

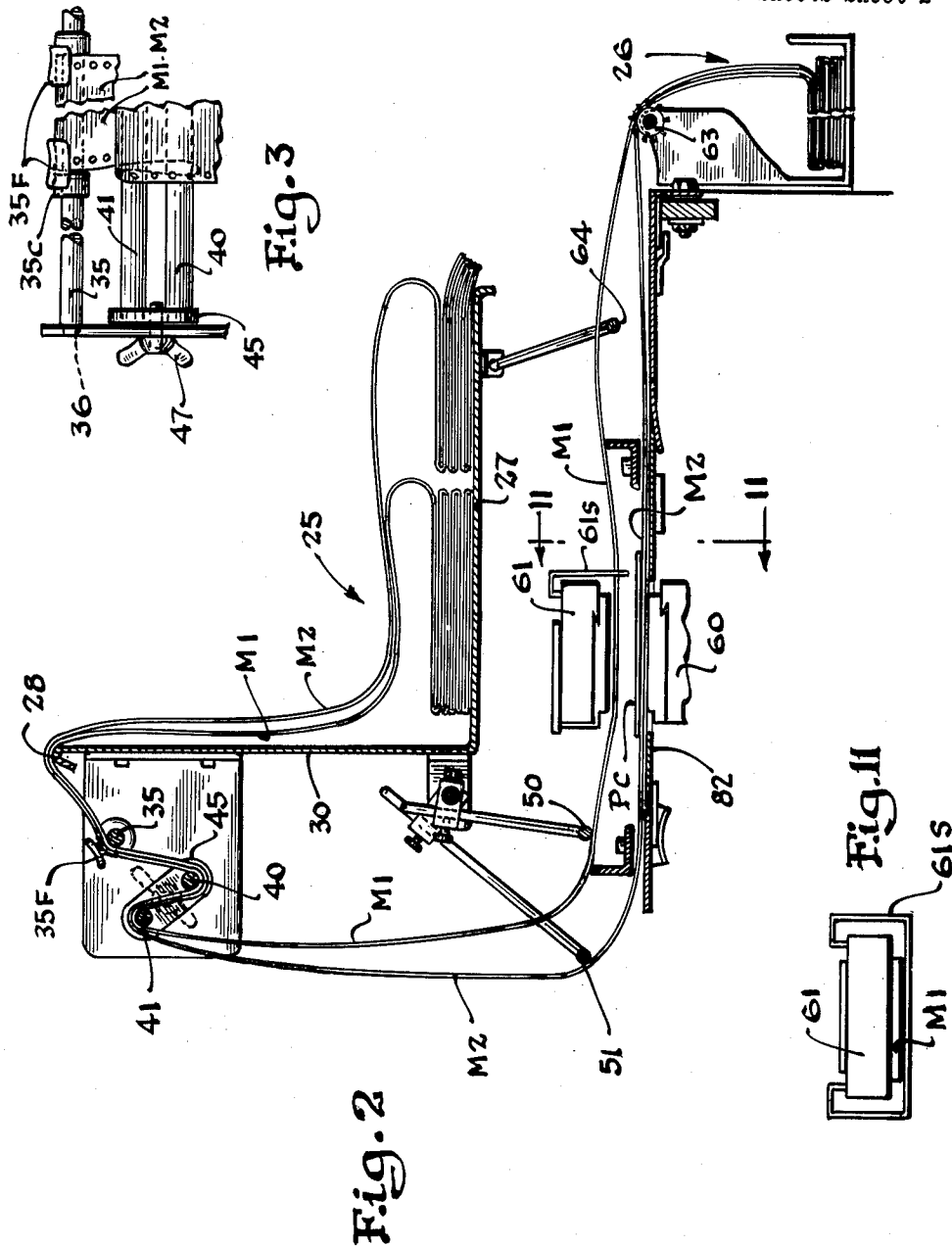
Jan. 30, 1962

A. F. WIKE ETAL
PRINTING MACHINES

3,018,723

Filed Sept. 25, 1959

7 Sheets-Sheet 2



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7 Sheets-Sheet 3

Fig. 4

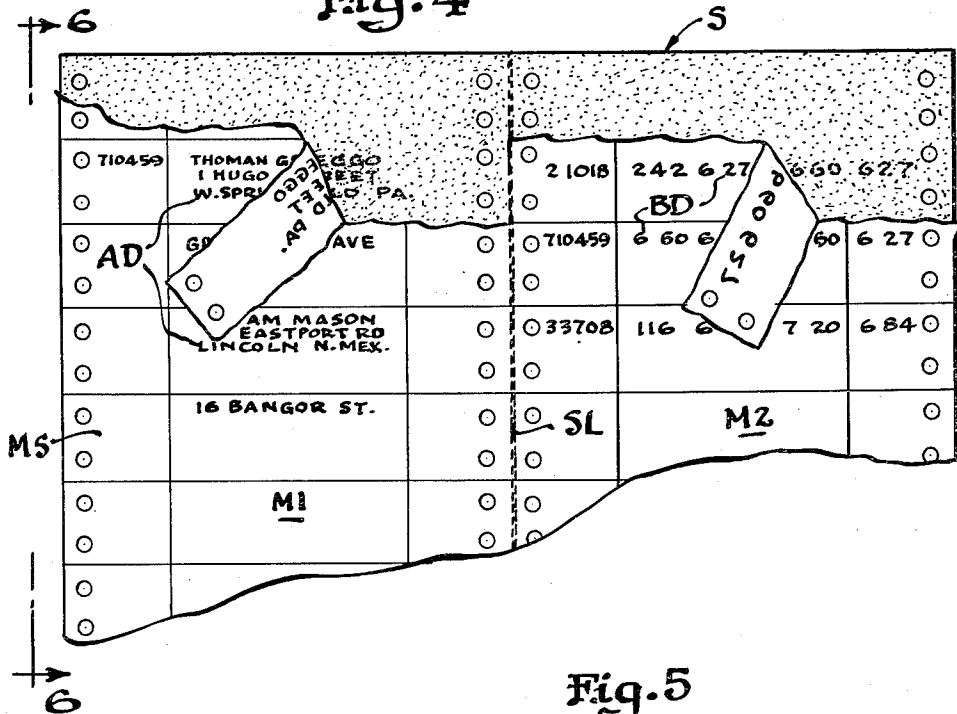


Fig. 5

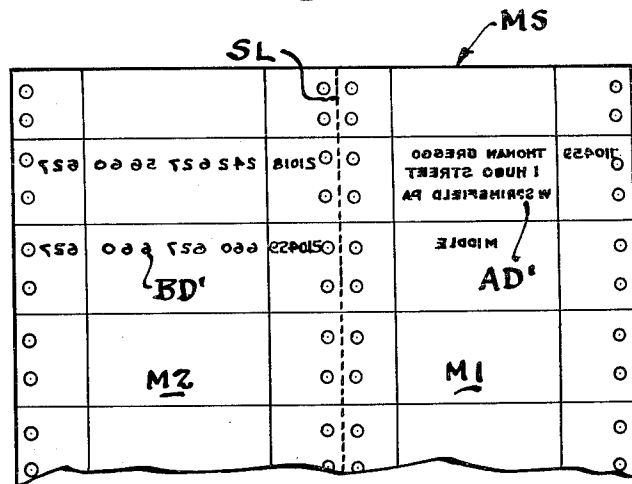
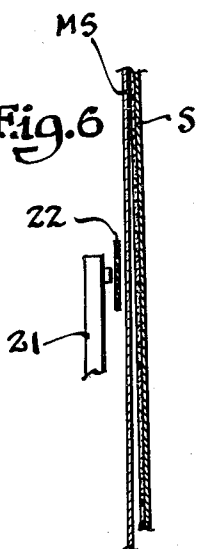


Fig. 6



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Fig. 7

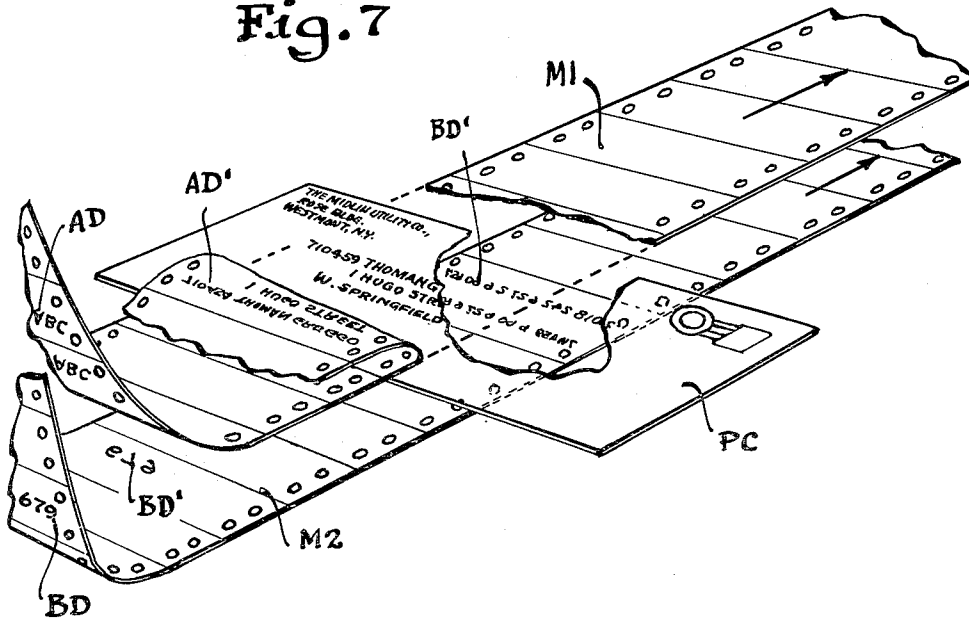


Fig. 8A

PC

THE MIDLAND UTILITY CO.,
808 E. 80th ST.,
WESTMONT, N.Y.

710459 THOMAS GREGGO
1 HUGO STREET
W. SPRINGFIELD PA.
667 MIDDLE AVE.

Fig. 8B

PC

PRESENT READING	UNITS USED	NET AMOUNT	GROSS AMOUNT	NET AMOUNT
2 1018	24 2 6 27		2 6 606 27	
7 10459	6 60 6 27		6 606 27	

ACCOUNT NO.	TOTAL GROSS	TOTAL NET	TOTAL GROSS	TOTAL NET

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Fig. 9

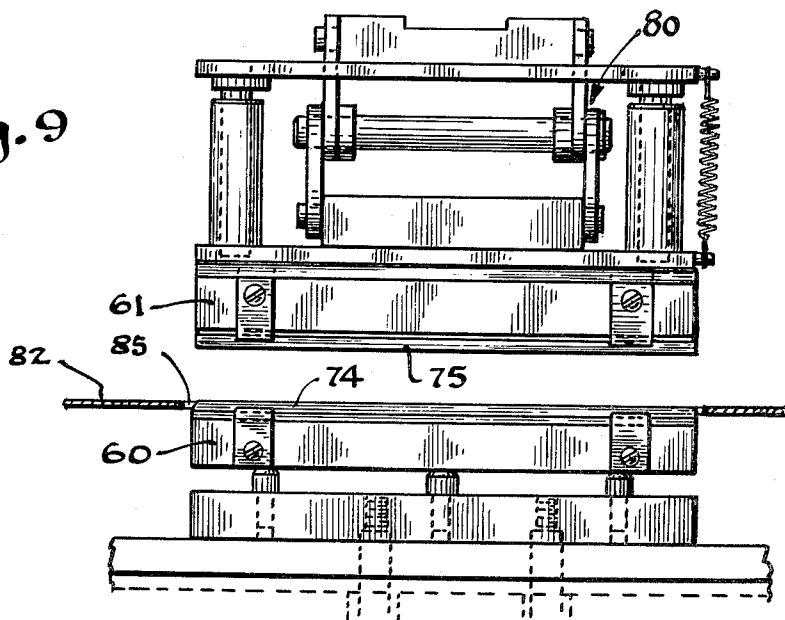
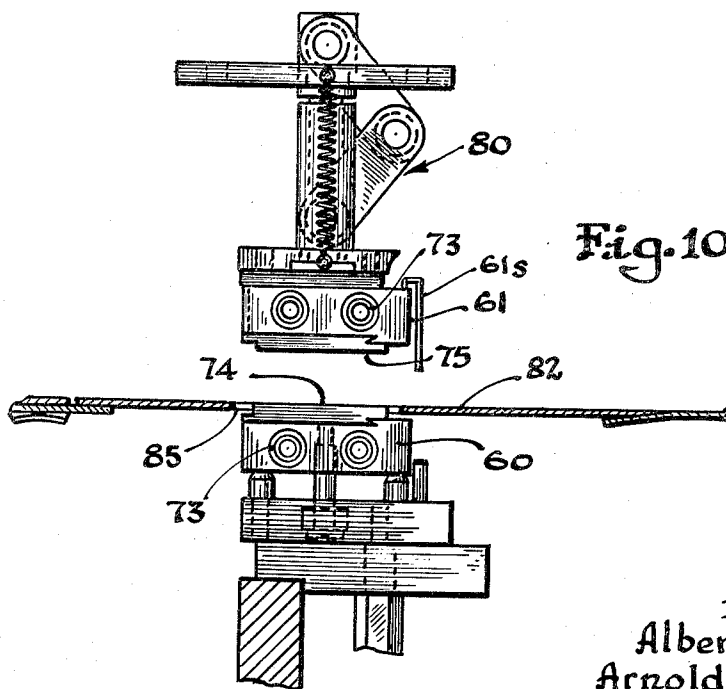


Fig. 10



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Fig. 12

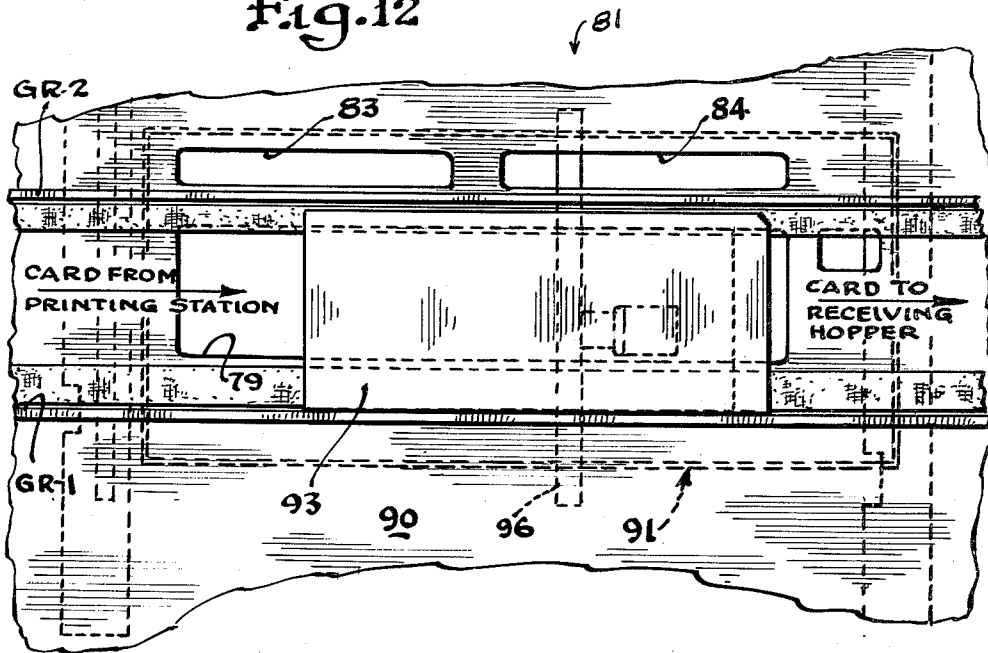
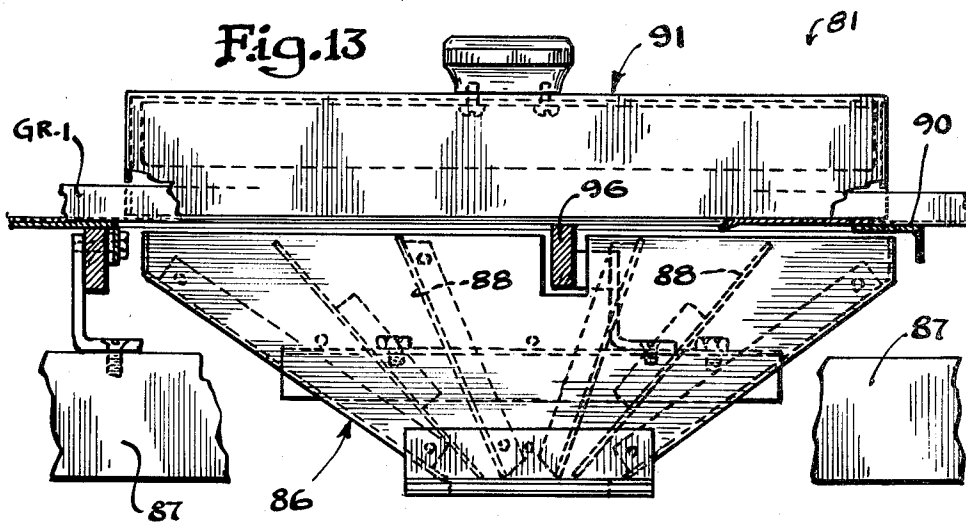


Fig. 13



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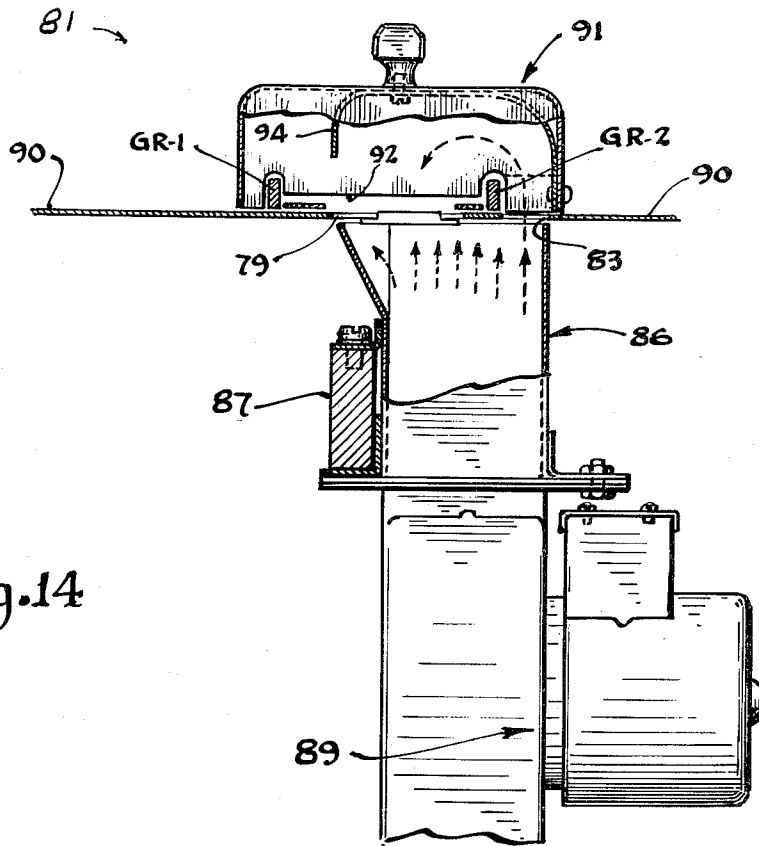


Fig. 14

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3,018,723

PRINTING MACHINES

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Filed Sept. 25, 1959, Ser. No. 842,292
11 Claims. (Cl. 101—134.5)

This invention relates to a printing machine, and in particular to a printing machine and method for effecting consecutive or continuous printing by way of transfer of data through the medium of a transferable ink medium.

One known system of printing utility bills and kindred forms is to print the bills on post cards, and heretofore this has been accomplished by running a continuous series of the cards in web stock form twice through a tabulator. In one run, the name and address of each person to be billed is printed on the address side of the post card stock, and at the same time the name, address and billing data are printed on a register sheet to be maintained as part of the permanent records of the accounting department. The continuous web of post cards is run again through the tabulator with the web reversed to enable the billing data to be typed on to the cards on the side of the card opposite the name and address. Following this, bursting operations are performed to separate the cards prior to mailing the same. The foregoing approach to utility billing is not particularly economical, and the primary object of the present invention is to print both sides of a card or like form simultaneously with related data in contrast to the two-run operation described above in connection with utility billing on post cards as an example. A related object of the present invention is to reduce the probability of error in preparing bills on post cards or like business instruments by preparing concurrently two master strips which will bear the data to be printed on individual cards, and an object ancillary to this is to assure accuracy in printing by effecting a collation of and consecutive register of the transfer data on the masters with respect to the cards to be printed.

An important procedure in preparing utility or like bills is of course to maintain a permanent record or so-called register in the accounting department. That is why the register sheet referred to above is prepared incidental to the first run of the post card stock in the conventional tabulator technique hereinabove described. In view of this, another object of the present invention is to prepare a permanent billing record for the billing register simultaneously with preparation of master strips that are to be used in printing the individual billing instruments that are to be mailed to customers. Of course it will be appreciated that reference is herein made to post card billing for purposes of disclosure, and that the present invention is applicable to other instances wherein it is desired to print related data on opposite sides of a card or the like incidental to consecutive printing, and further examples are direct mail promotion with post cards, meter repair tags and so on.

In accordance with this invention the cards or like forms after being printed are transported to a receiving magazine or hopper. It is important that the ink images imprinted on the forms not be offset from one card to an adjacent card in the hopper. It is therefore another object of this invention to insure that the ink images imprinted on the cards or like forms be dry prior to the time that the cards are stacked together in a receiving hopper. A blower arrangement is preferably utilized to accomplish such drying of the ink images and to incorporate a blower arrangement in combination with mechanism which accomplishes the simultaneous printing of both

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sides of the card with related data is yet another object of this invention.

A printing machine constructed in accordance with this invention embodies a vertically movable platen which is moved downwardly to press a portion of a master strip onto a form interposed between the master and an anvil member. Subsequent to the printing operation the master strip is advanced a predetermined amount while the printed form is removed from the printing position on the printing anvil. Simultaneous with the feeding of a printed form from the printing station and the advancement of the master strip, a new form to be printed is fed to the printing position from a direction which is transverse to the direction of advancement of the master strip. It is yet another object of this invention is to incorporate a flexible stripper member on the movable platen in a manner such that the stripper member is effective to lift the master upon movement of the platen upwardly at the completion of each printing operation so as to obviate any tendency for the form being fed to the printing position to become entangled with or tear the master strip.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a perspective view of a printing machine embodying the principles of the present invention;

FIG. 2 is a schematic view showing the manner in which the master strips are advanced through the machine;

FIG. 3 is a detail view of master strip tensioning means shown in FIG. 2;

FIG. 4 is a view illustrating the nature of the separable sheet material from which the master strips are to be prepared and its association with the transfer sheet bearing an imaging material;

FIG. 5 is a view of the reverse side of the master sheet shown in FIG. 4 and showing the manner in which this sheet bears the images for the two master strips;

FIG. 6 is a view illustrating typing of the masters;

FIG. 7 is a perspective view illustrating the manner in which the master strips are to be associated with the instrument to be printed;

FIGS. 8A and 8B are respective views of opposite sides of a post card printed in accordance with the present invention;

FIG. 9 is an elevational view of the pressure members used to effect transfer of the images from the masters to the instrument to be printed;

FIG. 10 is a side elevation of the apparatus shown in FIG. 9;

FIG. 11 is a schematic detail view taken in the direction of the arrows 11 in FIG. 2;

FIG. 12 is a plan view of a drying station incorporated in a printing machine constructed in accordance with this invention;

FIG. 13 is a front elevation view of the drying station illustrated in FIG. 12; and

FIG. 14 is an end elevation view of the drying station illustrated in FIG. 12.

The present invention is concerned with increasing the output and versatility of data processing operations by transferring images from continuous forms on to indi-

vidual or so-called unit forms, the latter being disclosed herein as specifically in the form of post cards bearing on one side the name and address of a person and on the opposite side data pertaining to the addressee.

Thus, under the present invention, such unit forms are printed simultaneously on opposite sides with related data, and exemplary of this is the name and address of a utility customer on one side of a post card PC, FIGS. 1, 8A and 8B, and utility accounting data on the opposite side of the card relating to utility uses by the addressee. Heretofore such bills have been prepared in a rather elaborate manner as has been explained above, and during the course of these operations a permanent record for the billing register in the accounting office is also prepared, but under the present invention data are printed on the post card by directly transferring data from master strips M1 and M2, FIGS. 1 and 7 which will then serve as a permanent record as will be explained.

These master strips are advanced in timed relation through a printing machine 20, FIG. 1, and the master strips respectively carry the related data (address on one hand and related billing data on the other hand) in mirror-image form facing toward one another and with the post card to be printed disposed therebetween. Transfer of the images from the master strips to the post card preferably occurs as an incident to producing heat and pressure contact between the masters and the post card. After an imprint has been effected, a new card is advanced to the printing station, and the two master strips are advanced one step forward at the same rate in consecutive registry to bring a new set of images into registry with the opposite sides of the next card to be printed.

The first step in accordance with systems printing under the present invention is illustrated in FIGS. 4 and 6. As here shown, a ruled compound fanfold master sheet MS of so-called endless or continuous form, and defined at its longitudinal center line by a center score line of spaced slits SL, is juxtaposed with respect to the coated side of a transfer sheet S which is heavily coated with transfer imaging material. This material is of a known kind which, in its thickly coated state on the transfer sheet S, can be transferred by heavy impact pressure to the back of the sheet MS as in the manner of reversed carbon paper. However, the transfer imaging material in the present instance is of a kind which once transferred can subsequently be off-set or transferred on to a post card or like stock material only by the simultaneous application of heat and pressure. Thus, the material coated on the transfer side S can be one composed of gilsonite, a wax selected from the group consisting of carnauba wax, paraffin and beeswax, and a non-drying vehicle selected from the group consisting of castor oil, mineral oil and oleic acid as disclosed in United States Patent No. 2,844,094. This particular transfer material when thickly coated on the transfer sheet S (as in carbon paper) will transfer into the sheet MS incidental to an imprinting operation as in a tabulator or typewriting machine. However, the amount of material thus transferred as in carbon paper does not represent a complete transfer, and therefore to assure efficient offset from the masters to the cards to be printed, resort is had to a heat and pressure technique as will be explained, and the transfer material described above is selected with this heat and pressure operation in mind.

It was mentioned above that the master sheet MS is compound in nature, which is to say that the center score line divides the sheet MS into a pair of ultimate master strips M1 and M2 mentioned above as the master sheets which carry images to be transferred to the utility bill instrument. It will be noted in FIG. 4 that the sheet MS is ruled to enable data to be typed thereon in predetermined column areas, and the sheet MS is provided with perforations along the two left and right hand margins as well as in rows immediately adjacent the center score line. This enables the two masters M1 and M2 to be

accurately fed through the machine 20 with the related images in consecutive registry in a manner to be described hereinafter.

The juxtaposed sheets MS and S as shown in FIG. 6 are arranged in a tabulator so as to produce a billing register as well as the two continuous transfer masters M1 and M2. Thus, in the tabulator the names and addresses AD, FIG. 4, are printed or listed column-wise on to the left-hand portion of the sheet MS which represents the ultimate master M1, and on the remaining portion of the master sheet MS, which will become the master strip M2, the permanent accounting and billing data BD, FIG. 4, are printed. The billing data will be directly opposite each related address, and as the data AD and BD are imprinted in direct reading form on what can be considered the front side of the sheet MS by type bars 21, FIG. 6, and the interposed ribbon 22, mirror reverse and corresponding images AD' and BD' are delineated on the back side of the sheet MS, such being effected by the pressure transfer of imaging material from the coated side of the sheet S on to the back side of the sheet MS. Resultantly, and at the completion of the listing operations in the tabulator, there will be a permanent type-printed record in direct reading form on the front side of the master sheet MS, and as shown in FIG. 5 mirror-image counterparts will appear on the back side of the sheet MS, whereupon by separating the sheet MS along the center score line two masters M1 and M2 of identical dimension are afforded which are to be used in the machine 20.

Referring to FIG. 2, the machine 20 is equipped with a supply hopper 25 and a receiving hopper 26 for the masters, and after the master strips M1 and M2 have been prepared in the tabulator, these are then placed in two separate stacks and accurately associated with one another as will be evident in FIG. 2. This association is accomplished in such a manner that the related images on the masters M1 and M2 are paired up, that is, the masters are registered so that an address AD' faces its related billing data BD' at the printing station. Hence, by feeding the two masters at the same rate through the machine, the paired mirror-images borne by the masters will be in continuous and consecutive registry at the printing station.

Thus, the masters M1 and M2 are associated in the supply hopper fanfold stack with the mirror-images facing toward one another, and it will be recognized that the images on the masters, being offsettable only by heat and pressure are somewhat smudge-proof. The masters repose on a support plate 27, which is part of the hopper 25, and are extended together up over a rounded lip 28 at the top of a vertical front wall 30 included as part of the hopper 25. In order to assure that the masters M1 and M2 are fed through the machine with the proper degree of tension and without undue sagging, especially at the printing station, the juxtaposed masters are associated with tensioning means. Such means is inclusive of a fixed rod 35 which is located at the front of the machine, as will be apparent in FIG. 2, and which is supported between a pair of spaced vertically disposed mounting plates 36. Advantageously, the rod 35 is equipped with a pair of adjustable collars 35C, FIG. 3, which can be spaced to neatly receive the width of the two masters. Moreover, the collars 35C are equipped with fingers 35F, FIG. 3, under which the masters M1 and M2 are advanced and which thereby assure proper location thereof. The masters are threaded under a tensioning rod 40 and up over a tensioning rod 41. These rods are joined by a strap 45 at the opposite ends enabling the bars 40 and 41 to be moved in unison so as to determine the extent of retardation exerted thereby on the master strips. The straps as 45 are supported by a screw for turning movement relative to the end mounting plates 36, and a wing nut 47 is provided for the support screw, as best shown in FIG. 3, to maintain the set position of the rods 40 and 41.

After passing through the tensioning means described above, the masters are separated prior to reaching the

printing station in the machine 20. Such separation is effected by passing the masters respectively under and in contact with the horizontal arms of a pair of U-shaped bars 50 and 51, FIGS. 1 and 2. These bars have the vertical legs thereof disposed in openings of related blocks 52 arranged in spaced relation on and supported by a horizontal mounting bar 53 supported at its ends by brackets 55 fastened to the front wall of the supply hopper 25. Holding screws 52S are mounted in the blocks 52 such that by loosening these screws the position of the bars 50 and 51 can be respectively set to determine the most efficient path of travel of the master strips through the printing station. Other screws 53S hold the blocks 52 in position on the support bar 53, such that by loosening these screws the bars 50 and 51 can be set fore and aft again to determine the path of the masters through the printing station.

The printing station is defined by a pair of pressure-applying members including a stationary anvil 60, FIG. 2, and a movable platen 61. The card PC to be printed is fed into printing position between the members 60 and 61 at the printing station, and the master strips are disposed at and fed through the printing station so as to have the transferable images thereof facing the opposite sides of the card PC. Further details of this feeding arrangement will be described hereinafter, and in advancing the master strips through the printing station at the same rate and in an accurately collated state with the sheets of related data continuously in registry, the master strips emerging from the printing station have the perforations at the margins thereof registered with the teeth of a pair of pin-type feed wheels 63 mounted on the same drive shaft. The feed wheels 63 are driven in a manner that constitutes no part of the present invention, and these are so controlled and timed as to advance the master strips together in a step-wise fashion through the machine to present a new set of transfer images as a new card to be printed is advanced into printing position. The master strip feed means are positioned, as shown in FIG. 2, so as to feed the masters directly into the receiving hopper, and advantageously separation of the masters leaving the printing station is maintained by a guide bar 64, FIG. 2, supported at the underside of the bed member 27 of the supply hopper.

The cards PC to be printed are stacked in a supply hopper SH, FIG. 1, and card feed and advancing means of the kind disclosed in Patent No. 2,359,852 can be advantageously utilized to advance the cards to be printed in timed sequence one by one to printing position. Each card to be printed is arrested in accurate printing position at the printing station by stop means in the form of a stop finger 65, FIG. 1, which operates as described in the Patent No. 2,359,852. Thus, the stop finger 65 is adjustably carried by a rocker arm 66, FIG. 1, and the operation of this arm is accurately timed with respect to feeding of the cards by cam means operated by a ratchet and pawl mechanism 70 as explained fully in Patent No. 2,359,852. Each card at printing position, FIG. 1 is disposed on a frame 71 having an opening therein which exposes the image carried by the lower master strip M2 (billing data) and which faces the underside of the card PC as viewed in FIGS. 1 and 7.

As was mentioned above, transfer of the images from the master strips to the opposite sides of the post card or like instruments to be printed under and in accordance with the present invention is effected by the generation of heat and pressure contact between the card and the images. Referring to FIGS. 9 and 10, the anvil member 60 is disposed in the machine in fixed relation beneath a vertically movable platen 61, and each of these members is provided with electrical resistance heating elements 73 of a known kind and which can be controlled to produce the desired heating of the opposed face plates 74 and 75 respectively associated with the anvil and the platen to produce the desired heating and pressing of the master

strips at the time transfer of the images therein is to be effected. The platen 61 is normally spring-urged, as will be evident from FIG. 10, into an elevated position well above the anvil 60 to enable the desired feeding operations of the master strips and the cards to be effected preliminary to each printing operation. The platen 61 is operated by toggle mechanism 80, and this mechanism is adjustable in order that the desired degree of pressure will be exerted on the master strips and the interposed card to be printed at the time of effecting image transfer. Advantageously, the heating elements are adjusted so that the only pressure required is that corresponding to a slight pressed touch of the images to be transferred, and it will be recognized that it is the directly printed back of the master in each instance which is directly heated during printing of a card PC.

It has been found important that the master strip M2 be effectively insulated during printing except in the actual area corresponding to the transferable image delineated thereon. Thus, in view of the likelihood of excessive exposure of the master strip M2 to heat generated by the anvil 60, a guard plate 82, FIG. 10, is disposed in surrounding relationship about the face plate 74 associated with the anvil 60. The upper surface of the plate 82 is coplanar with the upper surface of the heated anvil face plate 74, and the underside or directly imaged side of the master strip M2 will normally be disposed in this plane as will be evident from FIG. 2. However, the guard 82 is formed with an opening 85, FIG. 10, of greater area than the plate 74 so that all edges of the plate 82 defining the opening 85 are spaced well outward and away from the opposed marginal surfaces of the plate 74. Accordingly, the plate 82 is in effect insulated from the anvil 60 and this prevents undue overheating of the master strip M2 which might be likely to cause premature softening or offsetting of the images thereon.

It will also be noted that the master strip M1, FIG. 2, is more or less suspended in a somewhat sagging condition at the printing station as shown in FIG. 2, sufficient to avoid contact with the elevated platen 61 while allowing for proper contact with the card to be printed without causing an attendant rupture of the master M1.

Inasmuch as the cards to be printed are fed into the printing station intermediate the platen 61 and the anvil 60 from a direction transverse to the directional movement of the master strips, it is advantageous that the upper one of the master strips be moved upwardly with the platen 61 sufficiently far so as to enable an unprinted card to be fed into the printing station without becoming entangled with the edge of the upper master strip M1. A stripper member 61S, which may preferably comprise a piece of flexible piano wiring bent to the generally U-shaped configuration illustrated in FIG. 2, is mounted on one end of the platen 61. The stripper member 61S is effective to support the master strip M1 from the lower surface thereof in a manner such that the master strip may be freely advanced through the stripper member. Thus, the stripper member is effective to prevent the incoming form from engaging and tearing the master strip, and yet the flexible nature of the stripper member offers no restriction to the downward movement of the platen 61.

After preparation of the master strips in the manner described above, these are then accurately associated so that the first address to be printed on a post card is arranged in what can be termed back-to-back relationship with the first of the billing data to be printed on the opposite side of the same card. Of course there are sufficient blank areas on the masters in advance of this first set of data to enable the masters thus associated to be threaded upward from the receiving hopper 26 over the feed wheels 63, and it will be appreciated that this threading is accomplished while maintaining the first address and the first of the billing data in proper registry for the first printing operation. After the initial registry

of related data on the master strips has thus been accomplished, the masters are then threaded through the guides 50 and 51 and the tensioning means and the main supply is then neatly deposited in the supply hopper 25.

Subsequent operation of the feed wheels 63 assures a collated feeding of the masters through the machine, which is to say that each address on the master strip M1 will be properly associated with the related billing data carried by the master strip M2. Incidental to the printing of a card or like instrument, the card to be printed is accurately arrested at the printing station on the frame 71, FIG. 1, and this card is then printed by a set of related and registered data carried by the master strips. After an imprint is effected, the platen 61 is raised, the card last printed is advanced from printing position into a receiving hopper (not shown) and the masters are advanced one step forward to present a new set of related data at the printing station in position to imprint the next card or like instrument.

It has been found that the ink images on the cards so advanced from the printing station to the supply hopper are apt to be relatively wet so that the stacking of the cards in the hopper may cause the images to become smudged and illegible. In some instances the manner in which the cards are stacked together may cause the ink image on one card to be offset onto an adjacent card. To prevent such problems from arising a printing machine constructed in accordance with this invention incorporates a drying station intermediate the printing station and the receiving hopper, and this drying station is effective to dry the ink image on both sides of each card so transported from the printing station to the supply hopper.

With reference now to FIGS. 12-14, an embodiment of such a drying station is illustrated and indicated generally by the reference numeral 81. The table top 90 of the printing machine at the drying station 81 is formed with a rectangular-shaped opening 79 and a pair of smaller tandem openings 83 and 84 are disposed at one side of and parallel to the larger opening 79. These openings enable a stream of air to be applied to both faces of a printed form in a manner presently to be described.

An air-distributing duct 86 is mounted to a support rail 87 of the printing machine in a manner such that the open upper end of the air-distributing duct extends beneath all of the openings 79, 83, and 84. The air-distributing duct 86 diverges outwardly from bottom to top as viewed in side elevation of FIG. 13 so as to accommodate the entire length of the opening 79. A plurality of distributor vanes 88 direct the air from the lower, inlet end of the duct to the open outlet at the top of the duct in a manner such as to afford an even distribution of the air along the entire length of the opening 79.

A blower 89, preferably of the centrifugal type as illustrated, is mounted at the lower end of the distributor duct and is effective to supply a stream of air to the interior of the duct.

The drying station 81 also incorporates a cover 91 which is disposed above the openings 83-84 in the table top of the printing machine and which, in effect, forms a tunnel for the passage of the printed forms therethrough. Thus, and as best illustrated in FIG. 14, the ends of the cover are recessed as at 92 so as to enable a card to be readily passed between the table top 90 and the recessed, lower edge.

Preferably, the printed form is transported and guided to the drying station between the same guide rails GR1 and GR2 between which the form to be printed was advanced to the printing station. In FIG. 12 the guide rails GR1 and GR2 are shown as adjusted to a position wherein the guide rails accommodate a printed form 93 of standard tabulator card configuration.

In the position of the card 93 within the cover 91 as illustrated in FIG. 12 air flowing through the large opening 79 is directly effective to dry the ink image on the

under face of the card. Air flowing through the openings 83 and 84 is deflected by a curved deflector plate 94 so as to be directed downwardly on to the upper face of the card 93. Thus, the pressure exerted by the drying air is distributed on both sides of the card so that there is no tendency for the card to be blown out of the guide rails GR1 and GR2. As best illustrated in FIG. 13, a cross bar 96 extends across the width of the opening 82 and is effective to prevent buckling of the central portion of the card.

A stop finger arrangement, not illustrated, but like that shown at 65 in FIG. 1 is preferably incorporated with the drying station 81 and timed for operation with the stop finger 65 heretofore described so that the forms at the printing and drying stations are stopped at the same time.

At the completion of a printing run, all of the necessary data have been transferred from the masters to the cards as PC. The master strips M1 and M2 are then withdrawn from the receiving hopper and are transferred to the accounting register where the direct reading images thereon are utilized as permanent records.

It will be seen from the foregoing that under the present invention post cards or kindred instruments bearing addresses and utility billing data, are simultaneously printed on both sides in a continuous fashion under circumstances where accuracy in printing is assured. This is accomplished by printing the instruments with data transferable by heat and slight pressure contact from master strips onto opposite sides of the instrument to be printed. Characteristic features of the present invention are that two runs of post card stock through a tabulator, which is a standard commercial practice, is eliminated, and there is but a single run of the master sheet as MS through the tabulator to produce simultaneously the master strips as well as a direct image record for the permanent accounting register.

Hence, while we have illustrated and described a preferred embodiment of our invention, it is to be understood that this is capable of variation and modification, and we therefore do not wish to be limited to the precise details set forth, but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. A method of printing related sets of data simultaneously on opposite sides of cards or the like by a movable heated platen and a fixed anvil at a printing station and comprising, preparing a pair of transfer master strips to have the related data for each such card delineated column-wise respectively thereon in an imaging material transferable to said cards by heat and pressure, feeding the cards to be printed individually to the printing station, feeding the masters through said printing station at the same rate by a feed means common to both masters and with the mirror-imaged sides thereof respectively facing the opposite side of a card at the printing station and in timed relation such as to bring into registry related sets of data and the card to be printed thereby, causing the platen and anvil to effect heat and pressure contact of opposite sides of a card to be printed with said registered data to thereby print said card, and stripping one of the masters away from the anvil after each imprint as an incident to movement of the platen.

2. A method of printing related sets of data simultaneously on opposite sides of cards or the like by a reciprocal heated platen and a fixed anvil at a printing station and comprising, preparing a pair of transfer master strips to have the related data for each such card delineated column-wise respectively thereon in an imaging material transferable to said cards by heat and pressure, feeding the cards to be printed individually to the printing station, feeding the masters in superimposed relation through said printing station at the same rate by a feed means common to both masters and with the mirror-imaged sides

thereof respectively facing the opposite side of a card at the printing station and in timed relation such as to bring into registry related sets of data and the card to be printed thereby, reciprocating the platen to effect contact of opposite sides of a card to be printed at the printing station with said registered data and transfer thereof to said card, and stripping the upper one of the masters away from the fixed anvil after each imprint as an incident to movement of the platen away from the anvil.

3. A method of printing related sets of data simultaneously on opposite sides of cards or the like and preparing records pertaining thereto, said method comprising, juxtaposing sheet material to become master strips over the side of a transfer sheet coated with transfer imaging material, imprinting said related data column-wise in at least two columns and in direct reading form through the medium of a ribbon on one side of said sheet material to produce permanent records and simultaneously to effect transfer of said imaging material in mirror form in at least two like columns on the opposite side of the sheet material thereby affording master strips, separating said sheet material into master strips respectively bearing said columns of data, registering said master strips with the mirror images facing one another, feeding the cards to be printed individually to a printing station, feeding the thus-imaged and registered master strips through said printing station with the mirror-imaged sides thereof respectively facing the opposite side of a card at the printing station at the same rate by a feed means common to both master strips and in timed relation such as to bring into registry related sets of data and the card to be printed thereby, and effecting heat and pressure contact of opposite sides of a card to be printed with said registered data to thereby print said card.

4. Printing apparatus of the kind described comprising, a supply hopper for cards or the like to be printed, means to feed the cards individually to a printing station, a hopper for master strips carrying mirror-images delineated thereon in imaging material transferrable to said cards, guide means for disposing said strips in a juxtaposed relation at the printing station on opposite sides of a card at the printing station to be printed and with said mirror-images facing opposite sides of the card to be printed, feed means common to both masters to feed said masters at the same rate in a step-by-step fashion through the printing station and in timed relation to the feeding of the cards to bring images on the master strips into registry with opposite sides of the cards to be printed, a pair of pressure-applying members disposed adjacent the path of movement of the masters through the printing station, means for heating one of said members, means for moving said members toward one another, and thereafter away from one another, to produce heat and pressure contact of said mirror-images with opposite sides of a card to be printed, and stripper means effective upon movement of said members away from one another to carry one of the master strips away from the other.

5. A method of printing related sets of data simultaneously on opposite sides of cards or the like and preparing records pertaining thereto, said method comprising, juxtaposing sheet material over the side of a transfer sheet coated with transfer imaging material, said sheet material being divisible into two separable master strip portions, imprinting said related data for the cards column-wise and in direct reading form on one side of said portions of said sheet material to afford a continuum of sets of related data in direct reading form and in mirror-image form arranged in parallel relation respectively on the opposite sides of the portions of said sheet material, separating said portions of said sheet material into two master strips after delineating said data thereon, juxtaposing said master strips with the mirror-images thereon facing toward one another, feeding the cards to be printed individually to a printing station, feeding the masters through said printing station with the mirror-imaged sides

thereof respectively facing the opposite sides of a card at the printing station and in timed relation such as to bring into registry related sets of data and the card to be printed thereby, and effecting transfer of the images on said strips onto opposite sides of a card to be printed.

6. A method of printing related sets of data simultaneously on opposite sides of cards or the like while preserving a permanent record and comprising, preparing a pair of transfer master strips simultaneously on a common sheet to have the related data for each such card printed in direct reading form respectively in separate columns on certain sides thereof of said sheet to afford a record and delineated column-wise in mirror form respectively in separate columns on the opposite sides on said sheet in an imaging material transferrable to said cards by heat and pressure, separating said sheet into masters each bearing data on opposite sides thereof, feeding the cards to be printed individually to a printing station, feeding the masters through said printing station with the mirror-imaged sides thereof respectively facing the opposite sides of a card at the printing station and in timed relation such as to bring into registry related sets of said mirror-imaged data and the card to be printed thereby, and thereafter effecting heat and pressure transfer of a related set of said registered data onto opposite sides of a card to be printed.

7. A method of printing related sets of data simultaneously on opposite sides of cards or the like and preparing permanent records pertaining thereto, said method comprising, juxtaposing sheet material over the side of a transfer sheet coated with transfer imaging material transferrable therefrom by impact pressure, said sheet material being divided into two parallel separable portions by a center score line and having perforations along the margins thereof and on either side of said score line, imprinting said related data for the cards column-wise and in permanent direct reading form on one side of said portions of said sheet material juxtaposed as aforesaid to afford a continuum of parallel sets of related data in direct reading form and in mirror-image form respectively on the opposite sides of the portions of said sheet material, said mirror images being transferrable by the simultaneous action of heat and pressure, separating said portions of said sheet material into two master strips after delineating said data thereon, juxtaposing said master strips with related mirror-images thereon in registry and facing toward one another at a printing station and with said perforations in registry, feeding the cards to be printed individually to the printing station and between said registered master strips, feeding the masters through said printing station simultaneously and at the same rate by engaging registered perforations with a common pin-wheel feed means, and effecting heat and pressure transfer of registered images on said strips onto opposite sides of a card to be printed at the printing station.

8. Printing apparatus of the kind described comprising, means to feed cards or the like to be printed individually to a printing station, means for feeding to the printing station master strips bearing mirror images thereon transferrable to opposite sides of said cards, adjustable guide means for disposing said strips in a juxtaposed relation at the printing station individually along predetermined paths on opposite sides of a card at the printing station to be printed and with said mirror-images facing opposite sides of the card to be printed, means to feed said masters in a step-by-step fashion through the printing station and in timed relation to the feeding of the cards to bring images on the master strips into registry with opposite sides of the cards to be printed, a pair of pressure-applying members including a fixed anvil and a movable platen disposed adjacent the path of movement of the masters through the printing station, heating means for the anvil, a guard disposed about the anvil and which supports one of said masters in the course of operation, said guard having an opening therein of greater area dimension than

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the area of the operating face of said anvil member, means for moving said platen toward and away from said anvil to produce transfer contact of said mirror-images with opposite sides of a card to be printed, and stripper means carried by said platen for stripping the upper master away from the anvil during movement of the platen away from the anvil.

9. In a printing machine of the kind described, means to individually feed cards or the like to be printed to a printing station, adjustable guide means for disposing at the printing station and on opposite sides of a card to be printed master strips respectively bearing related mirror images thereon transferrable by heat and pressure to such a card, pin-wheel feed means to feed said masters simultaneously in a step-by-step fashion through the printing station and in timed relation to the feeding of the cards to bring related images on the master strips into registry with opposite sides of the cards to be printed, means for adjustably regulating the tension of said master strips, an anvil member and a cooperating platen member disposed adjacent the path of movement of the masters through the printing station, means for heating one of said members, means for moving the platen member toward the anvil member, and thereafter away from the anvil member, to produce heat and pressure contact of said mirror-images with opposite sides of a card to be printed, and stripper means carried by said platen for stripping the master associated therewith away from the anvil during movement of the platen away from the anvil.

10. A method of printing related sets of data simultaneously on opposite sides of cards or the like and preparing records pertaining thereto, said method comprising, juxtaposing sheet material to become master strips over the side of a transfer sheet coated with transfer imaging material, imprinting said related data column-wise and in direct reading form through the medium of a ribbon on one side of said sheet material to produce a permanent record and simultaneously to effect transfer of said imaging material in mirror form on the opposite side of the sheet material thereby affording master strips, feeding the cards to be printed individually to a printing station, feeding the thus-imaged master strips through said printing station with the mirror-imaged sides thereof respectively facing the opposite side of a card at the printing station and in timed relation such as to bring into registry related sets of data and the card to be printed thereby, effecting heat and pressure contact of opposite sides of a card to be printed with said registered data to thereby print said card, transporting said cards from the printing station to a receiving magazine wherein

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the cards are stacked, and simultaneously directing streams of air to opposite faces of each card at a position intermediate the printing station and the receiving magazine to balance the resulting pressure forces on the opposite faces of the cards and dry the ink images imprinted thereon.

11. Printing apparatus of the kind described comprising, a supply hopper for cards or the like to be printed, means to feed the cards individually to a printing station, a hopper for master strips carrying mirror-images delineated thereon in imaging material transferrable to said cards, adjustable guide means for disposing said strips at the printing station along respective paths predetermined by said guide means on opposite sides of a card at the printing station and with said mirror-images facing opposite sides of the card, means to feed said masters simultaneously and at the same rate in a step-by-step fashion through the printing station and in timed relation to the feeding of the cards to bring images on the master strips respectively into registry with opposite sides of the cards to be printed, adjustable means for simultaneously regulating the tension on said master strips, a pair of pressure-applying members including a fixed anvil and a reciprocal platen disposed adjacent the path of movement of the masters through the printing station, means for heating said members, means for moving said platen toward said anvil to produce heat and pressure contact of said mirror-images with opposite sides of a card to be printed, stripper means carried by the platen to move the master strip associated with the platen away from the anvil during movement of the platen away from the anvil, a guard disposed about the anvil and which supports the other one of said master strips, said guard having an opening therein of greater area dimension than the area of the operating face of said anvil, and means for simultaneously drying ink images on opposite faces of each card.

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