Oct. 27, 1970 R. V. GRUNDMAN 3,536,571

DEVICE FOR REMOVING MAGNETIC INK CODE MARKINGS

Filed Jan. 24, 1967

FIG. 2

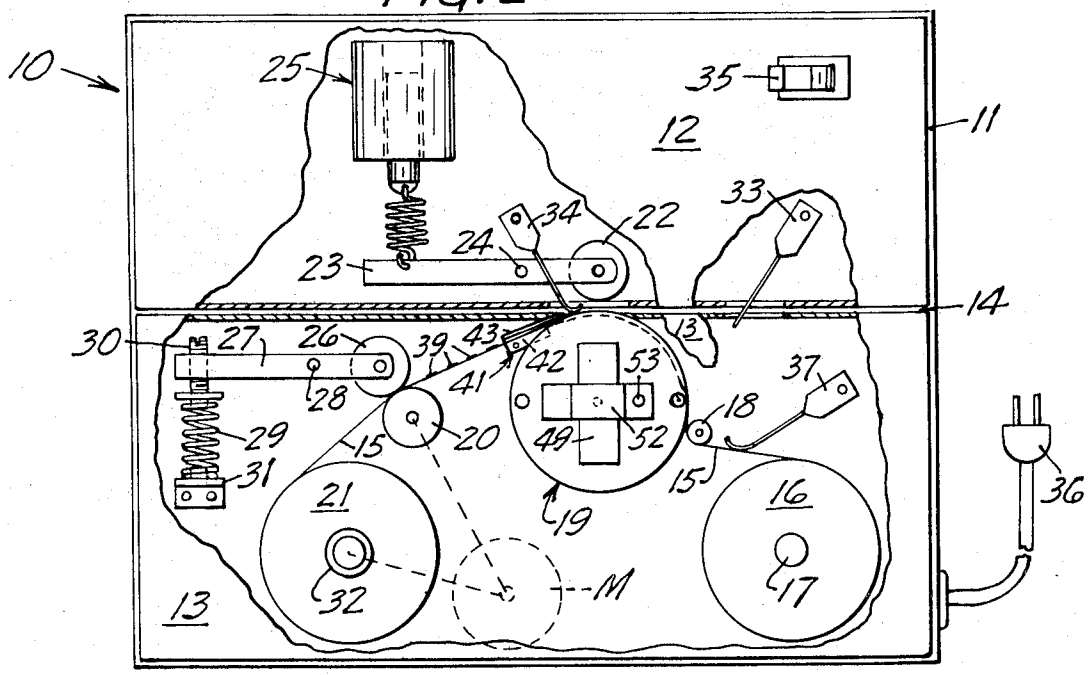


FIG. 3

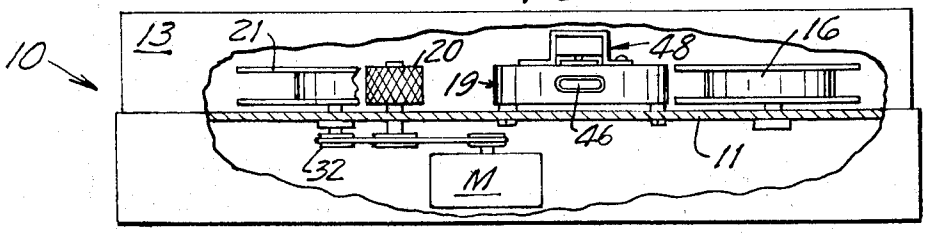


FIG. 5

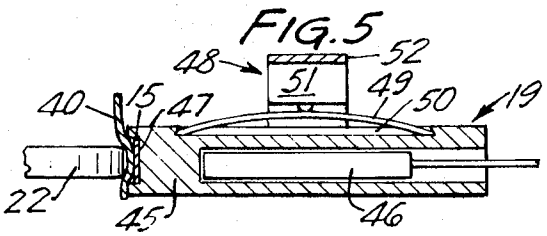


FIG. 1

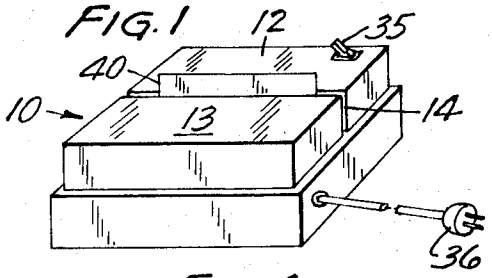


FIG. 6

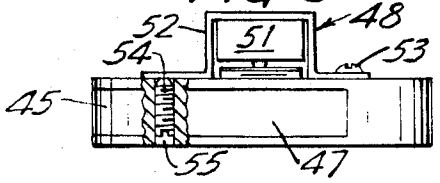


FIG. 4

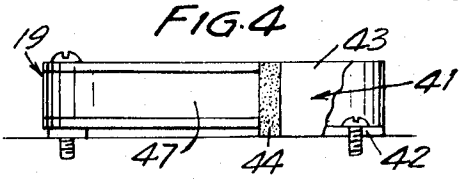


FIG. 7

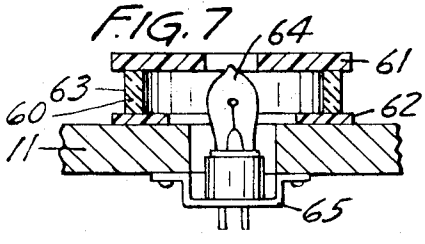
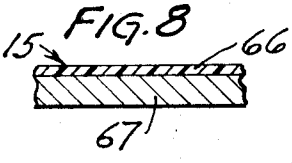


FIG. 8



INVENTOR.
ROGER V. GRUNDMAN
BY
Carpenter, Kinney & Coulter
ATTORNEYS

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DEVICE FOR REMOVING MAGNETIC INK CODE MARKINGS

Roger V. Grundman, Roseville, Minn., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn., a corporation of Delaware

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U.S. Cl. 156—584 5 Claims

ABSTRACT OF THE DISCLOSURE

Machine for stripping magnetic indicia from bank checks presses the check face against a heat-activated tape at a constant temperature heating unit having an indented arcuate face and strips the tape from the check.

BACKGROUND OF THE INVENTION

This invention relates to the erasure or removal of magnetic ink markings particularly as now widely employed on bank checks and the like.

The automatic and mechanical processing of checks and similar documents has been greatly facilitated by placing on the face of the document code markings or other indicia in magnetic ink, such for example as described in Peshin U.S. Pat. No. 3,284,360 and in Allyn U.S. Pat. No. 2,584,318. These markings are decoded by the processing machines which then compile the results and direct the documents accordingly.

Errors are occasionally made in applying the magnetic code marks, and for this or other reasons it becomes necessary to remove the erroneous markings. The present invention is directed to novel and improved methods and means for accomplishing such removal.

The encoding materials used in applying magnetic indicia to checks and other documents are typically in the form of coatings, on a suitable carrier, composed of particles of ferromagnetic materials, e.g., magnetic iron oxide, dispersed in a soluble waxy or polymeric binder. Accordingly it has been standard practice to remove the dried deposits of magnetic ink by means of solvents applied with a swab or dauber. Chlorinated solvents, such as trichlorethylene, are frequently used for this purpose. Continued exposure to the vapors of such solvents is both unpleasant and harmful. Complete removal of the deposited ink is difficult. The swab or dauber must be frequently cleaned or replaced.

SUMMARY OF THE INVENTION

It has now been found possible to obtain rapid and complete removal of magnetic ink markings without the difficulties associated with the solvent process, by first heat-bonding to the markings a thermoplastic erasure tape or strip material which, together with the ink deposit, is then removed from the clean surface of the document by stripping, using a self-contained and automatic tape applying and removing machine as will now be further described in connection with the accompanying illustrative drawing.

THE DRAWING

Apparatus and strip material useful in carrying out the indicia removal operation just described, with particular reference to the processing of bank checks and the like and in accordance with the principles of this invention, is illustrated in the accompanying drawing, in which:

FIG. 1 is a view of the device in perspective showing a bank check in position for treatment;

FIG. 2 is a top plan view and FIG. 3 is a partial elevation of the device of FIG. 1, with portions cut away or in section to show interior construction;

FIG. 4 is a view in elevation showing a portion of the heater unit and the separator unit, the latter being partly cut away;

FIG. 5 is a sectional elevation of the heater unit and showing the relative location of the pressure roller, tape strip, and check;

FIG. 6 is an elevation, partly in section, of the heater unit taken at right angles to the view of FIG. 5;

FIG. 7 is a partial elevation in section of an alternate form of heater unit; and

FIG. 8 is a representation in cross-section of a segment of indicia-removal tape.

THE PREFERRED EMBODIMENTS

The device **10** of FIG. 1 is shown in FIGS. 2 and 3 to comprise a panel **11** supported on a lower compartment or frame and in turn supporting two box-like cover members **12** and **13** separated by a narrow slot-like space **14** and enclosing mechanism as will now be described in conjunction with its mode of operation.

A narrow strip of erasure tape **15** is drawn from supply roll **16** mounted on spindle **17**, around an idler roll **18** and over an arcuate portion of the periphery of a stationary heater **19**. The tape then progresses to a drive wheel **20** and to a constant torque takeup reel **21**.

A pressure roller **22** mounted on a supporting arm **23** movable about a pivot **24** and normally biased away from heater **19** is in position for being urged toward the heater by tension supplied by an electromagnet **25**. A rubber-covered pressure roller **26** supported on arm **27** movable about pivot **28** is urged toward knurled drive wheel **20** by means of spring **29**, the pressure being adjustable by screw support **30** and against block **31** attached to the base **11**.

A motor indicated by the symbol M and located beneath the base **11** is attached directly to the shaft of roller **20** and through a slip clutch **32** to takeup reel **21**.

The motor M is driven by power supplied through an electrical relay actuated by microswitch **33**, the control arm of which is biased to the left as shown in FIG. 1 when the switch is in "Off" position. The same switch and relay actuates the electromagnet **25**. A second microswitch **34** maintains the connections established by switch **33** until deactuated. Electrical power is supplied through cord and plug **36** connected through a master switch **35**.

In operation and with the heater **19** at operating temperature, inserting a check **40** into the slot **14** from the left edge of the machine of FIGS. 1 and 2, and then moving the check to the right past the contact arm of switch **34**, past the pressure roller **22** and into contact with the switch **33**, actuates both switches, and thereby starts the motor M and energizes the electromagnet **25** to force the printed face of the check against the tape **15** which in turn is forced into heat-conductive contact with the edge of the heater **19**. The motor causes rotation of the drive roller **20** and takeup reel **21**, drawing the tape and check back to the left as viewed in FIGS. 1

and 2. The check remains within the slot **14**, being prevented from following the tape by its own rigidity assisted by the stripping action of a separator **41**, shown also in FIG. 4. The separator **41** consists of a thin metal plate folded along its longitudinal center to provide a base **42** and an upright **43**, the forward edge of the latter being provided with a friction-resistant coating **44**, for example of polytetrafluoroethylene.

The tape is separated from the check **40** and is stripped away as it progresses toward the roll **20**, taking with it the magnetic indicia **39**, and forcing the check, now freed of magnetic indicia, back to the left and out of contact with the heater **19**. A stripping speed of about two inches per second is suitable. At this point the switch **34**, the switch arm of which has meanwhile assisted in holding the check and tape against the heater, is opened, thus deactuating the mechanism, and the check is removed.

A safety switch **37** senses the presence of tape **15** at the supply roll **16** and prevents operation of the device in the absence of a supply of tape.

The heater **19**, as seen in FIGS. 5 and 6 and partially in FIG. 4, consists of a short cylinder or disc **45** of aluminum drilled to receive an electrically operated cartridge type heater element **46** which is connected into the electrical circuit through appropriate leads, not shown. The portion of the edge of the disc **45** over which the tape **15** slides is centrally indented as indicated at **47**, the outer ridges and central surface being smoothly polished and optionally lightly coated with polytetrafluoroethylene. The width of the indentation is approximately twice the width of the pressure-roller **22**, the latter being centrally located with respect to the former, as indicated in FIG. 6. Temperature variation at the surface of the cylinder is controlled by thermostat **48**. In normal usage the temperature is held to within ±2½° F. which is adequate for the purpose.

A convenient form of thermostat **48**, shown assembled on the heater disc **45** in FIGS. 5 and 6, consists of a bowed spring steel bridge member **49** supported at the ends within a shallow central slot **50** in the upper surface of the cylinder **45** and with its raised center in position to press against the control member of a microswitch **51** supported within a frame **52**. The frame **52** is fastened to the surface of the disc **45** at one end by a screw **53**; the other end presses against an adjustment screw **54** recessed within a threaded bore **55** in the disc and accessible from beneath and through a corresponding opening in the base **11** for adjustment of the thermostat. The structure described avoids damage to the microswitch **51** as well as providing means for adjustment and maintenance of temperature. Expansion of the disc **45** with increasing temperature permits the bridge **49** to lower and thereby deactuate the switch **51**. Excessive contraction of the disc and raising of the bridge raises the free end of the frame **52**, and injury to the switch **51** is avoided. For convenience in operation it is found desirable to invert the heater so that the thermostat assembly **48** extends downwardly through a suitable opening in the base **11** and the adjustment screw is accessible from above on removal of the cover **13**. A heat-insulating pad or cover, e.g., of fabric or sponge, is then preferably installed on the flat exposed upper surface of the disc **45** for the protection of the operator during removal or replacement of the tape **15**.

An alternate form of heater is shown in FIG. 7. The heater **59** comprises a transparent glass or plastic ring **60** held in place between an open-centered cover **61** and support ring **62** providing an indented edge **63**, and enclosing a heat lamp **64** supported from beneath the base **11** on a bracket **65**. The lamp is desirably a prefocused iodine vapor quartz envelope incandescent filament lamp which is connected to a source of power simultaneously with the motor M through the action of switches **33** and **34**. The radiation from the lamp is transmitted through the glass ring **60** and the removal strip **15**, and is absorbed in the printed indicia on the check **40**, causing the desired heating effect for bonding the ink to the strip. The surface of the ring may be treated with a low-friction material if desired, or the ring may be constructed of polymethyl methacylate or other low-friction material. With this form of heater unit, the removal strip or tape is preferably selected to be transmissive of the heat-inducing radiation, although radiation-absorptive tapes which themselves become heated by absorption of the radiation may be used if desired.

A particular effective erasure tape **15** for the removal of inks made with a thermoplastic binder may consist, as shown in FIG. 8, of a thin (.004 inch, about 0.1 mm.) coating **66** of normally nontacky, heat-activatable copolymer of methyl methacrylate and ethyl acrylate, such as "AC–33" acrylate, on a backing **67** of bleached kraft paper having a basic weight of 15 lbs. (24 x 36 x 500). The strip is ½ inch wide, i.e., the same as the width of the indented surface **47** of the heater **19**, and has a tensile strength of 16 lbs., which is ample to withstand the forces necessary to the effective operation of the machine. Coating weights of less than about 2 to 4 mils produce erratic erasure. Larger amounts of polymer are equally effective but above about 8 mils require excessive heat input and are uneconomical. The polymer is heated at the heater **19** to a point of preliminary softening, i.e., to approximately 245° F. At that temperature, and under the pressure of the roll **22**, the polymer adheres firmly to the magnetic ink markings but very lightly, if at all, to the unmarked surface of the document. The magnetic ink markings are removed; the paper surface is undisturbed.

The relative dimensions of the heater **19**, pressure roller **22**, and removal strip **15** will be seen to be such that the strip fits against the indented surface **47** whereas the check **40** is laterally bowed. The effect is illustrated at FIG. 5. As a result, the check is reinforced sufficiently to be prevented from bending and following the strip as the two are caused to advance together during the stripping operation, thereby further facilitating separation of strip and check. It will be appreciated that the height of the heater above the base **11** on which the edge of the check rests in adjusted to cause the line of printed indicia to fall at the midpoint of the heater edge and removal strip and in line with the pressure roll.

What is claimed is a follows:

1. A device for removing magnetic ink code markings from paper documents by a process involving stripping from the document a thermoplastic erasure tape overlying and bonded to said code markings, said device including, in combination, heater means for activating said tape, pressure means for pressing said document with its said markings against the activated tape surface, stripping means for separating said document and said tape, and power-applying means for advancing said document past said heater means, pressure means, and stripping means.

2. The device of claim **1** wherein said heater means has an indented arcuate contact surface for imparting to said documents a slight lateral bow.

3. The device of claim **1** wherein said heater means comprises a heat-expanding metal block carrying a bowed resilient bridge supported thereon at its ends and in position to contact a switch arm for actuating a heater element in said block as said block contracts on cooling.

4. The device of claim **2** wherein said heater means includes a source of radiation for heating said code markings and is transmissive of said radiation between said source and said contact surface.

5. The device of claim **1** wherein said stripping means comprises pull means for drawing the tape over and away from said heater means, and a low-friction separator plate closely alongside the tape travel path for separating said documents, freed of said code markings, from said tape.

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LELAND A. SEBASTIAN, Primary Examiner

U.S. Cl. X.R.

156—247; 161—406; 221—73; 283—58; 346—1