Aug. 21, 1956 D. A. HARRIS ET AL 2,759,415

SHEET FEED MEANS FOR LIQUID PROCESS DUPLICATING MACHINE

Filed Nov. 7, 1952

3 Sheets-Sheet 1

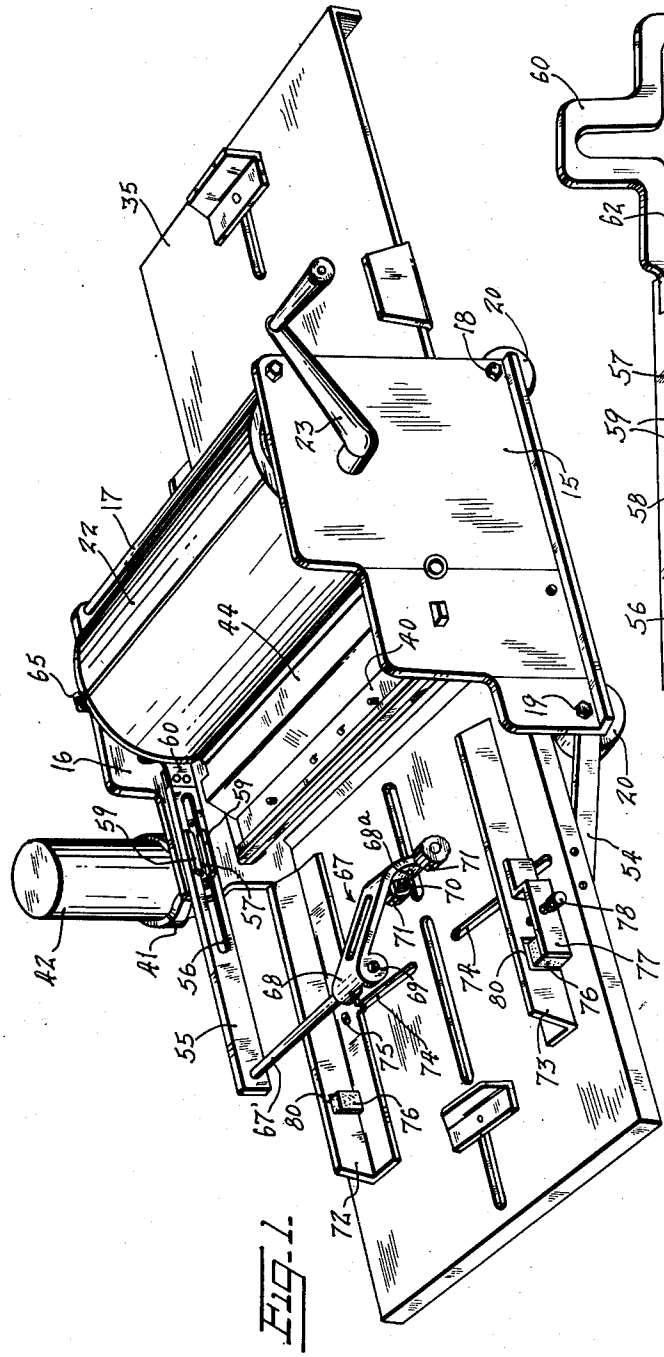


FIG. 1.

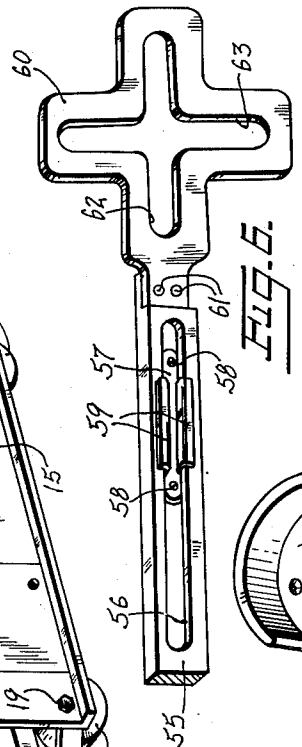


FIG. 6.

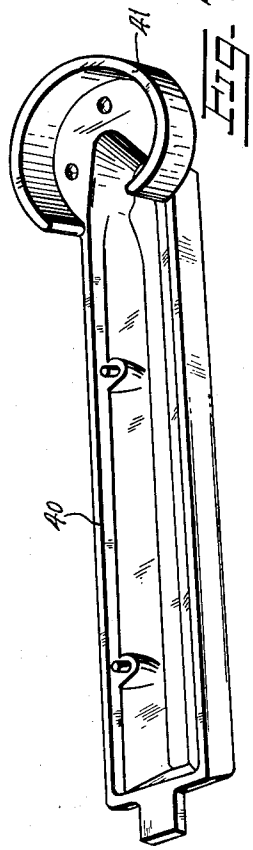


FIG. 7.

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SHEET FEED MEANS FOR LIQUID PROCESS DUPLICATING MACHINE

Filed Nov. 7, 1952 3 Sheets-Sheet 2

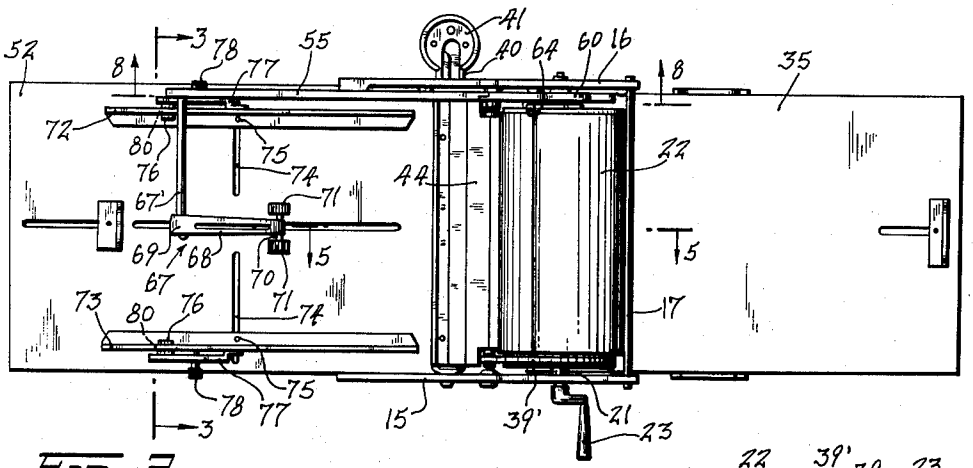


FIG. 2.

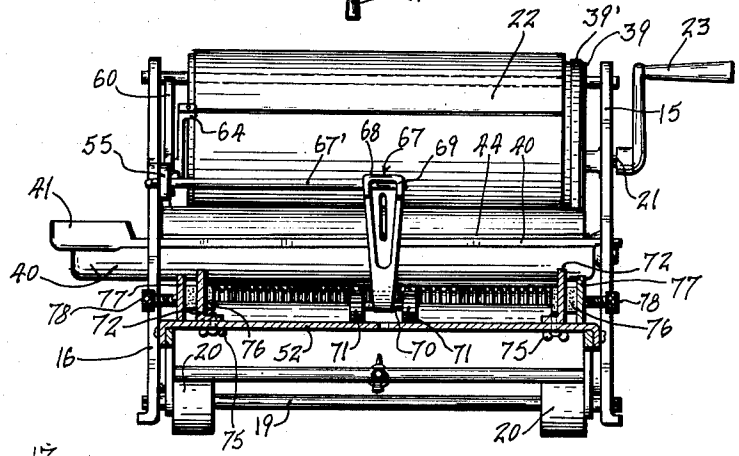


FIG. 3.

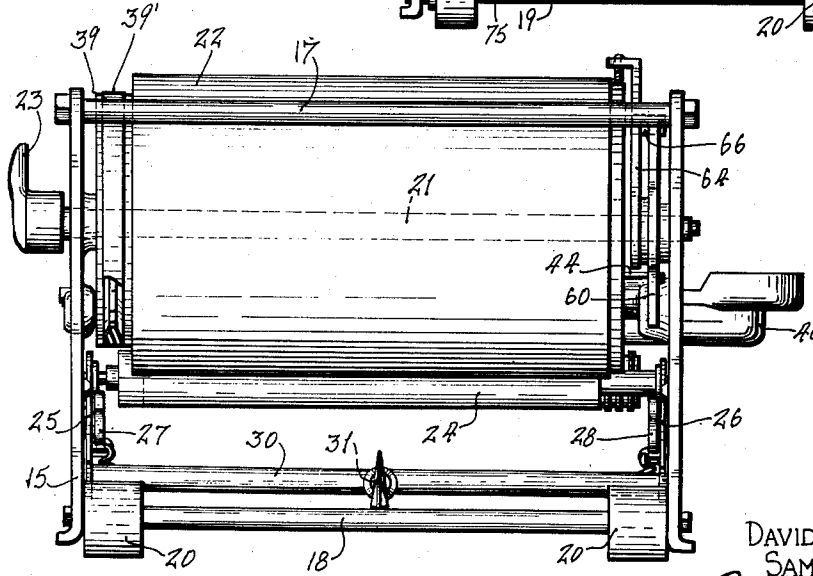


FIG. 4.

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SHEET FEED MEANS FOR LIQUID PROCESS DUPLICATING MACHINE

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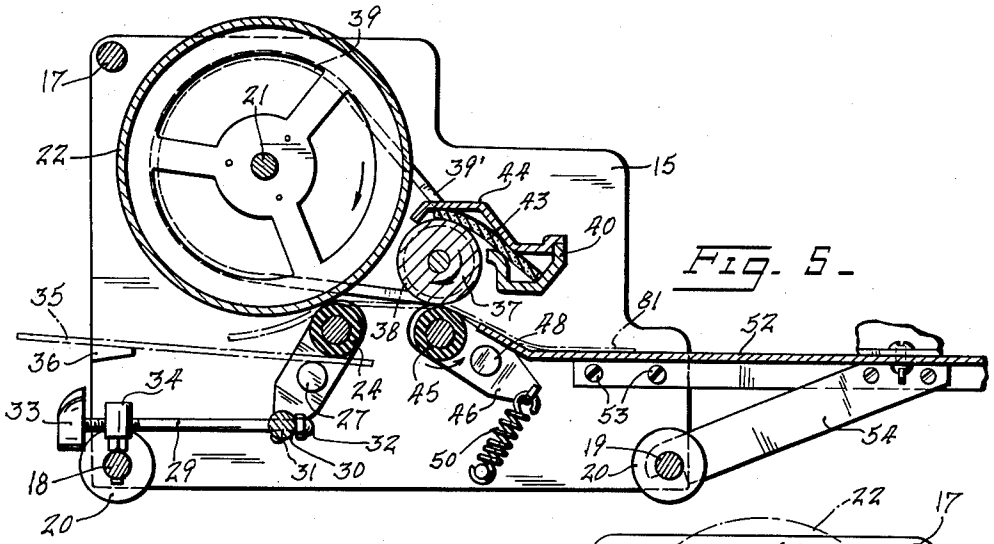


Fig. 5.

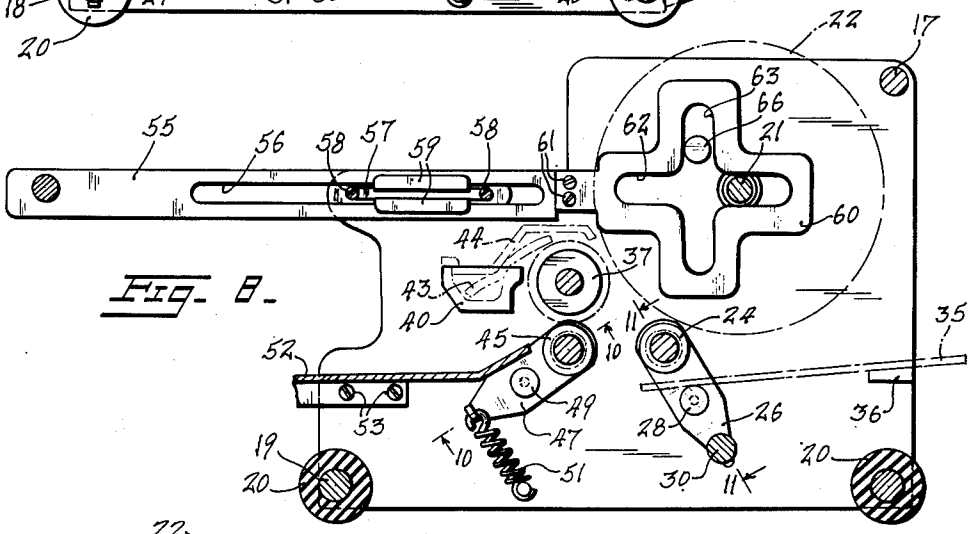


Fig. 8.

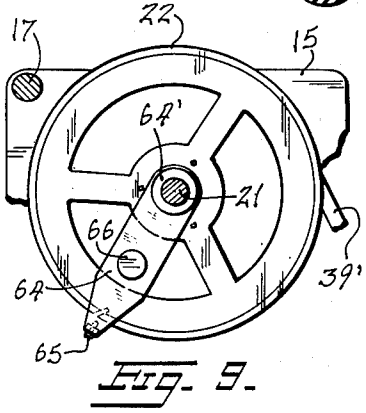


Fig. 9.

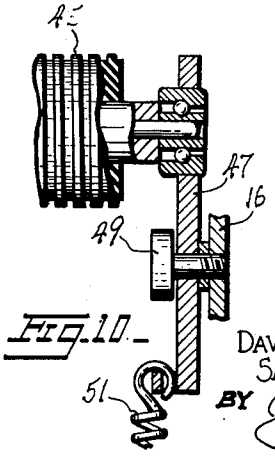


Fig. 10.

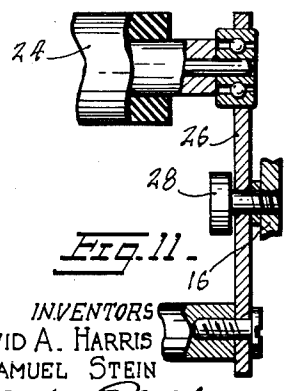


Fig. 11.

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SHEET FEED MEANS FOR LIQUID PROCESS DUPLICATING MACHINE

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Application November 7, 1952, Serial No. 319,308

2 Claims. (Cl. 101—132.5)

This invention relates to new and useful improvements in liquid process rotary duplicating machines for hectographic copying.

More particularly, the present invention proposes the construction of an improved duplicating machine having a novel paper feeding device which will feed blank sheets of paper from a stack, down to and including the last few sheets in the stack, one at a time to a hectograph ink solvent moistening roller for passage therefrom to and between a platen and a drum bearing a master copy sheet thereon containing aniline dye impressions so that the solvent on a moistened sheet can dissolve a fractional part of the dye on the negative master copy to provide a positive print on the blank sheet.

Another object of the present invention proposes providing the improved rotary duplicating machine with a reciprocating paper feeding device actuated from the rotary crank of the machine and adjustable to feed paper of different thicknesses and lengths.

Still further, the present invention proposes constructing the duplicating machine with an improved hectograph ink solvent feeding means and means to move the platen relative to the drum so that adjustments of any degree can be made in the brightness of the copies.

As a further object, the present invention proposes arranging the duplicating machine so that copies can be made on almost any paper.

The present invention further proposes a novel arrangement of a single easily accessible adjustment lever to control the timing and registration of the printing, the printing being raised on the paper by moving the lever in one direction and lowered by moving it in the other direction.

For further comprehension of the invention and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a perspective view of a duplicating machine embodying the present invention.

Fig. 2 is a top plan view of the machine shown in Fig. 1.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a rear end view.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 2.

Fig. 6 is a fragmentary detail view of the reciprocating lever for the paper feed device shown in the several figures.

Fig. 7 is a perspective view of the liquid feed trough of the machine.

Fig. 8 is a sectional view taken on line 8—8 of Fig. 2.

Fig. 9 is a fragmentary side view of one end of the drum and parts associated therewith.

Fig. 10 is a sectional view taken on line 10—10 of Fig. 8.

Fig. 11 is a sectional view taken on line 11—11 of Fig. 8.

Referring more particularly to the drawings, the duplicating machine illustrated in the several figures has two side plates or supports 15 and 16 held in spaced relation by tie rods 17, 18 and 19. Rubber cushion rolls 20 are provided on rods 18 and 19 to cushion the machine and to support it.

A drum shaft 21 and a drum 22 are rotatably mounted between the supports 15 and 16. The shaft 21 has each end journaled in one of the side supports and a crank 23 is fastened to one end of the drum shaft 21 on the outer side of side support 15. Drum 22 is fixed to the drum shaft 21, the ends of the drum being pinned to the shaft.

A platen 24 in roller form (see Figs. 4, 5, 8 and 11) is mounted between side supports 15 and 16 and adjacent the periphery of the drum 22. Means to move the platen 24 toward and away from the drum 22 and to hold it with varying degrees of pressure against the drum is provided as follows. A pair of levers 25 and 26 are fulcrumed to side supports 15 and 16 by pins 27 and 28 respectively. Platen 24 is rotatably fastened between the levers 25 and 26 at the upper end of each lever. (Also see Fig. 11.) A lever actuating rod 29 (Fig. 5) is connected with the other end of the levers, a cross rod 30 extending between the levers 25 and 26 and fastened to them having a central opening 31 (see Fig. 4) through which one end of rod 29 passes. This end of rod 29 is threaded and a nut 32 is screwed on it to prevent the rod from being pulled through the opening 31 in the cross rod 30 when the lever actuating rod 29 is pulled by a knob 33 fastened to its other end.

The lever actuating rod 29 is threaded adjacent knob 33 and passes through a threaded upstanding guide 34 fixed to tie rod 18. Adjustments of almost micrometer like accuracy may be made in the platen pressure by turning knob 33.

The platen 24, preferably of hard rubber, is disposed beneath the drum 22 and a paper receiving plate 35 is positioned between the side supports 15 and 16 with one end underlying the platen. Plate 35 is secured to the side supports by screws 36 (see Fig. 5).

A moistening roller 37 is also rotatably mounted between the side supports 15 and 16 and adjacent the platen 24 at the front or feed end of the machine. Moistening roller 37 has its ends journaled in the side plates. A pulley 38 at one end of the moistening roller 37 is aligned with a second pulley 39 fixed to the drum shaft 21 at the crank end of the drum with a pulley belt 39′ between the two pulleys to drive the moistening roller 37 from the drum shaft as the shaft and drum are rotated by the crank.

Adjacent the moistening roller 37, in front of it and below its uppermost edge is a liquid trough 40 extending the full length of the moistening roller 37. One end of the trough is closed and the other end is connected with a gravity feed bottle holder 41 adapted to receive the top portion of a bottle 42 (Fig. 1) of hectograph ink solvent liquid and feed the liquid into the trough. A wick sheet 43 (Fig. 5) extending the full length of the moistening roller 37 has one edge in the trough and another edge portion abutting the moistening roller to draw liquid from the trough onto the roller to moisten it. A cover 44 for the trough 40 also extends over the moistening roller 37 and holds the wick sheet against this roller.

A pressure roller 45 is rotatably mounted between the side supports 15 and 16 adjacent the bottom of the moistening roller 37. A pair of pressure roller levers 46 and 47 are centrally fulcrumed on pins 48 and 49 to the side supports 15 and 16 respectively. Pressure roller 45 is rotatably fastened to the upper ends of the levers

46 and 47 as by being journalled in bushing 49. (See Fig. 10.) Preferably, the pressure roller 45 is of rubber and is spirally grooved. The lower ends of the levers 46 and 47 are fastened to coil springs 50 and 51 respectively. The other end of spring 50 is fixed to side support 15 and the other end of spring 51 is fixed to side support 16, the spring normally biasing the pressure roller 45 against the moistening roller 37.

A paper feed table plate 52 is mounted between side supports 15 and 16 and fastened to them by screws 53 at the front or feed end of the machine. One end of plate 52 is adjacent the moistening roller 37 and the pressure roller 45 and is bent upwardly at 53 to provide a ramp to the moistening roller 37 so that a sheet of paper can be fed from plate 52 into the bight between the driven moistening roller 37 and pressure roller 45. A brace 54 extends from the plate 52 to tie rod 19.

A slide bar 55 is reciprocally fastened to side support 16, a slot opening 56 being provided in the slide bar and a retainer clamp 57 being fastened to the side support 16 by screws 58 and extending through slot opening 56 with flanges 59 bent outwardly of the slot opening and overlying the slide bar. The slide bar 55 is located at the front or feed end of the machine.

A cross-slotted scotch yoke 60 is fixed to one end of the slide bar 55, as by screws 61. Yoke 60 has one elongated slot 62 around the drum shaft 21 horizontally disposed and another elongated slot 63 at right angles to slot 61 and vertically disposed.

The drum shaft 21 being encircled by slot 62 confines the movement of the yoke and the slide bar to reciprocation.

A yoke pin lever arm 64 (see Fig. 9) is rotatably secured to the drum shaft 21 at one end of the arm, a sleeve 64' on the arm fitting over the shaft. The other end of the yoke pin lever arm 64 is removably fastened to the periphery of the drum 22. This end of the arm 64 is bent over and spaced from the drum and a set screw 65 extends through the bent over portion of arm 64 to abut the periphery of the drum. Lever arm 64 is positioned adjacent the end of the drum facing side support 16.

Yoke pin 66 is fixed to the lever arm 64 and spaced from the drum shaft 21 radially of the drum. Yoke pin 66 is encircled by and movable in the vertically disposed cross-slot 63 of the scotch yoke 60 so as to reciprocate the yoke and slide bar as the drum is rotated.

A paper gripping member 67 is connected with the end of slide bar 55 to reciprocate with the slide bar. The paper gripping member 67 has a rod 67' fixed at one end to the slide bar. A downwardly disposed forwardly bent bar 68 has its upper end rotatably fastened to the other end of rod 67', a collar portion 69 being provided on bar 68 for this purpose.

The lower end of bar 68 is fastened to an axle 70 having two rubber wheels 71 swivelly but non-rotatively fixed thereto by a pivot pin 68a. The axle 70 is loosely and freely fastened to bar 68 so it can tilt and rotate. Wheels 71 normally rest on the paper feed table plate 52.

A pair of paper guides 72 and 73 are slidably secured to the paper feed table plate 52 and disposed lengthwise of the plate. The plate 52 has slot openings 74 running crosswise of it and bolts 75 extend through the guides 72 and 73 and through the slot openings 74 to hold the guides to the plate.

Guides 72 and 73 are made of angle stock as angle paper guides. Each has an upstanding leg and a plate abutting leg. A sponge 76 is fixed to each guide near its outer end to moisten the edges of paper held between the guides on plate 52. A leaf spring 77 is fastened to the back of each upstanding guide leg and a sponge pressure adjusting screw 78 extends through each leaf spring 77 and bears against a guide to hold the free end 79 of each spring away from the adjacent guide leg.

A sponge opening 80 is provided in the upstanding leg of each angle guide, 72 and 73, and a sponge 76 is secured in each opening 80 with the free ends of the leaf springs 77 bearing against the sponges.

To operate the machine a bottle 42 of hectographic ink solvent fluid is placed in bottle holder 41. The original matter to be copied, a negative sheet made by typing, writing, drawing or otherwise marking on a sheet backed by an aniline dye hectograph carbon paper, is secured to the drum. By turning the crank 23, the drum is rotated reciprocating slide bar 55 and feeding one sheet of blank paper 81 (see Fig. 5) from a stack previously placed in the feed plate into the bight, between the moistening roller and the pressure roller. These driven rollers will pull the sheet through the bight moistening it as it goes through. The sheet is fed by the moistening roller and pressure roller into the bight between the platen and the drum where it is brought into direct contact under pressure with the negative carbon impression. The solvent on the moist paper sheet dissolves a small part of the dye on the master leaving a positive print on the sheet which is passed from the drum to the receiving table plate at the rear of the machine.

While we have illustrated and described the preferred embodiments of our invention, it is to be understood that we do not limit ourselves to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new and desire to secure by United States Letters Patent is:

1. In a liquid process rotary duplicating machine, the combination of a pair of side supports, a drum shaft and a drum rotatably mounted between said supports, a platen mounted between the side supports and adjacent the periphery of the drum, a slide bar reciprocally fastened to one of the side supports, a cross-slotted scotch yoke fixed to the slide bar and having one slot around the drum shaft, a slide bar actuating pin connected with the drum shaft and the drum adjacent one end of the drum and spaced from the drum shaft and the drum adjacent one end of the drum and spaced from the drum shaft radially of the drum, said yoke having its other slot around the pin for movement of the yoke when the drum is turned to reciprocate the slide bar, a paper gripping member connected with the end of the slide bar, said paper gripping member having a rod fixed at one end to the slide bar and extending midway between the side supports, a downwardly disposed forwardly bent bar having its upper end rotatably fastened to the rod and an axle with two rubber wheels fixed thereto loosely and freely fastened to the lower end of the bent bar, a paper feed table plate secured between the side supports with one end of the plate adjacent to the drum, said end of the plate being bent upwardly to provide a ramp to the drum, a pair of angle paper guide members each having an upstanding leg and a plate abutting leg slidably secured to the plate and disposed lengthwise of the plate, a leaf spring fastened to the back of each upstanding guide leg and a set screw extending through each spring and bearing against a guide member to hold the free end of each spring away from the adjacent guide leg, each angle guide member having a sponge opening in its upstanding leg and a sponge secured in each opening with the free end of a leaf spring bearing against it.

2. In a liquid process rotary duplicator, a pair of side supports, a drum, a drum shaft rotatably mounting said drum, a sliding bar slidably fastened to one of the side supports, a cross-slotted scotch yoke fixed to the slide bar, the drum shaft being encircled by one slot of the yoke to confine the movement of the yoke and slide bar to reciprocation, a yoke pin lever arm having one end rotatably secured to the drum shaft and the other end removably fastened to the periphery of the drum, said lever arm being adjacent the yoke, a yoke pin fixed to the lever

arm spaced from the drum shaft radially of the drum, said pin being encircled by and movable in the other cross slot of the yoke to reciprocate the yoke and the slide bar as the drum is rotated, a paper gripping member connected with the end of the slide bar to reciprocate therewith, said paper gripping member having a rod fixed at one end to the slide bar and extending midway between the side supports, a downwardly disposed forwardly bent bar having its upper end rotatably fastened to the rod and an axle with two rubber wheels fixed thereto loosely and freely fastened to the lower end of the bent bar, a paper feed table plate secured between the side supports adjacent the rubber wheels with the wheels normally resting on the plate, a pair of angle paper guide members having an upstanding leg and a plate abutting leg slidably secured to the plate and disposed lengthwise of the plate, a leaf spring fastened to the back of each upstanding guide leg and a set screw extending through each spring and bearing against a guide member to hold the free end of each spring away from the adjacent guide leg, each angle guide member having a sponge opening in its upstanding leg and a sponge secured in each opening with the free end of a leaf spring bearing against it.

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