Aug. 23, 1949. H. G. ROBINSON 2,479,865

DUPLICATING MACHINE

Filed May 5, 1945 4 Sheets-Sheet 1

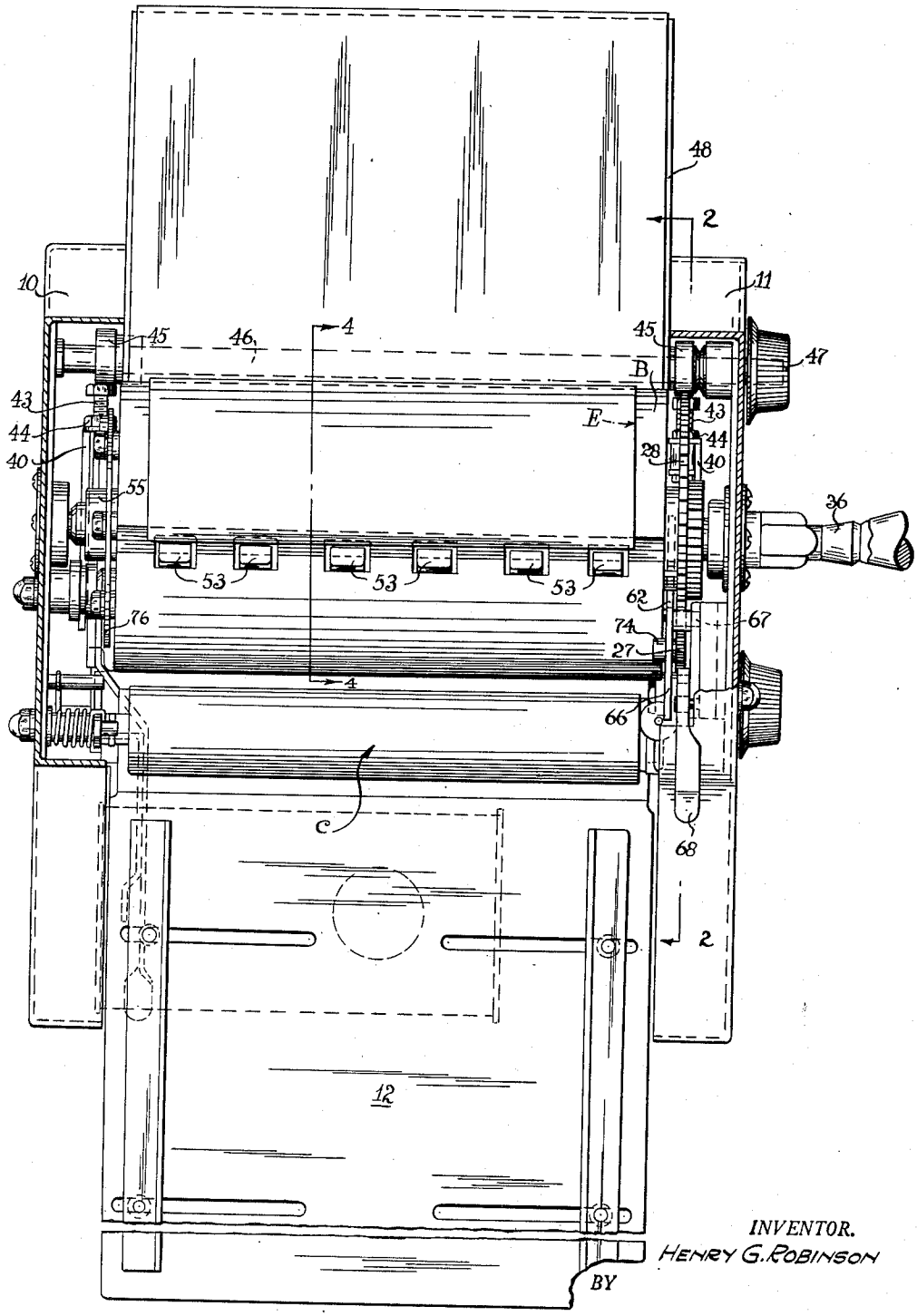


FIG. 1

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DUPLICATING MACHINE

Filed May 5, 1945 4 Sheets-Sheet 2

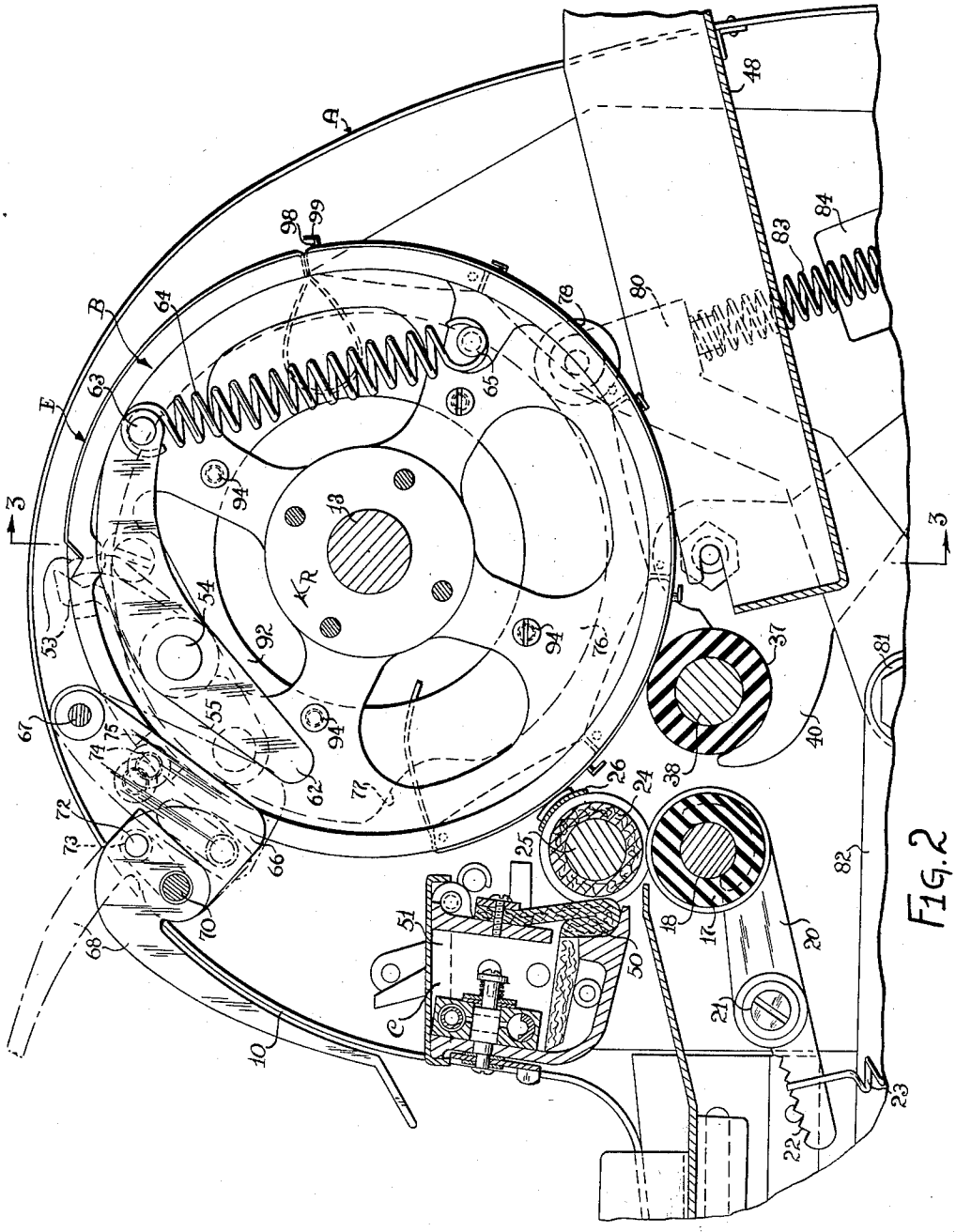


FIG. 2

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DUPLICATING MACHINE

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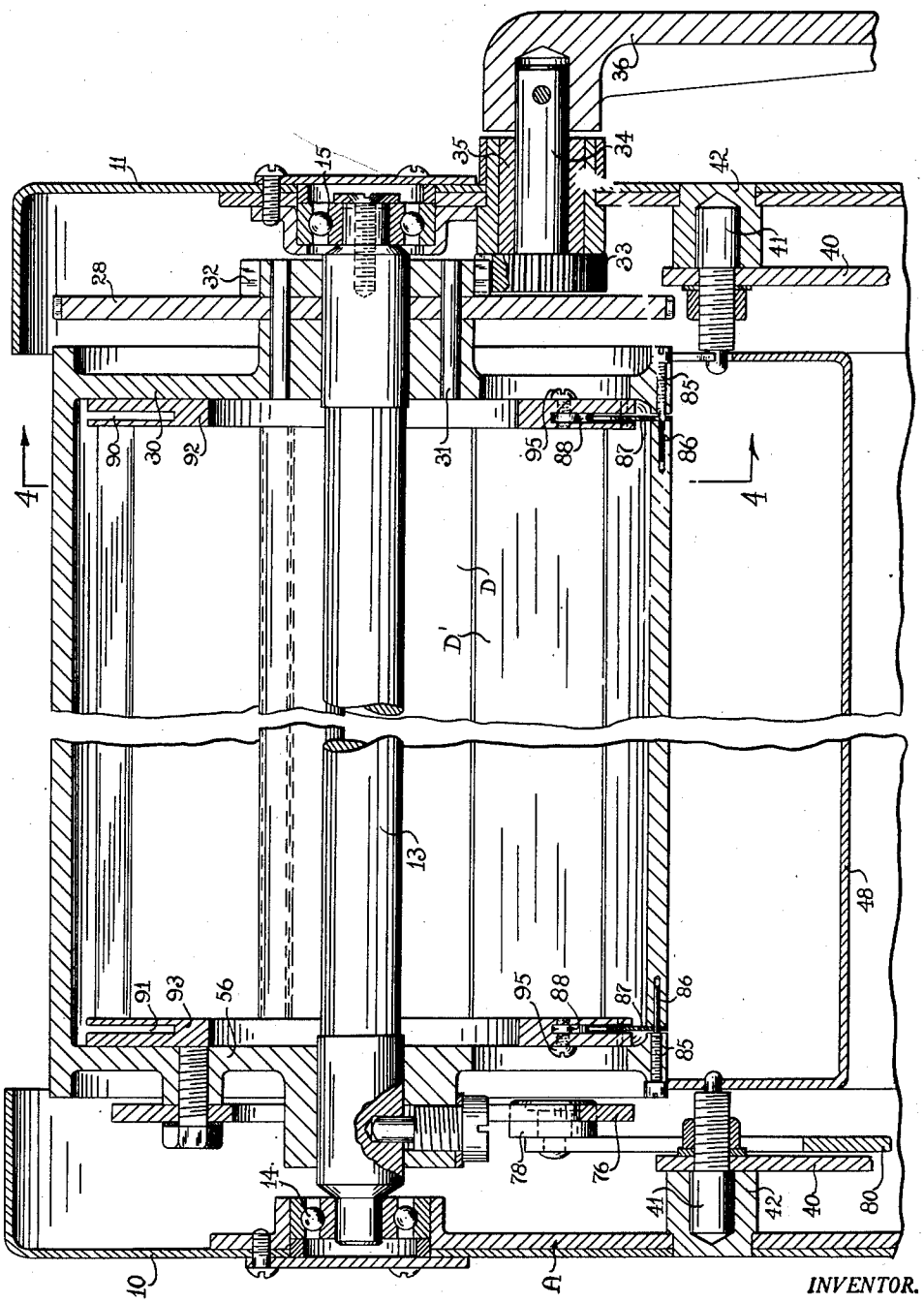


FIG. 3

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DUPLICATING MACHINE

Filed May 5, 1945 4 Sheets-Sheet 4

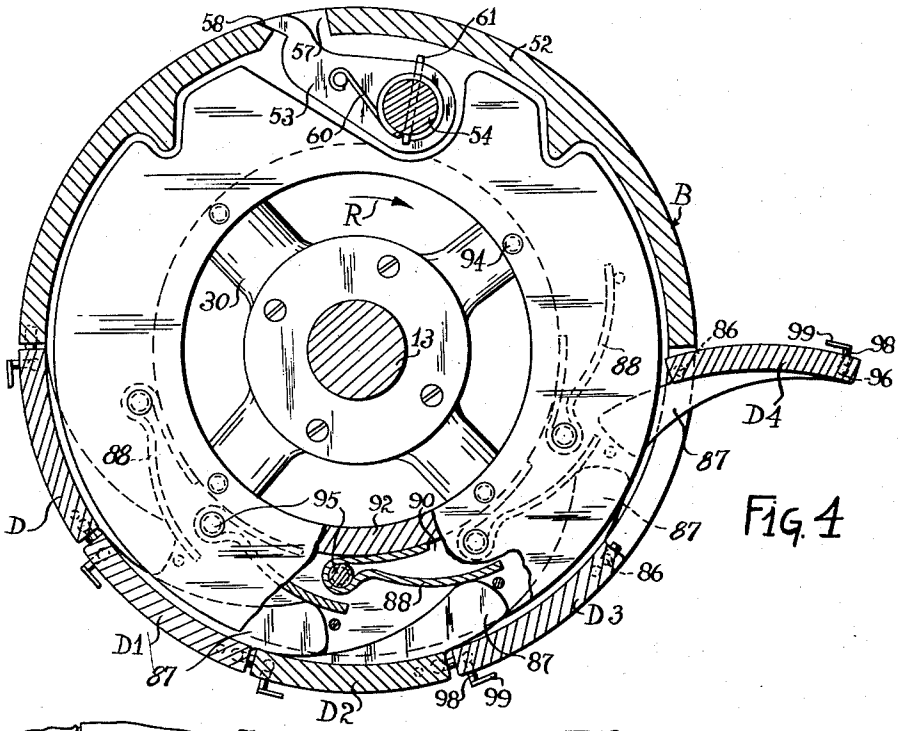


Fig. 4

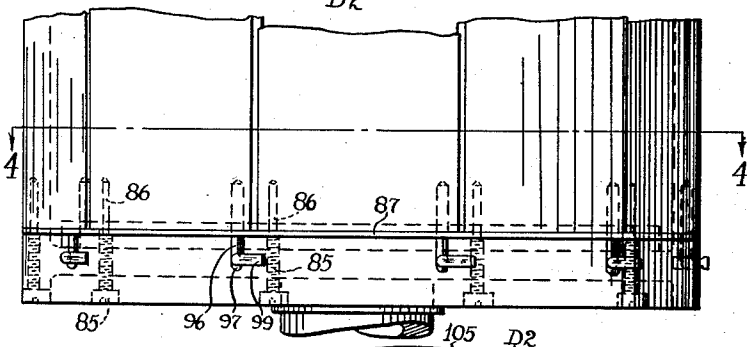


Fig. 5

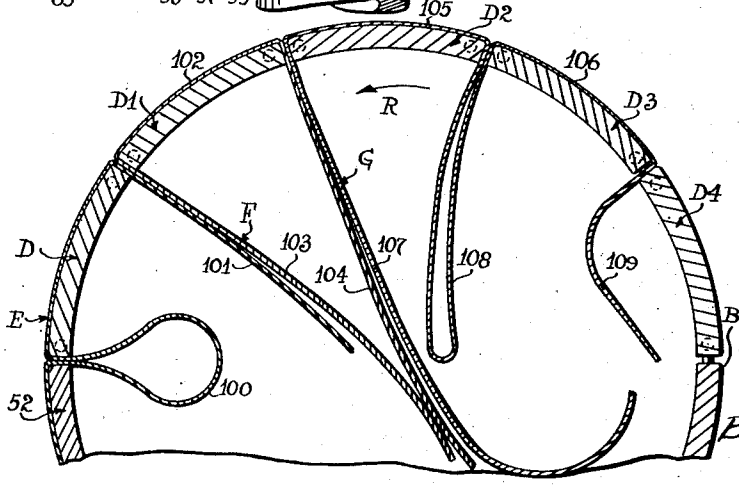


Fig. 6

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Patented Aug. 23, 1949

2,479,865

UNITED STATES PATENT OFFICE

2,479,865

DUPLICATING MACHINE

Henry G. Robinson, Lakewood, Ohio, assignor to The Lamson & Sessions Company, Cleveland, Ohio, a corporation of Ohio

Application May 5, 1945, Serial No. 592,225

9 Claims. (Cl. 101—132)

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The present invention relates to duplicating apparatus and, more particularly, to duplicating apparatus of the type wherein a master sheet having data written thereon and secured to a rotatable drum is brought into contact with a copy sheet upon rotation of the drum.

One of the principal objects of the present invention is the provision of a novel and improved duplicating machine having a master sheet carrying drum, which drum is so constructed and arranged that selective portions of one or more master sheets may be simultaneously duplicated or reproduced on a single copy sheet.

Another object of the invention is the provision of a novel and improved duplicating machine of the type wherein a master sheet having data written thereon in reverse is secured to a rotatable drum and brought into contact with a copy sheet upon rotation of the drum, which copy sheet has been previously moistened with a solvent for the ink, etc., on the master sheet, the drum of which machine is so constructed and arranged that selective portions of one or more master sheets may be simultaneously employed without mutilating the master sheet or sheets.

Another object of the invention is the provision of a novel and improved master sheet carrying drum for a duplicating machine, which drum is so constructed and arranged that selective portions of one or more master sheets may be simultaneously employed without mutilating the master sheet or sheets.

The invention resides in certain novel constructions and combinations and arrangements of parts and further objects and advantages thereof will be apparent to those skilled in the art to which it relates from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of this specification, in which

Fig. 1 is a plan view of a duplicating machine embodying the present invention with parts of the frame broken away to better show the construction;

Fig. 2 is a fragmentary sectional view taken approximately on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged sectional view through the master carrying drum shown in the preceding figures taken approximately on the line 4—4 of Figs. 3 and 5;

Fig. 5 is an enlarged elevational view of the right-hand end of the master carrying drum as viewed in Fig. 1; and

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Fig. 6 is an enlarged sectional view of the master carrying drum showing one manner in which a plurality of master sheets may be attached thereto.

The invention is herein illustrated and described as embodied in a duplicating machine sold commercially under the trade-mark "Ditto," however, it is to be understood that the invention is susceptible of various modifications and alternative constructions and is applicable to various types of duplicating machines other than the particular machine illustrated. For the most part, the duplicating machine shown and described herein is well-known in the art and is similar to that shown in U. S. patent to Marchev No. 2,145,729, and only those parts which are necessary to a complete understanding of the present invention are herein illustrated and described in detail.

Referring to the drawings, the duplicating machine shown therein comprises a frame, designated generally by the reference character A, and including two sheet metal side members 10, 11 and a feed table 12. At the discharge end of the table 12 and disposed between the side members 10, 11 is a master carrying drum B fixed to a shaft 13 journaled in the side frame members 10, 11 by anti-friction bearings 14, 15, see Fig. 3. The drum B is adapted to have a master sheet or sheets secured thereto in a manner hereinafter specifically described.

The copy sheets are fed to the drum B by a rubber roller 17 fixed to a shaft 18, opposite ends of which shaft are journaled in the ends of levers 20, one at either side of the machine, which levers are, in turn, journaled intermediate their ends upon a shaft 21 extending between the side frame members 10, 11. The opposite ends of the levers 20 are provided with a plurality of notches 22 adapted to have the upper ends of springs 23 engage therein. The lower ends of the springs 23 are connected by pins, not shown, to the side frame members 10, 11. The springs 23 yieldably urge the roller 17 against a composition roller 24 located directly above the roller 17 and the pressure with which the roller 17 engages the roller 24 can be adjusted by moving the upper ends of the springs 23 from one to another of the notches 22.

The roller 24 is on a shaft 25, opposite ends of which are journaled upon pins, not shown, carried by the side frame members 10, 11. Extending across the upper surface of the roller 24 is a plate 26 shaped to conform to the circumference of the roller and which prevents the copy

sheets from being drawn around the roller during operation of the machine. The right-hand end of the shaft 25, as the machine is viewed in Fig. 1, is provided with a gear, not shown, fixedly secured thereto, which gear is continuously in mesh with a gear 27. The gear 27, in turn, meshes with a gear 28 mounted on one end of the shaft 13. The gear 28 is fixedly secured by pins 31 to the right-hand end wall 30 of the drum B, which pins also project through a gear 32 continuously in mesh with a pinion 33 fixed to a shaft 34 rotatably supported by a suitable bearing 35 in the side frame member 11. The shaft 34 projects through the side frame member and the outer end thereof is provided with a crank 36, through the medium of which the operator may rotate the shaft 34, the pinion 33, the gear 32, the drum B and, in turn, the gears 28, 27, etc., previously referred to. The rollers 17 and 24 are in frictional engagement, therefore, the roller 17 rotates in unison with the roller 24.

As the copy sheets are fed to the drum B by the rollers 17 and 24, they are pressed against the master sheet or sheets carried by the drum B by a rubber roller 37 mounted on a shaft 38 journaled in bell crank levers 40, one at either side of the machine. The levers 40 are pivotally connected to the side frame members 10, 11 through the medium of pins 41 fixed to the levers intermediate their ends and rotatably supported in members 42 secured to the side frame members. The opposite ends of the levers 40 project in a downward direction and are apertured to receive setscrews 43 adjustably secured thereto by jam nuts 44. The heads of the setscrews 43 abut cams 45 fixed to a shaft 46 also journaled in the side frame members 10, 11 and provided at its right-hand end, as viewed in Fig. 1, with a knurled knob 47 so that the shaft may be rotated to adjust the pressure with which the roller 37 presses the copy sheets against the master sheet or sheets on the drum B. A detachable tray 48 is provided at the opposite side of the drum B from the feed table 12 for receiving the copy sheets after they have passed between the master drum B and the roller 37.

As the copy sheets are fed through the machine, each copy sheet is moistened on the side which comes in contact with the master sheet or sheets on the drum B by the composition roller 24 supplied with a solvent for the ink, etc., on the master sheet by mechanism, designated generally by the reference character C, and comprising a felt strip 50 continuously urged into engagement with the composition roller 24, which felt strip forms the lower forward portion of a chamber 51 supplied with the solvent in a conventional manner. The construction of the mechanism C referred to is similar to that shown in U. S. Patent No. 2,145,729 as are the other parts of the machine thus far described, with the exception of the drum B, and will not be herein further described. Reference is made to the aforesaid patent for a complete showing and description thereof.

According to the provisions of the present invention, the drum B is so constructed and arranged that a selected portion or portions of one or a plurality of master sheets may be duplicated or reproduced on a single copy sheet at one time. To this end the cylindrical wall or surface 52 of the drum B has a plurality of apertures therein adapted to receive a portion or portions of a master sheet or sheets. As shown, the cylindrical wall 52 comprises a plurality of movable segments D hinged at one end to the drum proper.

In the particular embodiment of the invention shown, five segments D, D1, D2, D3 and D4 are employed, however, it is to be understood that more or less segments may be provided, as required. Each of the segments D are alike and a description of one is a description of all.

In addition to the construction previously referred to, the drum B includes means for clamping one end of a master sheet to the cylindrical wall or surface 52 in the form of a plurality of clamping members 53 carried by a shaft 54 journaled in members 55 fixed to the right-hand end plate 30, previously referred to, and to the left-hand end wall plate 56 of the drum B. The radially outward ends of the clamping members 53 project through a slot 57 in the cylindrical wall of the drum B at a point spaced from the segments D and cooperate with an inclined surface 58 on the left-hand side of the slot, as viewed in Fig. 4, to clamp one end of a master sheet E to the drum B. The members 53 are supported on the shaft 54 for limited angular movement thereabout and are continuously urged in a counterclockwise direction, as viewed in Fig. 4, by springs 60 operatively connected thereto and to pins 61 fixed in the shaft 54 and extending outwardly through suitable slots in the hubs of the members 53. The construction is such that upon rotation of the shaft 54 in a counterclockwise direction, as viewed in Fig. 4, the members 53, after the elapse of a short lost motion movement, are moved with the shaft as a unit to disengage their free ends from the inclined surface 58 of the slot 57 or from the master sheet, as the case may be. When the shaft 54 is rotated in the opposite direction, the clamping members 53 are permitted to move in a direction toward the inclined surface 58 and are ultimately individually urged thereagainst by their respective springs 60. In the particular embodiment shown, six clamp members 53 are employed, however, it is to be understood that any desired number may be used.

The right-hand end of the shaft 54 is provided with a lever 62 fixed intermediate its ends to the shaft 54. The right-hand end of the lever 62, as viewed in Fig. 2, carries a pin 63 to which the upper end of a spring 64 is connected, which spring continuously urges the shaft 54 in a clockwise direction, as viewed in Fig. 2, or in a direction to allow the clamp members 53 to engage with the end of the master sheet E. The lower end of the spring 64 is connected to a pin 65 connected to the end wall 30 of the drum B. The end of the lever 62 opposite to the end connected to the spring 64 is adapted to be selectively engaged by the free end of the lever 66 pivotally connected to the end frame member 11 by a pin 67. The lever 66 is adapted to be rotated about its pivot 67 by a hand lever 68 also pivotally connected to the end frame member 11 by a pin 70 and having at its lower end a pin 72, one end of which continuously engages within a slot 73 in the lever 66. When the parts are in the position shown in full lines in Fig. 2, the drum B is free to rotate and the clamp members 53 are in their engaging position, however, the lever 66 may be moved into engagement with the lever 62 upon rotation of the hand lever 68 in a clockwise direction. Continued movement of the hand lever after the lever 66 has engaged the lever 62, moves the latter into the position shown in dot-dash lines in Fig. 2, thus moving the clamp members 53 to a disengaged position. Initial movement of the lever 66 engages a roller 74 carried by the

lever 66 within a slot 75 in the end of the drum B, thus locking the same against rotation.

A cam 76 secured to one end of the drum B and provided with a dwell 77 is engaged by a roller 78 connected to the rear end of a lever 80 pivoted intermediate its ends on a shaft 81 projecting from the side frame member 10. The front end of the lever 80 is operatively connected to a lever 82 also pivotally supported on the shaft 81, which lever is actuated upon actuation of the lever 80 by the cam 76 to supply solvent in a conventional manner to the chamber 51 of the moistening apparatus C, previously referred to. The roller 78 is continuously urged toward the cam 76 by a compression spring 83 interposed between the rear end thereof and a bracket 84 fixed to the inside of the frame A.

The members or segments D to D4 may be movably connected to the drum proper in any suitable manner. As shown, each segment is supported for pivotal movement about an axis parallel to the axis of rotation of the drum and located adjacent to the trailing side of the segment, referring to the direction of rotation of the drum during operation, which direction is indicated by the arrow R in the various figures. Opposite ends of the segments D to D4 are pivotally connected to the drum proper by screws 85, the reduced inner ends 86 of which project into suitable holes in the ends of the segments. The screws 85 project through members 87, one of which is connected to each end of each segment. Each of the members 87 has a portion thereof projecting radially inwardly of the drum where they are engaged by springs 88 located in annular grooves 90, 91 in disks 92, 93 fixed to the end plates 30, 56, respectively, of the drum as by screws 94. The springs 88 are more or less U-shaped and are held in position in the grooves 90, 91 by screws 95 and the parts thereof not engaged by the members 87 abut the bottom of the grooves. The construction is such that the inwardly extending parts of the members 87 act as cams and cooperate with the springs 88 to resiliently hold the segments D to D4 in either open or closed position. The open position of one of the segments is shown in dot-dash lines in Fig. 4.

The segments D to D4 are provided at one or both ends thereof with members 96 connected to the sides of the segments remote from their pivots 86. The members 96 are fixed within suitable apertures in the segments and project axially of the drum into apertures or recesses 97 opening into the surface of the drum adjacent to the segments. The engagement of the members 96 with the bottom of the recesses 97 limits the movement of the segments in a clockwise direction as viewed in Fig. 4. The free ends of the members 96 include angularly disposed portions 98, 99, the latter of which project slightly above the surface of the drum and constitute means through the medium of which the segments may be raised to open position.

In operation, the master sheet E is connected to the drum B by clamping one end thereof between the inclined surface 58 and the clamp members 53. The free part of the master sheet can be merely wrapped around the drum, or one or more portions which it is desired not to duplicate can be enclosed within the drum. This is accomplished by opening the proper segment or segments D to D4 and tucking the desired part or parts of the master sheet in the opening therebetween and the next adjacent segment. As shown in Fig. 6, an intermediate part 100 of the master sheet E is tucked between the drum proper and the segment D and the free end 101 of the master sheet is enclosed within the drum by being inserted between the segments D, D1.

In addition to the master sheet E, Fig. 6 shows a second master sheet F having an intermediate portion 102 which it is desired to reproduce on the copy paper immediately underneath the lower part of the master sheet E which is duplicated. In this event both ends of the master sheet F are inserted within the drum and only that part of the master sheet which it is desired to reproduce is on the outside of the drum. As shown, the upper end 103 of the master sheet F is inserted between the segments D, D1 and the lower part 104 is inserted between the segments D1, D2. In addition to the two master sheets previously referred to, Fig. 6 shows a third master sheet G, two intermediate portions 105, 106 of which it is desired to reproduce. As shown, the upper part 107 of the master sheet G extends into the interior of the drum between the segments D1, D2; the intermediate part 108 of the master sheet which is not to be reproduced is tucked into the interior of the drum between the segments D2, D3; and the lower end 109 of the master sheet is enclosed within the interior of the drum between the segments D3, D4.

While a definite number of segments D to D4 have been shown and while all of the segments shown are of uniform size, it will be apparent that any desired number of segments may be employed and that any of the segments employed may be of any desired size. Alternatively the segments may be detachably secured to the drum in such a manner that any desired combination of segments of varying width may be used. Only those parts of the master sheets which are exposed on the surface of the drum will be reproduced on the copy paper when the drum is rotated in the conventional manner by turning the crank.

From the foregoing description of the preferred embodiment, it will be apparent that the objects of the invention heretofore enumerated and others have been accomplished and that there has been provided a novel and improved duplicating machine having a master carrying drum so constructed and arranged that selective portions of one or more master sheets may be simultaneously duplicated upon a single copy sheet. While the invention has been described with considerable detail and as applied to a commercially known duplicating machine, it is to be understood that the invention is not limited to the particular construction shown or to the particular type of duplicating machine shown but may be otherwise incorporated and embodied in other types of machines and it is my intention to hereby cover all adaptations, modifications and uses thereof which come within the practice of those skilled in the art to which the invention relates and within the spirit and scope of the appended claims.

Having thus described my invention, I claim:

1. A hollow rotatable drum for a duplicating machine or the like, the said drum comprising a cylindrical surface adapted to receive and support a master sheet having information which is to be reproduced, a portion of the surface of said drum being formed by a segment movable relative to the remainder of the surface to provide an opening therethrough for the insertion of a portion of the master sheet into the interior of the drum at only one side of the segment, the surface

of the drum being substantially smooth and continuous when the segment is in its closed position so that when a portion of the master sheet is inserted into said drum the non-inserted portions of the master sheet are disposed in abutting relationship on the surface of the drum with a part of the master sheet extending over the movable segment to provide a substantially continuous reproducing surface, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without a blank space on the latter corresponding to the portion of the master sheet which has been inserted within the drum.

2. A hollow rotatable drum for a duplicating machine or the like, the said drum comprising a cylindrical surface adapted to receive and support a master sheeet having information which is to be reproduced, a portion of the surface of said drum being formed by a plurality of segments movable relative to the remainder of the surface to provide openings therethrough for the insertion of a portion or portions of the master sheet into the interior of the drum at only one side of each segment, the surface of the drum being substantially smooth and continuous when the segments are in their closed positions so that when a portion or portions of the master sheet are inserted into said drum the non-inserted portions of the master sheet are disposed in abutting relationship with a part of the master sheet extending over the movable segments to provide a substantially continuous reproducing surface on the surface of the drum, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without blank spaces on the latter corresponding to the portion or portions of the master sheet which have been inserted within the drum.

3. A hollow rotatable drum for a duplicating machine or the like, the said drum comprising a cylindrical surface adapted to receive and support a master sheet having information which is to be reproduced, means to clamp a portion of the master sheet to the drum, a portion of the surface of said drum being formed by a plurality of segments movable relative to the remainder of the surface to provide openings therethrough for the insertion of a portion or portions of the master sheet into the interior of the drum at only one side of each segment, the surface of the drum being substantially smooth and continuous when the segments are in their closed positions so that when a portion or portions of the master sheet are inserted into said drum the non-inserted portions of the master sheet are disposed in abutting relationship with a part of the master sheet extending over the movable segments to provide a substantially continuous reproducing surface on the surface of the drum, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without blank spaces on the latter corresponding to the portion or portions of the master sheet which have been inserted within the drum.

4. A hollow rotatable drum for a duplicating machine or the like, said drum having a cylindrical surface adapted to carry a master sheet, a portion of the surface of said drum being formed by a movable segment pivoted at one side thereof to said drum to enable a portion of the master sheet to be inserted into the interior of the drum at the side of the segment opposite its pivot, the pivot being provided on the trailing side of the segment with respect to the intended direction of rotation of the drum, the surface of the drum being substantially continuous when the segment is in its closed position and the non-inserted portions of the master sheet being disposed in abutting relationship on the surface of the drum with a part of the master sheet extending over the movable segment to provide a substantially continuous reproducing surface, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without a blank space on the latter corresponding to the portion of the master sheet which has been inserted within the drum.

5. A hollow rotatable drum for a duplicating machine or the like, said drum having a cylindrical surface adapted to carry a master sheet, a portion of the surface of said drum being formed by a plurality of pivoted segments to enable a portion of the master sheet to be inserted into the interior of the drum at one side of each of said pivoted segments, the surface of the drum being substantially continuous when the segments are in their closed positions and the non-inserted portions of the master sheet being disposed in abutting relationship with a part of the master sheet extending over the pivoted segments to provide a substantially continuous reproducing surface on the surface of the drum, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without blank spaces on the latter corresponding to the portion or portions of the master sheet which have been inserted within the drum.

6. A hollow rotatable drum for a duplicating machine or the like, said drum having a cylindrical surface adapted to carry a master sheet, means to clamp a portion of the master sheet to the drum, a portion of the surface of said drum being formed by a plurality of pivoted segments to enable a portion of the master sheet to be inserted into the interior of the drum at one side of each of said pivoted segments, the surface of the drum being substantially continuous when the segments are in their closed positions and the non-inserted portions of the master sheet being disposed in abutting relationship with a part of the master sheet extending over the pivoted segments to provide a substantially continuous reproducing surface on the surface of the drum, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without blank spaces on the latter corresponding to the portion or portions of the master sheet which have been inserted within the drum.

7. A hollow rotatable drum for a duplicating machine or the like, said drum having a cylindrical surface adapted to carry a master sheet, a portion of the surface of said drum being formed by a plurality of pivoted segments to enable a portion of the master sheet to be inserted into the interior of the drum at one side of each of said pivoted segments, and resilient means for retaining the pivoted segments in their closed positions, the surface of the drum being substantially continuous when the segments are in their closed positions and the non-inserted portions of the master sheet being disposed in abutting relationship with a part of the master sheet extending over the pivoted segments to provide a substantially continuous reproducing surface on the surface of the drum, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without blank spaces on the latter corresponding to the portion or portions of the master sheet which have been inserted within the drum.

8. A hollow rotatable drum for a duplicating machine or the like, said drum having a cylindrical surface adapted to carry a master sheet, means to clamp a portion of the master sheet to the drum, a portion of the surface of said drum being formed by a plurality of pivoted segments to enable a portion of the master sheet to be inserted into the interior of the drum at one side of each of said pivoted segments, and resilient means for retaining the pivoted segments in their closed positions, the surface of the drum being substantially continuous when the segments are in their closed positions and the non-inserted portions of the master sheet being disposed in abutting relationship with a part of the master sheet extending over the pivoted segments to provide a substantially continuous reproducing surface on the surface of the drum, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without blank spaces on the latter corresponding to the portion or portions of the master sheet which have been inserted within the drum.

9. A hollow rotatable drum for a duplicating machine or the like, said drum having a cylindrical surface adapted to carry a master sheet, means to clamp a portion of the master sheet to the drum, a portion of the surface of said drum being formed by a plurality of movable segments pivoted at one side thereof to said drum, the said pivots being provided on the trailing side of each segment with respect to the intended direction of the rotation of the drum, a cam surface on the interior of each segment, leaf springs mounted within the drum and cooperating with the cam

surfaces to maintain the corresponding segments in closed position, and means to individually open each of said segments to enable a portion of the master sheet to be inserted into the interior of the drum at the side of each of said segments opposite its pivot, the surface of the drum being substantially continuous when the segments are in their closed positions and with the non-inserted portions of the master sheet being disposed in abutting relationship with a part of the master sheet extending over the movable segments to provide a substantially continuous reproducing surface on the surface of the drum, whereby selected spaced portions of said master sheet may be reproduced upon a copy sheet without blank spaces on the latter corresponding to the portion or portions of the master sheet which have been inserted within the drum.

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