

[54]	PRINTER FOR EMBOSSED CARD	3,531,625	9/1970	Mizuta et al.	340/149 A
[75]	Inventors: Yoshizo Ikegami; Susumu Fukeda, both of Hyogo, Japan	3,608,485	9/1971	Schulze	101/269
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[73]	Assignee: Fuji Photo Film Co., Ltd., Minami-Ashigara, Japan	3,624,360	11/1971	Collier et al.	235/61.11 B
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[58] **Field of Search** 101/269, 272, 233, 234, 101/316, 287, 310; 194/9, DIG. 9, DIG. 6; 222/2; 235/61.11 R, 61.11 B; 271/265; 340/149 A; 197/1 R

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[57] **ABSTRACT**

An automatic printer for a card with an embossed portion thereon having starting and stopping switches, a printing device, a feeding and conveying mechanism for a web of paper emanating from a roll of slip paper and the embossed card, and the roll of slip paper, the starting switch starting the printer by energizing a driving motor upon depression of a switch arm by the insertion of the embossed card into an inlet and the stopping switch automatically stopping the printer by de-energizing the driving motor upon depression of a switch arm by the embossed card coming out of the outlet after completion of the printing by the printing device.

2 Claims, 2 Drawing Figures

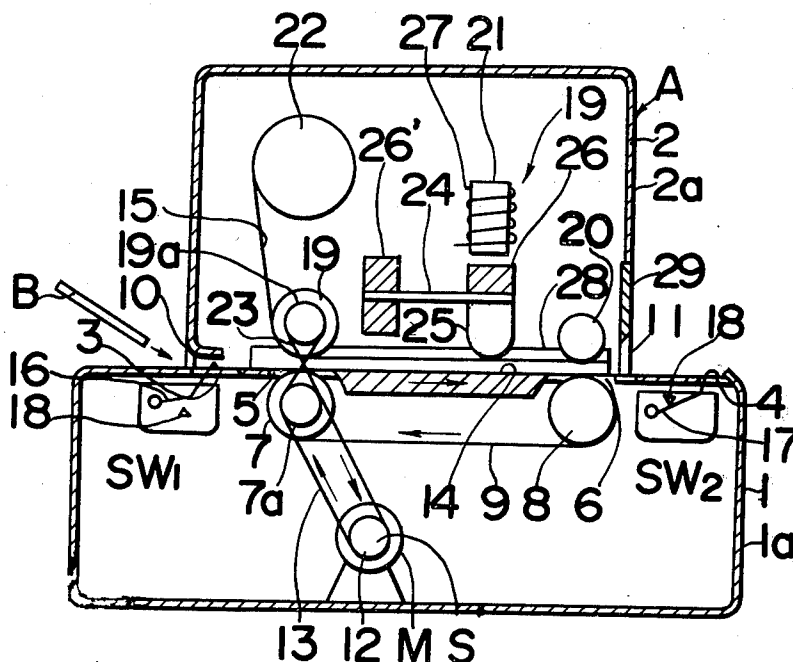


FIG. 1

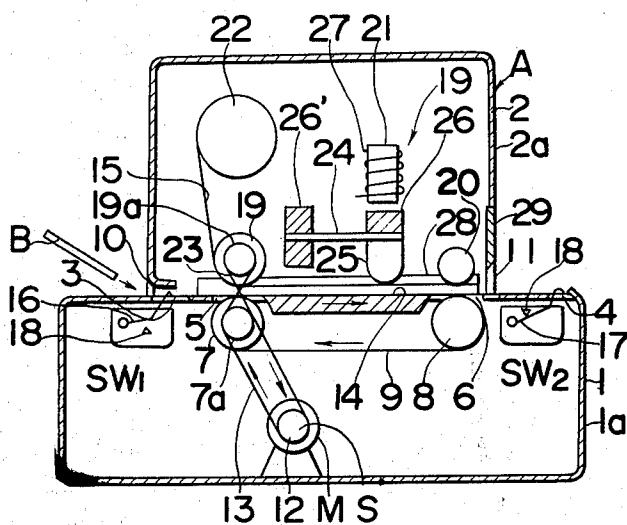
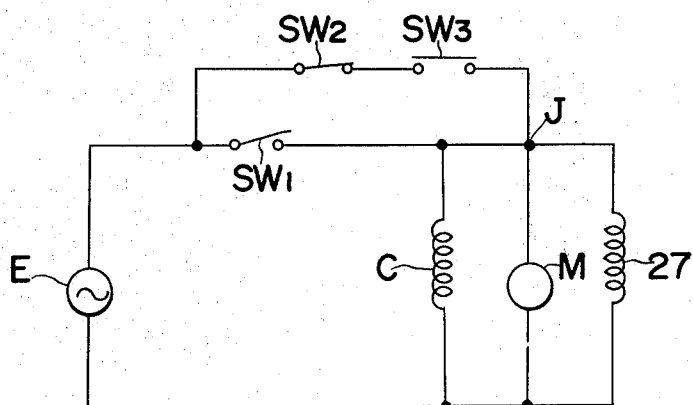


FIG. 2



PRINTER FOR EMBOSSED CARD

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a printer and, more particularly to an automatic electric printer to be used with embossed cards, wherein the operation of a printing device, a driving motor, and a feeding and conveying devices for a web of paper to be printed and the embossed card are controlled by starting and stopping switches operated automatically upon insertion of and discharge of the embossed card.

2. Description of the Prior Art

In order to identify a specific issuer or holder, it has been well known that a card, for example, a credit card or identification card on which necessary items such as names, numbers, symbols, etc., are embossed is used. For the purpose of taking many copies of the card, if desired, the necessary items are raised in relief from the card surface, on which copying paper is laid and pressed by means of a roller, so that the necessary items embossed on the card are formed as in die stamping on the copying paper, which is used, for example, for a sales slip in case of a credit card and for a passport in case of an identification card.

Accordingly to a conventional printing device for such an embossed card, it has been a practice to place such copying paper, sheet by sheet, on the embossed portion of the card laid on a printer base, and the necessary items on the card are die-stamped on the pair by manually rotating a roller thereon, which method is not only troublesome in printing the paper piece by piece, but also, depending upon the degree of pressure applied by the roller, results in inconsistent quality of the printing and slipping of the paper, requiring assistance in printing. Furthermore, it will be difficult to cope with the spread of cards of this kind in the future by the above manual method.

Accordingly, an essential object of the present invention is to provide an automatic printer for embossed cards which can be operated by electrical power with substantial elimination of the disadvantages inherent in the conventional printers for embossed cards.

Another important object of the present invention is to provide the automatic printer for embossed cards of the above described type in which an embossed portion of a card can be printed on a web of paper by means of a printing device by merely inserting an embossed card into the printer through an inlet.

A further object of the present invention is to provide the automatic printer for embossed cards of the above described type in which the printed web of paper comes out onto a fixed place through a conveying means by merely inserting an embossed card into the printer.

SUMMARY OF THE INVENTION

According to a preferred embodiment of the printer of the present invention, a starting switch positioned near an inlet for an embossed card is provided with a movable switch contact arm extending into the inlet through a hole, and upon insertion of the embossed card, the arm is depressed to contact a stationary contact of the switch, establishing an electric circuit through an AC power source, which causes a driving motor to rotate, driving the conveying means including a pair of pulleys, a belt horizontally connected therebe-

tween and a pair of rollers positioned correspondingly over the pair of pulleys so as to rotatably contact the upper surface of the horizontal belt. A printing device including an electromagnet with an iron piece and a printing hammer provided thereunder which is operated simultaneously upon closure of the starting switch, causes the printing hammer to vibrate vertically, thus repeatedly striking the surface of the web of paper on the embossed card being conveyed along the upper surface of the horizontal belt. The embossed card together with the printed web of paper further preceeds to an outlet where it depresses a movable switch contact arm of a stopping switch positioned near the outlet so as to leave a stationary contact thereof, thus opening the electric circuit to stop the printer.

In the above construction of the printer according to the present invention, one of the most essential features resides in the fact that the whole operation of the printer from starting upon insertion of the embossed card to stopping after sending out the printed slip paper is carried out automatically, requiring no manual operation especially in printing, which is very effective when a large number of embossed cards are dealt with.

These and other objects and features of the present invention will become apparent from the following description taken in conjunction with the preferred embodiment thereof with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram showing a sectional side view of a printer for embossed cards, and

FIG. 2 is an electric circuit block diagram illustrating various elements of the printer in FIG. 1.

Before the description of the present invention proceeds, it is to be noted that the like parts are designated by like numerals throughout the several view of the accompanying drawings.

It should also be noted that the printer according to the present invention requires a card having an embossed portion on which necessary symbols, letters, numbers, names, etc., are embossed, and a soft web of slip paper emanating from a roll of slip paper housed in the printer, to be placed on the surface of the embossed card to print the embossed items thereon with or without ink.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to FIG. 1, the printer A for embossed cards is fabricated in the form of two cases rigidly mounted, one on the other, which generally comprises a driving unit 1 housed in a lower base case 1a of a larger size, and a printing unit 2 housed in an upper case 2a of a smaller size. The upper face of the lower case 1a is provided with two holes 3, 4, one each on the left and right, for insertion of contact switch arms of a starting switch SW1 and stopping switch SW2, and also two other holes 5, 6, similarly on the left and right, through which, part of pulleys 7, 8 and a belt 9, connected therebetween pass forming part of conveying means, which are referred to later, while the upper case 2a is provided with an inlet 10 and outlet 11 for an embossed card B formed at the lower left and lower right, respectively.

The driving unit 1 housed in the lower base case 1a includes a motor M rigidly attached to the bottom of the case 1a and having a drive shaft S extending out-

wardly from one side of the body of said motor M in alignment with the longitudinal axis of said motor M, a pulley 12 rigidly mounted on the drive shaft S to rotate therewith, and the two pulleys 7, 8 also rotatably attached separately to the inner top surface of the case 1a by a suitable means. The pulley 7 is a two-step cone pulley with a belt 13 connected between the smaller step 7a thereof and the pulley 12 rigidly mounted on the drive shaft S, the belt 13 running in the direction of arrows with the pulleys 12, 7, rotating clockwise respectively when the motor M is driven by an AC power source. Another belt 9 is connected between the pulley 7 and the pulley 8, running in the direction of arrows with the pulleys 7 and 8 rotating clockwise when the pulley 7 is driven by the belt 13 connecting the motor pulley 12 with the smaller step 7a of the pulley 7. The horizontal upper surface of the belt 9 between the pulleys 7 and 8 is parallel to the top surface 14 of the lower case 1a and is adapted to run thereof forming part of the conveying means for embossed card B and paper 15 between the inlet 10 and outlet 11.

The driving unit 1 further includes a normally open starting switch SW1, fixed to the inner top surface, near the left end of the lower case 1a and having a movable switch contact arm 16 extending through a hole 3 into the inlet 10 formed at the lower left end of the upper case 2a mentioned later, and a stopping switch SW2 normally closed, fixed to the inner top surface near the right end of the lower case 1a and having a movable switch contact arm 17 extending through a hole 4 onto the right end surface of the lower case 1a in front of the outlet 11. It is to be noted here that a normally open switch is one which establishes an electric circuit only when it is closed, and that a normally closed switch is one which opens an electric circuit only when it is open.

The printer is adapted to start functioning upon depression of the arm 16 of the switch SW so as to contact the stationary contact 18 by the insertion of the embossed card B into the inlet 10 and to stop functioning upon depression of the arm 17 of the switch SW2 so as to leave the stationary contact 18 by the emergence of the printed web of paper 15 and the embossed card B from the outlet 11.

The printing unit 2 housed in the upper case 2a includes two rollers 19', 20 provided on the horizontal upper surface of the belt 9, separately positioned near the inlet 10 and outlet 11, correspondingly over the pulleys 7 and 8 respectively, a printing device 19 having a printing hammer 25 adapted to work by means of an electromagnet 21 mentioned later and a roll of slip paper 22 mounted on a reel (not shown) which is rotatably secured to the case 2a over the roller 19' positioned near the inlet 10.

The rollers 19, 20, each of which is positioned over the pulleys 7, 8 of the lower case 1a respectively with the upper surface of the belt 9 in between, are rotatably attached to the lower part of the case 2a and are adapted by an elastic means, preferably by means of springs (not shown) to contact, under pressure, the horizontal upper surface of the belt 9, so as to hold and convey the embossed card B from the inlet 10 and the web of paper 15 from the roll 22 in between, while the smaller step 19a of the roller 19' of two-step pulley shape is connected to the smaller step 7a of the pulley 7 positioned thereunder by a belt 23, the roller 19' being adapted to rotate in the opposite direction to the

pulley 7, that is, counterclockwise as the belt 23 is connected between the two in the shape of eight.

It is to be noted here that the inlet 10 and outlet 11 should be of such dimensions as are sufficient in height and width to insert the embossed card B thus setting the card B in position upon insertion, and that the horizontal belt 9 is connected between the pulley 7, near the inlet 10 and the pulley 8 near the outlet 11, forming a conveying path between the inlet 10 and outlet 11 so as to carry the card B with the web of paper 15 thereon toward the outlet 11 as soon as said card B is inserted.

The printing device 19 includes a vibrating plate 24 having the printing hammer 25 attached to one end thereof and facing downwardly towards the belt 9 and made of, for example, hard rubber soaked with printing ink, and an iron piece 26 for magnetic attraction rigidly attached on the same end above the hammer 25, the other end of the plate 24 being held by a supporting piece 26' rigidly fixed in the case 2a, the electromagnet 21 of bar type with a coil 27 fixed vertically immediately over the iron piece 26, and a pair of paper guides 28 to form a passage for the web of paper 15 and the embossed card B along the upper surface of the belt 9. The pair of paper guides 28 are fixed on both sides of the belt 9 to guide the card B and paper 15 carried on said belt 9, without interfering the movement of them, and guide the end of the web of paper 15 so as to be easily rolled in between the roller 19' and the belt 9.

The roll of slip paper 22 is rotatably mounted on a reel (not shown) fixed to the case 2a by a suitable means and the web passes over the roller 19' and of paper 15 from the roller 19' and the free end of the web from the roll 22 is lightly pressed between the roller 19' and the left upper surface of the horizontal belt 9 near the inlet 10 along with the embossed card B inserted between the belt 9 and the paper 15 and is adapted to be carried toward the outlet 11 formed at the right lower end of the case 2a.

The electromagnet 21 which is rigidly fixed to the case 2a by a suitable means is adapted to vibrate the iron piece 26 and consequently the printing hammer 25 vertically by an alternating magnetic field generated by passing an AC current through the coil 27 upon closure of the starting switch SW1 by the depression of the movable arm 16 upon insertion of the embossed card B through the inlet 10.

The movement of the card B and paper 15 carried on the belt 9 should be slow enough to provide sufficient time for above stamping.

There is provided a cutter blade 29 at the upper end of the outlet 11, with the edge of which the printed web of paper 15 can be cut to a desired length when it is pulled out.

It should be noted here that the roll of slip paper 22, the roller 19' the pulleys 7, 12 and the starting switch SW1 for the inlet 10 are positioned on the left, whereas the printing device 19 including the electromagnet 21 and the printing hammer 25, the roller 20, the pulley 8 and the stopping switch SW2 are positioned on the right and the tip of the printing hammer 25 is positioned over and close to the upper surface of the belt 9 on which the embossed card B with the web of paper 15 is conveyed along the paper guide 28.

Referring now to FIG. 2, an electric circuit for use in the printer includes the motor M connected to a power source E through a starting switch Sw1. A parallel circuit includes a pair of first and second solenoid coils,

C for the relay switch SW3 and 27 for the electromagnet 21 respectively connected in parallel to the motor M. A series circuit including the switches SW2 and SW3 has one terminal connected to the power source E and the other terminal connected to a common junction J. The starting switch SW1 having the movable switch contact arm 16 is adapted to close when the movable arm 16 contacts the stationary contact 18 upon depression of the movable arm 16 by the insertion of the embossed card B. The stopping switch SW2 also having the movable switch contact arm 17 is adapted to open when the movable arm 17 is depressed by the embossed card B and the web of paper 15 coming out of the outlet 11 of the printer. The relay switch SW3 is adapted to close when the solenoid coil C is energized. When the switch SW1 is closed as mentioned above, the motor M is driven, the solenoid coil 27 for the magnet 21 is energized, and simultaneously the switch SW3 is closed by the action of the coil C also energized, in which state, even if the switch SW1 is open, the switch SW3 is kept closed by the action of the energized coil C, being adapted to open only when the switch SW2 is opened.

In the printer according to the present invention with the construction as hereinabove described, the free end of the web of paper 15 from the roll 22 is lightly pressed between the roller 19' and the left upper surface of the belt 9 near the inlet 10 formed at the lower left and of the upper case 2a, and the embossed card B is inserted between the belt 9 and the paper 15 when inserted through the inlet 10 with the embossed face up, beneath the web of paper 15, and between the roller 19' and the belt 9. The starting switch SW1 is closed by the depression of the movable arm 16 thereof, establishing an electric circuit and thus rotating the motor M as mentioned earlier. The motor M drives the belt 13 connected between the motor pulley 12 and the pulley 7, the belt 9 connected horizontally between the pulleys 7 and 8, and also the roller 19' near the inlet 10 by means of the belt 23. It should be noted here that the upper surface of the horizontal belt 9 runs from the left to the right, while the pulley 7 turns clockwise with the roller 19' rotating counterclockwise to convey the web of paper 15 and the embossed card B toward the printing hammer 25 and the outlet 11.

On the other hand, the printing hammer 25 of the printing device 19 vibrating upon closure of the above mentioned switch SW1 repeatedly strikes the surface of the web of paper 15 with the embossed card B laid thereunder as they pass under the hammer 25, thus printing the embossed portion of the card B on the web of paper 15. After the printing, the web of paper 15 with the card B is further conveyed by the belt 9, and when the end of the embossed card B, in coming out of the outlet 11, depresses the movable contact arm 17 of the stopping switch SW2 to separate it from the stationary contact 18, the switch SW2 is opened, completing a series of operation.

From the foregoing description, it has now become clear that with the printer of the present invention, the printing operation can be performed very easily as the printer is so designed as to print the embossed portion of the card B on the web of paper 15 by repeatedly striking the card surface through the web of paper 15 with the vibrating printing hammer 25 upon insertion of the card B into the inlet 10 of the printer, requiring no manual driving of a printing roller as in the conven-

tional means. Upon completion of the printing, the printer is adapted to stop automatically by the depression of the movable contact arm 17 of the stopping switch SW2 by the embossed card B as it comes out of the outlet 11.

Although the present invention has been fully described by way of example with reference to the attached drawings, it is to be noted that various changes and modifications are apparent to those skilled in the art. For example, the vibrator for the printing chamber can be so designed as to work on the basis of the detection of thickness of the slip paper and embossed card. Similarly, by providing a cutter blade on the upper part of the outlet which is adapted to fall by suitable means when the stopping switch is opened, the web of paper is automatically cut to a required length, thus further increasing efficiency. Therefore, unless such changes and modifications otherwise depart from the scope of the present invention, they should be construed as included therein.

What is claimed is:

1. In combination, a printer for a card having an embossed portion thereon, said printer comprising a housing structure including a horizontal top surface extending from one side to the other and forming a horizontal embossed card travel path, said housing structure including an inlet and an outlet opening in alignment with said top surface on respective sides of said housing structure, an endless conveyor belt rotatably trained over said top surface and extending from said inlet to said outlet opening, an electric motor operatively associated with said conveyor belt and energizable to transport an embossed card inserted within said inlet opening along said embossed card travel path for discharge at said outlet opening, a roll of paper mounted above said endless conveyor belt, a paper drive roller mounted below said roll of paper for rotation about an axis parallel to the axis of rotation of said endless belt, means operatively coupling said motor to said paper drive roller for unwinding said paper from said roll and for feeding said paper along said card travel path and overlying said card such that said card is conveyed to said outlet while sandwiched between the web of paper and the endless conveyor, a vibrating printer mounted within said housing structure above said paper web and downstream of said roll of paper, intermediate of said inlet and outlet, said vibrating printer including a stationary magnetic hammer coil and a vibrating hammer for contact with said paper web, a source of electrical current, a first normally open switch mounted adjacent to said inlet opening and responsive to card insertion for momentary closure, a second normally closed switch mounted adjacent to said outlet opening and responsive to card discharge for momentarily opening the switch contacts thereof, and a third normally open relay switch including normally open contacts and a relay coil for operating the same, and circuit means for electrically connecting said relay coil, said motor and said hammer coil in series with the source of electrical current and in parallel with each other, and parallel paths including said first switch, and said second and third switches respectively connecting said source to said relay coil, said motor and said hammer coil; whereby, insertion of said embossed card into said inlet opening causes said motor to be energized, said hammer coil to be energized, and said relay coil to be energized, effecting transport of said embossed card from

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said inlet opening to said outlet opening during which time said paper web is continuously fed, said vibrating hammer is continuously vibrating and whereupon, discharge of said embossed card automatically opens the holding circuit between the source of electrical energy, said relay coil, said vibrating hammer coil, and said drive motor, terminating operation of said printer.

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2. A printer as claimed in claim 1, further comprising a cutter provided at the upper end of the outlet and adapted to fall when the second switch is opened so as to cut the web of paper to a required length, automatically, after printing occurs.

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