Jan. 13, 1953 H. F. GAMMETER 2,625,101

SHEET REVERSING MECHANISM FOR ROTARY PERFECTING SHEET PRINTING APPARATUS

Filed June 1, 1951 5 Sheets-Sheet 1

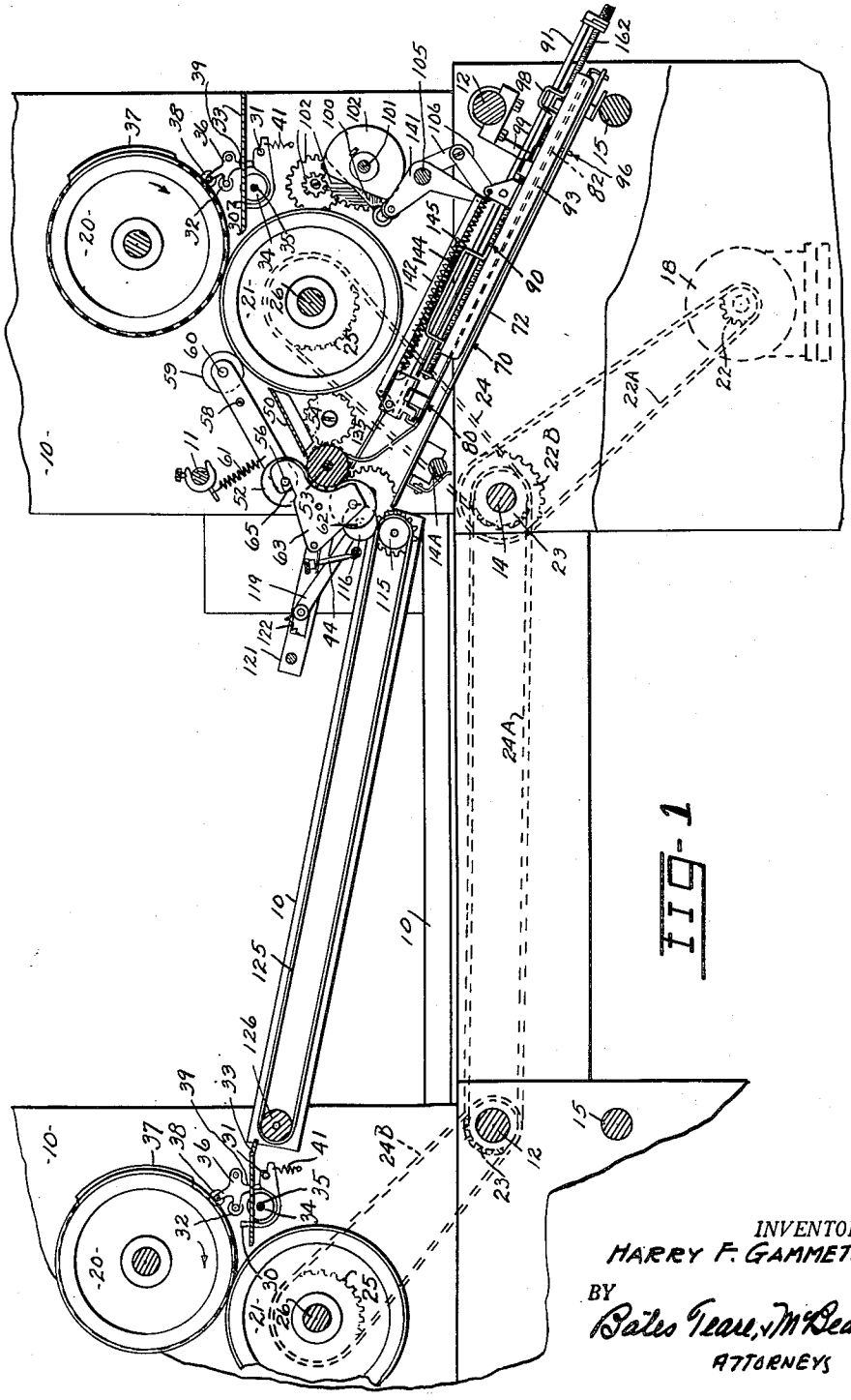


FIG. 1

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SHEET REVERSING MECHANISM FOR ROTARY PERFECTING SHEET PRINTING APPARATUS

Filed June 1, 1951 5 Sheets-Sheet 2

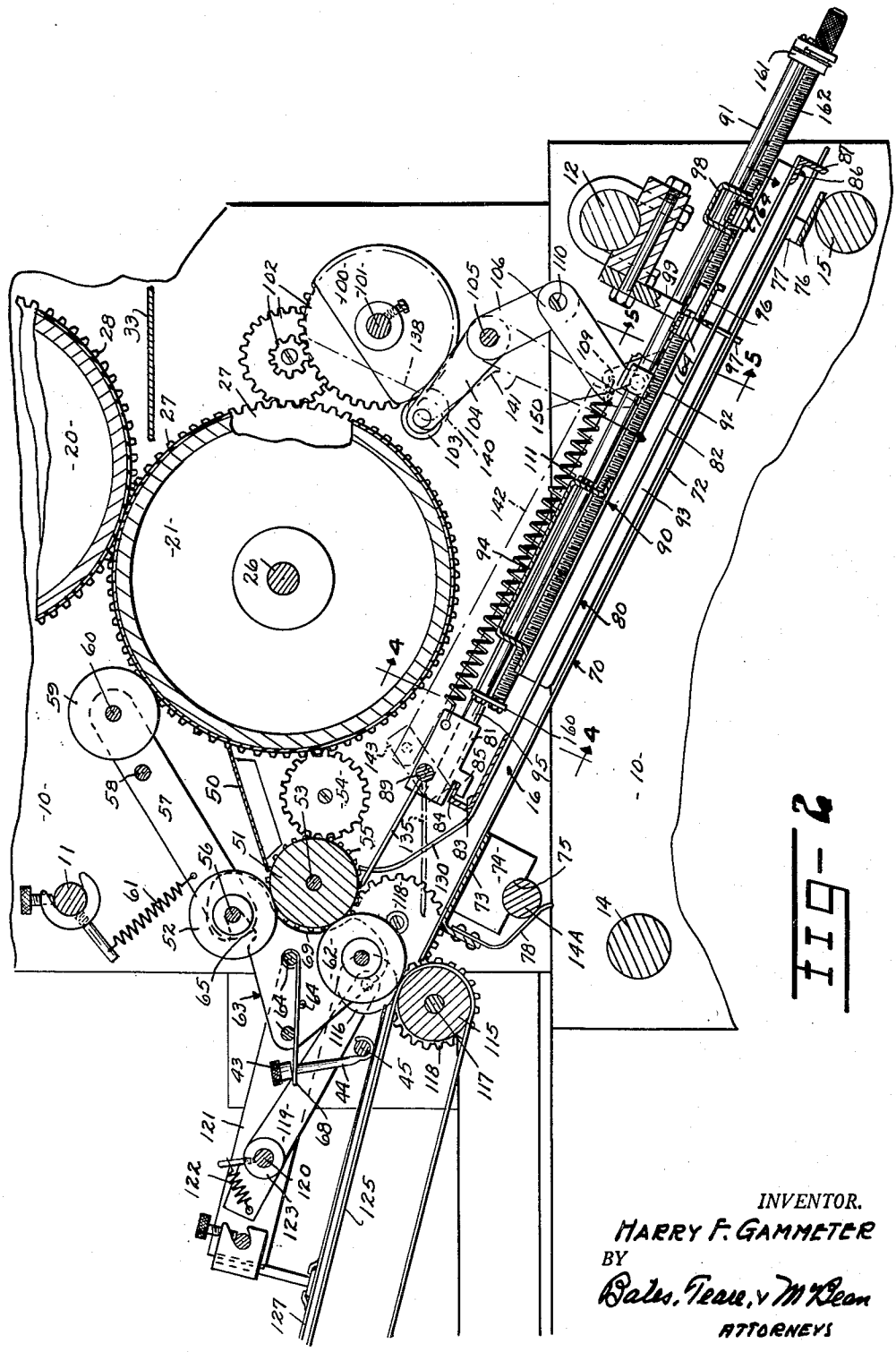


FIG-2

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Jan. 13, 1953 H. F. GAMMETER 2,625,101

SHEET REVERSING MECHANISM FOR ROTARY PERFECTING SHEET PRINTING APPARATUS

Filed June 1, 1951 5 Sheets-Sheet 3

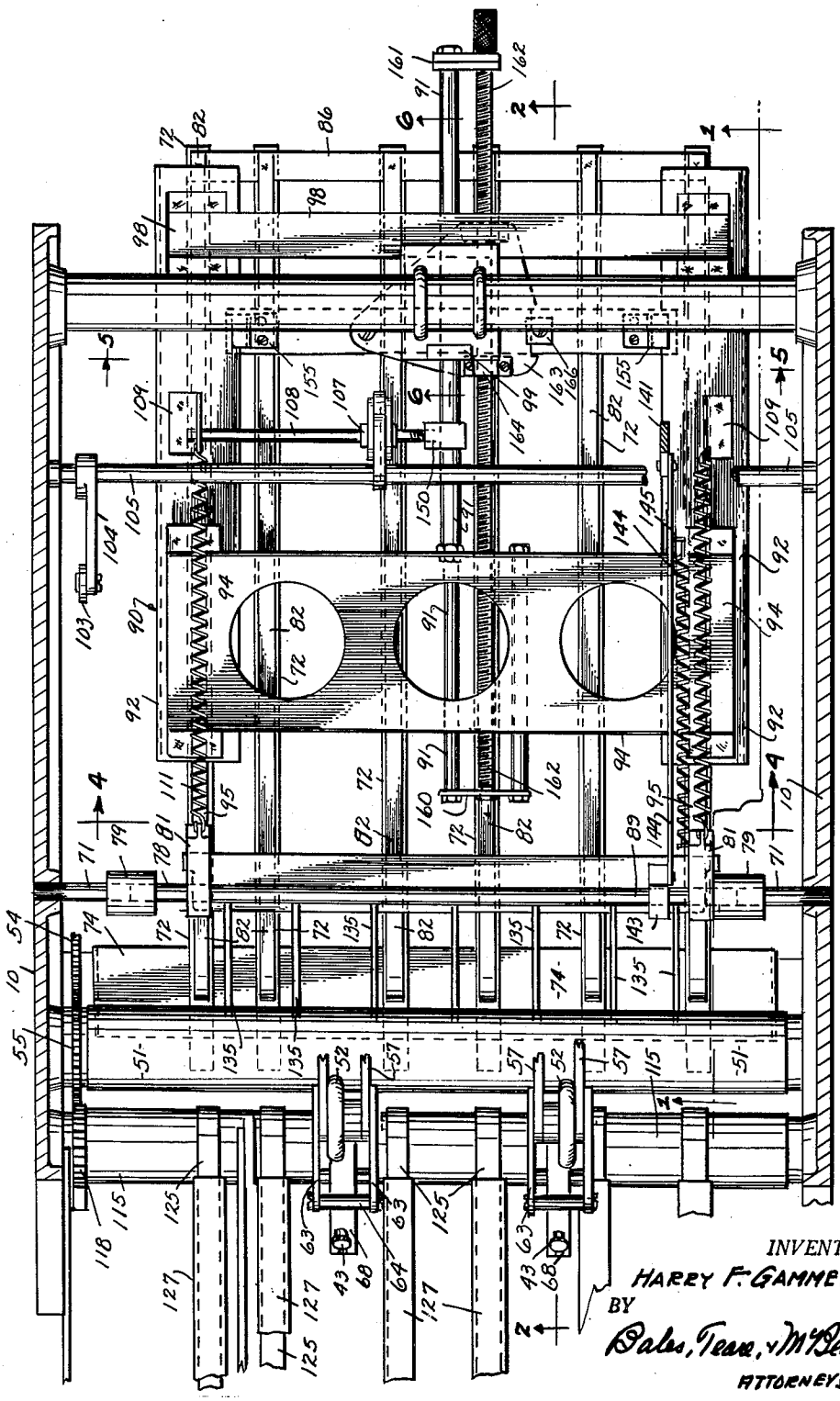


FIG-3

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SHEET REVERSING MECHANISM FOR ROTARY PERFECTING SHEET PRINTING APPARATUS

Filed June 1, 1951 5 Sheets-Sheet 4

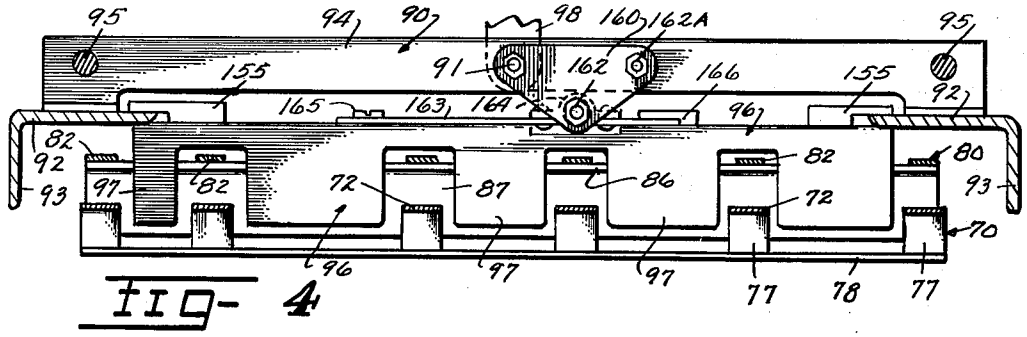


FIG- 4

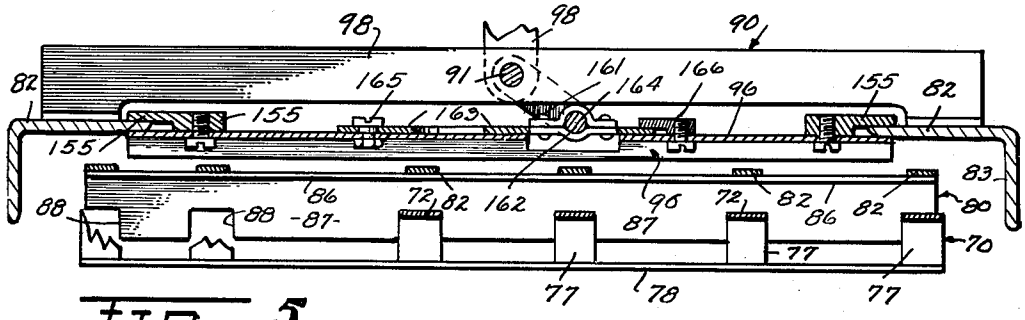
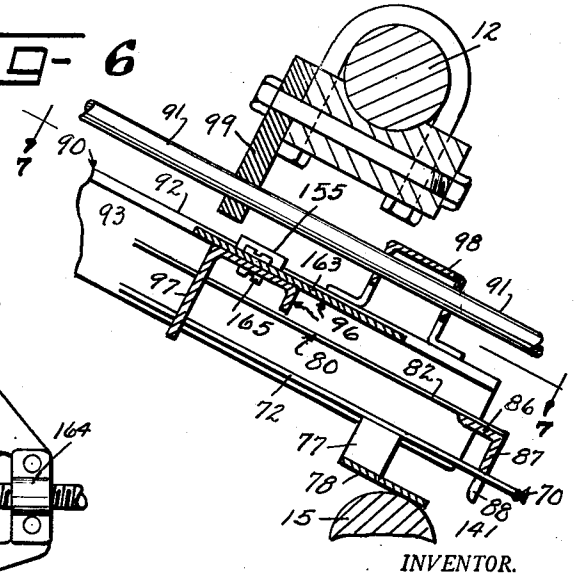


FIG- 5

FIG- 6



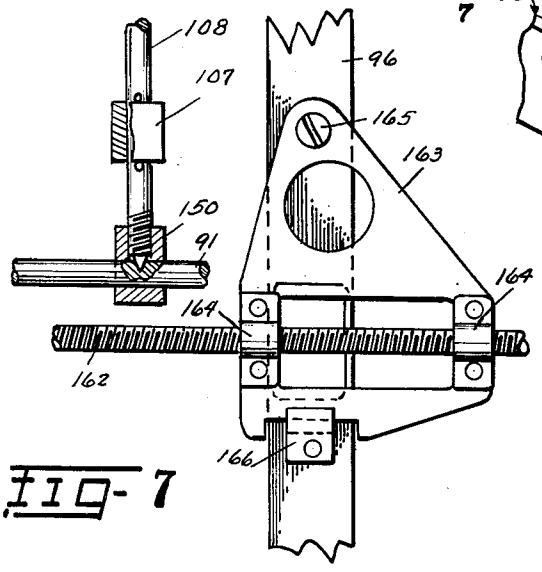


FIG- 7

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Jan. 13, 1953 H. F. GAMMETER 2,625,101

SHEET REVERSING MECHANISM FOR ROTARY PERFECTING SHEET PRINTING APPARATUS

Filed June 1, 1951 5 Sheets-Sheet 5

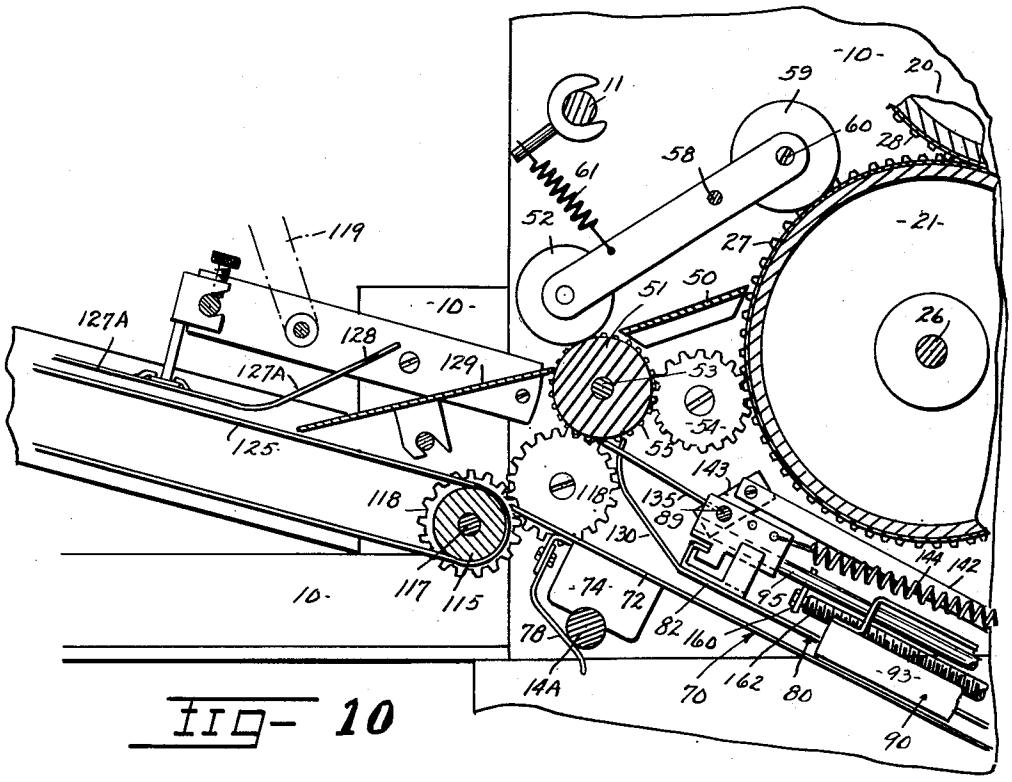


FIG- 10

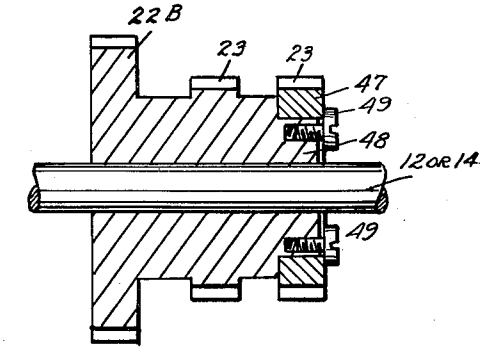


FIG- 9

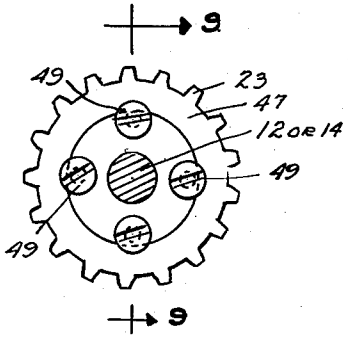


FIG- 8

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Patented Jan. 13, 1953

2,625,101

UNITED STATES PATENT OFFICE

2,625,101

SHEET REVERSING MECHANISM FOR ROTARY PERFECTING SHEET PRINTING APPARATUS

Harry F. Gammeter, Cleveland Heights, Ohio, assignor to Addressograph-Multigraph Corporation, Cleveland, Ohio, a corporation of Delaware

Application June 1, 1951, Serial No. 229,404

15 Claims. (Cl. 101—230)

1

The present invention is a continuation in part of my prior application filed February 17, 1951 and assigned Serial No. 211,482, now abandoned. The invention relates to improvements in a printing apparatus for imprinting both surfaces of a sheet. More specifically, the present invention is concerned with improvements in or relating to a rotary printing apparatus of the type having two horizontally spaced printing couples, each couple including an impression drum and a platen drum mounted therebelow, together with a mechanism which will receive a sheet imprinted on one face by one of the printing couples, turn such imprinted sheet upside down and forward it to the other printing couple which imprints the other face. These, therefore, are the general objects of the present invention.

A more specific object of the present invention is to provide a simple, compact and improved delivery mechanism for a rotary printing couple, which mechanism will receive a sheet having an impression on its upper face and deliver the sheet upside down with the image on its bottom face.

Another object of the present invention is to provide an improved rotary printing machine having a rotary printing couple to imprint the upper surface of a sheet, with a delivery mechanism to receive the imprinted sheet and deliver it to a receptacle mounted below such printing couple with the imprinted surface facing downward, and then discharge the sheet from the receptacle in substantially the same general direction as that taken by the sheet during the imprinting operation and forward the imprinted sheet to a second rotary printing couple, similar to the first couple, to imprint the other surface of the sheet, and wherein the delivery mechanism is readily adaptable for use in connection with sheets of various lengths.

Other objects and advantages of the invention will become more apparent from the following description, reference being had to a preferred embodiment of the invention illustrated in the accompanying drawings.

In the drawings, Fig. 1 is a vertical section through a printing apparatus embodying the present invention, the plane of the section being generally indicated by the lines 1—1 on Fig. 3; Fig. 2 is an enlarged vertical section of a portion of the printing apparatus illustrating the sheet inverting mechanism, the scale being somewhat larger than that of Fig. 1, and the plane of the section being indicated by the lines 2—2 on Fig. 3; Fig. 3 is a fragmentary section on the same scale as Fig. 2, the plane of the section being inclined

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from a horizontal plane as indicated by the lines 3—3 on Fig. 2; Figs. 4 and 5 are transverse sectional details, the planes of which are indicated by the correspondingly numbered lines on Fig. 3; Fig. 6 is a fragmentary sectional detail the plane of which is indicated by the lines 6—6 on Fig. 3; Fig. 7 is a sectional detail, the plane of which is indicated by the lines 7—7 on Fig. 6; Fig. 8 is a detail of a portion of the drive mechanism; Fig. 9 is a sectional detail the plane of which is indicated by the lines 9—9 on Fig. 8; and Fig. 10 is a sectional view similar to Fig. 2 but illustrating the sheet inverting mechanism disabled to provide for the imprinting of the same face of the sheet by both printing couples.

Referring now to the drawings, it will be seen that the improved printing apparatus is illustrated as being mounted in a frame including a pair of spaced vertically extending side frame members 10 secured together by cross frame members such as rods 11, 12, 14 and 15. A pair of longitudinally spaced printing couples are mounted in this frame, one couple being positioned adjacent each end of the frame. Each printing couple includes a printing drum 20 adapted to carry an image to be transferred to a sheet to be printed, together with a cooperating platen drum 21 which is mounted therebelow. These drums may be journalled in the frame 10 in any well-known manner. The drum 20 may comprise a direct printing drum carrying a master printing plate to which ink is applied in any well-known manner, or it may comprise a transfer or offset drum to which an inked image is applied by any well-known process, such as by the use of lithographic or planographic principles. Methods and means for applying ink or an inked image to the drums 20 are well known and hence none is illustrated or described herein.

The printing drums 20 are each rotated in the same direction, as indicated by the arrows on Fig. 1. The printing image may be placed on one printing drum with the top thereof in a predetermined relation to the direction of rotation of the drum and on the other printing drum with the top thereof in the opposite direction. For instance, the top of the image on the right hand printing drum may be positioned so that it is transferred to the sheet first while the image on the left hand drum may be positioned so that the bottom of the image will be transferred to the sheet first. Following the imprinting by the right hand printing couple the sheet is turned upside down and end for end, as will become hereinafter more apparent, so that the sheet will

enter the bite of the second or left hand printing couple bottom of the image foremost. Accordingly, the top of both imprints will lie adjacent the same end of the sheet, one on one face of the sheet and one on the other face thereof.

The printing drums are illustrated as being driven by a motor 18 (Fig. 1). This motor is provided with the usual armature shaft carrying a sprocket wheel 22 which is drivingly connected by a drive chain 22A with a sprocket wheel 22B journalled on a suitable shaft such as the rod 14. A pair of sprocket wheels 23 are drivingly connected with the sprocket wheel 22B, and one of these is connected by a drive chain 24 with a sprocket wheel 25 on the shaft 26 to which the right hand platen drum 21 is secured. The other sprocket wheel 23 is drivingly connected by a chain 24A with one of a second pair of sprocket wheels 23 which are journalled on a suitable shaft such as the left hand rod 12. The other of these sprocket wheels 23 is connected by a drive chain 24B with a sprocket wheel 25 drivingly connected with the left hand platen shaft 26. The arrangement is such that the shafts 26 are synchronously driven. The platen drums 21 are drivingly secured to their respective shafts 26 and each carries a gear 27 which meshes with a corresponding gear 28 mounted on the associated printing drum 20 (Fig. 2).

One of the drums 20 or 21 of each couple may include the usual paper gripping and discharge mechanism such as, for instance, that shown in Patent No. 2,165,231, issued July 11, 1939, to my assignee, Addressograph-Multigraph Corporation.

The driving mechanism may be arranged to provide for the accurate positioning of one set of printing drums relative to the other. This is advantageous when the apparatus is arranged to be selectively conditioned so that the printing couples print either on opposite sides of the sheet, or on the same side of the sheet. It is likewise desirable to facilitate the use of the machine on sheets of differing lengths or when the printing couples are equipped with paper grippers as above mentioned. For this purpose the sprocket wheels of one set 23 as, for instance, the right hand set in Fig. 1 are adjustable relative to each other. As indicated in Figs. 8 and 9, one sprocket wheel 23 is integral with or drivingly secured to the sprocket wheel 22B and drives the right hand printing couple through the chain 23 as heretofore mentioned. The other sprocket wheel 23 of this set comprises an annular sprocket tooth equipped ring 47 which is rotatably mounted ring 47 which is rotatably mounted on a hub portion 48 of the other sprocket wheel 23 and is clamped in an adjusted position relative thereto by clamping devices such as bolts 49 which are threaded into the hub 48, and the heads of which engage the face of the ring 47 clamping it to a suitable shoulder formed on the other sprocket wheel 23. The sprocket ring 48 is connected by the chain 24A with the left hand set of sprocket wheels 23 which drive the left hand printing unit as heretofore described.

Any suitable mechanism may be used to control the time of entrance of the sheet between the drums of each printing couple to thereby insure registration of the impression made by one printing couple with that made by the other couple. One such mechanism is more or less diagrammatically shown in Fig. 1. A paper stop finger 30 is pivotally mounted as at 31 on a suitable frame member and projects upward through an opening in a horizontally extending feed table 33 across which sheets are fed to the respective printing couple. A set of sheet forwarding rolls 34 are mounted on a shaft 35 which is journalled in the frame members 10. These rolls are driven from the associated platen drum 21 by suitable gearing, not shown. The rolls 34 project through openings in the respective feed table 33 and coact with rollers 32 carried by pivoted brackets one of which is shown at 36. These brackets are swung periodically to bring the rolls 32 downward into contact with a sheet positioned on the rolls 34 and to swing the respective stop finger 30 downward out of the path of such sheet. The swinging of the rollers 32 and the stop finger 30 may be accomplished by a cam 37 mounted on the respective drum 20 and coacting with a roller 38 carried by a bracket 36 and having a spur 39 which engages the stop fingers 30. Suitable springs 41 serve to retain the parts in their normal position as shown in Fig. 1. The cams 37 are preferably adjustable relative to their respective drums so that registration and position of the respective imprints on the sheet may be adjusted or controlled.

The present invention provides an improved mechanism to receive a sheet imprinted by the left hand printing couple, invert such sheet so that the printing image thereon faces downward, and forwards such inverted sheet to the second printing couple for the transfer of an imprint to the other face of the sheet. The compactness of the improved mechanism reduces to a minimum the horizontal spacing of the printing couples one from the other, and its arrangement facilitates the removal of any sheet which may become jammed or clogged therein.

Sheets to be printed are fed across the substantially horizontal feed table 33 of the right hand printing couple Fig. 3, into the bite of the drums 20 and 21 of such couple. These drums cause an impression to be made on the upper face of the sheet and forward the sheet across a discharge table 50 into the bite of a roll 51 and rollers 52. The roll 51 is secured to a shaft 53 journalled in the frame 10 and is driven from the platen gear 27 through the medium of an idler gear 54 and a gear 55 which is drivingly secured to the roll 53.

The rollers 52 comprise narrow rollers each of which is mounted on a spindle 56 carried by a pair of parallel arms 57 which are loosely pivoted, intermediate their ends, to a cross bar 58 carried by the frame 10. A similar roller 59 is mounted on a spindle 60 at the opposite end of each pair of arms 57. The rollers 59 engage the periphery of a platen drum 21 and guide the sheet from the bite of the printing couple onto the feed table 50. A spring 69 is interposed between one of the arms 57 and the rod 15 to control the pressure between the various rollers.

The imprinted sheet passes from the bite of the roll 51 and rollers 52, around the roll 51 to a position where it is gripped between such roll and one or more rollers 62. Each roller 62 is mounted in a removable bracket 63 comprising a pair of side plates secured to and spaced apart by rods 64. These brackets are provided with key slots 65 which are arranged to removably embrace the spindles 56 which support the respective rollers 52. Each roller 62 is journalled on a spindle 66 carried by the bracket 63 and is spaced below the roller 52 heretofore described. The bracket 63 depends from a spindle 56 and is normally held in position to cause the rolls 52

and 62 to engage the roll 51 by a flat spring 68 which is supported by cross rods 64 of the bracket. This spring is tensioned in a downward direction by an adjusting nut 53 which engages the threaded end of a strap 44, the lower end of which is supported by a frame bar or rod 45, and the upper end of which extends through a forked outer end of the spring 68. The forward surfaces 69 of the side plates of the bracket 63 serve to guide the sheet around the roller 51.

The sheet is discharged from the bite of the rollers 51 and 62 into a receptacle 16 which is disposed below the right hand printing couple. The receptacle 16 includes a bottom or sheet supporting member 70, a top member 80 which is spaced above the bottom member 70, and a reciprocating slide 90 which ejects the sheet from the receptacle.

The bottom member 70 of the receptacle 16 includes a plurality of transversely spaced narrow flat strips or bars 72 which, at their forward ends, are secured to a cross bar or plate 73, the ends of which are bent downwardly as at 74 and are provided with recesses 75 to engage the frame rod 14. The opposite ends of the bars 72 are secured to a transverse plate 76 by spacers 77. The plate 76 rests on the frame bar 15 heretofore described. The bottom member of the receptacle is removably retained in position by one or more flat leaf springs 78 which are carried by the plate 73 and which engage the under surface of the cross rod 14, thus clamping the bottom member 70 of the receptacle 16 to such rod.

The top 80 of the receptacle 16 includes a plurality of narrow elongated strips or bars 82 positioned to lie above the bars 72 of the bottom member 70. The bars 82 are secured together adjacent their rearmost ends by a transversely extending angle bar, one flange 86 of which is secured to the bars 82 and the other flange 87 of which projects downwardly and is provided with notches 88 to embrace the bars 72 of the bottom member 70 of the receptacle. The angle bar 86 thus serves to position the right hand end of top member 80 (Fig. 2) tranversely and to space it from the bottom member 70.

Adjacent their forward ends the bars 82 are secured to a transverse plate 83. This plate is bent upward and then rearward to form a rearwardly facing channel, the upper lip 84 of which is supported by hook-like formations 85 on each of a pair of spaced blocks 81 which are pivotally mounted on a transversely extending rod 89. This rod (Fig. 3) extends between and is pivotally supported by a pair of sleeves 79. Each sleeve is secured to the adjacent side frame member 10 by a rod stub rod or stub shaft 71.

The slide 90 which ejects the sheet from the receptacle 16 includes a pair of longitudinally extending side members 92 having depending flanges 93 which extend downward to a point adjacent the bottom 70 of the receptacle, thus forming side members therefor. The members 92 are secured together adjacent their opposite ends by transverse channel-like members 94 and 98. Mounted in the channel 94 and extending forwardly therefrom and adjacent each side thereof, is a rod or plunger 95 which is slidably mounted in an opening in the respective block 81, heretofore described. An elongated rod 91 is secured to and passes through both members 94 and 98 and extends axially substantially along the longitudinal center line of the receptacle 16. Adjacent its rear end this rod is slidably engaged by a bracket 99 secured to the frame rod 12, heretofore described. The rods 95 and 91 thus support the slide for reciprocation in a direction parallel with the longitudinal center line of the receptacle.

The slide 90 is provided with a transverse ejector member 96, hereinafter to be more fully described, but which has a plurality of lug portions projecting downward through the spaces between the bars 72 and 82 to a plane below the bottom of the bars 82. Accordingly, the member 96 forms an end wall for the receptacle 16 and a stop for sheets forwarded to the receptacle by the feed rollers 51 and 52.

The position of the slide or ejector 90 of the receptacle 16 is controlled by a cam 100. As shown in Fig. 2, this cam is adjustably secured to a shaft 101 which is drivingly connected with the platen gear 27 by gearing 102. This cam coacts with a roller 103 carried by a lever 104 which is secured to a rod 105 pivotally mounted in the frame members 10. The rod 105 is provided with a downwardly extending arm 106, the lower end of which engages a roller 107 mounted on a cross rod 108 carried by the slide 90. The arm 106 may be made of two members secured together as at 110 to permit adjustment thereof.

The rod 108 extends transversely across the slide 90. As shown, the inner end of this rod is threaded and engages a threaded opening in a block 150 carried by the rod 91, the arrangement being such that the end of the rod 108 engages the rod 91 and secures the block 150 in position thereon. The opposite end of the rod 108 is mounted in one of a pair of brackets 109 secured to respective side members 92 of the ejector 90.

The cam 100 acts to draw the ejector or slide 90 rearward to the position indicated in Fig. 2. As illustrated, the arm 106 engages the forward surface of the roller 107. A spring 111 is interposed between each bracket 109 of the slide 90 and either the frame plates 10, or as shown, the respective blocks 81, heretofore described. Such springs move the slide 90 forward as the cam rotates and also serve to retain the roller 103 in contact with the cam.

The operation of the slide is so timed that when a sheet has been deposited in the receptable 16 by the rolls 51 and 62, the slide is brought forward by the springs 111 thereby moving such sheet forward into the bite of a pair of feed rolls 115 and 116 which are spaced from the forward open end of the receptacle 16 and which remove the sheet from the receptacle as will be hereinafter more fully described.

As heretofore mentioned it is desirable that the sheet reversing mechanism be arranged to handle sheets of various lengths. It is likewise desirable that the distance of the ejecting movement of the slide 90 be held to a minimum so as to provide a compact light weight construction and at the same time enable accurate registration of the sheets. Accordingly, in the present embodiment the ejector member 96 is adjustably mounted on the slide 90. As illustrated, the ejector member 96 extends transversely across the slide 90 and its opposite ends underlie the horizontal flanges of the side members 92 of the slide. Mounted on the ejector 96, adjacent each end thereof are clips 155 which overlie the adjacent side members 92. The ejector is thus supported by the slide and may be adjusted relative to the slide in a direction to and from the bite of the feed rolls 115 and 116.

The position of the ejector 96 relative to the slide 90 is manually settable. To this end

brackets 160 and 161 are secured to the outer ends of the rod 91 of the slide 90, which rod projects some distance beyond the ends of the slide. An elongated threaded rod 162 is journalled in these brackets and extends therebetween with its axis parallel with the axis of the rod 91. A relatively flat plate 163 is positioned beneath this rod 162 and is provided with spaced threaded portions 164 which threadingly engage the threaded rod 162. The plate 163 is pivotally secured to the ejector member 96 as at 165 and is secured in an adjusted position relative thereto by a clamp 166 secured to the member 96 at a point remote from the pivot 163.

The arrangement of the ejector, above described, is such that rotation of the screw or threaded rod 162 moves the plate 163 together with the ejector 96 to and from the discharge rolls 115 and 116. The pivotal connection between the plate 163 and the ejector 96 permits adjustment of the ejector 163 to cause it to be aligned with the bite of such rolls. The movement of the ejector 96 to and from the rolls 115 and 116 enables the portion 97 thereof to be positioned so as to stop a sheet entering the receptacle 16 with the edge of the sheet nearest the bite of the rolls 115, 116 always the same distance from such bite. Accordingly, a relative short movement may be imparted to the ejector regardless of the length of sheet being imprinted.

As heretofore mentioned, the forward movement of the ejector 96 feeds the sheets from the receptacle 16 into the bite of a pair of feed rolls 115 and 116. The lower feed roll 115 may be secured to a shaft 117 journalled in the frame members 10 and driven by the gear 55, heretofore mentioned, through the medium of gearing 118.

The upper roll 116, as shown, comprises a series of rollers each of which is carried by one end of an arm 119. Each arm 119 is pivotally mounted on a cross rod 120 which extends between a pair of frame members 121. The rollers 116 are resiliently maintained in contact with the roller 115 by springs 122 disposed between the respective arm 119 and collars 123 secured to the rod 120.

The printed sheet is guided from the bite of the rolls 51 and 62 into the receptacle 16 by forwardly projecting portions 139 of the bars 82 of the receptacle top 80. These bars incline upwardly and forwardly to a position above the bite of the rolls 51 and 62. As the sheet is ejected from the receptacle 61 it is guided into the bite of the rollers 115 and 116 by a diverter mechanism including a plurality of pins 135 which are secured at one end to and project forward from the rod 89 heretofore described. This rod is swung from the full line position to the dotted line position (Fig. 2). In the former or full line position, the forward end of the pins 135 engage the roller 52 and act to strip the sheet therefrom. In the latter or dotted line position, the pins restrict the mouth of the receptacle 16 and guide the sheet being ejected into the bite of the rollers 115 and 116.

The pins 135 are actuated by a cam 138. This cam is adjustably secured to the shaft 101 and is engaged by a roller 140 carried by a bell crank 141. The bell crank is pivotally mounted on the rod 105 and is connected by a link 142 with an arm 143 which is secured to the rod 89. A spring 144, interposed between the blocks 81 and a pin 145 carried by the link 142, maintains the roller in engagement with its cam 138.

The rollers 115 and 116 forward the sheet to a feed table comprising a plurality of belts 125. These belts are looped about the roller 115 and a

second roller 126 which is rotatably mounted adjacent the feed table 33 of the forwardly positioned or left hand printing couple. The sheets are normally held in engagement with the belts 125 by bars 127 which may be removably positioned above the belts in any suitable manner.

It will be noted that the bite of the rollers 53 and 62 which feed the sheets into the receptacle 16 is above the bite of the rollers 115 and 116 which complete the removal of the sheets from the receptacle. Accordingly, as soon as a sheet has been picked up by the rollers 115 and 116, the rake or diverter pins 135 may be raised to admit another sheet to enter the receptacle 16 above the sheet being withdrawn by the rolls 115 and 116. This arrangement provides for operation of the machine at a relative high rate of speed and maintains the time interval between the sheets at a minimum.

It is sometimes desirable to utilize the machine for imprinting one surface of the sheet with two colors, one color being placed thereon by the right hand printing couple, and the other color being placed on the same side of the sheet by the left hand printing couple. Under such circumstances the bracket members 63 are removed and the rollers 62 moved to an idle position. The bars 127 are removed, and bars 127*a* substituted therefor. The rearmost ends of the bars 127*a* are inclined upwardly, as at 128 (Fig. 5), to guide the sheet from the bite of the rolls 51 and 52, across a removable feed table 129 which is substituted for the inverter bracket 63, onto the belts 125 which then forward the sheet to the left hand printing couple without reversing the sheet.

While the invention has been illustrated and described in connection with printing couples each having the printing drum positioned above the platen drum, it is within the concept of the invention to place both printing drums below their respective platen drums. However, the positioning of the printing drums uppermost has decided advantages. It provides ample space for the mounting of inking mechanisms above the printing drums where they will be accessible. It also facilitates the positioning of removable printing plates on the printing drums and permits such drums to be readily cleansed.

From the foregoing it will be seen that this invention provides a compact and efficient printing apparatus wherein two substantially identical rotary printing couples are utilized to imprint opposite faces of a sheet which is inverted or turned upside down by a mechanism which is readily removable from the machine to provide for the imprinting by both printing couples on the same side of the sheet.

I claim:

1. In a printing apparatus having a pair of horizontally spaced rotary printing couples, each couple including a drum adapted to carry an image to be transferred to a sheet to be printed and a platen drum mounted below the printing drum and coacting therewith, a sheet receiving receptacle, means to receive sheets from the first printing couple and turn them face to face and forward them to the receptacle, said means comprising a roll, a pair of rollers coacting with said roll at circumferentially spaced points, said roll and one of said rollers being positioned to receive printed sheets from said couple, means to guide said sheets into the bite of said roll and the other roller, said roll and such other roller being positioned to guide the printed sheet into said receptacle with its printed surface down,

means to eject said sheets one at a time from said receptacle in a direction reverse to that in which they enter the receptacle, and means to forward the ejected sheets one at a time to the second couple while maintaining the previously printed surface bottommost.

2. In a printing apparatus having a rotary printing couple, a second rotary printing couple spaced horizontally from the first printing couple including a drum adapted to carry an image to be transferred to a sheet to be printed and a platen drum mounted below the printing drum and coacting therewith, a sheet receiving receptacle mounted below the first couple, a feed roll mounted between said couples, a roller mounted with its axis above the axis of said roll and coacting therewith to receive printed sheets from said couple, a second roller coacting with said roll and having its axis disposed below the axis thereof, means to guide sheets from the bite of the first named roller and said roll into the bite of said roll and the other roller, said roll and said last named roller being positioned to guide the printed sheet into said receptacle with its printed surface down, means to eject said sheets one at a time from said receptacle in a direction opposite to the direction in which they enter the receptacle, and means to forward the ejected sheets one at a time to the second couple while maintaining the previously printed surface bottommost.

3. In a printing apparatus having a pair of printing couples, one couple being spaced forward of the second couple, each couple including a rotary printing drum adapted to carry an image to be transferred to a sheet and a platen, sheet feed tables across which sheets are fed forwardly to respective couples, a sheet receiving means spaced forwardly of the rearmost printing couple to receive imprinted sheets from such couple, a sheet receiving receptacle mounted below such printing couple, means coacting with said sheet receiving means to move imprinted sheets one at a time downwardly and rearwardly into said receptacle with their printed surfaces down, a pair of coacting feed rolls spaced forwardly of said receptacle, means to engage the rearmost end of a sheet in said receptacle and forward it to said feed rolls, means to drive said feed rolls to move the sheet forwardly and complete the removal of such sheet from said receptacle, movable guide means to guide the ejected sheet into the bite of said feed rolls, means controlled by one of said drums to move said guide means from an active to an inactive position, and means to feed said sheet from said feed rolls to the second printing couple.

4. In a printing apparatus having a pair of horizontally spaced rotary printing couples, each couple including a rotary printing drum adapted to carry an image to be transferred to a sheet and a platen drum mounted therebelow, a feed roller adapted to receive imprinted sheets from one printing couple, a sheet receiving receptacle mounted below said printing couple, means coacting with said feed roller to turn the sheet face for face and forward the turned sheets to said receptacle, a reciprocable member associated with said receptacle, means to reciprocate said member to partially eject a sheet from said receptacle in a direction opposite to the direction of movement of the sheets into the receptacle, a pair of feed rolls to receive the partially ejected sheet and complete its removal from said receptacle, and means to forward said sheet from said feed rolls to the second printing couple.

5. In a printing apparatus having a pair of horizontally spaced rotary printing couples, each couple including a rotary printing drum adapted to carry an image to be transferred to a sheet and a platen drum, a sheet receiving receptacle mounted below one printing couple, means to receive sheets from said last named printing couple and turn them face for face and forward the turned sheets to said receptacle, means to engage the end of a sheet in said receptacle and partially eject it therefrom in a direction opposite to the direction of movement of the sheets into the receptacle, a pair of feed rolls to receive the ejected sheet and complete its removal from said receptacle, means to forward said sheet from said feed rolls to the second printing couple, movable guide means to guide the ejected sheet into the bite of said feed rolls, and means controlled by said drum to move said guide means into an inactive position.

6. In a printing machine having a frame, a drum rotatably mounted therein and adapted to carry an image to be transferred to a sheet to be printed, a platen drum rotatably mounted beneath said first named drum and coacting therewith to print a sheet, and a feed table associated with each drum and across which sheets are fed one at a time to the bite of respective drums, the combination of a receptacle having an open end mounted substantially below said drums, means to turn the imprinted sheets face for face and guide printed sheets into said receptacle with their printed faces downward, a pair of feed rollers spaced from the open end of said receptacle, means to engage the end of a sheet remote from the open end of said receptacle and push it from said receptacle in a direction reverse to that in which it enters the receptacle and into the bite of said feed rolls, a second drum rotatably mounted in said frame and adapted to carry a second image to be transferred to said sheet, a platen drum mounted beneath said last named drum and coacting therewith to cause an impression to be transferred to a sheet passed therebetween, and means to forward sheets from said feed rolls to the bite of said last named pair of drums while maintaining the previously printed surface of the sheet downward whereby a second image will be transferred to the upper or non-printed surface of the sheet.

7. In a printing machine, a frame, a drum rotatably mounted therein and adapted to carry an image to be transferred to a sheet to be printed, a platen drum rotatably mounted beneath said first named drum and coacting therewith to print a sheet, a substantially horizontally extending feed table across which sheets are fed in a forward direction one at a time to the bite of said drums, a sheet receptacle having a forwardly facing open end mounted substantially below said drums, means to guide printed sheets from the bite of said drums downward and rearward into the open end of said receptacle with their printed faces facing downward, said receptacle inclining downward and rearward from its open end, a pair of coacting feed rollers spaced forwardly from the open end of said reecptacle and having their bite below said guide means, means to engage the end of the sheet in the receptacle, said last named means being slidable to and from the forward end of the receptacle to engage and push the sheet into the bite of said feed rolls, a second drum rotatably mounted

in said frame and adapted to carry an image to be transferred to said sheet, a platen drum mounted beneath said last named drum and coacting therewith to cause an impression to be transferred to a sheet passed therebetween, and means to forward sheets from said feed rolls to the bite of said last named pair of drums while maintaining the previously printed surface of the sheet downward, means to drive both pairs of drums, and means associated with each pair of drums to control the admission of sheets to the respective pairs to thereby control the position of the image on said sheets.

8. In a printing machine, a printing couple, a second printing couple spaced horizontally forward from the first named printing couple, each couple comprising a rotary drum adapted to carry an image to be transferred to a sheet to be printed and a rotary platen drum mounted therebeneath and coacting therewith to print a sheet, a receptacle mounted substantially below said first named printing couple and having a forwardly facing open end, a pair of feed rollers mounted between said printing couples and having their bite spaced above and forwardly of the open end of said receptacle to forward printed sheets from the bite of said drums into said receptacle, a second pair of coacting feed rollers spaced forward of the open end of said receptacle with their bite positioned below the bite of said first named feed rollers, means to eject a sheet from said receptacle, a movable diverter member mounted adjacent the forward end of said receptacle and movable to divert the ejected sheet toward the bite of said second named pair of feed rollers, and means to move sheets from said second named pair of feed rolls to the second named printing couple.

9. In a printing machine, a rotary printing couple, a second rotary printing couple spaced forward of the first named couple, a receptacle mounted substantially below the first named couple and having a forwardly facing open end, means including a pair of feed rollers having their bite spaced above and forwardly of the open end of said receptacle to receive sheets from the first named couple and forward them into said receptacle with their printed faces facing downward, a second pair of coacting feed rollers spaced forwardly of the open end of said receptacle with their bite below the bite of the first named feed rollers, means adjustable to and from the bite of the second pair of feed rollers to stop the movement of the sheet into the receptacle, means to periodically move said adjustable means to eject a sheet from said receptacle, a movable diverter member to divert the ejected sheet toward the bite of said second named pair of feed rollers, and means to move the sheets from said second named pair of feed rolls to the second printing couple.

10. In a printing machine a frame, a drum rotatably mounted therein and adapted to carry an image to be transferred to a sheet to be printed, a platen drum rotatably mounted beneath said first named drum and coacting therewith to print a sheet, a feed table across which sheets are fed forwardly one at a time into the bite of said drums, a receptacle mounted substantially below said drums and having a forwardly facing open end, a pair of feed rollers having their bite spaced above and forwardly of the open end of said receptacle to forward printed sheets from the bite of said drums into said receptacle with their printed faces facing downward, a second pair of coacting feed rollers spaced forward of the open end of said receptacle with their bite substantially aligned with the bottom of the receptacle, means to eject a sheet from said receptacle, a movable diverter member to divert the ejected sheet toward the bite of said second named pair of feed rollers, a second drum rotatably mounted in said frame and adapted to carry an image to be transferred to said sheet, a platen drum mounted beneath said last named drum and coacting therewith to cause an impression to be transferred to a sheet passed therebetween, and means to move sheets from said second named pair of feed rolls to the bite of said last named pair of drums.

11. In a printing machine having a frame, a drum rotatably mounted therein and adapted to carry an image to be transferred to a sheet to be printed, a platen drum rotatably mounted beneath said first named drum and coacting therewith to print a sheet, and a feed table across which sheets are fed one at a time to the bite of said drums, the combination of a receptacle having an open end mounted substantially below said drums, means including a pair of sheet feeding rolls to receive printed sheets from the bite of said drums and feed them into said receptacle with their printed faces facing downward, a second pair of feed rollers spaced from the open end of said receptacle, ejecting means to move a sheet out of said receptacle into the bite of said second named pair of feed rolls, a second drum rotatably mounted in said frame and adapted to carry a second image to be transferred to said sheet, a platen drum mounted beneath said last named drum and coacting therewith to cause an impression to be transferred to a sheet passed therebetween, and means to forward sheets from said second named pair of feed rolls to the bite of said last named pair of drums while maintaining the previously printed surface of the sheet downward, whereby the second image is transferred to the upper or non-printed surface of the sheet, said receptacle including a slotted bottom member, a top member spaced above said bottom member and having slots substantially registering with the slots of the bottom member, the sheet ejecting means comprising a member projecting through the slots of both members and forming an end wall for said receptacle, means controlled by said drums to reciprocate said last named member to eject sheets from said receptacle, and a pivoted rake adjacent the open end of said receptacle having tines adapted to project through the slots in said top member and movable to one position to permit sheets to enter said receptacle and movable to another position to restrict the open end of the receptacle and guide sheets moving out of the receptacle into the bite of said feed rolls.

12. In a printing apparatus having a rotary printing couple including a drum adapted to carry an image to be transferred to a sheet to be printed and a platen drum mounted therebelow and coacting therewith, a sheet receiving receptacle mounted below one of said couples, means to receive sheets from said couple and forward them to said receptacle with their printed surfaces bottommost, a pair of sheet feed rolls, ejecting means to move a sheet out of said receptacle into the bite of said feed rolls, said receptacle including a slotted bottom member, a top member spaced above said bottom member and having slots substantially registering with the slots of the bottom member, the sheet ejecting means

comprising a member projecting through the slots of both members and forming an end wall for said receptacle, means controlled by said drums to reciprocate said last named member to eject sheets from said receptacle, and a pivoted rake adjacent the open end of said receptacle having tines adapted to project through the slots in said top member and movable to one position to permit sheets to enter said receptacle and movable to another position to restrict the open end of the receptacle and guide sheets moving out of the receptacle into the bite of said feed rolls.

13. In a printing apparatus having a pair of horizontally spaced rotary printing couples, each couple including a drum adapted to carry an image to be transferred to a sheet to be printed and a platen drum coacting therewith, an open ended sheet receiving receptacle, means to feed a sheet from one couple into said receptacle through its open end, a member slidably mounted for movement to and from the open end of said receptacle, a threaded rod mounted on said member and extending toward the open end of said receptacle, a sheet ejector slidably mounted on said member for movement to and from the open end thereof and in threaded engagement with said rod, said ejector extending into the receptacle and forming a stop for sheets entering therein, and means to periodically reciprocate said member to move a sheet out through its open end, a pair of rollers mounted adjacent the open end of the receptacle to receive the ejected sheets and complete their removal from said receptacle, and means to forward said sheets to the second printing couple.

14. In a printing apparatus having a frame, a rotary printing couple mounted in said frame and including a drum adapted to carry an image to be transferred to a sheet to be printed and a platen drum mounted therebelow and coacting therewith, an open ended longitudinally extending sheet receiving receptacle mounted in said frame beneath the couple and provided with a series of longitudinally extending slots, means to feed a sheet from said couple longitudinally into said receptacle through its open end, a member slidably mounted on said frame for longitudinal movement to and from the open end of said receptacle, a longitudinally extending threaded rod mounted on said member, a transversely extending sheet ejector slidably mounted on said member for movement to and from the open end thereof, a bracket pivotally connected with said ejector and in threaded engagement with said rod, releasable means to secure said bracket to said member, said ejector extending through said slots into the receptable and forming a stop for sheets entering therein, and means under control of said drums to periodically reciprocate said member to move a sheet out of said receptable through said open end.

15. In a printing machine, a frame, a drum rotatably mounted therein and adapted to carry an image to be transferred to a sheet to be printed, a platen drum rotatably mounted beneath said first named drum and coacting therewith to print a sheet, a substantially horizontally extending feed table across which sheets are fed in a forward direction one at a time to the bite of said drums, a sheet receptacle having a forwardly facing open end mounted substantially below said drums, means to guide printed sheets from the bite of said drums downward and rearward into the open end of said receptacle with their printed faces facing downward, said receptacle inclining downward and rearward from its open end, a pair of coacting feed rolls spaced forwardly from the open end of said receptacle and having their bits positioned below said guide means while maintaining the previously printed surface of the sheet downward, means to drive both pairs of drums, and means associated with each pair of drums to control the admission of sheets to the respective pairs to thereby control the position of the image on said sheets, said receptacle comprising a top member having longitudinally extending slots, a bottom member supported below the top member with its slots in registration with the slots of the top member, and a slide mounted above said top member for longitudinal reciprocation and having depending side flanges forming sides for said receptacle, a longitudinally extending threaded rod mounted on said slide, means threadingly mounted on said rod and having downwardly extending tines projecting through the registering slots of the top and bottom members to form an adjustable end abutment for sheets entering the receptacle, means controlled by said drums to reciprocate said slide to move sheets out of the receptacle, and means to guide such sheets into the bite of said feed rolls.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
357,927	Hawkins	Feb. 15, 1887
1,534,884	Trautman	Apr. 2, 1925