April 12, 1966 A. J. WRIGHT 3,245,342

PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

Filed Feb. 12, 1964 7 Sheets-Sheet 1

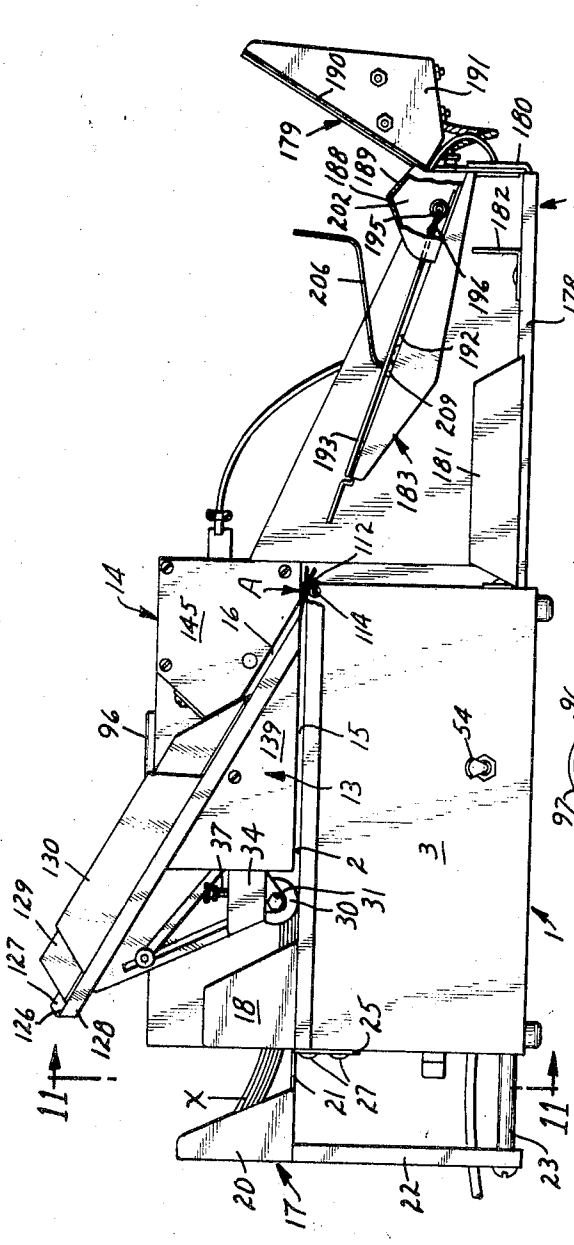


FIG. 1

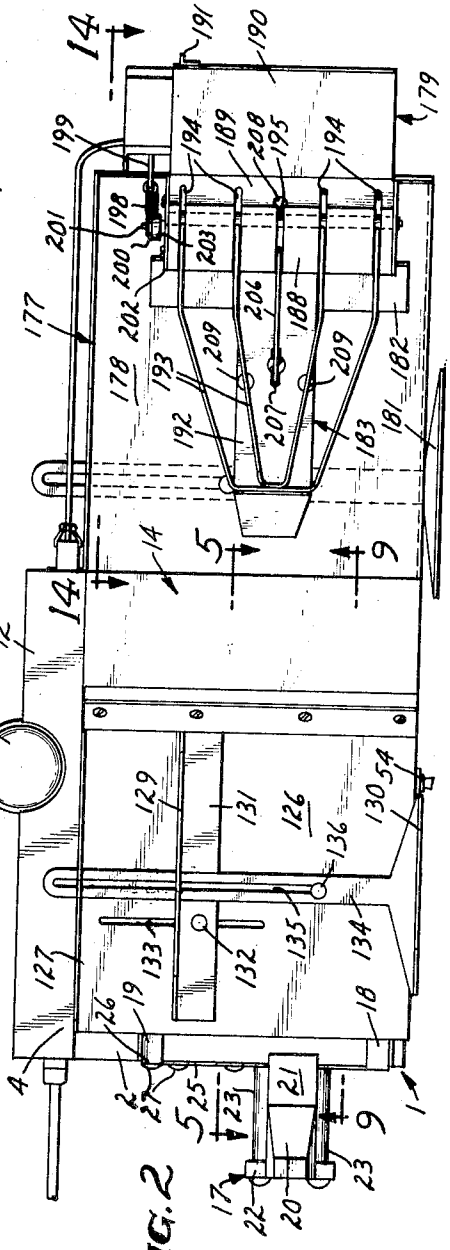


FIG. 2

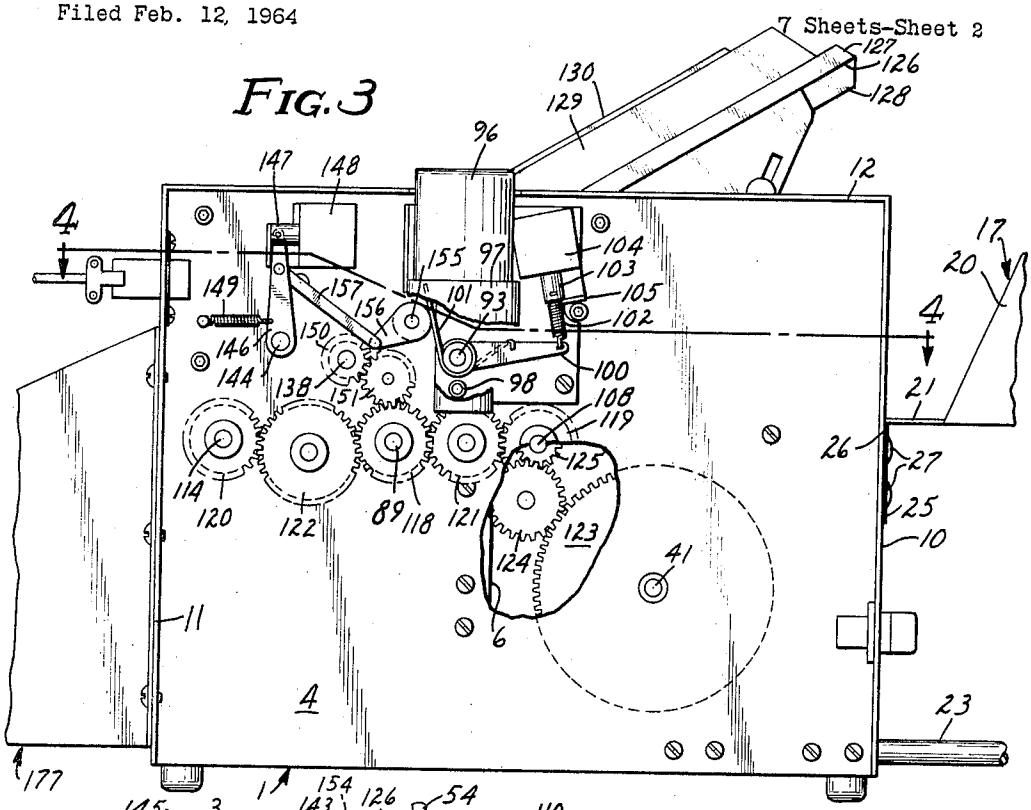
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PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

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FIG. 3



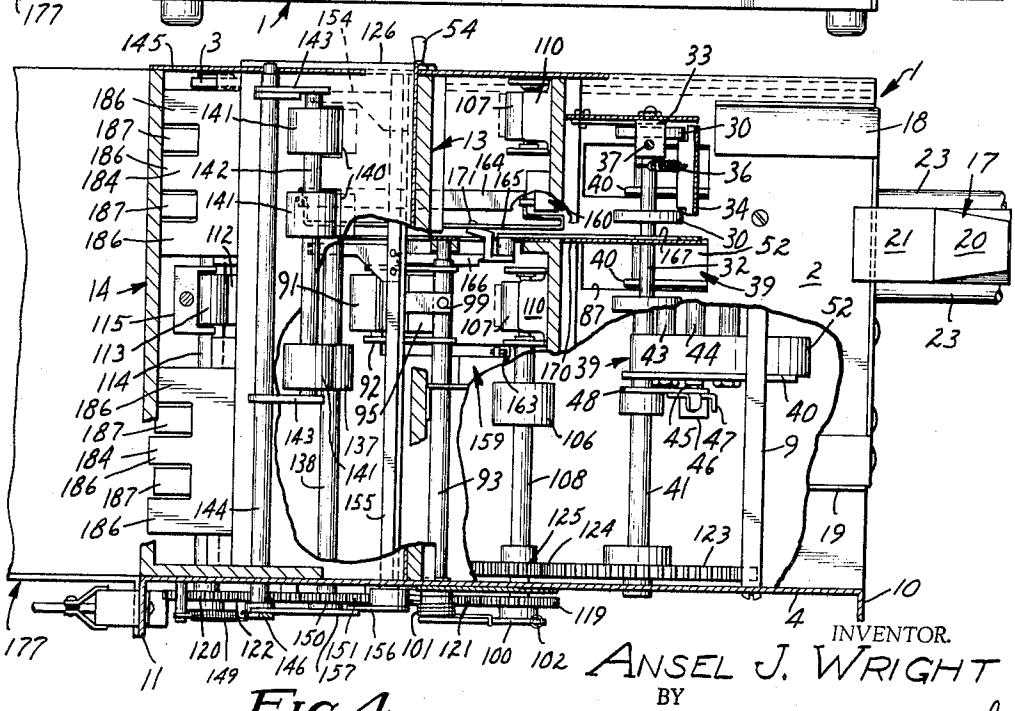


FIG. 4

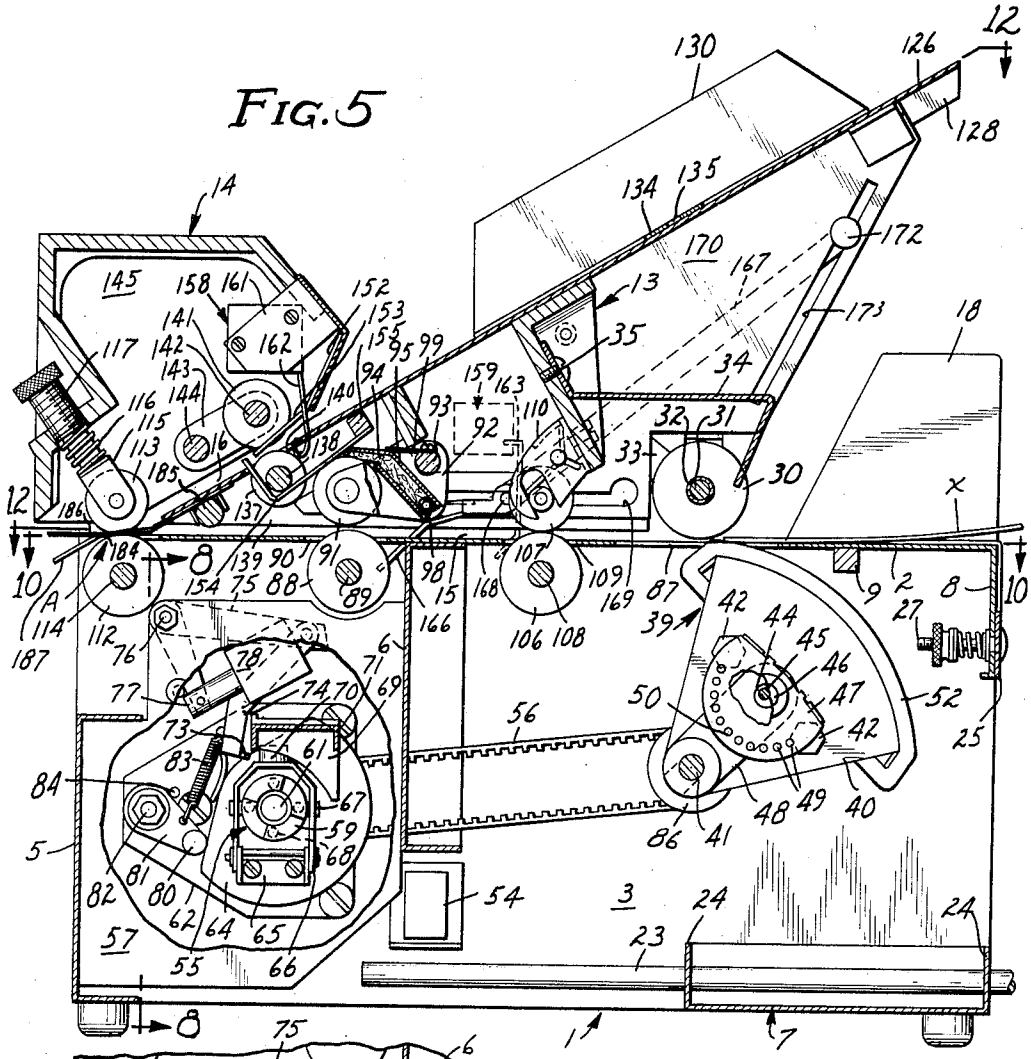
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PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

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FIG. 5



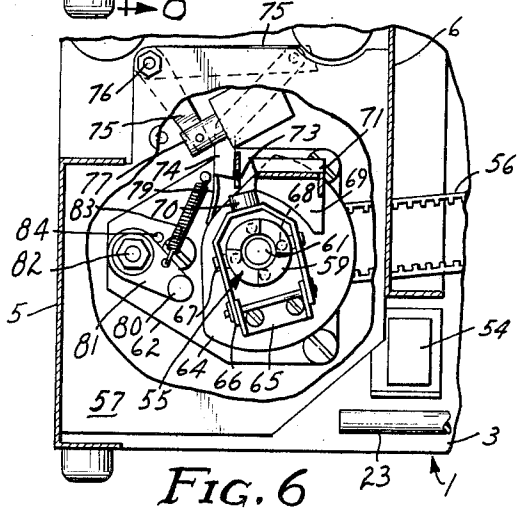


FIG. 6

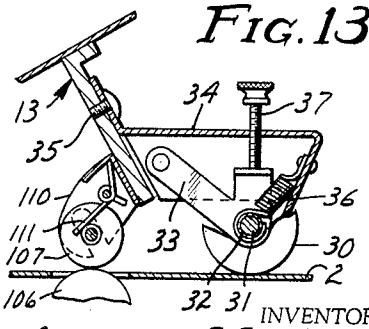


FIG. 13

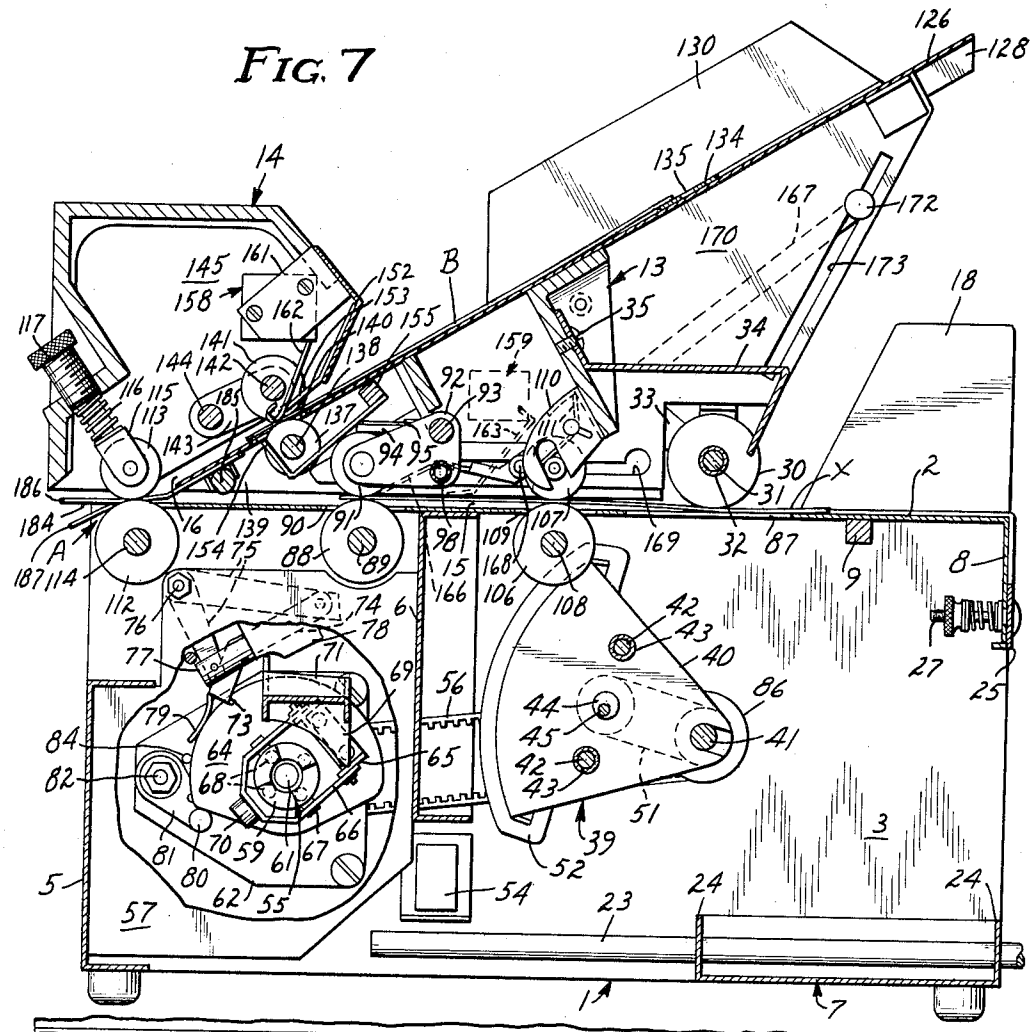
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PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

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FIG. 7



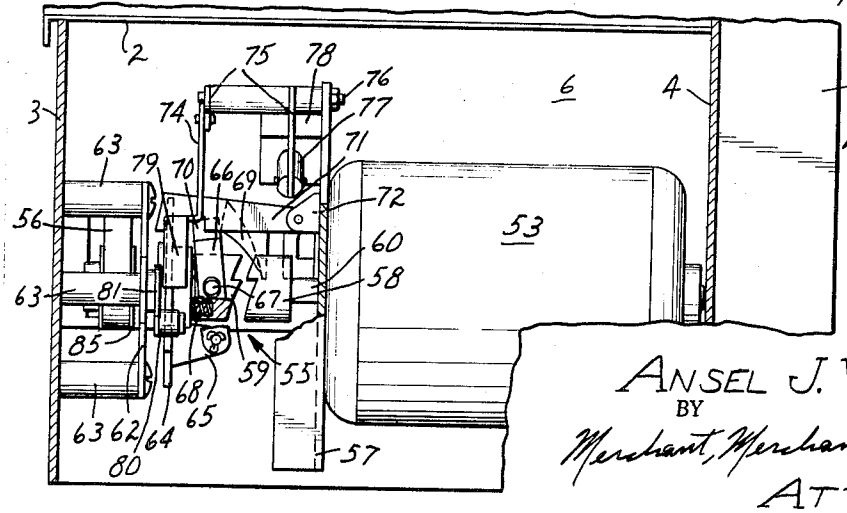


FIG. 8

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PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

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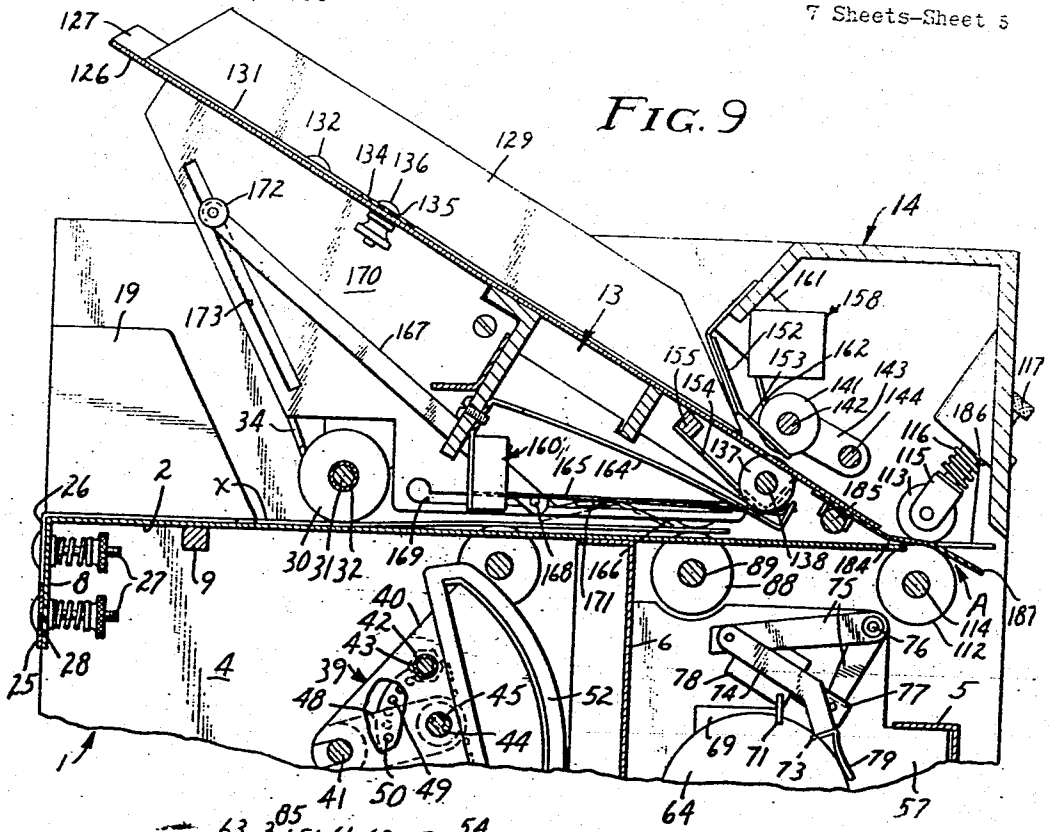


FIG. 9

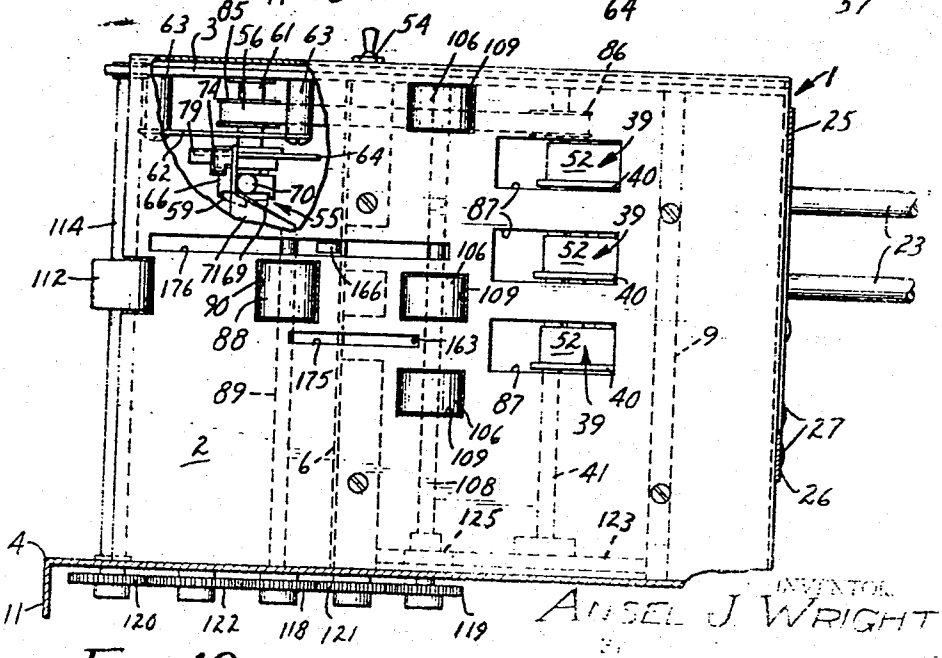


FIG. 10

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PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

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FIG. 11

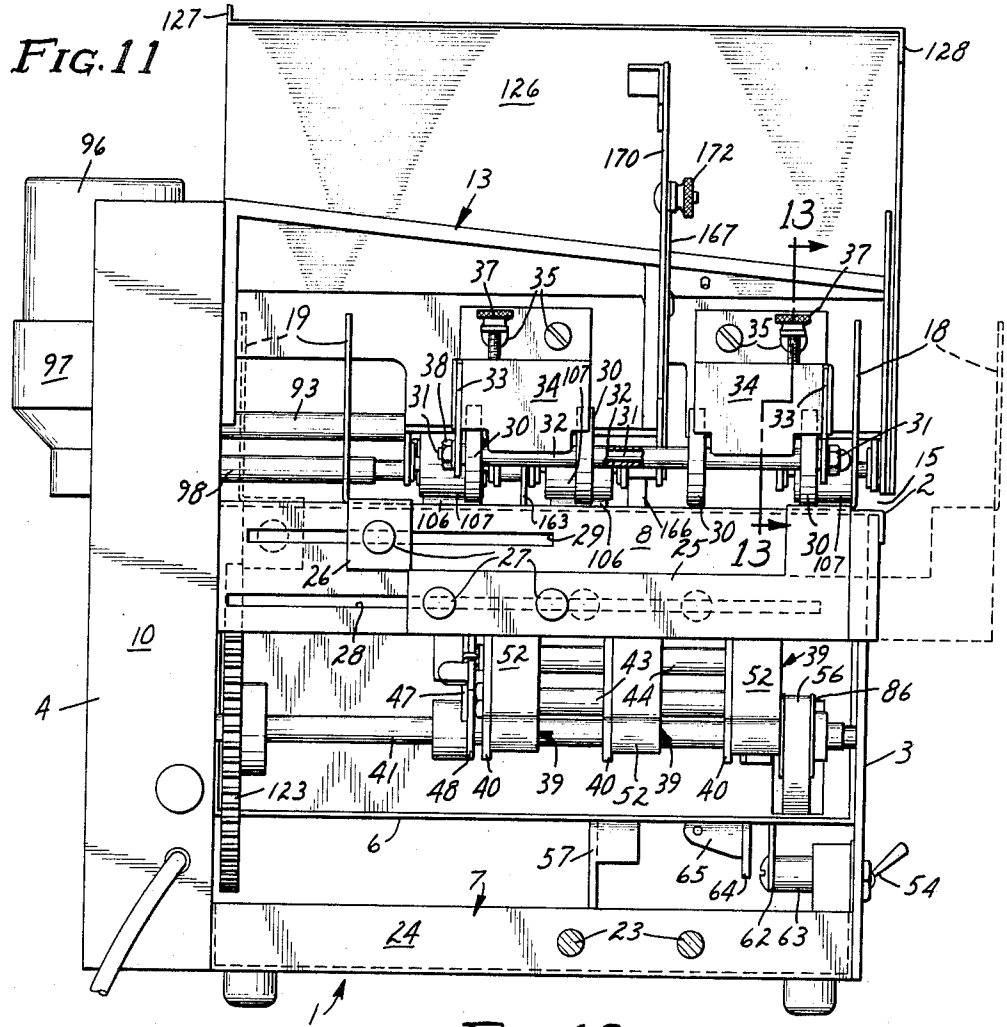
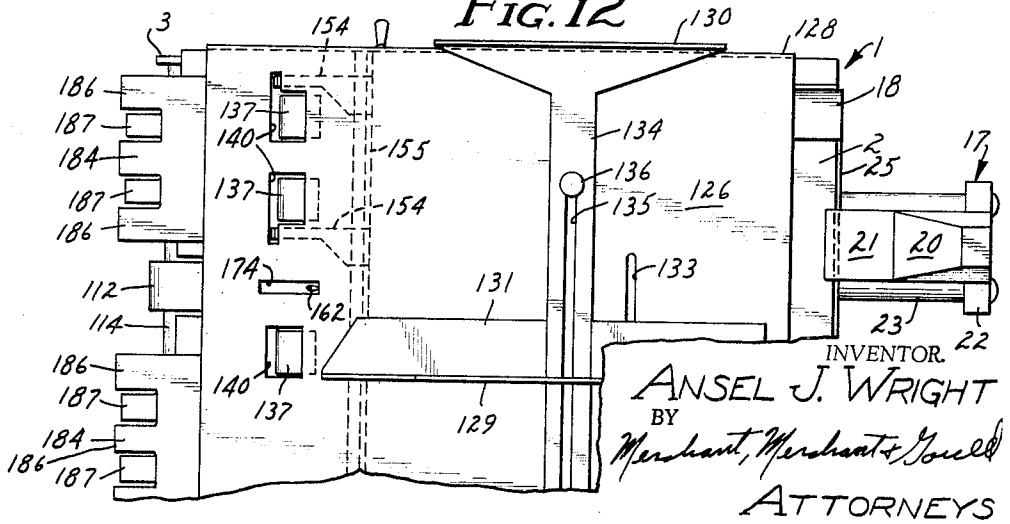


FIG. 12



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PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

Filed Feb. 12, 1964 7 Sheets-Sheet 7

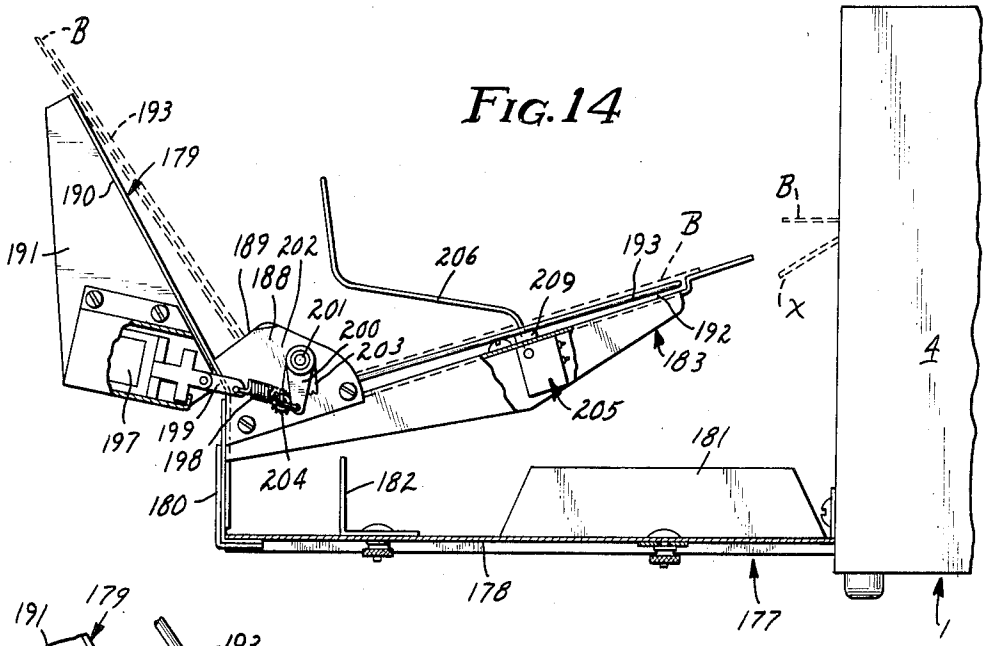


FIG. 14

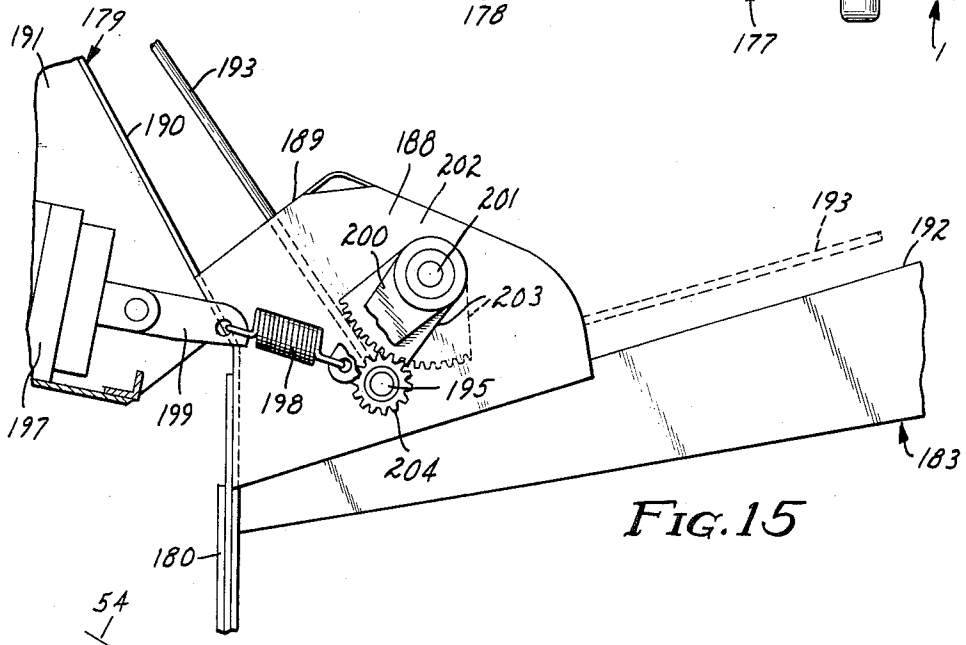


FIG. 15

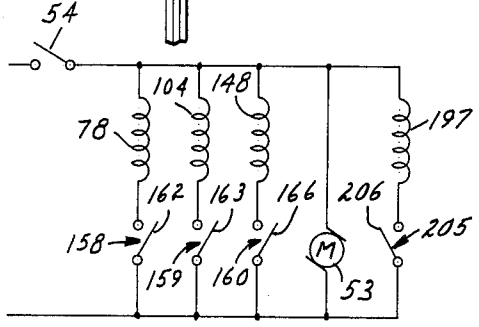


FIG. 16

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United States Patent Office 3,245,342 Patented Apr. 12, 1966

3,245,342

PRINTING MACHINE AND SHEET TRANSFER MECHANISM THEREFOR

Ansel J. Wright, Minneapolis, Minn., assignor to Master Addresser Company, Minneapolis, Minn., a corporation of Minnesota

Filed Feb. 12, 1964, Ser. No. 344,478
15 Claims. (Cl. 101—132.5)

My present invention relates to printing machines of the type utilizing the spirit transfer process and master elements having spirit responsive transfer material thereon for the printing of sheets of paper and the like.

More specifically, this invention involves a machine for printing the names and addresses of intended recipients, or similar data, on form letters or other mailing pieces and various types of inter-office record material and the like.

An important object of my invention is the provision of a printing machine as set forth which is capable of receiving master cards or sheets of various sizes and shape, and which is capable of printing the required material on sheets of greater lateral dimension than that of the machine. To this end, I provide a printing machine comprising a base, a generally vertical support member extending upwardly from one side of the base, and cantilever structure extending transversely from said support member in overlying spaced relation to the base and defining therewith a passage for sheets to be printed, said passage having an open side so as to permit feeding through the machine of sheets having a greater lateral or transverse dimension than the lateral dimension of the passage.

Another object of my invention is the provision of a printing machine of the above type having a novel construction and arrangement which permits feeding therethrough of a master card or sheet having a greater dimension transversely of feeding movement thereof than said machine.

Still another object of my invention is the provision of a printing machine having novel means for feeding a sheet and master card toward each other and toward a common printing zone from spaced apart portions of the machine.

Another object of my invention is the provision of sheet-feeding means and master card-feeding means and control means responsive to insertion into the machine of a master sheet or card to energize the sheet-feeding means and card-feeding means.

Another object of my invention is the provision of means for adjusting said control means whereby to vary the timing of initiation of the card-feeding means relative to that of the sheet-feeding means, to adjust the position of a sheet to be printed relative to a cooperating master card at the printing zone of the machine.

Yet another object of my invention is the provision of novel means for guiding a master card and a printed sheet in different directions during discharge thereof from the machine, and of means for receiving the printed sheet and for stacking the used master cards in a predetermined order.

Another object of my invention is the provision of a printing machine comprising, a frame structure including a base having a magazine at one end for sheets to be printed, a generally vertical support member extending upwardly from one side of said base, a pair of spaced parallel cantilever arms extending laterally from said support member in overlying spaced relation to the base and defining with said base a passage for sheets to be printed, said arms cooperating to define a passage for master cards, said passages being opened at the side of

said machine opposite said support member, sheet-feeding means for feeding sheets singly from said magazine and between said space and cantilever arms toward a printing zone adjacent the opposite end of the base, card-feeding means including coooperating card-feeding elements on said cantilever arms for feeding a master card in a direction generally toward a sheet delivered by the sheet-feeding means and toward said printing zone, sheet-moistening means for applying solvent liquid to said sheet during feeding movement thereof to said printing zone, means including a pair of cooperating rotary pressure and feed cylinders, one in said base and the other in one of said cantilever arms at said printing zone, for pressing the master card and moistened sheet together therebetween and for discharge of said card and sheet from said printing zone, drive means for imparting feeding movements to said sheet-feeding means and card-feeding means and rotary discharge movement to said feed cylinder, and a receiver for said card and sheet and including a sheet-receiving tray, a card storage rack, and a transfer device for stacking a plurality of said master cards in predetermined order on said rack responsive to discharge of said cards to said receiver.

The above, and still further highly important objects and advantages of my invention will become apparent from the following detailed specificaton, appended claims and attached drawings.

Referring to the drawings, which illustrate the invention, and in which like reference characters indicate like parts throughout the several views:

FIG. 1 is a view in side elevation of a printing machine made in accordance with my invention;

FIG. 2 is a view in top plan;

FIG. 3 is an enlarged fragmentary view in side elevation opposite that of FIG. 1, some parts being broken away;

FIG. 4 is a view partly in plan and partly in section, taken substantially on the irregular line 4—4 of FIG. 3, some parts being broken away;

FIG. 5 is an enlarged fragmentary section taken substantially on the line 5—5 of FIG. 2, some parts being broken away;

FIG. 6 is a fragmentary view corresponding to a portion of FIG. 5, but showing a different position of some of the parts;

FIG. 7 is a view corresponding to FIG. 5 but showing a different position of some of the parts;

FIG. 8 is a fragmentary view, partly in end elevation and partly in section, taken substantially on the line 8—8 of FIG. 5;

FIG. 9 is an enlarged fragmentary vertical section taken substantially on the line 9—9 of FIG. 2;

FIG. 10 is a view partly in top plan and partly in section, on a reduced scale, taken substantially on the line 10—10 of FIG. 5, some parts being broken away;

FIG. 11 is an enlarged view in end elevation as seen from the line 11—11 of FIG. 1, some parts being removed and some parts being shown in section;

FIG. 12 is a fragmentary view in top plan as seen from the line 12—12 of FIG. 5, on a reduced scale;

FIG. 13, sheet 3, is a fragmentary vertical section, taken on the line 13—13 of FIG. 11;

FIG. 14 is an enlarged fragmentary view partly in elevation and partly in section, taken substantially on the line 14—14 of FIG. 2, some parts being broken away.

FIG. 15 is an enlarged fragmentary view corresponding to a portion of FIG. 14, but showing a different position of some of the parts; and

FIG. 16 is a schematic wiring diagram.

In the preferred embodiment of the invention illustrated, the numeral 1 indicates, in its entirety, a generally

rectangular base having a top wall 2, and opposed side walls 3 and 4 that are connected by transverse frame members 5, 6 and 7 and a transverse flange 8. The flange 8 and frame member 7 are disposed at one end of the base 1, the transverse member 5 being disposed at the opposite end thereof. The transverse member 6 is disposed intermediate the opposite ends of the base 1 and provides a stiffening element for the top wall 2, as does a transverse reinforcing bar 9.

The side wall 4 is formed to provide end flanges 10 and 11 and a horizontally disposed top flange 12, and extends upwardly from the level of the top wall 2 to provide a support member for cantilever structure involving a pair of cantilever arms 13 and 14 that are bolted or otherwise rigidly secured to the upper end portion of the side wall 4 in overlying spaced relation to the top wall 2 and in spaced relation to each other. The free ends of the cantilever arms 13 and 14 terminate substantially in the plane of the base side wall 3, the arms 13 and 14 cooperating with the top wall 2 of the base 1 to define a generally horizontally disposed passage 15 for sheets or the like to be printed. Further, the arms 13 and 14 cooperate to define a sloping passage 16 for master sheets or cards, the passage 16 sloping downwardly toward the passage 15 and merging therewith at a printing zone indicated generally at A adjacent one end of the base 1. It will be noted that the passages 15 and 16 are open at the side adjacent the side wall 3 of the base 1 whereby to accommodate sheets and master cards of width which would cause the same to project laterally outwardly beyond the side wall 3 of the base 1.

At its end opposite end printing zone A, the top wall 2 cooperates with a supporting device 17 and a pair of adjustable guide members 18 and 19 to provide a magazine for a plurality of envelopes, sheets or the like, to be printed. For the purpose of the present example, a plurality of sheets of paper are shown and indicated by the reference character X. The supporting device 17 comprises a supporting block 20 having a horizontally disposed flange 21 extending therefrom toward the top wall 2 and disposed substantially in the plane of the top wall 2, a depending leg 22 and a pair of laterally spaced mounting rods or bars 23 extending longitudinally of the base through spaced flanges 24 in the transverse frame member 7. The mounting rods 23 are rigidly secured to the lower end portion of the leg 22 and are longitudinally slidable through the flanges 24 whereby the block 20 may be adjustably moved toward and away from the base 1. The upstanding guide members 18 and 19 are provided with depending anchoring tabs 25 and 26 respectively disposed in face-to-face engagement with the outer surface of the flange 8, and are releasably locked in engagement with the flange 8 by nut-equipped locking screws 27 that extend through suitable apertures in the tabs 25 and 26 and through a pair of horizontally elongated slots 28 and 29 in the end flange 8 of the base 1, see particularly FIGS. 5, 7, 9 and 11. As shown by full and dotted lines in FIG. 11, the guide members 18 and 19 may be adjusted to receive sheets X of various widths including sheets having a width greater than that of the base 1.

The afore-mentioned magazine is further defined by a plurality of axially spaced separator rolls 30 that are mounted on an elongated shaft or bolt 31 extending transversely of the base 1, the rolls 30 being separated by tubular spacers or the like 32 on the bolt 31. Adjacent its opposite ends, the bolt 31 is mounted on a pair of lever arms 33 that are pivotally mounted in brackets 34 anchored to the cantilever arm 13 by means of screws or the like 35, see FIGS. 4, 5, 11 and 13. The separator rolls 30 are urged in an upward direction away from the base 1 by coil tension springs 36 anchored at their lower ends to the spacers 32 and at their upper ends to the brackets 34, upward movement of the separator rolls 30 being limited by engagement of the lever arms 33 with

adjustable stop screws or the like 37 that are screw threaded in the brackets 34, see particularly FIG. 13. The separator rolls 30 are held against rotation by the tightening of a nut 38 on one end of the bolt 31, the peripheral surfaces of the separator rolls 30 engaging the leading edges of the sheets X, as seen in FIG. 1, and being spaced above the top wall 2 of the base 1 only slightly greater than the thickness of one of the sheets X.

Primary feeding means for the sheet X comprises a plurality of generally segmental feeding drums 39 having radially inwardly extending flanges 40 mounted for limited radial movements on a transverse shaft 41 that is journalled in its opposite ends in suitable bearings in the base side walls 3 and 4. The feeding drums 39 are disposed in spaced apart relationship axially of the shaft 41 and are anchored together by a pair of laterally spaced parallel nut-equipped tie bolts 42 and tubular spacers 43. An elongated crankshaft 44 is journalled in the flanges 40 of the feeding drums 39 intermediate the tie bolts 42 and is provided at its opposite ends with crankpins 45 one of which is eccentrically journalled in a stub shaft 46 fast on an adjustment plate 47 that is journalled on the outer end of a radial arm 48 that is keyed or otherwise rigidly secured to the shaft 41 for common rotation therewith. The adjustment plate 47 is provided with a plurality of circumferentially spaced apertures 49 that selectively receive a detent 50 on the radial arm 48 to selectively hold the adjustment plate in desired adjusted relationship to the radial arm 48. The crankpin 45 at the opposite end of the crankshaft 44 is journalled in the radially outer end portion of a second radial arm 51, as shown by dotted lines in FIG. 7, the arm 51 being secured at its inner end to the shaft 41 in the same manner as the radial arm 48. Adjustment of the plate 47 causes the group of feeding drums 39 to move radially of the shaft 41 for adjustment of the feeding drums 39 relative to the top wall 2, each feeding drum 39 being provided with a sheet-engaging tire 52 of rubber or the like.

Means for imparting feeding rotation to the primary feeding drums 39 includes a continuously-operated motor 53 that is controlled by a switch 54, a single-revolution clutch mechanism 55, and a drive belt 56. The motor 53 is mounted on a bracket 57 that is supported by the transverse frame members 5 and 6, the clutch mechanism 55 involving a pair of cooperating clutch elements 58 and 59 the former of which is mounted on the shaft 60 of the motor 53 for common rotation therewith. The clutch element 59 is keyed or otherwise secured to a shaft 61 for axial sliding movements thereon and for common rotation therewith, the shaft 61 being axially aligned with the motor shaft 60 and journalled in the side wall 3 and in a mounting plate 62 secured in laterally inwardly spaced parallel relation to the side wall 3 by mounting legs or the like 63. A cam 64 is mounted on the clutch shaft 61 for common rotation therewith, and has mounted thereon a bracket 65 to which is pivotally secured a shifter fork 66 having pin and slot connections 67 with the clutch element 59. The clutch element 59 is yieldingly urged toward engagement with the clutch element 58 by coil compression springs 68 interposed between the clutch element 59 and the hub of the cam 64. This engagement of the clutch elements 58 and 59 against bias of the springs 68 is effected by a cam member 69 and a cam follower element 70, the latter of which is mounted on the shifter fork 66. The cam member 69 is integrally formed with an arm 71 which overlies the clutch elements 58 and 59 and which is pivotally secured to mounting ears 72 on the bracket 57, one of said ears being shown in FIG. 8. The outer or free end portion of the arm 71 rides on the peripheral cam surface of the cam 64 and is adapted to be engaged by a hook element 73 projecting laterally from the lower end of a leg 74 the upper end of which is pivotally connected to one end of a bell crank lever 75 that is pivotally connected to the bracket

57, as indicated at 76. The other end of the bell crank 75 is pivotally connected to the armature 77 of a solenoid 78 mounted on the bracket 57, see particularly FIG. 8. With the parts positioned as in FIGS. 5 and 8, energization of the solenoid 78 causes the leg 74 to move upwardly and inwardly toward the arm 71 to move the cam member 69 out of engagement with the cam follower element 70, permitting the springs 68 to move the clutch element 59 into engagement with the clutch element 58. The depending leg 74 is provided with a tongue 79 that engages the cam 64 to move the hook-like element 73 out of engagement with the arm 71 during rotation of the clutch elements 58 and 59. Upon completion of a single revolution of the clutch element 59 and cam 64, the cam 64 permits the arm 71 to drop into a position wherein the cam 69 will engage the cam follower element 70 to disengage the clutch elements 58 and 59. The cam 64 then permits the depending leg 74 to drop into a position wherein it can engage the arm 71 upon a subsequent energization of the solenoid 78. A second cam follower 80 is mounted on the outer end of a crank arm 81 pivotally secured to the mounting plate 62, as indicated at 82, and is yieldingly urged toward engagement with the cam 64 by a coil spring 83. A stop pin 84 on the plate 62 limits spring biased movement of the cam follower 80 toward the cam 64. The drive belt 56 is entrained over a cooperating pulley 85 fast on the shaft 61 and a second pulley 86 fast on the transverse shaft 41; and over-running of the feeding drums 39, when the clutch 55 is disengaged, is prevented by engagement of the cam follower element 70 with a depending portion of the arm 71, as shown in FIG. 5. Rebounding of the cam follower element 70 from said depending portion of the arm 71, and resultant reverse rotation of the feeding drums 39 is prevented by engagement of the cam follower 80 with the cam 64. With reference to FIGS. 4, 5, 7 and 10, it will be seen that the feeding drums 39 work through apertures 87 in the top wall 2 intermediate the separator rolls 30, the peripheral surfaces of the tires 52 frictionally engaging the bottom surface of the lowermost sheet X to be printed and imparting initial advancing movement to said lowermost sheet toward the printing zone.

Secondary feeding means for the sheets X comprises a pressure roller 88 mounted fast on a horizontally disposed transverse shaft 89 that is suitably journalled in the side walls 3 and 4, the pressure roller 88 projecting upwardly through an opening 90 in the top wall 2 and underlying a moistener roll 91 that is journalled in a bracket or holder 92 secured fast to a mounting shaft 93 that is journalled in the cantilever arm 13 and the side wall 4 of the base 1. A moistening wick 94 is carried by a duct 95 in the holder 92, the wick 94 engaging the peripheral surface of the moistening roll 91, the duct 95 being connected to a reservoir 96 mounted in a holder 97 on the upper portion of the side wall 4, through a flexible tube 98 extending from the holder 97 to the duct 95. A leaf spring 99 secured to the shaft 93 maintains the wick 94 in engagement with the moistening roller 91.

The mounting shaft 93 extends outwardly through the side wall 4, and has mounted on its outer end a radial arm 100 that is engaged by a torsion spring 101 which yieldingly urges the mounting shaft 93 in a direction of rotation to move the moistening roll 91 in an upward direction away from engagement with the underlying pressure roller 88. At its outer end, the radial arm 100 is attached to one end of a coil tension spring 102, the other end of which is attached to the armature 103 of a solenoid 104 suitably mounted on the side wall 4 adjacent the upper edge thereof. The spring 102 is stronger than the torsion spring 101 so that, when the solenoid 104 is energized, the radial arm 100 is moved in a direction to lower the moistening roller 91 toward engagement with a sheet X passing therebetween and the underlying pressure and feed roller 88. A stop flange 105 limits outward movement of the armature 103 with respect to the solenoid 104.

Intermediate the primary feeding drums and the secondary feeding means comprising the roller 88 and moistening roller 91, is disposed intermediate feeding means comprising a plurality of power-driven feed rolls 106 and cooperating pressure rolls 107, the former being mounted fast on a horizontally disposed transverse shaft 108 that is journalled at its opposite ends in the side walls 3 and 4, the feed rolls 106 projecting upwardly through openings 109 in the top wall 2. The pressure rolls 107 are mounted in slotted brackets 110 carried by the cantiliver arm 13, and are yieldingly urged toward engagement with their respective underlying feed rolls 106 by suitable means, such as by torsion springs 111, see particularly FIG. 13.

A pair of cooperating printing and discharge cylinders 112 and 113 are disposed at the printing zone A, the former being mounted fast on a horizontally disposed transverse shaft 114 journalled at its opposite end portions in the side walls 3 and 4, and the latter of which is journalled in a yoke 115 that is carried by the cantilever arm 14 and yieldingly urged toward engagement of the cylinder 113 with the underlying cylinder 112 by a coil compression spring 116. Adjustment of the yielding bias of the spring 116 is had through a conventional adjustment nut 117 in a manner well known to those skilled in the art.

The shafts 89, 108 and 114 outwardly of the side wall 4 have fixed thereon respective gears 118, 119 and 120, these gears being connected by idler gears 121 and 122, for rotation in a common direction and at equal speeds, the rollers 88, 106 and cylinder 112 being preferably of equal diameter. These are driven from the shaft 41 by a gear 123 fast on the shaft 41, an idler gear 124 suitably journalled in the base 1 and having meshing engagement with the gear 123, and a pinion 125 fast on the shaft 108 and in meshing engagement with the idler gear 124, see FIGS. 3 and 4.

Means for feeding spirit-responsive printing sheets, hereinafter referred to as master cards, to the printing zone A, comprises an elongated card-feuding tray 126 and mechanism now to be described. The card-feeding tray 126 overlies and is secured to the cantilever arm 13, said tray having upturned and downturned stiffening flanges 127 and 128 respectively at its opposite side edge portions, the former being disposed adjacent the side wall 4 and the latter substantially overlying the side wall 3 of the base 1. As shown, the tray 126 slopes downwardly toward the printing zone A, and has adjustably mounted to its upper surface a pair of laterally spaced transversely adjustable guide members 129 and 130 for reception of master cards therebetween, a master card being shown in FIG. 7 and indicated by the reference character B. As shown in FIG. 2, the guide member 129 is formed with a base flange 131 that rests upon the top surface of the tray 126 and is adjustably secured thereto by a nut-equipped screw 132 extending downwardly through a transverse slot 133 in the tray 126. The guide member 130 is formed to provide a transversely elongated mounting tongue 134 that extends through suitable slots or apertures in the guide member 129 and upturned flange 127, the tongue 134 having therein a slot 135 for reception of a nut-equipped anchoring screw 136 that extends downwardly through a suitable aperture in the tray 126 to releasably anchor the guide member 130 in desired adjusted position.

A plurality of power-driven card-feeding rolls 137 are mounted fast in axially spaced relation on a horizontally disposed transverse shaft 138 that is journalled at its opposite end portions in the upper portion of the side wall 4 and in an outer end wall 139 of the contilever arm 13. The card-feeding rolls 137 project upwardly through openings 140 in the card-feeding tray 126 and underlie a like plurality of cooperating pressure rolls 141 that are journalled on a horizontally disposed transverse shaft 142 supported at its opposite ends by radial arms 143 that are

mounted fast on a transverse rock shaft **144** journalled at one end portion in the upper portion of the side wall **4** and at its opposite end in an end wall **145** of the cantilever arm **14**. As shown in FIGS. 3 and 4, an actuator arm **146** is mounted fast on one end to the projected end of the rock shaft **144**, and has its opposite end pivotally connected to the armature **147** of a solenoid **148** suitably mounted on the side wall **4** adjacent the top flange **12** thereof. A coil compression spring **149** anchored at its opposite ends to the side wall **4** and actuator arm **146** yieldingly urges the actuator arm **146** in a direction to move the pressure rolls **141** upwardly away from engagement with their respective underlying card-feeding rolls **137**. As shown in FIG. 3, the card-feeding rolls **137** are driven from the gear **118** by means of a pinion **150** fast on the shaft **138** and an idler gear **151** suitably journalled from the side wall **4** and having intermeshing engagement with the gear **118** and pinion **150**.

An angle plate **152** is suitably mounted on the cantilever arm **14** and carries a plurality of guide fingers **153** to guide the master cards B into the space between the rolls **137** and **141**. A pair of displaceable stop fingers **154** has end portions that normally project upwardly through the openings **140** to limit movement of the master cards B toward the printing zone A, as will hereinafter be described. The stop fingers **154** are rigidly secured to a rockshaft **155** that is journalled at its opposite ends in the side wall **4** and end wall **139** on a horizontal axis extending transversely of the machine. Outwardly of the side wall **4**, as shown in FIG. 3, the rockshaft **155** has mounted fast thereon a crank arm **156** that is connected at its outer end to the actuator arm **146** by means of a rigid link **157**. When the solenoid **148** is energized, resultant movement of the actuator arm **146** causes the stop fingers **154** to be retracted downwardly out of the path of travel of the master card B on the tray **126**, thus permitting movement of the master card B toward the printing zone.

The solenoids **78**, **104** and **148** are controlled by respective ones of a plurality of switches **158**, **159** and **160**. The switch **158** is mounted within the cantilever arm **14** by means of a mounting flange **161**, and is provided with a depending actuator finger **162** that extends downwardly across the passage **16** in the path of feeding movement of a master card B. The switch **159** is mounted to the interior portion of the cantilever arm **13** and is provided with a depending actuator finger **163** that extends downwardly across the passage **15** in the path of travel of each sheet X as it is fed from the magazine toward the printing zone A. The switch **160** is mounted within the cantilever arm **13** by means of a bracket **164**, see FIG. 9, and is provided with an elongated switch-operating crank **165** that cooperates with an actuator finger **166** to energize or deenergize the switch **160**. The actuator finger **166** is pivotally connected at one end to the lower end of an adjustment bar **167**, by means of a pivot pin or the like **168**, the pivot pin **168** extending transversely through an elongated slot **169** in a vertically disposed partition member **170** depending from the cantilever arm **13** and tray **126**, see particularly FIGS. 9 and 11. The actuator finger **166** includes a crank-engaging portion **171** that extends laterally through the slot **169**, the actuator finger **166** having its free end portion normally disposed in the path of travel of sheets X and moved thereby to a switch-energizing position during forward movement of a sheet X toward the printing position A, as shown in FIG. 9. The upper end of the adjustment bar **167** is provided with a thumb nut-equipped screw **172** that extends through a slot **173** in the partition member **170** whereby to releasably lock the adjustment bar **167** in desired set positions. It will be noted that by shifting the adjustment screw **172** upwardly or downwardly in the slot **173**, the actuator finger **166** will be caused to be shifted toward or away from the printing zone A, for a purpose which will hereinafter become apparent. As shown in FIG. 12, the actuator finger **162** moves into and out of a slot **174** in the card-feeding tray **126**; and, as shown in FIG. 10, the actuator fingers **163** and **166** are movable into and out of elongated slot **175** and **176** respectively in the top wall **2** of the base **1**.

The master card or cards B used with the machine of this invention are preferably adapted to have various data typed or written thereon relative to the name of a department, firm or individual, with the name and address only of the firm or individual imprinted on a given area of the master card with spirit-responsive carbon or similar material for duplication. The sheets X are preferably imprinted with desired information intended for distribution to the individuals or firms whose names and addresses appear on the master card B. Assuming that the spirit-responsive material is imprinted on the same area of each master card, the guide members **129** and **130** are adjusted to align this area of the master cards with the printing cylinders **112** and **113**. The guide members **18** and **19** are also adjusted to position the sheets X with regard to the printing cylinders **112** and **113** so that the names and addresses will be imprinted in the desired location on the sheets X. Assuming that the motor **53** is energized, the operator places a master card on the tray **126** and slides the same downwardly until the leading edge thereof engages the stop finger **154**. During this movement, the actuator finger **162** closes the switch **158**, causing the solenoid **78** to be energized to operatively connect the sheet-feeding mechanism to the motor **53**. Then, as a sheet X is advanced by the feeding drums **39** and feed rolls **106**, the actuating finger **163** is tripped thereby to close switch **159**, energizing solenoid **104** whereby to move the moistening roller **91** into engagement with the sheet X as it passes therebetween and the power-driven pressure roller **88**. Further, as the sheet X engages the actuating finger **166**, the switch **160** is closed thereby to energize solenoid **148**, causing the stop fingers **154** to be retracted and the pressure rolls **141** to simultaneously move into operative engagement with the master card B, whereby the card-feeding rolls **137** move the master card B toward the printing cylinders **112** and **113** and toward engagement with the sheet X between the printing cylinders. It will be noted that adjustment of the actuator finger **166** longitudinally of the slot **169** will vary the timing of energization of the solenoid **148**, so that the spirit-responsive printed matter on the master cards may be adjusted on the sheets X longitudinally of the direction of movement of the sheets X through the machine. The drive gearing for the various feeding rolls and printing cylinders is such that the clutch elements **58** and **59** are disengaged immediately upon discharge of the master card B and printed sheet X from the machine.

Rigidly mounted to the base **1** and extending longitudinally outwardly beyond the printing zone A is a receiver **177** comprising a sheet-receiving tray **178** and a master card storage rack **179** carried by an outer end wall **180** of the tray **178**. The tray **178** is provided with a guide flange **181** and a stop flange **182**, the former of which is adjustable transversely of the tray **178** and the latter of which is adjustable longitudinally of the tray **178**. A master card transfer mechanism **183**, carried by the end wall **180**, is disposed in overlying spaced relation to the bottom of the tray **178**, and is adapted to receive the master cards B as they are discharged from the printing cylinders **112** and **113**. For the purpose of guiding the discharged master card B to the transfer mechanism **183** and the printed sheets toward the bottom of the tray **178**, I provide a pair of discharge guide members **184** one each disposed laterally outwardly of an adjacent end of the printing cylinders **112** and **113**, see particularly FIG. 4. The guide members **184** are mounted on a horizontally disposed transverse mounting rod **185** carried at its opposite ends by the side wall **4** and end wall **139** of the cantilever arm **13** in underlying relation-

ship to the delivery end of the card-feeding tray **126**. The guide members **184** are formed to provide laterally spaced horizontal guide lips **186** and angularly downwardly projecting intervening guide lips **187**. The guide members **184** are so disposed that the master cards B move thereover while the printed sheets X move thereunder during printing and discharge thereof, the guide lips **186** dircting the master cards B in a direction to be received upon the transfer mechanism **183**, the printed sheets X being directed generally downwardly toward the bottom of the tray **178**.

The card-receiving rack **179** comprises a transverse housing **188** which defines a platform **189** for edgewise reception of master cards B as they are received, and a sloping backplate **190** for face-to-face engagement with the first-delivered master card. Backplate **190** is provided with a flanged brace member **191**. The transfer mechanism comprises a deck **192** which is secured to the housing **188** and which slopes upwardly toward the printing cylinders **112** and **113**; and a grid-like transfer element **193** that is normally disposed in face-to-face engagement with the top surface of the deck **192**. Portions of the transfer element extend through slots **194** in the housing **188** and are rigidly secured to a horizontally disposed shaft extending through the housing **188** transversely of the receiver, the shaft being indicated by the reference numeral **195** and being journalled in the opposite end walls of the housing **188**. As shown in FIGS. 14 and 15, the transfer element **193** is movable between its normal receiving position adjacent the deck **192** and a card-stacking position in closely spaced relation to the backplate **190**, and is yieldingly urged toward said normal card-receiving position by a torsion spring **196** within the housing **188**, see FIG. 1. Means for moving the transfer element **193** from its card-receiving position shown by full lines in FIG. 14 to its card-delivery or transfer position shown by dotted lines in FIG. 14, comprises a solenoid **197** secured to the brace flange **191**, a coil tension spring **198** secured at one end to an armature extension **199** of the solenoid **197**, a crank member **200** mounted on a stub shaft **201** that is journaled in an end wall **202** of the housing **188**, and a gear segment **203** operatively connected to the crank member **200** for common rotation therewith. The outer free end of the crank member **200** is connected to the opposite end of the tension spring **198**, and the gear segment **203** has meshing engagement with a cooperating pinion **204** fast on the shaft **195**.

The solenoid **197** is controlled by a switch **205** mounted within the deck **192** and having an elongated actuator finger **206** that extends upwardly from the switch **205** through an opening **207** in the top wall of the deck **192**. As shown in FIG. 2, the housing **188** is provided with a slot **208** for reception of the actuator finger **206**. It will be noted that the top surface of the deck **192** is provided with a pair of laterally spaced cushions **209**, of felt or the like, upon which the transfer element **193** rests in its normal card-receiving position.

As each master card B is discharged from the machine, it falls upon the transfer element **193** and actuator finger **206**, moving the actuator finger **206** downwardly to close the switch **205**, thus energizing the solenoid **197** which imparts movement to the transfer element **193** to stack the master cards B with one edge on the platform **189** and in face-to-face relationship to the backplate **190**. As the card is moved to its stacked position, the actuator finger **206** is disengaged, and returns to its position shown in FIGS. 1 and 14, whereby to de-energize the solenoid **197** and permit the torsion spring **196** to return the transfer element **193** to its normal card-receiving position. As subsequent printed sheets are delivered to the tray **178** and master cards to the transfer element **193**, said master cards are stacked on the platform **189** in the order in which they were introduced to the machine, thus making it easier for the operator to replace the cards in their respective file.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the objectives set forth; and, while I have shown and described a commercial embodiment of my printing machine, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention, as defined in the claims.

The claims are:

1. In a printing machine utilizing the spirit transfer process:

(a) frame structure providing a magazine for sheets to be printed and including a base having a generally vertical support member extending upwardly from one side of the base and a cantilever structure extending laterally from the support member in overlying spaced relation to said base,

(b) sheet-feeding means for feeding sheets singly from said magazine and between said base and cantilever structure toward a printing zone adjacent one end of said frame structure,

(c) card-feeding means including cooperating card-feeding elements on said cantilever structure for feeding a master card in a direction generally toward a sheet delivered by said sheet-feeding means and toward said printing zone,

(d) sheet-moistening means for applying solvent liquid to said sheet during feeding movement thereof to said printing zone,

(e) means including a pair of cooperating pressure members one in said base and the other in said cantilever structure at said printing zone for pressing the master card against the moistened sheet, and

(f) drive mechanism for imparting feeding movements to said sheet-feeding means and card-feeding means.

2. The structure defined in claim **1** in which said cantilever structure comprises a pair of spaced cantilever arms cooperating to define a passage for movement of said master card therebetween.

3. The structure defined in claim **1** in further combination with guide means adjacent said pressure members for directing said master card and sheet in diverging directions from said pressure members.

4. The structure defined in claim **1** in further combination with the master card-feeding tray for guiding said master card toward said master card-feeding elements, and control means including an actuator element responsive to predetermined movement of a master card in said tray to initiate feeding movement of said sheet-feeding means.

5. The structure defined in claim **4** in which said drive mechanism includes power transmission mechanism between said sheet-feeding means and said card-feeding elements for feeding a master card and sheet to said printing zone at an equal rate, and in further combination with a displaceable stop element normally disposed in the path of travel of said master card, release mechanism for displacing said stop element, and an actuator for said release mechanism and operative responsive to predetermined feeding movement of said sheet to cause displacement of said stop element from the normal position thereof.

6. The structure defined in claim **5** in which said card-feeding mechanism comprises a card-feeding roller operatively coupled to said power transmission mechanism, and a pressure roller rotatively mounted on an axis parallel to the axis of said feed roller and for bodily movements toward and away from said card-feeding roller, said release mechanism moving said pressure roller toward said card-feeding roller during displacement of said stop element from said normal position thereof.

7. The structure defined in claim **1** in which said sheet-feeding means includes a primary feeding member disposed to engage sheets in said magazine singly and in

succession, said sheet-moistening means including a secondary feeding roller operatively coupled to said primary feeding member, and a cooperating moistening roller, one of said secondary and moistening rollers being journalled in said base and the other in said cantilever structure and one thereof being movable toward and away from the other thereof and providing a bight for reception of said sheet, and means responsive to feeding movement of a sheet from said magazine for moving one of said secondary and moistening rollers toward the other thereof.

8. The structure defined in claim **1** in which said cantilever structure comprises a pair of spaced cantilever arms having free ends overlying the opposite side portion of said base and defining a passage for said master card, said passage being opened at the side adjacent said free ends of the cantilever arms to permit reception therein of a card of greater transverse dimension than said passage.

9. The structure defined in claim **8** in which said cantilever arms, support member and base define a generally horizontal passage for said sheets during feeding movement thereof, said generally horizontal passage being opened at the side adjacent said free ends of the cantilever arms to permit passage of sheets of greater transverse dimension than said generally horizontal passage.

10. The structure defined in claim **1**, in which said pressure members at said printing zone comprise a pair of cooperating cylinders having parallel axes, one of said cylinders being operatively coupled to said drive mechanism, the other of said cylinders being mounted for movements toward and away from operative engagement with said one thereof, and in further combination with yielding means urging said other cylinder toward engagement with said one thereof.

11. In a printing machine utilizing the spirit transfer process:

(a) frame structure including a base having a magazine at one end for sheets to be printed, a generally vertical support member extending upwardly from one side of the base, and a cantilever structure extending laterally from the support member in overlying spaced relation to said base,

(b) sheet-feeding means for feeding sheets singly from said magazine and between said base and cantilever structure toward a printing zone adjacent the opposite end of said base,

(c) card-feeding means including cooperating card-feeding elements on said cantilever structure for feeding a master card in a direction generally toward a sheet delivered by said sheet-feeding means and toward said printing zone,

(d) sheet-moistening means for applying solvent liquid to said sheet during feeding movement thereof to said printing zone,

(e) means including a pair of cooperating rotary pressure and feed cylinders, one in said base and the other in said cantilever structure at said printing zone, for pressing the master card and moistened sheet together therebetween and for discharge of said card and sheet from said printing zone, and

(f) drive means for imparting feeding movements to said sheet-feeding means and card-feeding means and rotary discharge movement to said feed cylinder.

12. The structure defined in claim **11** in further combination with means for separating said card and sheet during discharge thereof from said printing zone, said means including guide members adjacent said cylinders directing said master card and sheet is diverging directions generally longitudinally of said base.

13. The structure defined in claim **12** in further combination with a receiver for said card and sheet and including, a sheet-receiving tray, a card storage rack, and a transfer device for stacking a plurality of said master cards in predetermined order on said rack responsive to discharge of said cards to said receiver.

14. The structure defined in claim **13** in which said guide members are disposed to direct said sheet toward the bottom portion of said tray and said card toward said transfer device, said transfer device including a transfer element mounted for movements between a normal card-receiving position overlying said tray and a card-delivery position adjacent said storage rack, and means for imparting card-stacking and return movements to said transfer element.

15. The structure defined in claim **14** in which said transfer element is mounted at one end in said receiver for limited swinging movements between said positions thereof, and in which said means for imparting said movements thereto includes a yielding member urging said transfer element toward one of said positions thereof and power-operated mechanism for moving said transfer element to the other of said positions against bias of said yielding member.

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