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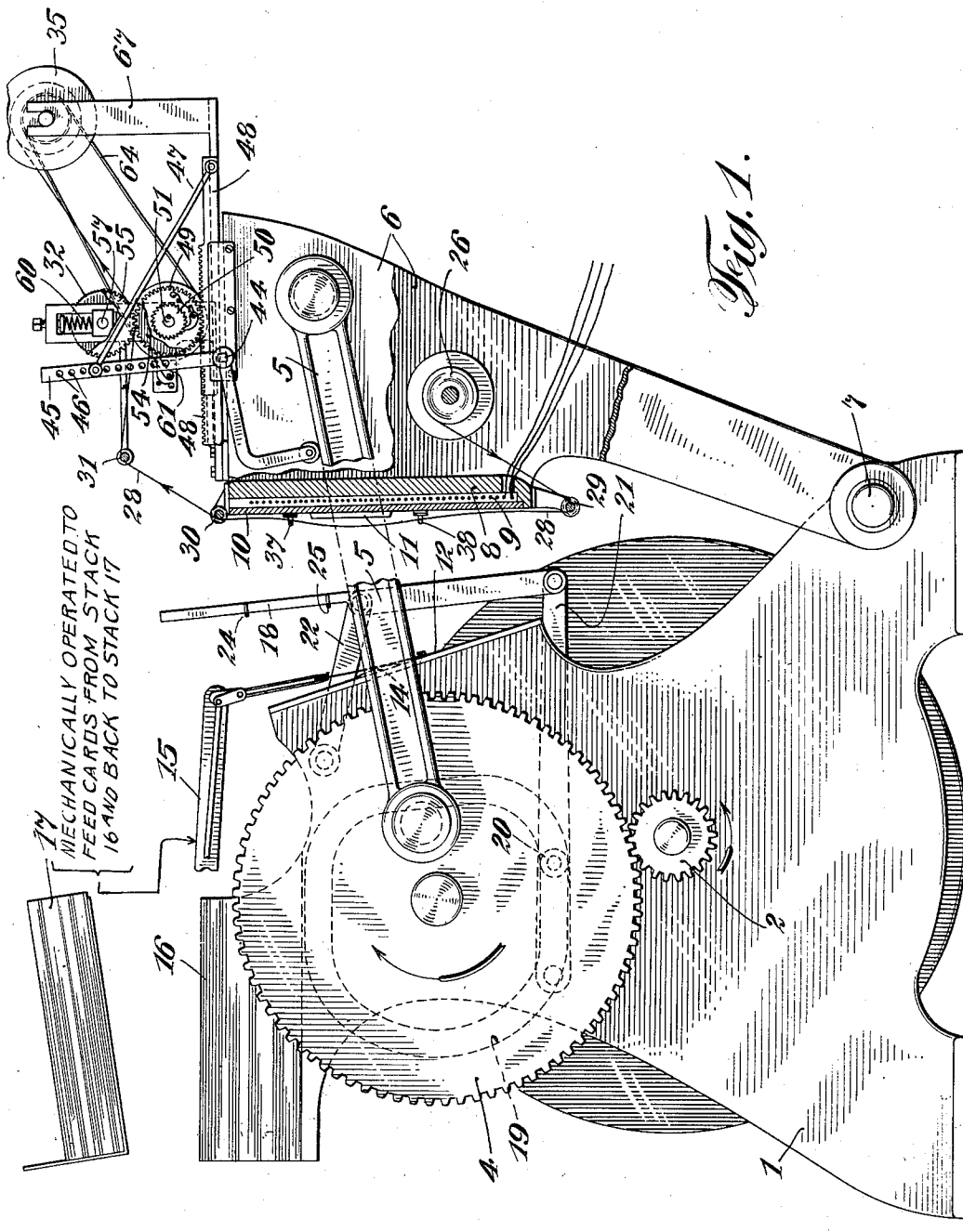
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1,650,666

METHOD AND APPARATUS FOR HOT STAMPING WITH FULL AUTOMATIC PRESSES

Filed Oct. 19, 1926

6 Sheets-Sheet 1



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6 Sheets-Sheet 2

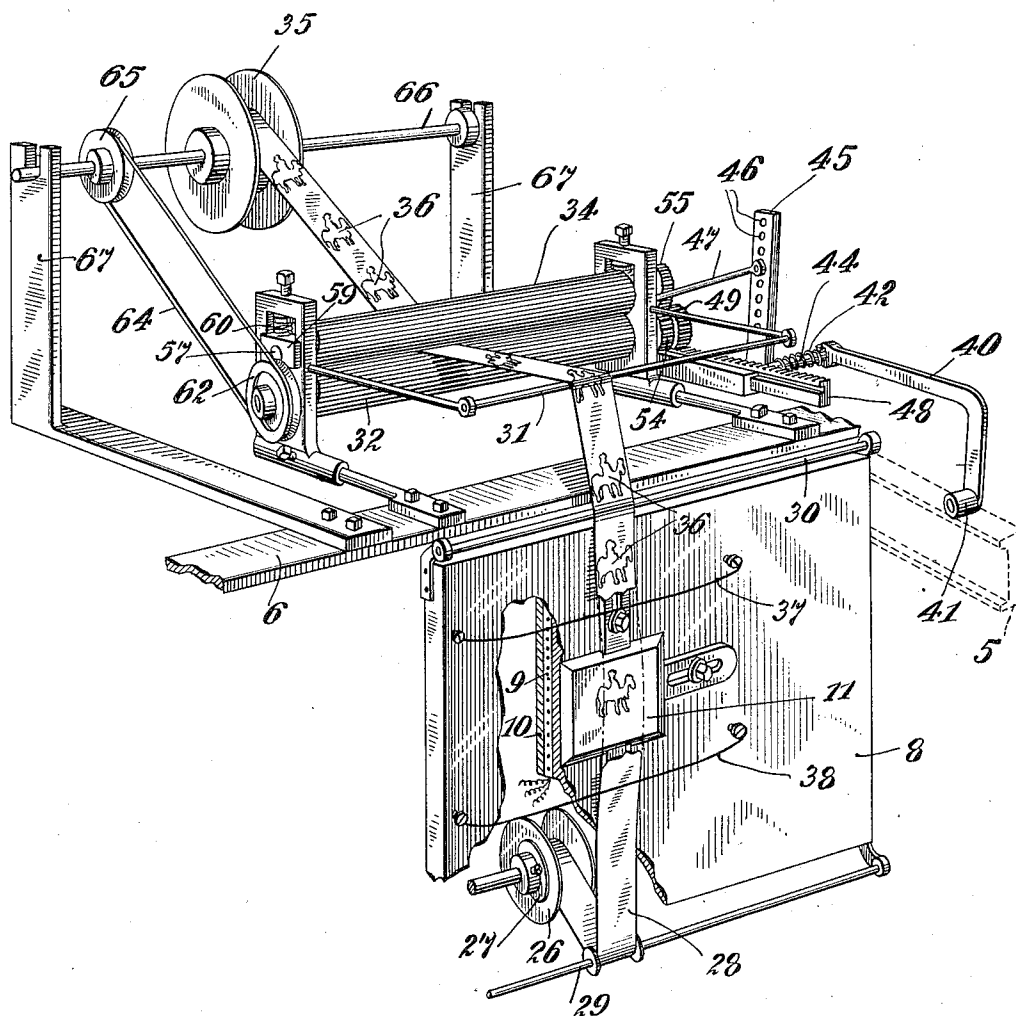


Fig. 2.

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6 Sheets-Sheet 3

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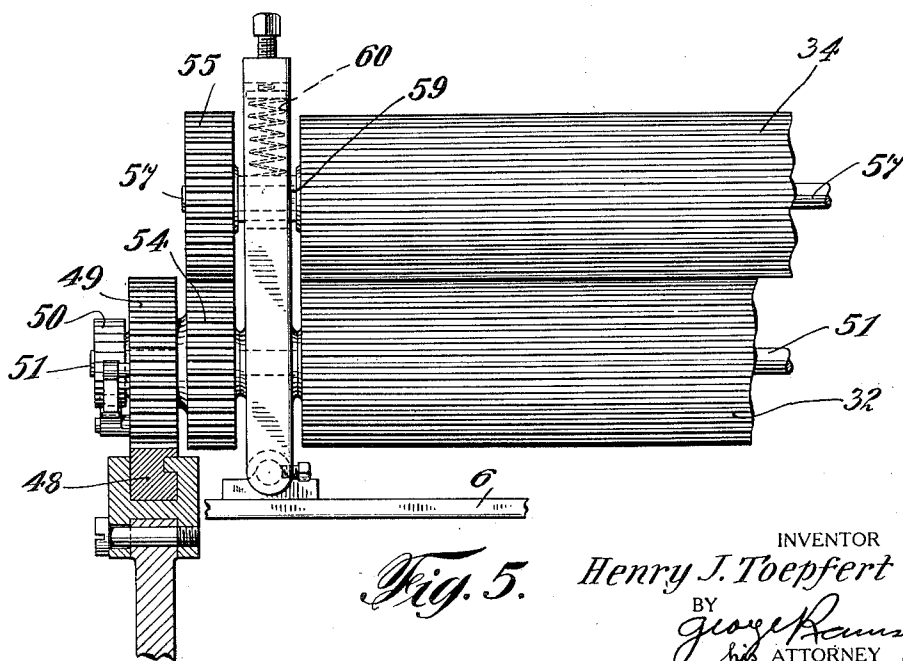
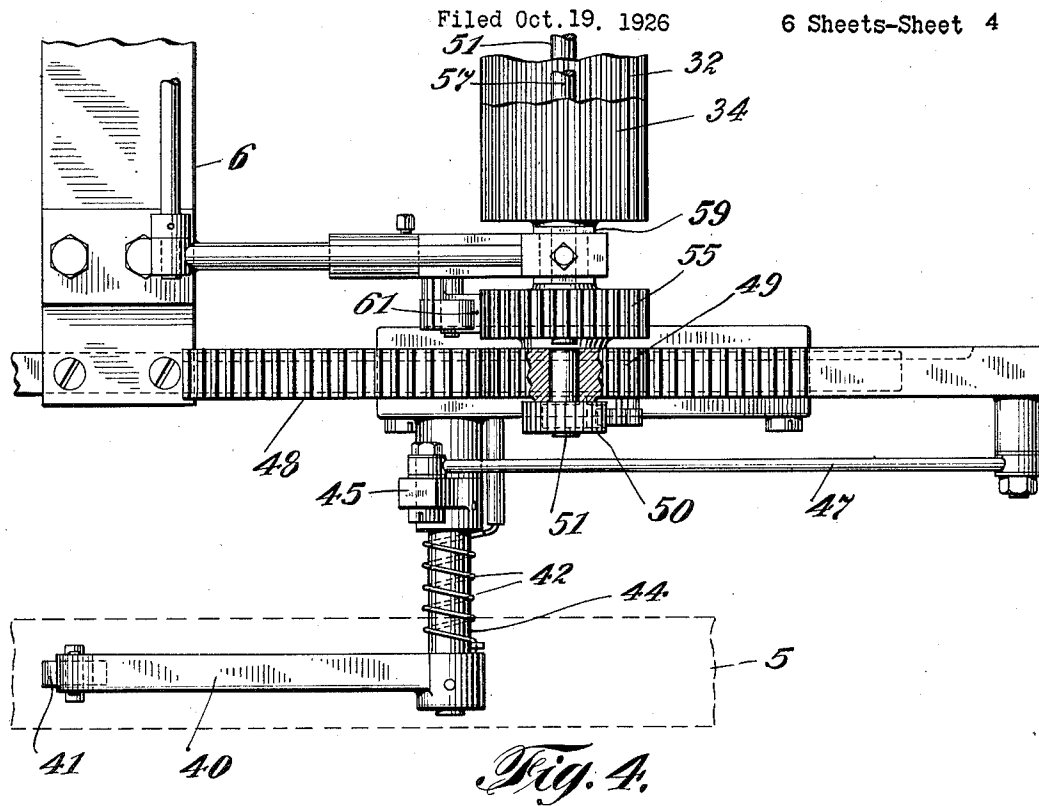
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6 Sheets-Sheet 4



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6 Sheets-Sheet 5

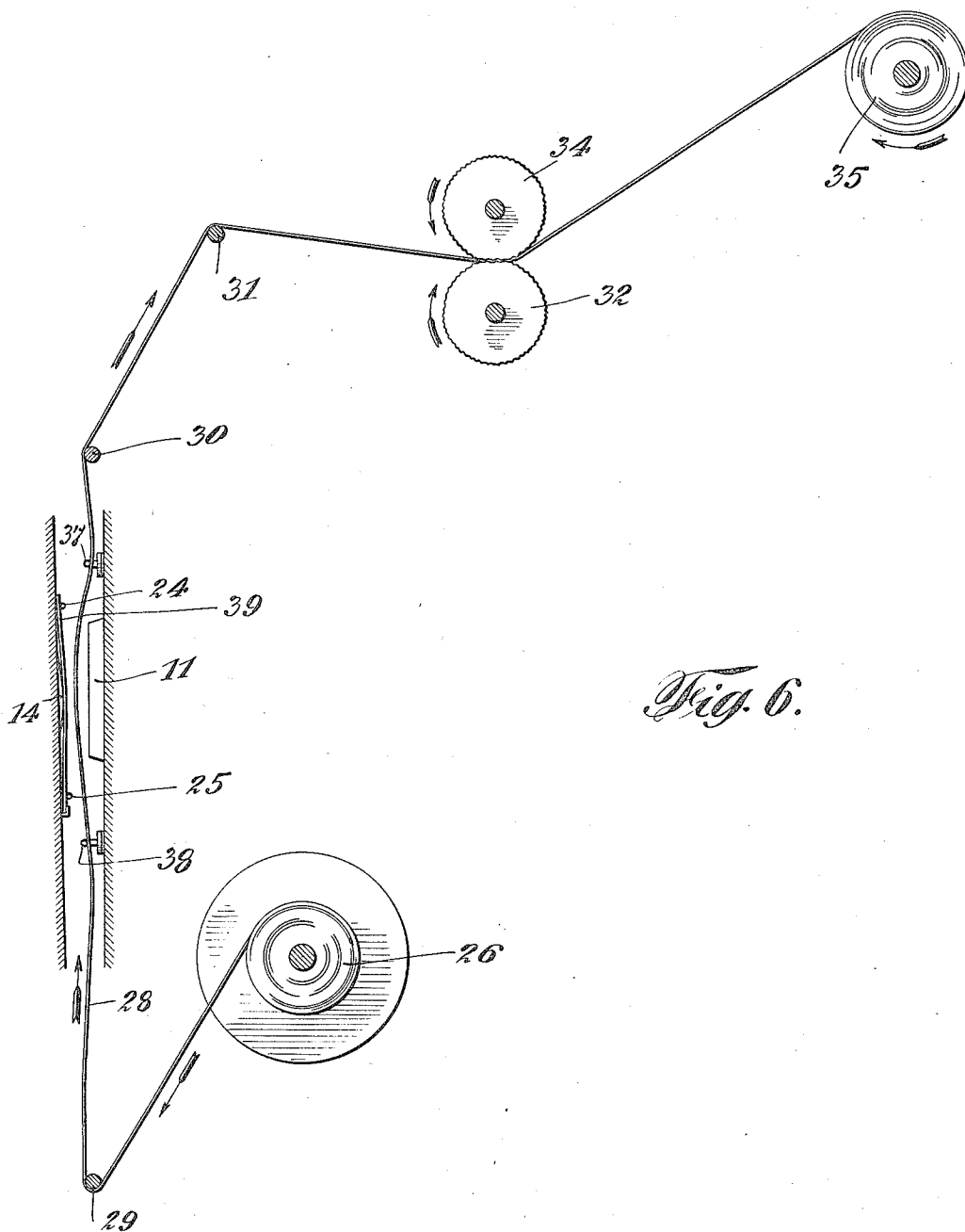


Fig. 6.

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6 Sheets-Sheet 6

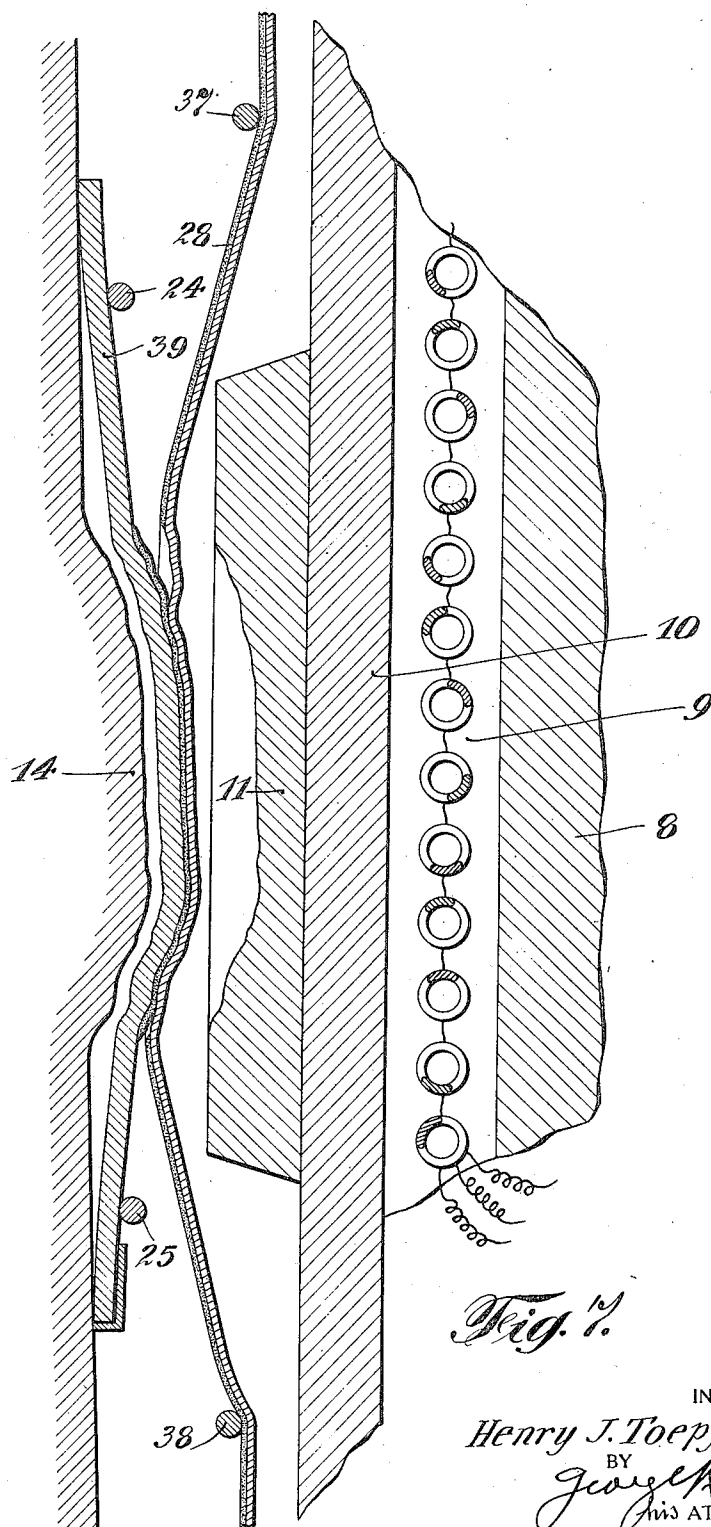


Fig. 1.

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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR HOT STAMPING WITH FULL AUTOMATIC PRESSES.

Application filed October 19, 1926. Serial No. 142,554.

The present invention relates broadly to the art of hot stamping cardboard, sheets of paper, or the like, and more especially to a method and apparatus for hot stamping of cards in embossed designs in color (or metal) in very rapid sequence. By means of the invention cards, such as Christmas cards, may be machine fed to and delivered from a continuously running press at a speed equal to that used in ordinary type printing operations.

In hot stamping on cards the color, gold or other metal, is carried on a paper backing or the like, usually a strip in roll form, by means of a binder that may be melted by heat. The color strip is forced against the card by a hot die which melts the binder and leaves the metal such as gold, silver, etc. (or color as the case may be) on the card, usually over an embossed figure. This operation is commonly carried out by special presses that are hand fed at a slow rate.

It has been proposed to utilize the ordinary printing press for hot stamping on rolled paper, by permitting the paper and color strip to move together, thereby obtaining the same long period of time, as in hand feeding, to elapse before attempting to separate the paper and the color strip (see U. S. Patent 1,549,065, to Coon August 11, 1925). This allows time for the melted binder to cool before it is necessary to strip the color strip from the paper. This idea is not adaptable to hot stamping cards, because cards must be individually fed to and from the press and are not adaptable for travel with the color strip.

A printing press provided with machine feed and delivery mechanism (known in the trade as an "automatic" press) for ordinary printing with type on cards operates at a very much higher speed than a hand fed press. With this kind of a press the machine itself feeds and delivers the cards without the intervention of a human operator. As is said in the trade, the machine operates "automatically"; and the speed is such that the time interval between the impression and the separation of the type from the card is very short, and would not be sufficient to permit the cooling of a color strip binder which is necessary before the carrier strip may be removed from the card.

I have found that hot stamping on cards

may be carried out at high speed in conjunction with a machine feed and delivery mechanism by arranging the supports for the card and for the color strip in such manner that the opening of the bed and platen will tend to raise the stamped portion of the card slightly from the platen and also permit the paper strip to separate from the die, thereby facilitating circulation of air, which rushes in back of the color strip as it leaves the die and rushes in under the card when it is lifted. Preferably, the supports for the color strip are arranged to permit a sufficient slack in the strip to cause an angular pull between the color strip and the card so that the color strip is peeled from the card rather than being lifted directly therefrom. This desirable operation may be produced by arranging yielding supports for the color strip or by allowing sufficient slack to the color strip so that the peeling action is produced as the bed of the press moves away from the platen.

In the color stamping of cards handled by full machine operated feed and delivery mechanism (or as said in the trade by a full "automatic" press), it is necessary that the color or metal strip shall be stripped from the card quickly after the heat is applied during the embossing operation, at the same time the stripping must not be so quick as to tear the color strip. I have found that by holding the card in the manner described so as to allow the card to yield the color carrying strip may be quickly separated from the card without injuring the metal, or color, on the card or without tearing the color carrying strip. While various types of presses may be used, an oscillating bed press, the upper edge of which has a greater linear movement than the lower edge, is admirably adapted for use in carrying out my invention. According to my method, the stripping operation unpeels the strip from the card as the dies are opened and permits the resilient elastic forces in the card itself to regulate the peeling forces during stripping action.

The above specified method permits sufficient cooling to take place in the time allowed with the fast operation of a full mechanically operated feed and delivery press. The cooling air is automatically drawn in to the heated zone in three layers, namely, one

layer flowing between the hot die and color strip as the die recedes; the second layer flowing between the card and the cold die as the color strip lifts the middle of the card
 5 from the cold die; and the third film of air flows between the color strip and the card during the peeling action. The third cooling film of air becomes effective after the first and second layers have been in contact
 10 with the back of the card and the back of the color strip while the card and the color strip are still stuck together. An important factor appears to be a provision for holding or guiding the color strip in such manner as to cause an angular pulling away of
 15 the color strip from the impressed card to facilitate peeling the strip from the card.

The disclosure herewith comprising this specification and drawings are for the purpose of describing the principal of operation of my invention in accordance with the requirements of the patent statutes. However,
 20 I realize that the invention may be carried out in mechanisms other than that herewith disclosed, and, therefore, I desire that this disclosure shall be considered as illustrative and not in the limiting sense.

Throughout the several figures of the drawings, like characters are utilized to
 30 represent like parts.

Fig. 1 is a diagrammatic representation of portions of an oscillating bed printing press known in the trade as a full automatic press. Many parts of the printing press that are
 35 well known in the art are omitted for the sake of clearness.

Fig. 2 is a view which illustrates in perspective a preferred arrangement for mounting the color strip mechanism on the bed portion of such an oscillating press.

Fig. 3 is a detail end elevational view of part of the strip feeding mechanism.

Fig. 4 is a plan view of a portion of the feeding mechanism illustrated in Fig. 3.

Fig. 5 is a detail side elevational view of one end of the color strip feed rolls.

Fig. 6 illustrates a preferred arrangement of travel for the color strip when mounted on an oscillating bed press.

Fig. 7 illustrates the beginning of the separation of the color strip from an embossed card according to my invention.

Referring now to the drawings and more especially to Fig. 1, the diagrammatic illustration of the printing press comprises a
 55 frame 1 supporting a main shaft carrying a pinion 2, a pitman gear 4 driven by the pinion 2, and connected by pitman 5 with the oscillating bed arms 6 which may be pivoted at 7 to the frame 1 and which carries the usual bed 8. This bed is provided with an electric heater 9 which heats the face plate 10 of the bed. This face plate 10 carries a die 11 of metal, or the like, which is
 65 heated from the face plate 10, which in turn

receives heat from the electric heater 9 so that the die is maintained hot during the operation of the press. The platen 12 of the press carries a corresponding die 14 which is adapted to register with the hot die 11 carried by the bed 8 of the press.

In order to avoid confusion, the mechanically operated feed and delivery mechanism for placing cards in position on the platen and removing the same after the stamping
 75 operation, has been omitted. Any mechanism for this purpose well known in the art may be utilized and as a matter of illustration, reference is made to the mechanism disclosed in U. S. patent to Cheshire
 80 1,145,405, July 6, 1915, as illustrating a device capable of performing this operation, and the delivery arm 15 is the only feature of this mechanism shown herewith with the exception of the stack 16 of cards to be fed
 85 and the stack 17 of embossed cards which have been delivered from the press.

After a card has been machine fed to position on the platen 12, a holder frame 18 moves downward by action of the cam 19
 90 operating on the roller 20 on the operating arm 21 for the holder frame 18. This holder frame may be guided by a pivoted guide link 22 to have a downward and inward movement so that the cords or wires
 95 24 and 25 on the holder frame contact with the upper and lower margins of the card and hold the card in position after the embossing operation is completed and until the color strip has been removed from the card
 100 at which time the holder frame moves upwardly out of the way and the delivery mechanism is effective to deliver the card from the platen and stack the same upon a stack of delivered cards 17.

The usual inking mechanism has been removed and a color strip feed mechanism has been mounted in its place. Referring now more particularly to Figs. 1, 2 and 6 which illustrate a preferred mechanism for the
 110 color strip, a supply roll 26 is mounted back of the bed 8 and may be provided if desired with a suitable friction brake 27 which tends to provide tension on the color strip. Preferably, the color strip 28 is led downwardly at a relatively sharp angle from the supply roll 26 over a lower guide roll 29
 115 where the color strip 28 makes an acute angle and travels upwardly over the face of the hot die 11 on the bed of the press. Then the color strip is carried over a top guide roll 30 and then backwardly at an angle over a front guide roll 31 to corrugated feed rolls 32 and 34, and finally to the take up roll 35. The color strip bearing
 120 areas 36 in which color has been taken, is positively gripped between the corrugated feed rolls 32 and 34 so that it is given a positive upward feed over the hot die 11. The sharp angle which the color strip makes
 130

in going over the lower guide roll 29 tends to put the portion of the color strip over the platen, under a slight tension during the peeling operation. This tension may if desired be regulated by a friction brake 27. A pair of resilient wires or cords 37 and 38, arranged one on each side of the hot die 11 provide a relatively small free section to the color strip between these wires and over the hot die. When the dies are closed, the color strip is tightly compressed against the card over the pressure area portion of the two dies, and the pigment from the color strip is left on the card because of the melting of the binder from the pigment due to heat from the hot die. The cold die 14 preferably is of sufficient height that only the embossed portion of the card is under pressure.

After the impression is made and the dies start to open, a condition arises as is illustrated in Fig. 7. The opening of the bed from the platen pulls the back of the color strip away from the hot die 11 and air immediately rushes in between the hot die and the color strip. The continued opening of the bed begins to put stress upon the color strip 28. This is resisted by the wires 37 and 38 so that a slight pull is exerted on the card 39 due to the color strip sticking to the card over pressure zone of the dies. This action slightly lifts the stamped portion of the card from the die 14 and permits air to rush under the card. The cool air beneath the card and also in back of the color strip tends to chill the material transferred from the color strip to the card. The continued movement of the bed increases the pull on the color strip and also the angularity between the color strip and the card. This bows out the card and gradually peels the color strip off of the card in a manner as illustrated in Fig. 7, thus leaving the color upon the card and freeing the strip from the card. This peeling operation also facilitates the entrance of air between the color strip and the card and further cools the binding material. As the bed continues its opening, the color strip is entirely peeled from the card, so that the card is left free to be lifted from the press by the delivery mechanism. This arrangement which causes the peeling action of the color strip from the card facilitates rapid cooling so that I am enabled by this system of embossing and applying color by hot stamping to adapt the same to the rapid operations produced by a press provided with a full machine feed and delivery mechanism.

Referring now to Figs. 2, 3, 4, and 5, the mechanism for feeding forward the color strip comprises an operating arm 40 provided on its lower end with an antifriction roll 41 which is maintained in engagement with the top of the pitman 5 by means of

a spring 42 coiled around the shaft 44 on which the operating arm 40 is mounted. This shaft 44 carries on the other end an arm 45 which is provided with a plurality of openings 46 in which the pivot for the link 47 may be placed in order to adjust the effective operation of the link, and thereby the feed of the strip, by placing the pivot thereof nearer to or further away from the axis of the shaft 44. This link 47 connects with a rack 48 in such manner that the rack is moved to and fro, when the arm 45 oscillates. A drive gear pinion 49 is in mesh with the rack 48 and carries a ratchet mechanism 50 in such manner as to communicate the rotation of the drive pinion 49 to the roll shaft 51 when the rack moves forwardly, and the pawl of the ratchet mechanism 50 rides idly over the ratchet wheel when the rack moves backwardly. The roll shaft 51 carries a pinion 54 which meshes with an upper pinion 55. The roll shaft 51 also carries the corrugated roll 32, while the pinion shaft 57 on which the upper pinion 55 is mounted carries the upper corrugated roll 34. This upper roll is mounted in bearings 59 which are pressed downwardly by means of adjustable springs 60 in order to form line of pressure contact with the lower feed roll 32. A dog 61 is arranged to cooperate with the lower pinion 54 to prevent backward movement of the rolls so that the feed of the color strip is in one direction only. The shaft 51 is provided on its other end with a pulley 62 which carries a belt 64 that runs to another pulley 65 on the take up shaft 66. This take up shaft 66 is mounted in arms 67, and carries a take up reel 35.

As the press operates, a card is fed in position on the platen by the full machine operated feed mechanism (not shown), the holding frame 18 descends to lay the cords or wires 24 and 25 over the margin portions of the card. The bed of the press approaches the platen and pressure is applied between the dies, thereby causing the hot die 11 to tightly press the color strip 28 against the card 39 which rests upon the corresponding cold die 14. The pigment binder is melted by this application of heat and pressure and then the press starts to open by the swinging of the bed outwardly on the pivoted bed arms. When this takes place the peeling action, previously referred to occurs. After the color strip is peeled from the card, the holder frame rises, and the delivery mechanism lifts the card from the platen and delivers it to the stack of embossed cards. During the latter part of the opening of the press and the first part of the closing of the press, the forward end of the pitman 5 has been oscillating in a downward direction and this causes the arm 40 to swing in a downward arc under the influ-

ence of the spring 42 thereby causing the pawl of the ratchet mechanism 50 to engage the teeth of the ratchet, and through the pinions 54 and 55 to turn the feed rolls and feed the color strip forwardly one step. During the latter part of the closing and the first part of the opening of the press, the arm 40 rises and the pawl of the ratchet mechanism 50 rides idly over the ratchet teeth.

Heretofore in the art of applying gold to fine cards such as Christmas cards, it has been customary to take at least two operations to apply gold to embossed portions of cards. One step being the application of the color, or metal, and the other being a burnishing and embossing step. In these operations of the prior art, a large amount of hand work was necessary, requiring three operators to each press, namely, a feeder, a lay-off man, and a press man. Furthermore, there was the important question of registration to be dealt with. The maximum output by the prior art method was approximately 8,000 cards per day for each operation; and since two operations were required for each card, it took a press and three operators two days (i. e. 16,000 operations) to finish 8,000 cards. The present invention, whereby the operations are performed entirely by the machine, enables one press man (no other operators being required) to run two or three presses and to turn out as many as 20,000 finished cards per day on each press.

While the drawings illustrate a preferred construction and arrangement, I desire it to be understood that the terms used in this specification and in the claims have the following significance:—"Color" is used in signifying a color pigment, or metal leaf, or metallic powder; "strip" refers to either a continuous piece such as a roll or separate pieces adapted to carry the color which is to be transferred; "die" comprises a flat member, an itaglio recess, or a raised cameo design either in full or in outline; "card" means a piece of material in sheet form, such as, for example, a sheet of cardboard, or sheet of paper, or fiber board, or metal, or other material; "peeling" refers to an action whereby the line of separation of materials moves in a progressive manner as distinguished from a separation such as occurs when type faces are lifted from printed paper; "full machine operated" used in connection with mechanism for carrying out a specified manipulation of a card or the like, means that the manipulation is carried out by the machine without the intervention of a human operator, such mechanism being known as an "automatic" feed and delivery mechanism.

Having described my invention, what I claim is:

1. In a power operated press having full machine operated card feeding and delivering mechanism, means to feed a color strip, a heated die adapted to transfer the color from said strip to a card in said machine, and means to separate said strip from said card after an impression has been made.

2. In a power operated press having full machine operated card feeding and delivering mechanism, a hot die, a cold die, mechanism to feed a color strip between said dies in such manner that the color strip comes between the hot die and the card to be stamped, and means to produce an angular relation between the stamped portion of the card and the adjacent portion of the color strip so that the color strip is peeled from the stamped portion of the card when the dies are opened.

3. In a power operated press having full machine operated card feeding and delivering mechanism, a hot die, a cold die, mechanism to feed a color strip between said dies in such manner that a fresh portion of the color strip comes between the hot die and the card to be stamped, while the dies are opening, die operating mechanism, and means to produce an angular relation between the stamped portion of the card and the adjacent portion of the color strip so that the color strip is peeled from the stamped portion of the card when the dies are opened.

4. A machine for hot stamping on cards comprising a pair of dies, means for heating one of said dies, full machine operated means to position a card between said dies, before the stamping operation and remove the same after the stamping operation, supports for a color strip, mechanism to close said dies and transfer a portion of the color from said color strip to said card, said supports for said color strip being arranged to peel said color strip from said card after the stamping operation, and means to move the color strip to position fresh coloring material for the next operation.

5. A machine for hot stamping upon cards comprising full machine operated card feeding and delivery mechanism, a card support adapted to resiliently engage the margins of said card, a heated die, means to impress said die against said card, and devices to mount a color strip over said hot die in such manner that the color strip is peeled from said card by said devices after the stamping is completed.

6. A machine for hot stamping upon cards comprising full machine operated card feeding mechanism, a card support adapted to resiliently engage the margins of said card, a heated die, means to impress said die against said card, and devices to mount a color strip over said hot die in such manner that the color strip is peeled from said card

by said devices after the stamping is completed.

7. A machine for hot stamping upon cards comprising a card support adapted to resiliently engage the margins of said card, a heated die, means to impress said die against said card, full machine operated devices to remove said card when the stamping is finished, and devices to mount a color strip over said hot die in such manner that the color strip is peeled from said card by said devices after the stamping is completed.

8. A machine for hot stamping upon cards comprising a card support adapted to resiliently engage opposite margins of said card and hold the same throughout the stamping operation, a heated die, means to impress said die against said card, and devices to mount a color strip over said hot die in such manner that the color strip is peeled from said card by said devices after the stamping is completed.

9. The method of hot stamping on material comprising impressing a color strip against said material by hot die and removing the die, then peeling the color strip from opposite sides of the stamped portion toward the center thereof.

10. The method of hot stamping on material comprising impressing a color strip against said material by hot die and removing the die, then simultaneously pulling the color strip outwardly away from the material on opposite sides of the stamped portion to peel the color strip from opposite sides of the stamped portion toward the center thereof.

11. The method of hot stamping upon sheet material comprising impressing a color strip against said sheet material by a hot die, lifting the material to permit circulation of air thereunder, and peeling the color strip from the stamped portion of the material.

12. The method of hot stamping upon sheet material comprising impressing a color strip against said sheet material by a hot die, separating the hot die from the back of the color strip to permit cool air to enter therebetween, lifting the material to permit circulation of air thereunder, and peeling the color strip from the stamped portion of the material by gradually pulling the color strip away at an angle to the material.

13. The method of hot stamping a card comprising impressing a color strip against said card by a hot die and removing the die, supporting the card to permit the card to be bowed outwardly, and pulling the color strip away from the card at an angle to bow out the card and peel the color strip from said card.

14. The method of hot stamping a card comprising impressing a color strip against said card by a hot die and removing the

die, supporting the card at the edges to permit the card to be bowed outwardly, and pulling the color strip away from the card on each side of the stamped area and at an angle to the card to bow out the card and peel the color strip from said card.

15. The method of hot stamping a card comprising embossing a figure on the card and impressing a color strip against said card by a hot die and removing the die, supporting the card to permit the card to be bowed outwardly, and pulling the color strip away from the embossed area and at an angle to the face of the card to bow out the card and peel the color strip from said card.

16. A machine for hot stamping upon sheets of paper, comprising a hot die carrying a design to be embossed, a platen, means to cause a relative movement between said die and said platen for the stamping operation, machine operated mechanism to feed sheets of paper over said platen, means to support a color strip ribbon over said die, and adjustable feeding devices to feed said color strip ribbon over said die, said devices being adjustable to accommodate the feed of the color strip ribbon to the dimension of said design measured in the direction of the feed of the color strip ribbon.

17. A machine for hot stamping upon cards comprising a hot die; mechanism to support a color strip adjacent the stamping face of the die, said supporting mechanism comprising retaining means engaging the strip adjacent the die on opposite sides thereof; card supporting means adapted to hold a card to be stamped while permitting the stamped portion of the card to be lifted a limited distance by the color strip; and means to cause a relative movement between the die and card to stamp the color strip against a portion of the card and then pull the same therefrom.

18. A machine for hot stamping upon cards comprising a hot die; a platen; mechanism to support a color strip adjacent the stamping face of the die, said supporting mechanism comprising means engaging the strip adjacent the die; a card holder operative to hold a card on the platen while permitting the stamped portion of the card to be lifted a limited distance from the platen by pull upon the color strip; and means to cause a relative movement between the die and platen to stamp the color strip against a portion of the card and then peel the same therefrom.

19. In the art of hot stamping upon separate sheets of paper, the combination of a heated die, a support for the sheets of paper to sustain stamping pressure, means to operate the heated die to apply pressure to the paper and to remove the die after the impression, feeding means to feed a color strip

- between said heated die and paper before the pressure is applied, and means operative on opposite sides of the die to simultaneously pull said color strip on both sides of the stamped area, the pull being at an angle to the stamped paper whereby the color strip is removed from the stamped portion by being simultaneously peeled from both sides thereof.
20. A machine for hot stamping, a platen adapted to support material to be hot stamped, a hot stamp, and means to operate said stamp to cause a stamped impression on said material, mechanism to feed a color strip over said hot stamp, and means to cause said color strip to be pulled at an angle from the stamped portion of said material on opposite sides thereof so as to cause the color strip to be peeled from opposite sides of the stamped portion toward the center thereof.
21. A machine for hot stamping upon cards comprising full machine operated card feeding and delivery mechanism, a die, means to support and heat said die, a platen, means to cause a relative movement between said die and platen for stamping operations, means to support a color strip over said die, and adjustable feeding devices to move said color strip over said die after each stamping operation, said adjustable feeding devices comprising adjustable elements to control the feed of the color strip proportionate to the dimension measured lengthwise on the strip of the outline of the operating face of the die.

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