

Nov. 2, 1954

J. L. WAGNER ET AL

2,693,277

CARD EJECTING DEVICE

Original Filed Jan. 9, 1948

2 Sheets-Sheet 1

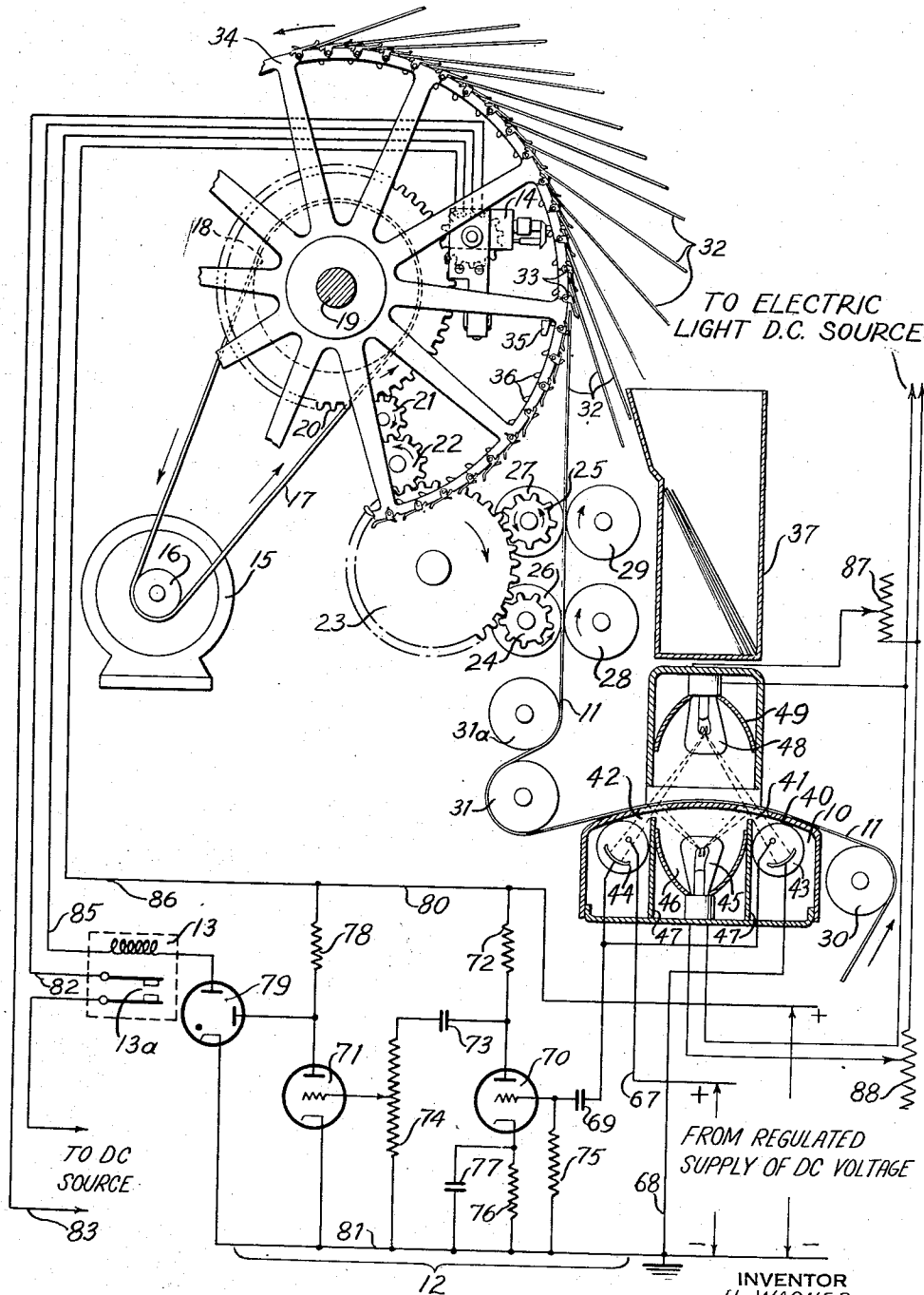


Fig. 1.

INVENTOR
JL WAGNER
R.H. HOLMWOOD
BY
John B. Spangler
AGENT

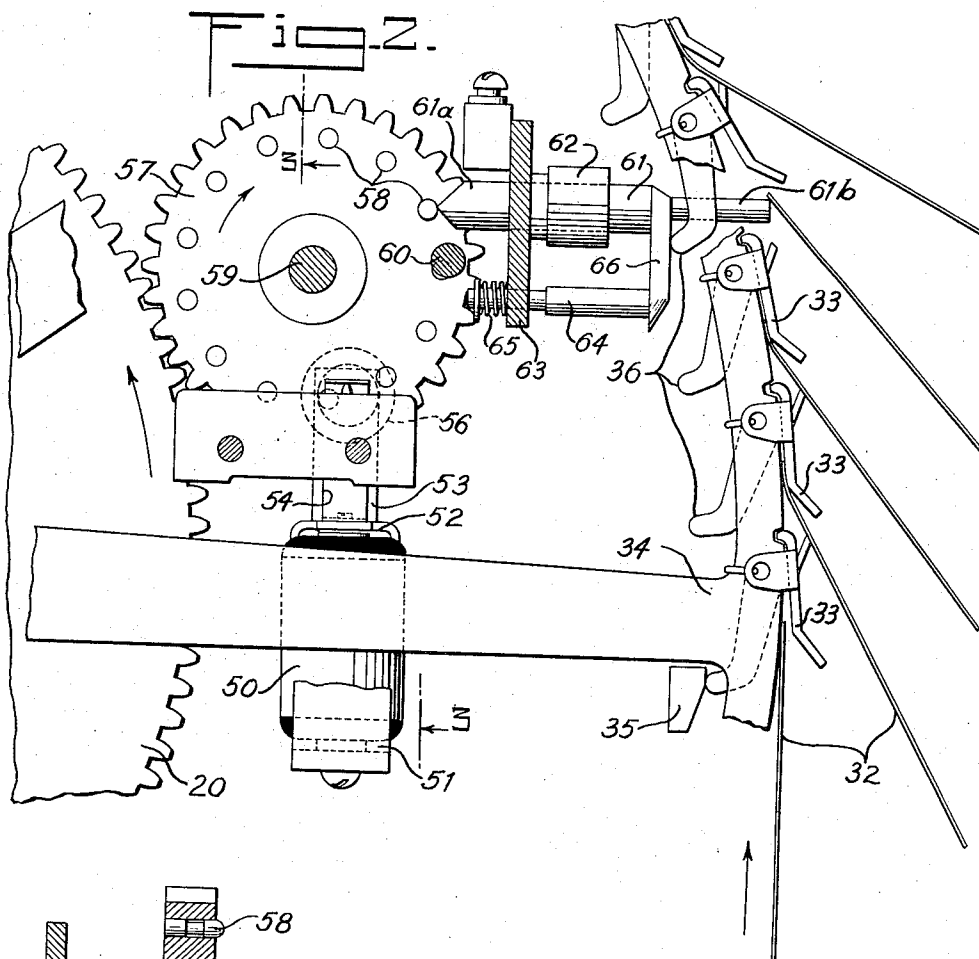
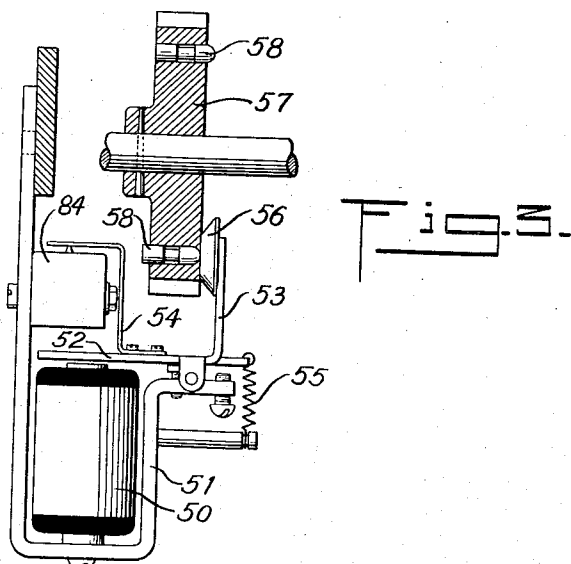
Nov. 2, 1954

J. L. WAGNER ET AL
CARD EJECTING DEVICE

2,693,277

Original Filed Jan. 9, 1948

2 Sheets-Sheet 2



INVENTOR
J.L. WAGNER
R.H. HOLMWOOD
BY
John B. Spousler
AGENT

1

2,693,277

CARD EJECTING DEVICE

John L. Wagner, Endwell, and Richard H. Holmwood, Binghamton, N. Y., assignors to International Business Machines Corporation, New York, N. Y., a corporation of New York

Original application January 9, 1948, Serial No. 1,335, now Patent No. 2,617,048, dated November 4, 1952. Divided and this application December 29, 1950, Serial No. 203,336

2 Claims. (Cl. 209—74)

This invention relates to an ejector mechanism and more particularly to a card ejector mechanism to be used with a record card printing machine of the type shown in U. S. Patent No. 2,181,935 in conjunction with a photoelectric paper inspection device similar to that filed in copending application Serial No. 1,335, now matured into U. S. Patent No. 2,617,048, of which this application is a division.

In the application referred to above, there is disclosed a photoelectric device for inspecting web materials. Since the well-known Hollerith tabulating card requires both precision and quality of manufacture, particularly when it is used in business machines where it is sensed by electrical means, careful inspection of the card or paper stock is required, not only to detect conductive particles or unwanted perforations, but also to detect other imperfections sometimes referred to as "slime spots." The invention disclosed in U. S. Patent No. 2,617,048 is concerned primarily with the detection of "slime spots" or other imperfections, and the present invention discloses a device whereby material is rejected upon determination of its containing the above-mentioned imperfections.

The principal object of this invention, therefore, is to provide apparatus whereby cards containing imperfections may be automatically ejected from a card printing machine.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings which disclose, by way of example, the principle of the invention, and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a side view showing the arrangement of the card ejector mechanism in relation to the card printing machine of U. S. Patent No. 2,181,935 together with the photoelectric device and a circuit diagram of the photo-cell amplifier and other electrical circuits disclosed in U. S. Patent No. 2,617,048 and used in the activation of the card ejector unit.

Fig. 2 is a side view of the card ejector unit.

Fig. 3 is a partial sectional view of the card ejector unit taken along the line 3—3 of Fig. 2.

Referring to Fig. 1 of the drawings the card ejector mechanism 14 is shown as applied to a card printing machine similar to that disclosed in U. S. Patent No. 2,181,935 and of which certain elements are included in the drawing of Fig. 1. Briefly the card printing machine equipped with the additional components of the present invention operates as follows: A motor 15 via a pulley 16 and belt 17 turns another pulley 18 in a counterclockwise direction. The pulley 18 is fixed to a shaft 19 to which is fixed a gear 20 which drives a train of gears 21, 22, 23. The gear 23 engages and drives gears 24 and 25 which are fixed to feed rolls 26 and 27, respectively. The strip 11 is pulled from a supply roll (not shown) by the action of the feed rolls 26 and 27 and their cooperating idler rolls 28 and 29 respectively, over an idler roll 30, over the photoelectric unit 10, over the idlers 31 and 31a between the rolls 26 and 28 and between the rolls 27 and 29. Normally the rolls 26 and 28 are provided with print cylinders (not shown), and a cutter (not shown) is provided with the rolls 27 and 29 for severing the strip 11 into card lengths to form the cards 32. The severed portion of the strip or card 32 is fed upwards until it engages a clip 33 pivotally mounted on and spring urged against the periphery of a carrier drum 34, which is fixed to the shaft 19 and is turned in a counterclockwise direc-

2

tion thereby. A fixed cam 35 engages the tail 36 of each clip 33, as the drum 34 rotates, and pivots the clip 33 (see also in Fig. 2) to receive a card 32, the clip thereafter engaging and retaining the card 32 against the drum 34. (The operation of the above-mentioned mechanism is discussed in greater detail in U. S. Patent No. 2,181,935, but is repeated herein to provide a better understanding of the subject invention.) When a slime spot is detected in the strip 11 by the photoelectric unit 10, an electrical signal is transmitted to the electronic amplifier 12 which operates the relay 13 to control the ejector mechanism 14 to open a clip 33 carrying a card 32 containing the slime spot and to forcibly eject the card from the clip 33 into a reject hopper 37 (see Fig. 1) which is positioned to receive the rejected card. The time constants of the electrical and mechanical components are so correlated that a slime spot detected in the strip 11 at the photoelectric unit 10 is eliminated by the ejection of the record card 32 then containing it as the drum 34 presents the card 32 to the ejector mechanism 14.

Referring again to Fig. 1, and in particular to the photoelectric unit 10, it will be evident that the strip 11 is fed over a curved member 40 containing slots 41 and 42 transverse to the strip 11. Mounted within the unit 10 are two photoelectric cells 43 and 44 and a light source 45, these being arranged so that light from the source 45 is reflected from the surface of the strip 11 at each of the slots 41 and 42 to the photoelectric cells 43 and 44 respectively, sided by a reflector 46. Two light baffles 47 are provided to prevent light from entering directly into the photoelectric cells 43 and 44 from the source 45. A second light source 48 is provided in a mounting directly above the first light source 45, and is equipped with a reflector 49. Light is transmitted from the source 48 through the strip 11 at each of the slots 41 and 42 to the photoelectric cells 43 and 44 respectively. It is apparent that the strip 11 will be scanned by both photoelectric cells 43 and 44 as it is fed over the slots 41 and 42, respectively, not only as a result of light from source 45 reflected from the strip but also as a result of light from source 48 transmitted through the strip. It is obvious also that any variations in the strip 11, for example, a slime spot passing the slots 41 and 42, will vary the amount of light transmitted or reflected into the photoelectric cells 43 and 44.

The card ejector mechanism 14 (Fig. 1) is shown in detail in Figs. 2 and 3, and includes an electromagnet 50 mounted in a yoke 51 carrying an armature 52 having an arm 53 and an auxiliary arm 54. A spring 55 normally biases the armature 52 away from the pole face of the electromagnet 50. On the extremity of the arm 53 is attached a cam disc 56 which coacts with a gear 57 carrying a plurality of pins 58 spaced equidistant from shaft 59 to which the gear 57 is fixed and equally spaced around the face of the gear near its root circle. The pins 58 are slidably mounted transversely in the gear 57 and are of greater length than its thickness. Normally these pins are cammed in a position (as shown by the pin 58 at the top of the gear 57 in Fig. 3) by a tapered cam 60 bearing against one face of the gear 57 as the gear is rotated by the gear 20 which drives it. When the electromagnet 50 is energized, however, the disc 56 is forced against the other face of the gear 57 by the action of the armature 52, thereby camming a pin 58 so that it protrudes from the opposite face of the gear 57 (as shown by the pin 58 at the bottom of the gear 57 in Fig. 3).

Also coacting with the gear 57 and the pins 58 is a plunger 61 slidably supported in a bearing 62 which is attached to a bracket 63 mounted upon the card printing machine and arranged so that a tip 61a engages any pin 58 which has been cammed from its normal position by action of the disc 56. The bracket 63 also holds a plunger or rod 64 which is slidably supported therein and biased normally against the bracket by a spring 65. A circular plate 66 is fastened to the plungers 61 and 64, an extension 61b of the plunger 61 passing through the plate which has its edges chamfered. The extension 61b and the plate 66 are arranged normally not to interfere with the clips 33 or the cards 32 on the carrier drum 34 by the action of the spring 65. However, when a pin 58 is made to project (as shown by a pin 58 in the lower part of the gear 57 of Fig. 3) the plunger 61 will be cammed

to the right (as shown in Fig. 2) as the gear 57 is rotated clockwise due to the camming action of the pin 58 upon the tip 61a. Consequently the plate 66 engages the tail 36 of a clip 33 thereby releasing the card 32 normally retained against the carrier drum 34 by the clip 33 and at the same time the extension 61b contacts and pushes the card 32 to eject it forcibly. Thereafter as the gear 57 continues to rotate, the pin 58 will be cammed into its normal position by the cam 60.

The electronic amplifier 12 is illustrated in the electrical circuit shown in the lower half of Fig. 1. The photoelectric cells 43 and 44 are electrically connected to the amplifier 12 via the connections shown so that the anode of cell 44 is connected to the positive terminal of a direct current supply (not shown) via a conductor 67 and the cathode of cell 44 is connected to the anode of cell 43 of which the cathode is connected to ground via conductor 68. The common connection of the cells 43 and 44 is connected via a capacitor 69 to the control grid of a vacuum tube 70 which is resistance coupled to another tube 71 in the conventional manner via a load resistor 72, a capacitor 73, and a potentiometer 74, which also regulates the amplifier sensitivity. An input resistor 75 is provided for the tube 70 which is self biased to be normally non-conductive by the cathode resistor 76 having a by-pass capacitor 77. The tube 71 is normally conductive and is provided with a load resistor 78. A gas tube 79 is coupled to the tube 71 so that when the latter becomes non-conductive its increased potential drop will be sufficient to energize the former to become conductive to energize the relay 13. The anodes of the tubes 70, 71, and 79 are energized via line 80 which is connected to the positive side of a second direct current supply (not shown) which has its negative side connected to the grounded line 81. When relay 13 is energized its contacts 13a complete a circuit from a third direct current supply (not shown) to the solenoid 50 (see Fig. 3) via conductors 82 and 83. Simultaneously the operation of solenoid 50 causes the arm 54 (Fig. 3) to operate a microswitch 84 which is connected in series with the relay 13, via conductors 85 and 86, thereby opening the work circuit of tube 79.

Normally the amplifier, connected as shown and as described above, is adjusted so that the tubes 70 and 79 are not conducting and tube 71 is conducting, the latter upon being rendered non-conductive causing tube 79 to conduct. When a slime spot of darker color than the paper strip 11 enters over the slot 41, the amount of light falling upon the cell 43 is reduced and the cell becomes less conductive thereby increasing the potential across it and providing a positive pulse to capacitor 69 which causes tube 70 to conduct, tube 71 to become non-conductive to energize tube 79 to conduct and relay 13 to be energized. The relay contacts 13a therefore close and energize solenoid 50 so that the pin 58 opposite the disc 56 is forced to protrude from the gear 57, as previously described. The pin 58, after gear 57 rotates approximately 270 degrees, thereafter engages the tip 61a of plunger 61 which ejects a card 32 from its position upon the drum 34 and a clip 33. The time period of these operations is arranged to coincide with the period required for a point of the strip 11 to pass from the center of the photoelectric unit 10 to a position opposite the ejector mechanism 14 (see Fig. 1) so that the card ejected carries the slime spot detected.

When a dark colored slime spot enters over the slot 42, the light to the cell 44 is reduced and its resistance increases so that a negative pulse is supplied to capacitor 69 and no operation of the amplifier 12 occurs.

When a slime spot of lighter color than the paper strip 11 enters over the slot 41, the light falling on cell 43 is increased and its resistance is reduced and its potential drop reduced so that a negative pulse is supplied to capacitor 69 and no amplifier operation occurs. However, when a light colored or transparent spot enters over the slot 42, the light to the cell 44 is increased and its resistance reduced so that a positive pulse is supplied to the capacitor 69, thereby operating the amplifier to cause the

train of events to occur leading to the ejection of the card 32 containing the slime spot, as previously described.

It is to be noted that the device is in no way limited merely to the rejection of material containing slime spots, since any sudden variation in the paper strip 11 causing a change in the amount of light falling into the cells 43 and 44 will bring about an operation of the amplifier 12 and the resultant operation of the ejector device in the manner already described. Consequently, dark or light marks, holes, or breaks in the strip 11 will bring about similar action and ejection of the cards 32 ultimately containing them.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a card printing machine having a carrier drum containing pivotable clips for holding printed cards, an ejector mechanism comprising a cam for engaging and opening one of the said clips to release a card held thereby and a plunger connected with the said cam for forcibly displacing the said card, resilient means normally restraining the said cam and the said plunger from acting to release and displace a card, a gear, a plurality of pins along the periphery of said gear slidably mounted transversely to its face, each of said pins being longer than the thickness of said gear, means to rotate the said gear at a predetermined rate, a fixed cam bearing against one face of the said gear to press the ends of said pins normally to have their opposite ends protruding from the opposite face of said gear as it rotates, means for selectively camming one of said pins to protrude from its said normal position to engage said plunger, whereby said plunger and said cam are moved to an effective position.

2. In a card printing machine having a carrier drum containing pivotable clips for holding printed cards, a plunger having a cam cooperating surface and an extension for forcibly displacing a card, a camming plate fastened to said plunger for engaging and opening one of the said clips to release a card held thereby, a rod extending from said camming plate, resilient means positioned on said rod for normally restraining said camming plate and said plunger from acting to release and displace a card, a gear, a plurality of pins along the periphery of said gear slidably mounted transversely to its face, each of said pins being longer than the thickness of said gear, means to rotate said gear at a predetermined rate, a fixed cam bearing against one face of said gear to press the ends of said pins normally to have their opposite ends protruding from the opposite face of said gear as it rotates, and means for selectively camming one of said pins to protrude from its normal position to engage the cam cooperating surface on said plunger, whereby the plunger is actuated and said extension and said cam are made effective.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,219,767	Pierce	Mar. 20, 1917
2,034,010	Thomas	Mar. 17, 1936
2,047,221	Pechy	July 14, 1936
2,138,645	Rey	Nov. 29, 1938
2,258,109	Carroll	Oct. 7, 1941
2,363,577	Dexter	Nov. 28, 1944
2,429,331	Sachtleben	Oct. 21, 1947
2,433,685	Dowell	Dec. 20, 1947
2,542,090	Lorenz	Feb. 20, 1951