

July 18, 1961

R. H. WILLIAMS

2,992,608

DUPLICATING BILLING MACHINE

Filed April 11, 1960

4 Sheets-Sheet 1

FIG. 1.

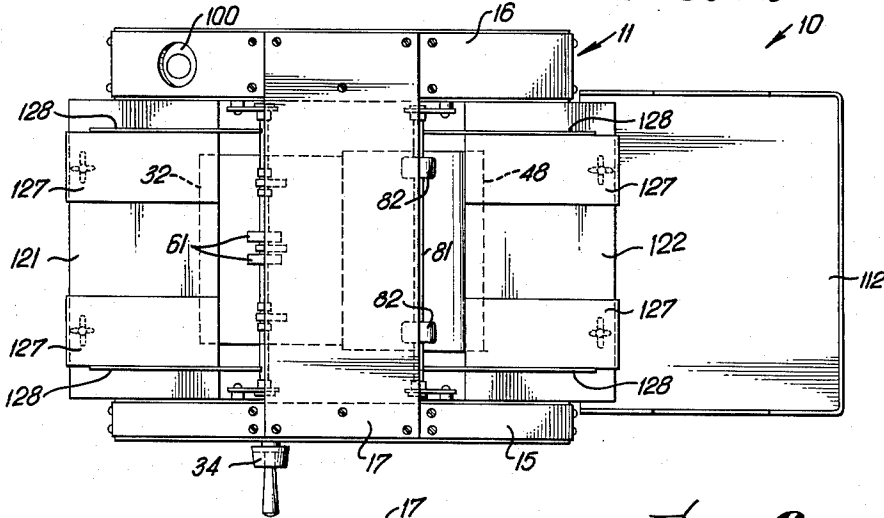


FIG. 2.

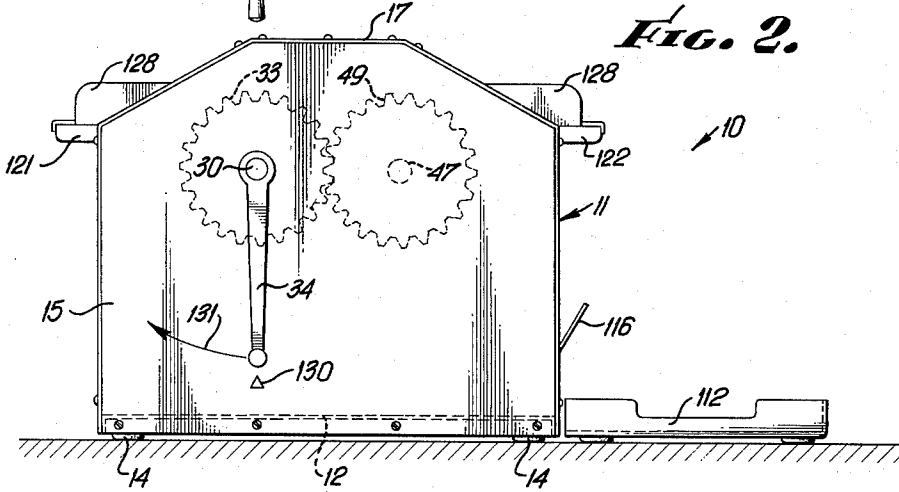
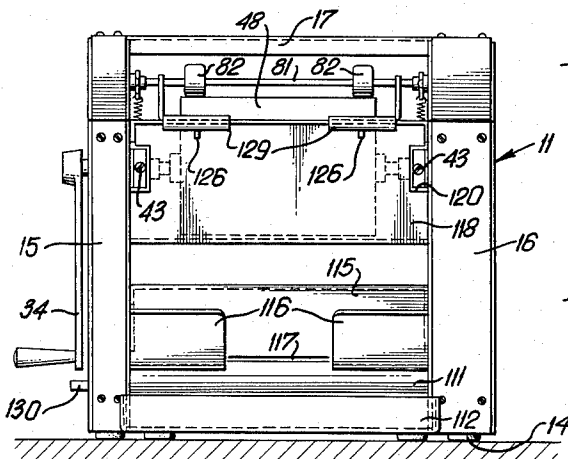


FIG. 3.



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4 Sheets-Sheet 2

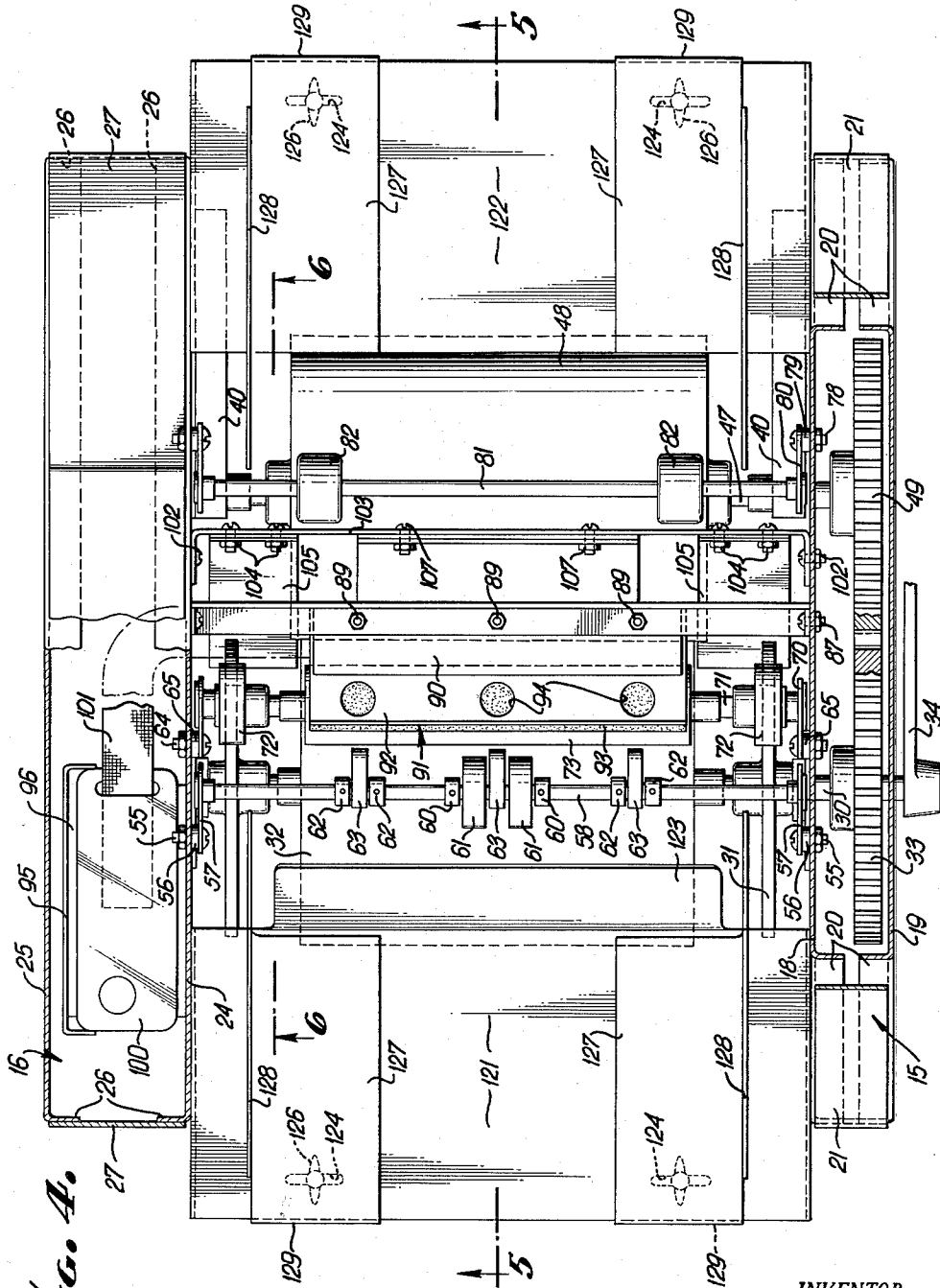


FIG. A.

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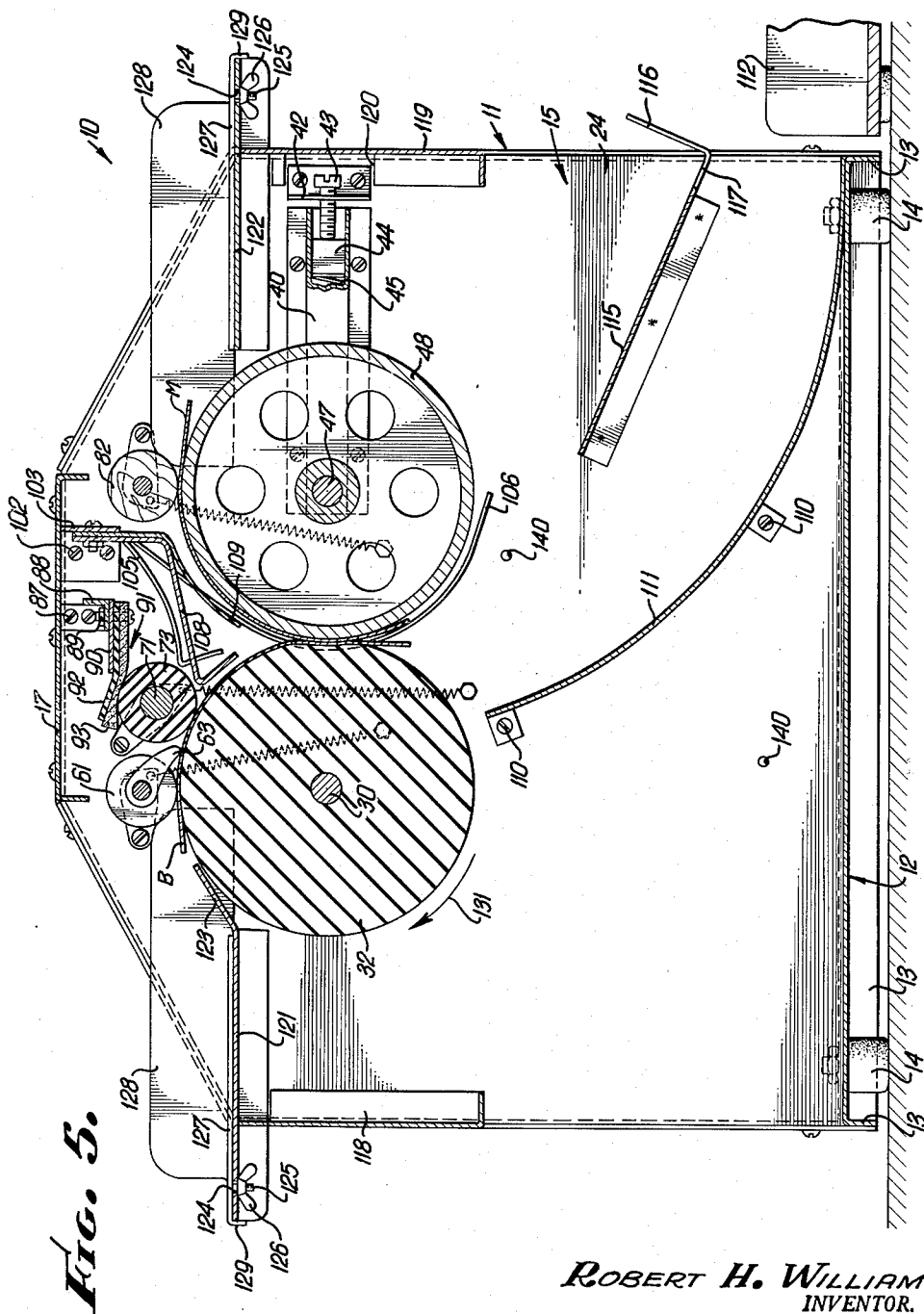
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4 Sheets-Sheet 3



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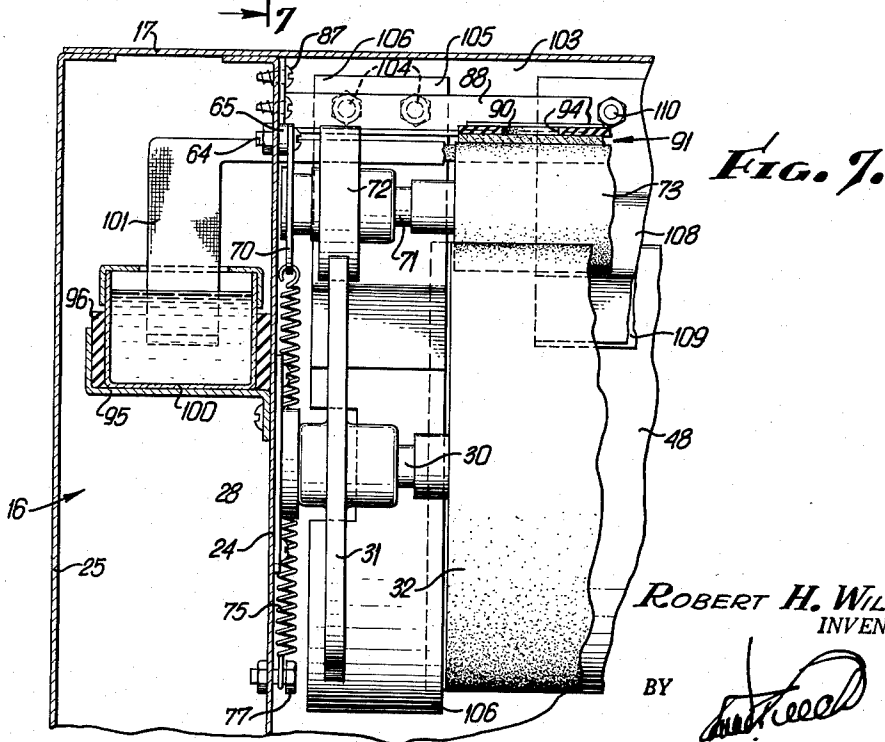
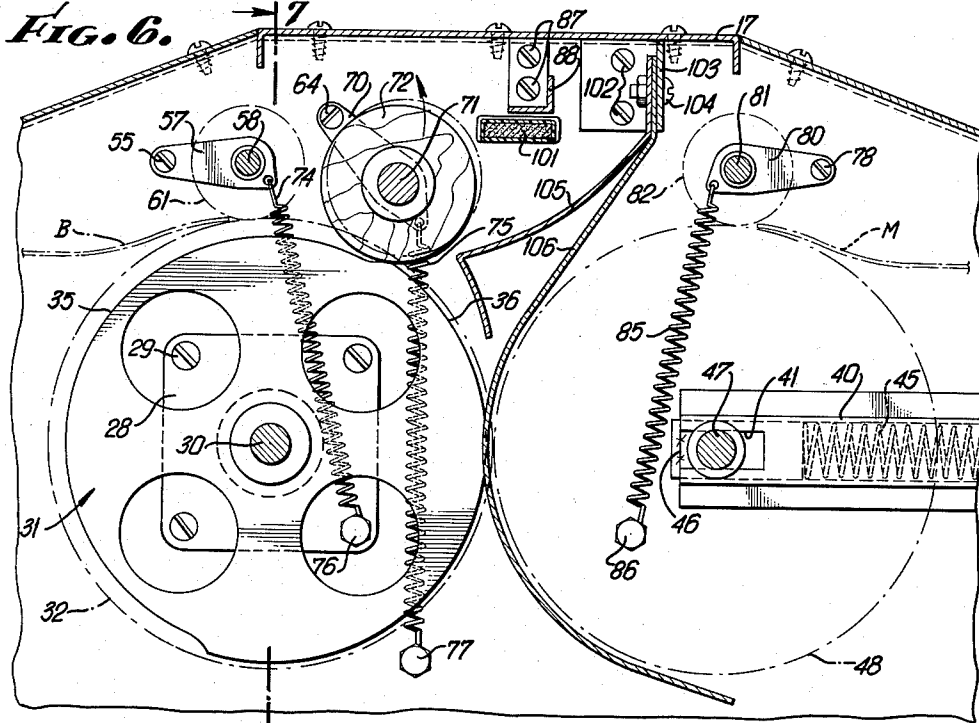
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DUPLICATING BILLING MACHINE

Filed April 11, 1960

4 Sheets-Sheet 4



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2,992,608

DUPLICATING BILLING MACHINE

Robert H. Williams, Silverado, Calif., assignor to Dashew Business Machines, Inc., a corporation of Delaware
Filed Apr. 11, 1960, Ser. No. 21,388
1 Claim. (Cl. 101—132.5)

This invention relates to spirit duplicating machines and particularly to such machines as are primarily provided for making one copy of the data on each of an indefinite number of master cards.

Machines of this general type found in the prior art vary in elaborateness and costs from the complex data copying machine disclosed in the Crissy Patent No. 2,572,450, to the simple semi-automatic addressing machine shown in my Patent No. 2,830,535.

The Crissy machine is keyed to high speed production with automatic counterbalanced platforms for feeding the master printing cards and the blanks serially to the printing rollers and then restacking these cards and blanks. The Williams semi-automatic addressing machine has a simple but automatic means for utilizing one of the printing rollers as an envelope feeder, but depends on hand feeding of the master cards.

It occurred to me that a tremendous service would be performed by an extremely simple and inexpensive spirit duplicating machine if it were designed so as to be adaptable to handling the printing of statements, invoices or bills of the ledger type.

It is therefore an object of the present invention to provide a relatively simple spirit duplicating printing machine which will be able to accommodate statements, invoices and bills of the ledger type of those sizes in common use and which will introduce a substantial economy into the job of printing these records at the end of each month by small businesses and professional men generally.

Another object of the invention is to provide a spirit duplicating billing machine as aforesaid which may also be used to perform the service of printing an indefinite number of copies from a single master copying sheet.

Still another object is to provide such a machine which will perform either of the aforesaid functions and which will operate in each use by manually turning a crank in a clockwise direction.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which

FIG. 1 is a plan view of a preferred embodiment of the invention.

FIG. 2 is a front side elevational view of FIG. 1.

FIG. 3 is a right end elevational view of FIG. 2.

FIG. 4 is an enlarged plan view of the machine shown in FIG. 1 with the transverse bridge member of the frame removed and the hollow side standards of the frame partially broken away to illustrate the machine parts enclosed therein.

FIG. 5 is a longitudinal vertical sectional view taken on the line 5—5 of FIG. 4.

FIG. 6 is an enlarged fragmentary vertical sectional detail view taken on the line 6—6 of FIG. 4.

FIG. 7 is a detail sectional view taken on the line 7—7 of FIG. 6.

Referring specifically to the drawings and particularly to FIGS. 1, 2 and 3, a preferred embodiment of the invention is there shown as incorporated in a duplicating billing machine 10. This machine includes a frame generally designated by the numeral 11 and which comprises a sheet metal base plate 12 having downturned flanges 13 at its edges the plate 12 being supported on

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four rubber cushions 14 secured thereto just inside the four corners of the plate.

The frame 11 also includes hollow side standards 15 and 16 which are joined at their upper ends by a transverse bridge member 17.

The standard 15 includes inner and outer sheet metal walls 18 and 19 having inturned edge flanges 20 which are united by standard edge plates 21.

Standard 16 has inner and outer side walls 24 and 25 which have inturned edge flanges 26, the latter being connected together by edge plates 27.

Walls 18 and 24 are provided with aligned bearings 28 which are secured to said walls by bolts 29, walls 18 and 19 being apertured coaxially with a shaft 30 which journals in said bearings so that said shaft extends through said apertured walls. Fixed on shaft 30 just within walls 18 and 24 are cams 31 while a solid rubber smooth-surfaced cylindrical printing blank feed roller 32 is fixed on shaft 30 between cams 31. Mounted on shaft 30 and concealed within hollow standard 15 is a spur gear 33, the pitch radius of which is equal to the radius of roller 32. Mounted on the extremity of shaft 30 extending outwardly through the aperture in wall 19 is a hand crank 34.

The cams 31 are approximately circular in form, corresponding low sections 35 occupying about half the periphery of the cam. The balance of each cam is occupied by a high section 36 (FIG. 6).

Secured to inner faces of standard walls 18 and 24 on about the same level as bearings 28 are a pair of spring-bearing shells which are rectangular in cross section, have corresponding slots 41 formed at their open inner ends and are provided with apertured and tapped screw mounting lugs 42 at their outer ends. Threadedly mounted in lugs 42 are adjusting screws 43 which bear against slide blocks 44 thus compressing springs 45 which blocks and springs are slidably confined within said shells. Pressed against inner ends of springs 45 and slidably mounted within shells 40 are bearing blocks 46 in which opposite ends of a shaft 47 journal. The wall 18 is slotted horizontally so that the shaft 47 is received through this wall into the interior of standard 15 whereby there is ample free play horizontally for adjustment of shaft 47 transversely relative to wall 18.

Fixed on shaft 47 between the bearings 46 is a smooth cylindrical metal master sheet feed roller 48 which is slightly longer than roller 32 and axially symmetrically disposed relative to roller 32 so that end portions of roller 48 at each of its opposite ends extend equally beyond corresponding end portions of roller 32 (FIG. 4). Roller 48 is of identically the same diameter as roller 32 and shaft 47 has fixed on the end thereof which extends into frame standard 15, a spur gear 49 which is identical to and meshes with gear 33. There is sufficient looseness in the meshing of gears 33 and 49 to permit freedom of movement to the roller 48 in responding to the action of springs 45 so that this roller is always pressed into snug rolling relation with roller 32 by said springs whereby pressure is applied by these two rollers to any printing sheets fed between these rollers. This pressure is uniform over the entire area of said sheets compressed between said rollers because of the fact that said rollers are smooth surfaced and cylindrical in shape throughout their lengths.

Pivotally mounted by screws 55 on short posts 56 on inner faces of standard walls 18 and 24 are short arms 57 on the free ends of which is mounted a shaft 58 which lies approximately directly above the shaft 30 and parallel therewith. Rotatably mounted on shaft 58 between a pair of collars 60 is a pair of blank sheet keeper wheels 61 which rest against roller 32 and support shaft 58. Rockably mounted on shaft 58 between the pair of wheels 61 and between pairs of collars 62 disposed out-

wardly from said wheels are three reverse rotation-preventing dogs 63.

Pivotaly mounted by screws 64 on short posts 65 on inner faces of standard walls 18 and 24 are short arms 70 on the free ends of which are mounted the opposite ends of a shaft 71 on which are provided freely rotatable cam following rollers 72 which are radially aligned with and rest upon cams 31, and a cylindrical spirit moistening rubber roller 73 of relatively small diameter which is approximately coextensive in length with roller 32 and rests thereon whenever the low sections 35 of cams 31 are disposed under rollers 72.

Upper ends of coil springs 74 and 75 are secured to the free ends of short arms 57 and 70 respectively and the lower ends of these springs are suitably secured as by screws 76 and 77 to the walls 18 and 24 so as to yieldably urge wheels 61 against roller 32 and also yieldably urge cam following rollers 72 against the cams 31 when the cam sections 36 are turned upwardly beneath said rollers, and, when the low sections 35 of said cams are disposed opposite said cam following rollers, yieldably urges the rubber moistening roller 73 against roller 32. The roller 73 is freely rotatable on shaft 71 so that when it thus engages roller 32 it is in free rolling contact with this roller.

Pivoted as by screws 78 on short posts 79 on the standard walls 18 and 24 are short arms 80 on the free ends of which are mounted the opposite ends of a shaft 81 which carries a pair of freely rotatable ball bearing rubber tired master sheet keeper wheels 82. The wheels 82 rest on roller 48 and support the shaft 81. Upper ends of a pair of contractile springs 85 are connected to the free ends of short arms 80 and the lower ends of said springs are secured to the walls 18 and 24 as by screws 86 so as to yieldably hold the rubber tired wheels 82 downwardly against the roller 48.

Rigidly secured at its opposite ends by screws 87 to upper ends of the walls 18 and 24 is a sheet angle member 88 on which are supported by bolts 89 a moistener plate 90 and a solvent transfer pad 91 which includes a flexible rubber base 92 and a porous face element 93 which may be formed of felt or sponge rubber. The solvent transfer pad 91 is coextensive in length with and rests directly upon the rubber moistener roller 73. Holes 94 are provided in the pad base 92 for priming the transfer pad by squirting solvent directly on the porous face element 93.

Fixed on wall 24 within frame standard 16 is a sheet metal bracket 95 having a rubber lining 96 which snugly receives a plastic solvent reservoir 100 from which a felt wick 101 extends through a suitable aperture in wall 24 to the solvent transfer pad 91 with which it connects so as to constantly keep this pad wet with solvent as it is used up in the operation of the machine 10.

Secured at its opposite ends to upper portions of inner standard side walls 18 and 24 by screws 102 is a transverse guide mounting bar 103. Fastened by bolts 104 to opposite end portions of bar 103 are two like sets of guide plates the plates in each set being identified respectively by numerals 105 and 106. Plate 105 is the shorter and the upper of the two plates which by the way are rather narrow measured in a transverse direction in the machine and lie between the respective side walls 18 and 24 and adjacent ends of roller 32. Inwardly disposed edge portions of these guide plates overlap end portions of roller 48.

Bolted to a middle portion of guide mounting bar 103 by bolts 107 is a pair of guide plates 108 and 109, which are coextensive in length, with the plate 108 located above the plate 109. As shown in FIG. 5 the guide plates 105 and 108 extend toward roller 73 to positions close to the latter and then are bent downwardly so these downwardly bent portions function as guides for the leading edge of a blank sheet B when this is being fed into the machine 10 as shown in FIG. 5, so as to guide this blank sheet

downwardly between rollers 32 and 48. Guide plates 106 and 109, on the other hand, are bent relatively downwardly in arcuate spaced relation with the periphery of roller 48 so as to be engaged by a master sheet M, being fed into machine 10 concurrently with blank sheet B so as to bend the master sheet M into conformity with roller 48 and cause it to smoothly pass downward between this roller and roller 32 and thus be compressed against the blank sheet B aforesaid.

The guide plate 109 is relatively short and terminates above the horizontal plane of the axes of the rollers 32 and 48 whereas guide plates 106 extend downwardly through said plane between said axes and continue in the same closely spaced relation with the periphery of roller 48 until these plates terminate approximately directly under the axis of said roller. As the master sheets M employed in the machine 10 are always wide enough so that their opposite edges engage guide plates 106, completion of a printing operation such as illustrated in FIG. 5 results in a complete separation of the master sheet M employed in this operation from the blank sheet B employed therein.

Fastened by bolts 110 to standard inner walls 18 and 24 is an arcuate chute 111 for receiving blank sheets B dropping downwardly from between rollers 32 and 48 and conveying these sheets by gravity out of the machine 10 at the open right side thereof into a tray 112 which is placed alongside said machine for receiving the printed blanks B.

Fixed as by spot welding at its opposite side edges to inner standard walls 18 and 24 is a master sheet receiving shelf 115 which is inclined downwardly towards the right end of the machine and is provided with a lower end wall 116 having a wide central opening 117 through which the fingers may be inserted to grip and remove a stack of master sheets M from said shelf.

Secured at their ends to upper end portions of standard inner walls 18 and 24 are partial frame end walls 118 and 119 the latter having openings 120 to give access to screws 43 for adjusting the same. Resting horizontally on upper edges of end walls 118 and 119 are blank sheet and master sheet feed platforms 121 and 122 respectively. The platform 121 has an inner upwardly inclined lip 123 disposed tangentially and closely spaced relative to roller 32, and is adapted for supporting a stack of blank sheets B for manual feeding of these to the machine 10. The platform 122, on the other hand, is provided for supporting a stack of master sheets M for likewise feeding these manually to said machine.

Each of the platforms 121 and 122 is provided with a pair of short transverse slots 124 through which screws 125 having wing nuts 126 may be extended downwardly from plates 127 resting flat against the platforms 121 and 122 and having vertical platform side walls 128 bent upwardly from outer edges of said plates. Bent downwardly from outer end edges of plates 127 are flanges 129 which bear against outer end edges of platforms 121 and 122 to retain platform side walls 128 in approximate parallelism with frame standards 15 and 16. The slots 124 and wing nuts 126 afford a means for ready manual adjustment of any of the platform side walls 128 transversely of the machine to adapt the machine to sheets B and M of various widths and to properly align the sheets B with the sheets M in preparing machine 10 for operation.

Operation

As one of the principal objects aforesaid of the present invention is to provide a spirit duplicating printing machine of relatively simple and inexpensive construction and which, while not requiring a high rate of production, is necessarily adaptable to handling invoices, statements, bills or other papers of different sizes. This simplicity is achieved in the machine 10 by completed eliminating automatic feeding mechanism and designing the machine to

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facilitate manual feeding of both the blank sheets and the master sheets to the machine.

To facilitate such feeding and maintain the proper correlation of the blank sheet and master sheet in the successive printing operations a marker lug 130 is mounted on the outer wall 19 of standard 15 just clear of the crank handle 34 and directly beneath the axis of shaft 30. Thus lug may be habitually felt for by one finger of the hand turning the crank 34 so as to halt the machine 10 after each printing operation with the crank 34 extending directly downwardly from its shaft 30.

It is also to be noted that in all functions which the machine 10 is adapted to perform, a single printing operation is accomplished by rotation of the hand crank 34 clockwise a single revolution. The lugs 63 being freely rotatable on shaft 58, gravitate into contact at their extremities with the surface of the rubber roller 32 or with a blank sheet B being fed through the machine, and any inadvertent attempt to rotate the crank 34 anti-clockwise is prevented by the lugs 63. These lugs also perform the function of guiding the leading edge of each blank B beneath the spirit moistening roller 73 as the operator turns the crank 34 in a clockwise direction as indicated by arrows 131.

There are two principal modes of operation of the machine 10. In the first of these, the machine uses a different master sheet M in printing on each of the blank sheets B. In other words an equal number of master sheets M and blank sheets B are employed in operating the machine and each master sheet M is used to print on only one of the blank sheets B. This is the mode of operation pursued when using the machine 10 as a spirit duplicating billing machine. This of course is only one specific task which the machine 10 may be used for while following this mode of operation. This mode of operation might be referred to as the collated data copying mode of using the machine 10 as the equal number of blank sheets B and master sheets M which are placed respectively on the feeding platforms 121 and 122 at the start of the operation, are deposited in the tray 112 and on the shelf 115 in the same order in which the printing takes place. Furthermore the printed face on a printed sheet B faces upwardly when this sheet arrives in tray 112 so that it may be immediately inspected by the operator to see if the printing is satisfactory, and a reprint may be immediately made if necessary.

Furthermore the master sheets M are deposited on the shelf 115 with the duplicating reverse images formed thereon with transfer material facing downwardly so that when a stack of master sheets M is removed from the shelf 115 and the stack inverted, these master sheets are in the same order, that is in the same sequence from the top of the stack down as they were in when first placed on the feed platform 122 upon starting the operation of machine 10.

If, when operating machine 10 in this manner, it is desired that the sheets B when printed upon be collated so that the printing impressions received by these sheets are in the same relation as the negative images on the respective master sheets M in the stack of these collected on the shelf 115, the chute 111 may be reversed in its position in the machine 10 by removal of the bolts 110, reversing the chute so that it inclines downward and toward the left end of the machine (instead of downward and toward the right end thereof as shown in FIG. 5), and the bolts 110 replaced in holes 140 provided in walls 18 and 24 to secure the chute 111 in its reversed position. The tray 112 is then placed opposite the left open end of the machine in position to receive the printed sheets B during successive printing operations. With the chute 111 thus reversed, the printed face on each sheet B passing through the machine and delivered into the tray 112 will be disposed downwardly, thus sacrificing the opportunity for inspecting the printing on this sheet immediately after each printing operation, in order to secure

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the advantage of collation of the printed sheets B so that when these are taken from the tray 112 and inverted the printed faces of all the sheets will be disposed upward and these sheets will appear in the same order as that in which they were fed into the machine.

Where the data on a stack of master sheets M represents successive pages of a book, such as a catalog, and the machine 10 is used for producing a small number of copies of this book the chute 111 would be reversed so as to collate the printed sheets B in the proper order in which they are to appear in this book. Thus, after running the stack of master sheets M, containing reverse negatives of the data in the book, with a corresponding number of blank sheets B through the machine 10, all that is necessary to do following this printing operation is to remove the printed sheets B from the tray 112 and bind these to form one copy of the book. Successive copies will then be printed by simply repeating this operation with the aforesaid stack of master sheets M.

When using the machine 10 as a duplicating billing machine, collation of the sheets B after they are printed on is unimportant and the machine 10 may therefore be used with the chute 111 positioned as shown in FIG. 5. This machine is especially adapted for printing from one hundred to five hundred bills at the end of each month from an equal number of file cards each one of which reflects the account of a customer (or patient or client, as the case may be).

This file card is made up by typing the data contained thereon in positive type on the front face thereof and in negative transfer material on the reverse face of the card. The data thus typed on each such file card, when this is used for billing, will include the name and address of the customer and the status of his account at the beginning of the month plus entries of services and goods rendered during the month with charges therefor, and concluding with the amount due with the rendering of the current bill.

The master sheet M comprising this file card is then used with other similar file cards at the end of the month to prepare bills to go to the various customers by running these file cards through the machine 10 as above described. Each blank sheet B thus printed on becomes a bill to be sent to a customer. After the printing operation the master sheets M are of course returned to the files. As only a small part of the blank space on each master sheet M will probably be used to show the services and goods rendered during one month, it is contemplated that in most instances each of these master sheets may be continued to be used for several months and the charges for these months accumulatively typed on this master sheet so that a recital of the entries in the account of each customer will accumulatively appear on the bills sent him at the end of each month but all balances due and payments made will also appear on this master sheet and on each bill printed therefrom so that the customer will be kept advised of payments and the amounts currently due on each statement rendered.

The other principal mode of operation with which the machine 10 may be used is where a substantial number of copies are desired to be made from a single master sheet M. In following this mode of operation, the single master sheet M to be used is secured to the the outer surface of roller 48 as by taping edges of the same onto this roller with pressure adhesive tape and then simply running the machine in the same manner as above described excepting that the only sheets necessary to be fed into the machine will be blank sheets B. Thus any desired number of printing operations may be performed to provide a corresponding number of copies of this single master sheet M.

I claim:

In a spirit duplicating printing machine, the combination of: two completely cylindrical smooth faced printing rollers rotatably mounted in rolling relation on paral-

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lel horizontal axes, one of said rollers being a hard surfaced roller and the other being made of soft rubber; keeper means yieldably bearing downwardly on said respective rollers in uniformly spaced relation with the line of tangency between said rollers, one of said rollers and the keeper means engaging the same being adapted to frictionally engage and retain in frictional contact with said roller a blank sheet fed manually into frictional contact both with said roller and with said keeper means, the other roller and the keeper means engaging therewith being likewise effective in frictionally engaging and retaining a master sheet in frictional engagement with said last mentioned roller when manually fed into contact with both said roller and said last mentioned keeper means; a pair of manual feeding platforms provided on substantially the same level with and in opposite directions outwardly from said rollers, and close to the latter, to facilitate the manual feeding of blank sheets from one of said platforms to one of said rollers and master sheets from the other of said platforms to the other of said rollers, means for rotating said rollers in rolling relation starting after said sheets have been fed into frictionally retained relation with said rollers as aforesaid until said sheets are fed inwardly and downwardly between said rollers and out and downwardly from between said rollers and providing for halting said rollers immediately after this has been completed; guide means for retaining said sheets in closely spaced relation with the respective rollers they are drawn into said machine by until said sheets have passed together between said rollers

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and downwardly out of contact with said rollers, said guide means remaining in contact with one of said sheets after the latter has passed between said rollers to segregate it from the other sheet fed through said machine coincidentally therewith; means for separately receiving said segregated sheets after they have thus passed downwardly from between said rollers; means for moistening each blank sheet after rotation of said rollers has started and prior to said blank passing between said rollers so that the coincidental passage of said sheets between said rollers transfers an image provided in negative ink on said master sheet to said blank sheet in the form of a positive image, the receptacle for receiving said blank sheets being optionally disposable at either of the opposite ends of said machine; a chute for receiving each such sheet immediately after it is printed upon and discharged downwardly from between said rollers and delivering said sheet to the receptacle therefor with the latter at a given end of said machine; and means for optionally reversing said chute from its position for delivering sheets to said receptacle at said given end of said machine, so as to deliver said sheets to said receptacle at the opposite end of the machine.

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