby rotating transverse rod 107 in the direction of arrow C (see FIG. 8). Cam element 114 is therefore moved to its position shown in solid lines in this Figure so that, by the time roller 89 and locking means 97 have been fully rotated to its intended angular position, locking lever 98 is moved against its coil spring 102 as the outer end of lever 98 comes into contact with the surface 105 of cam 104 now moved into interference therewith. Lever 98 therefore disengages from toothed wheel 95.

Connecting means 113 (see FIG. 6) is similar in all respects to locking means 97. However, support block 118 thereof is fixedly mounted to main rotating shaft 88 as at 119. Connecting lever 121 thereof is pivotally mounted to block 118 as at 122 and is biased into connecting engagement with one of the teeth of tooth wheel 95' by means of a compression spring 123. Accordingly, upon rotation of transverse rod 107 in the direction of arrow A after the “open” button 74 has been actuated, cam element 114 depresses lever 115 about its pivot point 116 so that arm 115 contacts connecting lever 121 and pivots it out of connecting engagement with toothed wheel 95'. It will be recalled that piston rod 57 of the first air cylinder 55 extends when the “open” button is actuated to thereby rotate rod 107 in the direction of arrow A before air is ported to the second air cylinder 62 for retraction of its piston rod 66 and the attached rack gear 81. Accordingly, movement of cam plate 104 away from the block 101 causes locking lever 98 to engage with toothed wheel 95 and at the same time, cam element 114 depresses arm 115 to cause connecting lever 121 to disengage from toothed wheel 95'. Printing feed roller 89 is therefore free to rotate about main rotating shaft 88 for the aforementioned operation.

Likewise, when the “Close” button 76 is actuated for setting the leading edge and side edge margins for the cards, the reverse operation respecting the locking means 97 and the connecting means 113 occurs from that described above. Compressed air first causes piston rod 66 of the second compressed air cylinder 62 to extend thereby rotating pinion gear 196 in the direction of arrow D (see FIG. 8) and causing printing feed roller 89 to rotate therewith since locking lever 98 continues to be interlocked with the teeth of toothed wheel 95. Connecting lever 121 is, at this time, out of engagement with the teeth of toothed wheel 95' since lever arm 115 is in its position shown in phantom lines in FIG. 7. Rotation of pinion gear 96 and the printing feed roller 89 interconnected therewith is limited by means of one of the stop elements 53 on cylinder 41 which had been placed into vertical alignment with pin 79 of rack 81. When this pin contacts one of these stop elements 53 (see FIG. 5), the pin of spool valve 77 is contacted by lever 84 to thereby move valve 78a of this spool valve to a position for opening line 71 to permit compressed air to be ported into the first air compressed cylinder 55. Movement of the pin of spool valve 77 in such manner is graphically shown in FIG. 11 by interconnection 79. The pin of spool valve 77 is not actuated until piston rod 66 reaches the extent to which it must extend in order to set the angular disposition of the printing head plates. At such time, piston rod 57 of cylinder 55 is extended thereby rotating transverse rod 107 in the direction of arrow C (see FIG. 8) thereby moving cam element 114 which serves to move locking lever 98 out of engagement with the teeth of tooth wheel 95. Rotation of rod 107 in this direction also causes cam element 114 to be
rotated away from lever arm 115 causing it to move to its position shown in solid lines in FIG. 7 under the action of its spring 117. Arm 115 therefore moves away from lever 121 thereby permitting it to engage with toothed wheel 95' under the action of its spring 123. Printing feed roller 89 with attached printing head plates 94 is therefore locked on main rotary shaft 88 in the prescribed angular relationship as set by the dial wheel 21 for the leading edge margin at which indicia is to be imprinted on to each of the cards fed through the machine.

An electric motor 124 is shown in FIGS. 1 and 2 as being mounted on a support 125 of the machine for rotating a pulley 126 by means of a drive belt 127. As most clearly shown in FIG. 6, pulley 126 is mounted for rotation about a shaft 128 which is mounted to side a plate 23. A smaller pulley wheel 129 is also mounted on shaft 128 for rotating a pulley wheel 131 through another drive belt 132, the pulley wheel 131 being fixedly mounted at one end of main rotary shaft 88. Pulley wheel 129 is of a much smaller diameter as compared to pulley wheel 131 and belt 132 is loosely mounted about these two wheels so that, when switch 133 shown in FIG. 11 is closed, the motor 124 is started and rotates wheels 126 and 129 without causing the wheel 131 to also rotate. Belt 132 merely slips about wheel 129 until the "run" switch 124 is actuated to cause the rotation of wheel 129 to be imparted to wheel 131 for causing rotation of wheel 129 to be imparted to wheel 131 for causing rotation of main rotary shaft 88. From the schematic electric diagram of FIG. 11, it can be seen that neither the "open" switch 74 nor the "closed" switch 76 nor the "run" switch 124 will close the electric circuit from source S unless the motor switch 133 is closed.

Before further proceeding with a description of those elements arranged for effecting a "run" operation of the machine, the means for setting the side edge margins for the cards will now be described. In FIG. 3, the third compressed air cylinder 63, already described with reference to FIG. 11, is shown mounted between side plates 23 with its piston rod 67 having a support 135 on to which is mounted a plate 136 having a flange 137 supported on the support 135. The support 135 is mounted thereon which is made to contact one of the stop elements 53 on cylinder 47 depending on the extent of rotation of cylinder 47 as determined by the desired setting for the side edge margin as set by the dial wheel 21. Accordingly, when piston rod 67 is retracted during the "closed" condition of the system, the margin on the bed 139 of the machine is set as the flanged plate 136 is moved inwardly a predetermined distance. This distance is governed by one of the stop elements 53 which is contacted by stop piece 138.

As can be seen more clearly in FIGS. 1 and 9 of the drawings, the fourth and fifth compressed air cylinders 64 and 65 are respectively mounted between side plates 38 and are identical in construction and operation to the support element 135. Support elements 141 and 142 are additionally guided along respective rods 130 and 140 supported between plates 138. Here, card plates 143 and 144, having upstanding outer flanges, are respectively mounted on support elements 141 and 142 to be moved toward and away from one another during retraction and extension, respectively, of the piston rods 68 and 69. A stop piece 145 and 146 is mounted respectively on each of the support elements 141 and 142 for limiting the arm of retraction of each piston rod as their respective stop pieces come in contact with one of the stop elements 53 on the respective cylinders 49, 51 which has been rotated into position in accordance with the desired setting for the side edge margins as determined by the setting made on rotating the dial wheel 21. Retraction of piston rods 68 and 69 therefore serves to locate the cards transversely of the machine for setting the side edge margin for each of the cards as indicia is imprinted thereon after passing through the nip of rolls 91 and 112.

After the side edge margins have been set in such manner and after the angular disposition of the printing plates have been set for the prescribed leading edge margin, the "run" switch 124 is actuated to begin rotation of the main rotary shaft 88 while the printing head plates 94 as mounted on printing feed roller 89 are locked in the set angular position thereon. Rotation of pulley wheel 129 imparts rotation to main rotary shaft 88 by means of a clutch mechanism, shown schematically at 147 in FIG. 11 and including belt 132 which is tensioned as a lever arm 148 (see FIG. 1) is pivotally moved into contact therewith. Arm 148 is pivotally secured to the machine as at 149 and has a smooth cylindrical end 151 which bears directly against belt 132 to make it taat. Such pivotal movement is effected by means of a solenoid 152 which, when actuated, serves to draw its magnetic plate 153 downwardly thereby pulling on lever arm 148 through a coil spring 154. The mechanical connection as described, between motor 124 and clutch 147, is shown schematically in FIG. 11 by dotted line 155.

Rotation of main rotary shaft 88 is effected through the operation of clutch 147 by actuating the "run" switch 124 which thereby closes the electric circuit to solenoid 152. This circuit, however, may not be closed and the main rotary shaft cannot operate until the margins for the card are set by actuation of "closed" switch 76 which, as described above, serves to retract piston rod 57 of first compressed air cylinder 55 to thereby close a switch 156. FIG. 2 shows switch 156 as connected in circuit for full retraction of plunger 57. Also, it should be noted that the "run" switch will not close its circuit, even when actuated, after the "open" switch 74 is closed during the "open" operation since plunger 57 is extended at such time out of contact with switch 156.

The impression coil 112 is cushion mounted between a pair of bracket plates 157, 158, each mounted as shown in FIGS. 7 and 8 to side plates 23 as at 159, 161. Bracket plate 157 has an arm 162 similar to an arm 163 of plate 158 between which the ends of impression roll 112 are freely mounted for rotation. Each of the plates is also provided with a depending leg 164 and 165, respectively. A compression spring 166 is attached one end to leg 164 and at its opposite end to a side plate 23 lying adjacent thereon. A similar coil spring (not shown for clarity) is likewise attached to leg 165. Accordingly, an impression roll 112 is mounted for movement toward and away from printing feed roller 89 as the impression roll is made to pivot about their pivot points 159, 161 against the action of the coil springs as legs 164 and 165 move to and fro as shown by the arrows in FIG. 7. Intermittent movement of impression roll 112 away from rolls 91 permits each of the cards which are to be
imprinted, to be fed into the nip of impression roll 112 and feed rolls 91 after which the impression roll is rotated by rolls 91 when again in contact therewith for feeding each card through the nip. This intermittent movement of the impression roll is effected by means of cam plates 168 and 169 (FIGS. 6, 7 and 8) mounted on main rotary shaft 88 for rotation therewith and each bearing against a respective collar 171, 172 on impression roll 112. Each cam plate 168, 169 has a 180° circular arc surface of a radius slightly in excess of each roll 91 radius so that impression roll 112 is moved away from the printing feed roller 89 for each half revolution of main rotary shaft 88.

As each card is fed between the nip of impression roll 112 and feed rolls 91, while the impression roll is depressed in the manner described above, the cards come to rest at such position by means of a plurality of arresting elements 173 each mounted for movement between a position shown in solid lines and as shown in phantom lines in FIGS. 7 and 8, it being understood that several of such elements 173 are required although only one is shown in the interest of clarity. These elements are so moved during rotation of cam plate 169 which makes contact with a bearing element 174 mounted at one end of an arm 175 (see FIG. 8). Arm 175 is pivotally mounted between its ends as at 176 to an adjacent side plate 23 and another arm 177 is pivotally connected at one end to arm 175 as at 178, and is pivotally connected as at 179 at its other end to a short arm 181. This latter arm 181 is fixedly secured to a rod 182 mounted for rotation at its ends between side plates 23. Also, a coil spring 183 is connected at its upper end to an adjacent side plate 23 and is connected at its lower end to arm 181. Accordingly, bearing element 174 is contacted by the arcuate peripheral surface of cam plate 169 during each half-revolution of shaft 88 in a manner as shown in FIG. 8 so that arm 175 rotates slightly counter-clockwise thereby moving arm 177 downwardly and causing arm 181 and its connected rod 182 to likewise move counter-clockwise again the action of spring 183. Since each of the elements 173 are fixedly secured to rod 182 by means of collars 184, counter-clockwise rotation of rod 182 moves elements 173 to their positions shown in solid lines in FIGS. 7 and 8. Conversely, when cam plate 169 is not in contact with bearing element 174 during rotation of plate 69, spring 183 causes arm 181 to be rotated clockwise so that the arresting elements 173 are moved into their arresting positions shown in phantom lines in FIGS. 7 and 8. The upper ends of these elements 173 project through slots 185 provided in a horizontal plate 186 which is disposed in the same horizontal plane as the top of a horizontal bed plate 212 of the machine (see FIG. 4).

It can therefore be seen that, contact between cam plates 168 and 169 with the collars 171, 172 of the impression roll, serves to depress the impression roll away from feed rolls 91 during rotation thereof. Each card comes to rest during this depressed condition, or roll 112 by reason of arresting elements 173 which are now in their position shown in phantom lines with their upper ends projecting upwardly through slots 185. Elements 173 are moved into their arresting positions while cam plate 169 is not in contact with bearing element 174 but while it is in contact with collar 172. Conversely, as soon as cam plate 169 moves away from collar 172, it commences contact with bearing element 174 to thereby effect a lowering of arresting elements 173 during the time the cam plate 169 is not in contact with collar 172. The printing head plates 94 therefore imprint the indicia on to the card which is now being fed by feed rolls 91 bearing against impression roll 112.

Each of the cards C are fed through the machine from a stacked position between plates 143, 144 to its position as shown in FIG. 4, over the bed 139 and through the nip between rolls 112 and 91, as follows: Feed rolls 187 are mounted on an axle 188 (see FIG. 3) for movement therewith, this axle being mounted for rotation between plates 23. A one-way clutch 189 is mounted at one end of axle 188 for incremental rotation of the axle about its longitudinal axis in the direction of arrow E (see FIG. 4). Feed rolls 187 bear against an idler roll 191 which is freely mounted between side plates 23 of the machine. A clutch arm 192 (FIG. 2) is eccentrically mounted at one end to main rotary shaft 88 as at 193 and is also eccentrically mounted as at 194 to the side of a toothed wheel 195 mounted to an adjacent side plate 23 for free rotation thereon and in intermeshing engagement with the teeth of clutch wheel 189. Accordingly, rotation of main rotary shaft 88 effects a back-and-forth rotation of wheel 195 (as shown by the arrows thereon) along with clutch wheel 189 thereby causing feed rolls 187 and axle 188 to be rotated incrementally in the direction of arrow E shown in FIG. 4.

Another feed roll 196 is mounted for rotation between sidewall plates 23 and has at one end thereof a toothed wheel 197 and a smaller toothed wheel 198. A toothed wheel 199 is mounted on main rotary shaft 88 for rotation therewith and a drive chain 201 extends about both wheels 197 and 199 (see FIG. 2) for transmitting rotation of the shaft 88 to feed roll 196. Toothed wheel 198 is in meshing engagement with a toothed wheel 202 fixedly mounted at one end of an idler roller 203. Accordingly, when the "run" switch 124 is actuated, main rotary shaft 88 rotates which in turn rotates feed roll 196 through drive chain 201 for feeding the cards C between rolls 196 and 203 through the machine which have been initially fed from behind feed rolls 187 incrementally by means of the one-way clutch wheel 189 through toothed wheel 195 and clutch arm 192. A deflecting plate 200, mounted between side plates 23, is provided for deflecting the cards C into the nip of rolls 196, 203 from the nip of rolls 187, 191. After leaving the nip of rolls 196 and 203, each card C is moved on to bed 139 of the machine which includes a roller 204 having a toothed wheel 205 (FIG. 3) at one end to facilitate driving of the roll 204 by means of a drive chain 206 which extends about toothed wheel 205 and another toothed wheel 207 fixedly mounted at one end of feed roll 196. Roll 204 is mounted for rotation between side plates 23 at a slight angle to feed roll 196. Bed 139 further includes an idler roller 208 mounted parallel to roll 204 for rotation on side plates 23 by means of a pair of support armments (not shown). Another idler roller 209 (FIG. 4) is mounted for rotation between side plates 23 and a plurality of feed tapes 211 extend about the three rollers 204, 208 and 209 so as to be moved in the direction of arrow F by means of roller 204 which is driven by feed roller 196. A horizontal plate 212 is mounted in place beneath these feed tapes 211. A transverse rod 213 (FIG. 3) is mounted between side plates 23 parallel to roller 204 and an elongated downwardly biased strip
214 for each tape 211 is mounted on this rod 213 for holding the cards C on to each tape 211 as they are moved toward printing head plates 94.

As each of the cards C are moved toward impression roll 112 by means of tapes 211, this roll is depressed away from printing feed rolls 91 in a manner as outlined above to accommodate each card so that indicia may be imprinted thereon by means of plates 94 as the main rotary shaft 88 continues to rotate. Mounted in the path of travel of the cards at a location upstream of the nip between rolls 91 and 112, is a first-sensing element 215 (FIG. 4) in the form of a sensing strip 216 mounted on a rod 217 parallel to roll 208 and supported at its ends between side plates 23. Strip 216 normally lies in its position as shown in FIGS. 1 and 4 within an annular groove (not shown) of idler roller 208 so that it may be moved into its position shown in phantom lines in FIG. 10 while no cards are being fed through the machine. A trip plate 218 is also provided at one end of rod 217 (see FIG. 1) at an angular relationship with strip 216 at an included angle less than 180° so that, when the cards are being fed through the machine, strip 216 is pushed upwardly and plate 218 is pushed downwardly to close "run" switch 124 thereby closing the electric circuit during the "run" operation as each Card C passes through the machine (see FIG. 11). The machine therefore continues to run and the cards continue to be imprinted simply by action of the cards themselves as they move beneath sensing strip 216.

During the inking-up operation of the train of inking rolls 219, printing head plates 94 must be maintained out of contact with impression roll 112 so as to avoid any smudging of the impression roll before the cards are fed therethrough. Accordingly, depending leg 164 of bracket plate 157 (see FIGS. 1 and 10) is provided with an inwardly extending stud element 221 and a bracket plate holding element 222 is connected to a rod member 223 for maintaining impression roll 112 in its lower position. Element 222 has a downwardly open notched end which engages stud 221 when leg 164 moves against its spring 166 at the time impression roll 112 is moved downwardly. Rod 223 is mounted between side plates 23 and a lever arm 224 is mounted at its lower end to rod 223. Arm 224 is moved from its position shown in solid lines to that shown in phantom lines in FIGS. 2 and 10 by means of a cam element 225 mounted at one end of main rotary shaft 88.

A second sensing element 226, similar to first sensing element 215, is provided forwardly thereof as shown in FIGS. 4 and 10 and comprises a sensing strip 227 connected to a transverse rod 228 mounted parallel to rod 217 between side plates 23 of the machine. This sensing strip 227 is also moved upwardly into its position shown in dotted lines in FIG. 10 by the cards passing thereunder.

A first catch element 229 is fixedly mounted at one end of rod 228 and is disposed in the same plane as lever arm 224. A second catch element 231 is fixedly supported as shown in FIG. 10 on a support element 232 connected with a support 233 which is mounted on lever arm 224. Accordingly, when sensing strip 227 is moved upwardly upon contact by a card C before it enters the nip between the impression roll and feed rolls 91, first catch element 229 is also moved upwardly to its position shown in dotted lines in FIG. 10 whereupon the downwardly open notch 234 of second catch ele-

231 will be made to engage with the upstanding flange 235 of catch element 229. Lever arm 224 is moved between its positions shown in solid and phantom lines by means of cam element 225 during rotation of the main rotary shaft 88 so that, when catch element 231 is moved into its position shown in solid lines in this Figure, it will engage with flange 235 which has been deflected upwardly as the cards continue to pass beneath sensing strip 227. Catch element 231 will remain engaged with flange 235 since lever 224 remains in its position shown in solid lines without being contacted by cam element 225. Accordingly, holding element 222, which is also fixedly connected to rod 223, will be moved into its position shown in dotted lines in FIG. 10 out of engagement with stud element 221 and will remain in such position until the interengagement between notch 234 and flange 235 is broken. Leg 165 of bracket plate 157 is therefore capable of moving under the action of its spring 166, thereby permitting impression roll 112 to be moved toward and away from feed rolls 91 to accommodate each of the cards C in the manner and for the purpose already described. Conversely, when the main rotary shaft is made to rotate without cards being fed through the machine as during an inking-up operation, sensing strip 227 remains in its lower position shown in solid lines in FIG. 10 thereby rotating rod 228 also in such direction so that catch element 229 will remain in its position shown in solid lines therein out of engagement with second catch element 231. Cam element 225 therefore moves lever arm 224 between its positions shown in solid and phantom lines without catch elements 229 and 231 ever interengaging. It can be therefore seen that impression roll 112 is permitted to normally move toward and away from rolls 91 by reason of cam plate 168 when Cards C pass beneath sensing strip 227, although the impression roll is locked in its position away from rolls 91 when no cards are passing through the machine while the "run" switch is actuated.

A card counting mechanism 236 is mounted on one of the side plates 23 near end of the bracket plates such as 157, shown in FIG. 10, with the counter arm 237 thereof lying adjacent a stud element 238 fixed to leg 165 which stud element serves to deflect arm 237 inwardly toward mechanism 236 each time leg 165 returns to its vertical position after having been moved under the action of its spring 166 during upward and downward movement of impression roll 112. Since leg 165 is so moved each time a card C is imprinted as it passes through the nip of rolls 112 and 91, arm 237 opens and closes a switch within mechanism 236 to thereby "count" each card C after it has been imprinted with indicia.

In FIG. 12, a means for recording the count of each card passing through the machine after they are imprinted is shown. Mechanism 236 is electrically interconnected with a counter recorder 249 designed in the normal manner as having numbers on several wheels therein actuated incrementally each time arm 237 is deflected so as to record the precise number of printed cards. In order to "erase" this recording and re-set each of these wheels to "zero" after a batch of cards have been imprinted with one marginal setting, a cam element 239 is fixedly mounted on transverse rod 107 so that, when rod 107 rotates in the direction of arrow A as when the printing head plates are moved to their neutral-initial position, arm 241 mounted on a side
plate 23 is rotated clockwise about its mounting point 242. Such rotation is made against the action of a coil spring 244 mounted thereto and to side plate 23 which maintains the free end of the arm 241 against a stop 243 secured to side plate 23. The other end of arm 241 is provided with a fixed linkage 245, 246, the latter of which has a bearing element 247 thereon. Elements 245 and 246 are fixedly interconnected to permit the bearing element 247 to move in an arc about pivot point 242 when arm 241 is rotated clockwise. A counter striking plate 248 is therefore depressed so as to reset the counter to "zero" before a new setting for the margins is effected each time the "close" switch is actuated. Countertrip 237 therefore only registers each of the cards imprinted at one of the pre-set leading edge and side edge margins. Such registration is thereafter "erased" each time the "open" switch is actuated before a new setting for the margins is made. The likelihood of mixing the count for cards having different marginal settings is therefore substantially avoided.

In FIGS. 1, 6, and 7, a block 251 is shown mounted on main rotary shaft 88 for rotation therewith. This block is provided with an extension 252 which is engaged by the inwardly turned end of an arm 253 which is fixedly mounted at one end to axle 149 (see FIG. 1). When lever arm 148 is rotated clockwise as when solenoid switch 152 is made to open, arm 253 engages with extension 252 on block 251 to thereby lock the main rotary shaft 88 and the printing plates 94 in the angular position as set during the "closing" operation of the machine each time "run" switch 124 is open as when no more cards C are passing through the machine. This will insure that another set of cards C may be imprinted with the same margins as previously done without resetting the margins since a closing of switch 124 causes movement of arm 253 out of engagement with extension 252 each time the switch is closed to close solenoid 152.

"Run" switch 124 is manually closed at the beginning of a printing operation for starting rotation of shaft 88 so as to feed the cards from their stack between plates 143, 144 toward the nip of rolls 112 and 91. After the first card passes through the nip, the "run" switch is designed to remain closed by actuation of the cards themselves passing through the nip. For this purpose, a bearing disc 254, having a flat peripheral surface 255 (FIG. 1) and an arcuate surface 256, is fixedly mounted on shaft 88. A bearing arm 257 is fixedly mounted on rod 217 at an angle of less than 180° with trip plate 218 and is maintained out of engagement with disc 254 so long as the "run" switch 124 is either manually closed as by a press button or is closed by trip plate 218 (see FIG. 11) as the cards pass beneath sensing strip 216. However, when the "run" switch is either manually open or when the last card passes through the machine, the "run" switch is not instantaneously opened for disengaging clutch 147 since arm 257 moves by gravity into contact with arcuate surface 256 thereby maintaining "run" switch closed by trip plate 218. Plate 218 does not open the "run" switch until arm 257 moves downward as when it contacts flat surface 255. The "run" switch is then opened and solenoid 152 is deactivated so that its plate 153 moves upwardly under the assistance of springs 150 and 154 thereby rotating arm 148 clockwise and causing interengagement between arm 253 and extension 252 for locking shaft 88 and the printing head plates in their set angular relationship.

To summarize operation of the aforesaid card imprinting machine, the intended leading edge and side edge marginal spacing for the cards is set by rotation of dial wheel 21 to the numeral thereon which is known to correspond with the intended marginal spacing. Such causes rotation of cylinders 41, 47, 49, 52 so as to align one of their respective stop elements 53 with stop pieces 79, 138, 145, 146 on the piston rods of compressed air cylinders 62, 63, 64, 65 respectively associated with each rotational cylinder. This one stop element is so located on each cylinder as to permit rotation of shaft 88, inward movement of plate 136 and movement of plates 143, 144 toward one another a distance equal to the leading edge and side edge marginal distances corresponding to the numeral at which the dial wheel is set. The remaining elements 53 are likewise located on each cylinder in a similar manner.

The "open" switch 74 is then made closed after motor 124 is turned on by means of switch 133. Plunger 57 of air cylinder 55 is extended thereby rotating transverse rod 107 in the direction of arrow A (FIG. 8) and causing cam plate 104 to be pivoted away from shaft 88 so that lockin lever 98 disengages from toothed wheel 95 (FIG. 6) as surface 105 moves fully out of contact with lever 98 upon full extension of plunger 57. When fully extended, arm 11 on plunger 57 trips valve 58 for opening air line 61 through two-way valve 59a to air cylinders 62, 63, 64 and 65. Piston rod 66 of cylinder 62 therefore fully retracts to raise rack 81 and rotate pinion 96 and printing feed roller 89 coupled thereto via arm 99, in the direction of arrow B (FIG. 8). Also, rotation of rod 107 in the direction of arrow A during the "open" condition, depresses lever arm 115 via rotation of cam element 114 so that arm 115 pivots connecting arm 121 against the action of its spring 123 and causes arm 121 to disengage from toothed wheel 95'. Roller 89 and its attached printing head plates 94 are therefore rotated on shaft 88 to their initial or neutral position thereon with respect to impression cylinder 112.

At the time plunger 66 is retracting, plungers 67, 68 and 69 of respective air cylinders 63, 64 and 65 are extending so as to move their respectively connected support plates 136, 143 and 144 toward their adjacent side wall plates 23 to the fullest extent possible. Also, retraction of plunger 66 trips valve 77 and shifts its one-way valve 78 into the path of air line 71 of air cylinder 55.

The "closed" switch 76 is then manually closed for extending plunger 66 and its connected rack 81 until stop piece or stud 79 thereon contacts stop element 53 on cylinder 41 which was rotated into vertical alignment therewith as aforesaid. Since transverse rod 107 has not yet been rotated, printing feed roller 89 remains coupled with pinion 96 via locking lever 98 and uncoupled from connecting means 113 via disengagement of connecting arm 121. Roll 89 is therefore free to rotate about shaft 88 into its intended angular position with respect to impression roll 112 in accordance with the dial setting as limited by stop element 53 contacted by stop piece 79. During extension of plunger 66, plungers 67, 68 and 69 of respective air cylinders 63, 64 and 65 are retracted thereby moving their respective connected plates 136, 143 and 144 inwardly to an extent as limited by respective stop pieces 138, 145 and 146 as they come to rest against those stop ele-
ments on respective cylinders 47, 49 and 52 which were rotated in the manner as aforedescribed.

Upon full extension of plunger 66, lever 84 (FIG. 5) contacts stud 79 which trips valve 77, shifts two-way valve 78a into the path of air line 71 and permits air to be ported therethrough into air cylinder 55 for retracting plunger 57 thereof. Transverse rod 107 is therein rotated in the direction of arrow C (FIGS. 7 and 8) thereby pivoting cam plate 104 toward shaft 88 so that locking lever 98 may gradually contact arcuate surface 105, and be fully disengaged from toothed wheel 95 when cam plate 104 is pivoted fully toward shaft 88. At the same time, rotation of rod 107 in the direction of arrow C allows lever arm 115 to pivot upwardly under the action of its spring 117 as cam element 114 is rotated also in the direction of arrow C. Connecting lever 121 is therefore permitting to engage with toothed wheel 95 under the action of its spring 123. Printing feed roller 89 and its connected printing head plates 94 are now coupled to shaft 88 in the intended angular position for printing indicia on to each card at the prescribed leading edge margin. Card support plates 143 and 144, of course, shift the stacked cards for printing the indicia thereon at the prescribed side edge margin. Plate 136 is shifted inwardly not as far as plate 144 but to an extent whereby the cards fed over the slightly skewed bed 139 will be guided by upstanding flange 137 thereof.

The Cards C are now ready to be fed from their stack (not shown) between plates 143, 144 and into the nip of rolls 91 and 112 for imprinting indicia thereon. The “run” switch 124 is manually closed for actuating clutch 147 to rotate shaft 88. Feed rolls 187 are rotated incrementally as one-way clutch 189 is operated by rotation of shaft 88 and feed roll 196 is rotated directly by shaft 88. Each card is fed one-at-a-time by feed rolls 187 from their stack and into the nip of rolls 196, 203 as guided by plate 200. Roll 204 is rotated directly by roll 196 for moving feed tapes 211 in the direction of arrow F (FIG. 4). Each card is fed by these tapes toward the nip of rolls 91 and 112 and, by reason of the slight angularity of the travelling cards over bed 139, each card is directed against a forward portion of flange 137 of plate 136 to be guided thereby before reaching the nip. Accordingly, each card is assured of being accurately fed through the nip without the likelihood of binding or bulging as with the use of other guide means.

Before reaching the nip, cam plates 168, 169 depress impression roll 112 away from feed rolls 91 by contacting collars 171 thereof. Roll 112 remains so depressed for approximately a half-revolution of shaft 88. At such time, cam plate 169 is out of contact with bearing element 174 (FIG. 8) thereby permitting arresting elements 173 to extend through openings 185 in plate 186 for temporarily arresting further movement of the card. However, as cam plate 169 moves away from shoulder 172 and into contact with element 174, impression roll 112 moves into contact with rolls 91 to be rotated thereby, and arresting elements 173 are moved out of the path of the card, respectively. The card is then fed by rollers 91 and 112 into a receiving tray 258 (FIG. 4) after indicia is imprinted thereon by plates 94.

Now that the first card has passed through the nip of rolls 91 and 112, it and subsequent cards fed from the card stack in the manner aforedescribed pass beneath sensing strip 216 rotating it slightly upwardly along with attached bearing arm 257 away from bearing disc 254. At the same time, trip plate 218 is rotated slightly downwardly on its rod 217 thereby maintaining the “rim” switch 124 closed. Manual closing of switch 124 is therefore not now necessary since the card themselves maintain the switch closed as they each pass beneath strip 216.

After the last card passes beneath strip 216, and after switch 124 is manually closed as during a “run” with no cards through the machine, clutch 152 is not deacti-vated for stopping shaft 88 until bearing arm 257 makes contact with flat surface 255 of disc 254. Until such contact is made, arm 257 is in contact with arcuate surface 256 of disc 254 thereby maintaining switch 124 closed via connected plate 218. Movement of this plate with contact between arm 257 and surface 255 open switch 124 and stops rotation of shaft 88 at the exact angular position of printing head plates 94 to the impression roll. Extension 252 on block 251 is mounted on shaft 88 is located in relation to flat surface 255 so that shaft 88 may be stopped by engagement between extension 252 and arm or catch element 253 when arm 257 contacts flat surface 255, as shown in FIG. 1.

Each card passes through the nip of rolls 91 and 112 also passes beneath sensing strip 227 (FIGS. 1 and 10). Consequent upward pivotal movement of strip 227 causes first catch element 229, also attached to rod 228, to be pivoted upwardly into engagement with second catch element 231. Lever arm 224 is therefore maintained in an upwardly pivoted position so that holding element 222 attached therewith remains out of engagement with stud 221 and permits brackets 157, 158 to be moved under the action of their coil springs (166 only shown) for intermittent movement of impression roll 112 toward and away from rolls 91 in the manner as aforedescribed. On the other hand, when no cards are passing through the machine, as when the “run” switch is manually closed during an inking-up operation of inking rollers 219, elements 229 and 231 are out of engagement since element 229 remains in its downwardly pivoted position. Lever arm 224 is therefore free to be pivoted upwardly and downwardly by rotation of cam element 225 so that element 222 will intermittently engage with stud 221 to lock impression roll 112 away from rolls 91 at such time as cam plates 168, 169 are out of contact with shoulders 171, 172 of the impression roll. When the cam plates are in such contact impression roll is moved away from rolls 91 so that it need not be locked away by interengagement of elements 222 and 221. Accordingly, impression roll 112 remains out of contact with rolls 91 thereby avoiding any likelihood of ink transfer from inking rolls 219 to printing plates 94 and on to impression roll 112.

Electrical interconnection of operating mechanism 236 with counter 249 signals the latter for recording each printed card as arm 237 moves toward mechanism 236 during back-and-forth movement of bracket leg 165. The cards for each batch printed with a prescribed marginal edge is counted for one “run.” At the end of this “run,” the total shown by counter recorder 249 is “erased” as the “open” switch is again manually closed after dial wheel 21 has been rotated to re-set the margins. Rotation of transverse rod 107 in the direction of arrow A, in the manner as set forth above, depresses arm 241 via cam element 239 (FIG. 12) for moving bearing element 247 downwardly against setting plate.
248. The numbered wheels therein are moved to "zero" to thereby "erase" the recorded total for the preceding batch of printed cards prior to the recording of the next batch.

With the foregoing machine, it can be seen that any number of marginal settings are made possible for the imprinting of cards by simply rotating a dial wheel to effect automatic imprinting of indicia at the precise leading edge and side edge margins without the need for manual adjustment of the printing head plates. Each bath of cards are imprinted and exactly counted without the likelihood of confusing the count for different batches and, during the ink- up operation, any transfer of ink to the impression roll is effectively avoided automatically without having to manually regulate any setting for the machine. Also, the printing head plates are automatically stopped in their precise angular position with respect to the impression roll for continuation of a "run" after a portion of one batch of cards has been printed, all in a highly effective, economical and relatively simple manner.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A card imprinting machine comprising:
   manually operable dial means for setting both the side edge margins and the leading edge margin for indicia to be imprinted on cards fed through the machine;
   side edge guide means responsive to said dial means for automatically locating a stack of the cards laterally depending on the desired side edge margin as set by said dial means;
   a main rotary shaft mounted for rotation about an axis substantially transverse to the direction in which the cards are fed through the machine;
   a printing head mounted on said shaft;
   an impression roller spaced beneath said shaft in parallel relation therewith;
   means for feeding each of said cards from a card rack toward said printing head;
   means responsive to said dial means for automatically causing said printing head to be set on said shaft from a neutral-initial position to a set angular position in relation to said impression roller depending on the desired leading edge margin as set by said dial means, and back again to said neutral-initial position; and
   means for rotating said main rotary shaft and said printing head mounted thereon in said set angular disposition, whereby said printing head will imprint indicia on each card fed through the machine at the desired margins from both the leading edge and from the side edge of each card.

2. The machine according to claim 1 wherein said printing head is removable mounted within a printing feed roller freely mounted on said main rotary shaft, a compressor providing a source of compressed air for the machine, said automatic setting means including a first compressed air cylinder and a second compressed air cylinder each operatively interconnected with said compressor in parallel through a common first solenoid valve, which, when actuated, effects an "open" operating condition of the machine, a first normally closed spool valve in the connection between said first solenoid valve and said second cylinder, said setting means further including means freely rotatable on said shaft and being operatively interconnected with said second cylinder, and means operatively interconnected with said first cylinder for coupling and uncoupling said freely rotatable means to said printing feed roller, actuation of said first cylinder causing said freely rotatable means to be coupled to said printing feed roller and further causing said first spool valve to open whereby said second cylinder is actuated and said coupled printing feed roller is rotated on said shaft to its neutral-initial position.

3. The machine according to claim 2 further including:
   a clutch means for rotating said main rotary shaft from an electric motor, a solenoid switch arrangement for actuation of said clutch means, a switch for manually operating said solenoid switch to effect a "run" operating condition of the machine, means for conveying the cards from said card feed means and into the nip of said printing feed roller, a first card sensing element mounted on a rod disposed above the top surface of said conveying means, said sensing element resting against said top surface when no cards are passing through the machine and said sensing element being moved upward for rotation of its rod when cards are passing therebeneath, said rod having a first lever thereon arranged in such a manner as to also close said switch as said sensing element is moved away from said top surface during contact by the conveyed cards, a second lever on said rod and in contact with an irregular surface of a disc mounted on said shaft when said switch is made to open for sensing the completion of the last full revolution of said main rotary shaft.

4. The machine according to claim 3 wherein said disc is circular and has a flat peripheral portion, said second lever being normally in contact with the circular portion of said disc while said sensing element rests against said top surface, said first and second lever being angularly related with respect to one another on said rod so that said first lever is in contact with said switch to close same either manually or while said card sensing element being is contacted by the conveyed cards, said first lever moving away from said switch for de-actuating said clutch by opening said solenoid switch.

5. The machine according to claim 4 wherein an extension element is fixedly mounted on said shaft, a catch element on said clutch being thereby movable into engagement with said extension element when said is de-actuated.

6. The machine according to claim 2 wherein said first air cylinder and said second air cylinder are, alternately, each operatively interconnected with said compressor in parallel through a common second solenoid valve which, when actuated, effects a "closed" operating condition of the machine, a second normally closed spool valve in the connection between said second solenoid valve and said first cylinder, whereby initial actuation of said second air cylinder causes said coupled printing feed roller to be rotated on said shaft from its neutral-initial position to the angular position as set by said dial means, and complete actuation of said second air cylinder causes said second spool valve to open whereby said first air cylinder is actuated and said printing feed roller is uncoupled from said second air cylinder.
7. The machine according to claim 6 further including means fixedly mounted on said main rotary shaft and being operated by actuation of said first cylinder for connecting and disconnecting said printing feed roller to said main rotary shaft respectively for rotation therewith at the same time as said printing feed roller is uncoupled from said second air cylinder, and for rotation independent thereof while said printing feed roller is coupled to said second air cylinder.

8. The machine according to claim 6 wherein said connecting and disconnecting means includes a transverse rod member rotatably connected to the piston rod of said first cylinder, said connecting lever being made to engage and disengage said printing feed roller for rotation thereof until actuation of said second cylinder is completed at which time said lever is disengaged by said coupling and uncoupling means, said freely rotatable means further including a pinion gear intermeshed with a rack gear element on the piston rod of said second cylinder.

9. The machine according to claim 6 wherein said side edge guide means includes a first side edge guide plate located between said card feeding means and said printing head, a third compressed air cylinder having a piston rod connected to said first side edge guide plate for movement thereof parallel to the longitudinal axis of said main rotary shaft, second and third side edge guide plates connecting said first compressed air cylinder each having a piston rod connected respectively to said second and third side edge guide plates for inward movement thereof parallel to the direction of movement of said first guide plate, said third, fourth, and fifth cylinders each being operatively connected with said compressor in parallel through said common first solenoid valve and, alternately, operatively connected with said compressor in parallel through said second solenoid valve.

10. The machine according to claim 9 wherein said dial means includes a rotatable dial wheel operatively connected with a rotatable first cylinder block having stop elements set thereon each at a predetermined distance from one end thereof in relation to the angular position to be set for said printing head, said cam plate being moveable into and out of contacting engagement with said locking lever upon respective opposite rotation of said transverse rod as said first cylinder piston rod is actuated, whereby said locking lever is made to respectively disengage and engage with said printing feed roller.

13. The machine according to claim 12 wherein said dial means includes a rotatable dial wheel operatively connected with a rotatable first cylinder block having stop elements set thereon each at a predetermined distance from one end thereof in relation to the angular position to be set for said printing head, said rack gear contacting one of said stop elements when actuated by said second cylinder for causing said pinion gear to rotate a predetermined amount.

14. The machine according to claim 13 wherein said dial means further includes rotatable second, third and fourth cylinder blocks each operatively connected with said dial wheel and each being associated respectively with said third, fourth, and fifth compressed air cylinders and each having stop elements set thereon each at a predetermined distance from one end of their respective cylinders blocks in relation to the side edge margins as set by said dial wheel, said piston of each said third, fourth, and fifth air cylinder contacting one of said stop elements of their respective cylinder blocks when actuated by said second cylinder for causing said respective first, second and third side edge plates to move a predetermined amount.

15. The machine according to claim 1 wherein means are provided for spring biasing said impression roll against said printing feed roll for rotation by said printing feed roll, a semi-circular disc mounted on said main rotary shaft near each end thereof for contact with said impression roll, each said disc having a diameter slightly greater than the diameter of said printing feed roll whereby said impression roll is intermittently moved away from said printing feed roll when contacted by said discs during rotation of said main rotary shaft.

16. The machine according to claim 15 further including means operated by one of said semi-circular discs for arresting the movement of said cards passing beneath said printing feed roll while said impression roll is moved by said semi-circular discs away from said printing feed roll.

17. The machine according to claim 16 wherein said card arresting means comprises a plurality of teeth operatively connected for movement into and out of the path of card travel, said teeth being connected through linkage elements having a portion thereof lying directly above said main rotary shaft so that, upon contact with said linkage elements portion, said one semi-circular disc causes said teeth to be moved out of the path of card travel while said feed roll rotates said impression roll.

18. The machine according to claim 15 further including means for automatically locking said impression roll at its position away from said printing feed roller so that said main rotary shaft may be rotated without contacting said impression roll.

19. The machine according to claim 18 wherein said automatic locking means includes a locking arm movable into and out of locking engagement with a support arm for said impression roll when said impression roll is moved away from said printing feed roll during contact by said semi-circular discs.

20. The machine according to claim 19 wherein a counter mechanism is provided for counting each of
the cards conveyed through the machine, a counter recorder electrically interconnected with said counter mechanism, a counter arm on said mechanism located adjacent said support arm for said impression roll so that, each time said impression roll moves into rolling engagement with said printing feed roll, said counter arm is actuated by said support arm for operating said counter recorder.

21. The machine according to claim 19 wherein a second card sensing element is mounted on a second rod disposed above the top surface of said conveying means, said second sensing element resting against said top surface when no cards are passing through the machine and said second sensing element being moved upwardly for rotation of its rod when cards are passing therebeneath, said second rod having a first catch element thereon, a second catch element pivotally mounted on the machine for movement into latching engagement with said first catch element when said second card sensing element is moved away from said top surface by the conveyed cards passing therebeneath, said second catch element being interconnected with said locking arm to thereby move said locking arm out of locking engagement when said first and second catch elements are interengaged.

22. The machine according to claim 21 wherein an eccentric cam element is mounted on said main rotary shaft for pivotal movement of said second catch element during rotation of said shaft.

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