Dec. 13, 1949 F. R. FORD 2,491,369

LINE PRINTING DEVICE FOR DUPLICATING MACHINES

Filed July 31, 1945 5 Sheets-Sheet 1

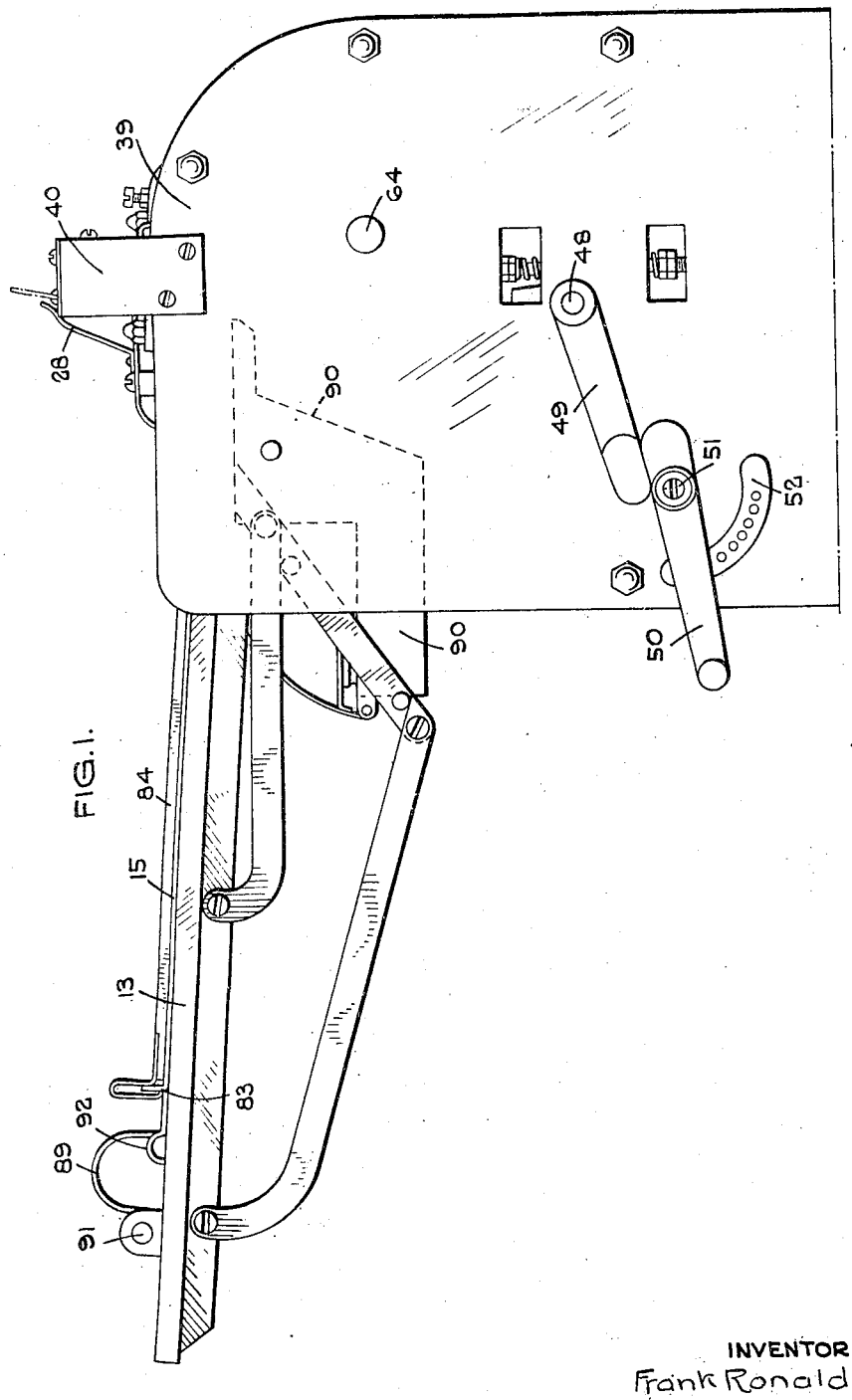


FIG. 1.

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LINE PRINTING DEVICE FOR DUPLICATING MACHINES

Filed July 31, 1945 5 Sheets-Sheet 2

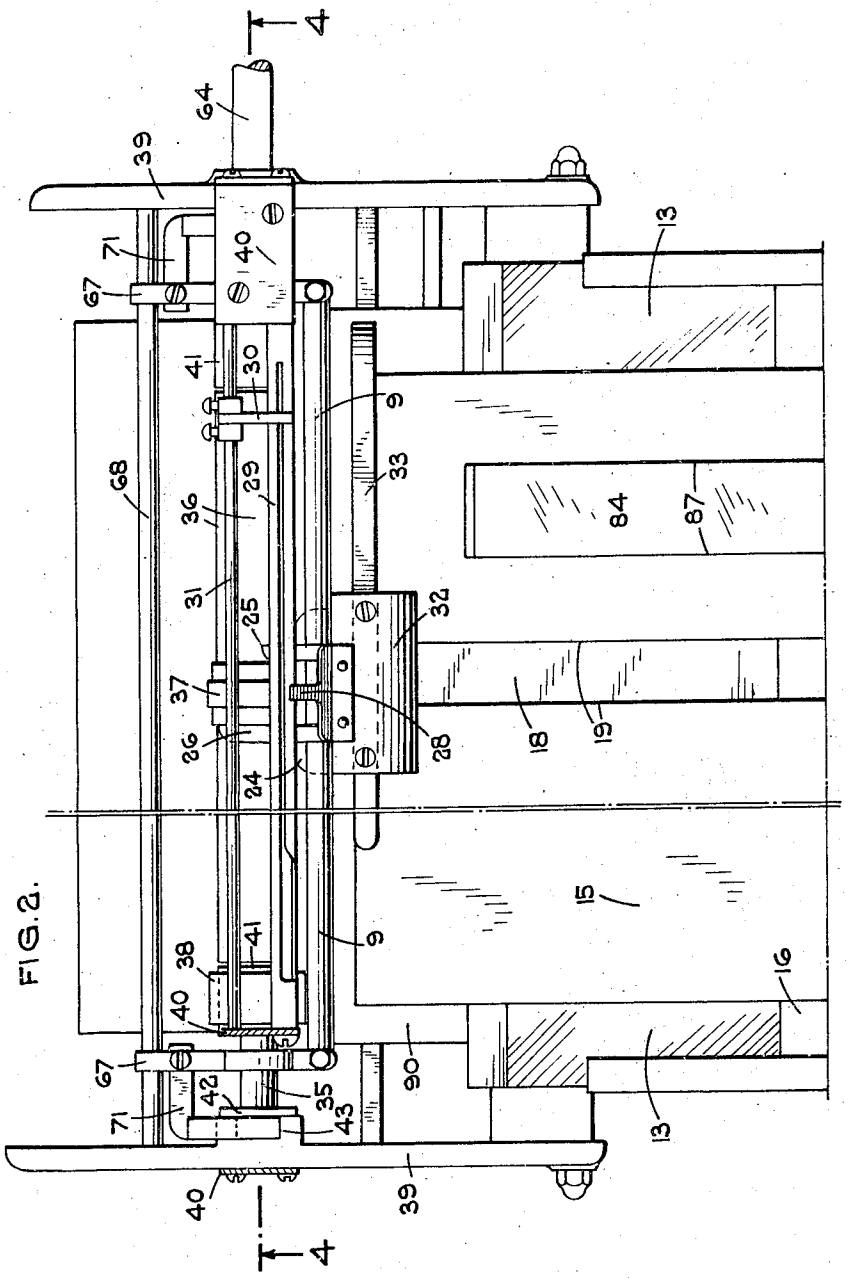


FIG. 2.

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LINE PRINTING DEVICE FOR DUPLICATING MACHINES

Filed July 31, 1945 5 Sheets-Sheet 3

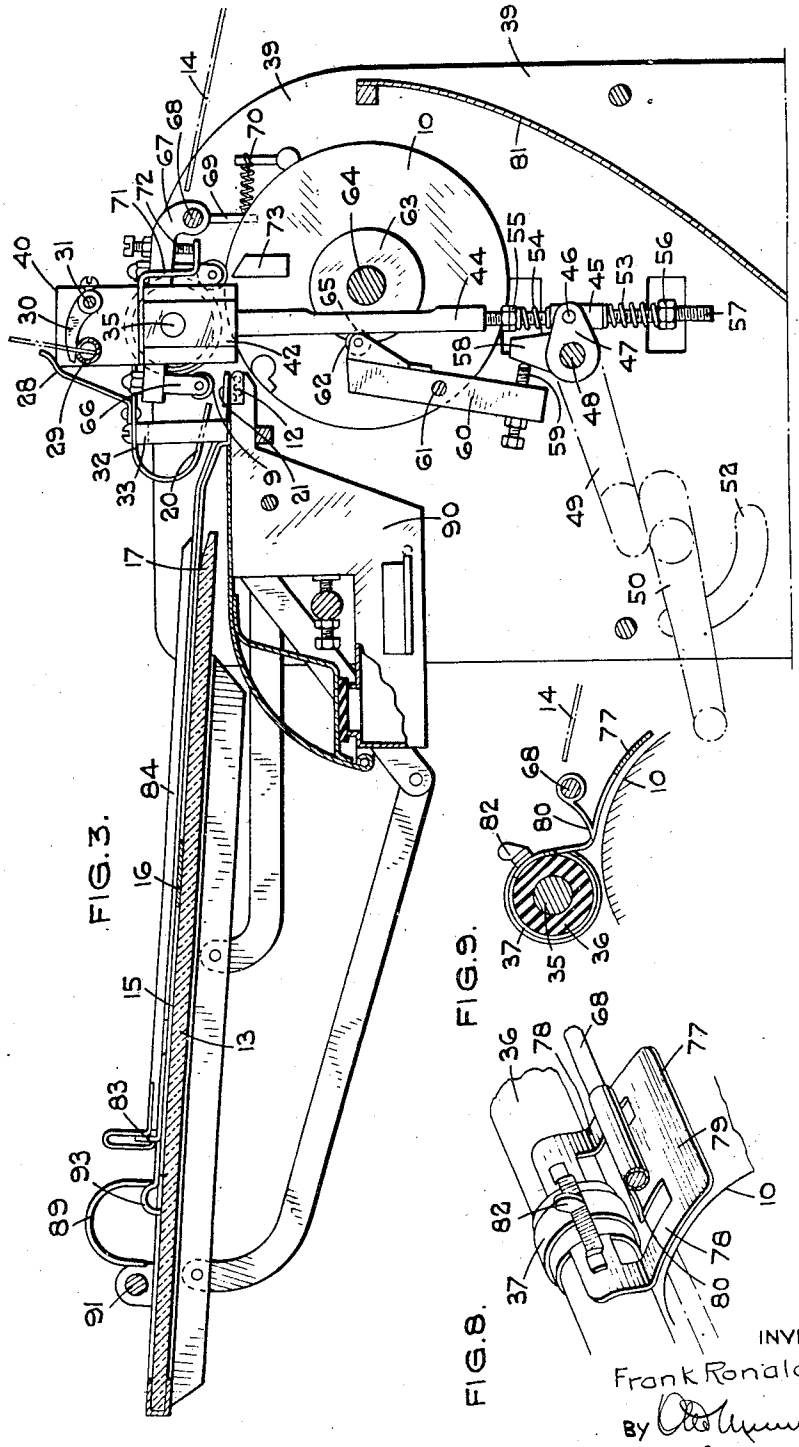


FIG. 3.

FIG. 9.

FIG. 8.

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LINE PRINTING DEVICE FOR DUPLICATING MACHINES

Filed July 31, 1945 5 Sheets-Sheet 4

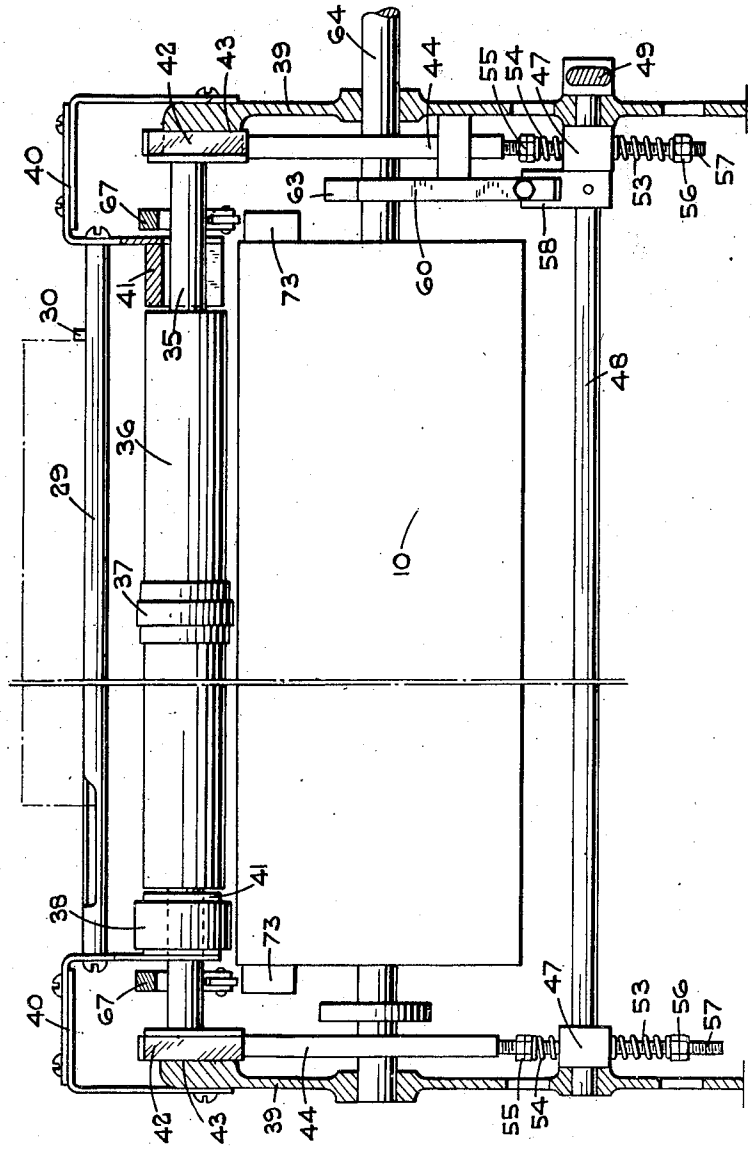


FIG. 4.

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Dec. 13, 1949 F. R. FORD 2,491,369

LINE PRINTING DEVICE FOR DUPLICATING MACHINES

Filed July 31, 1945 5 Sheets-Sheet 5

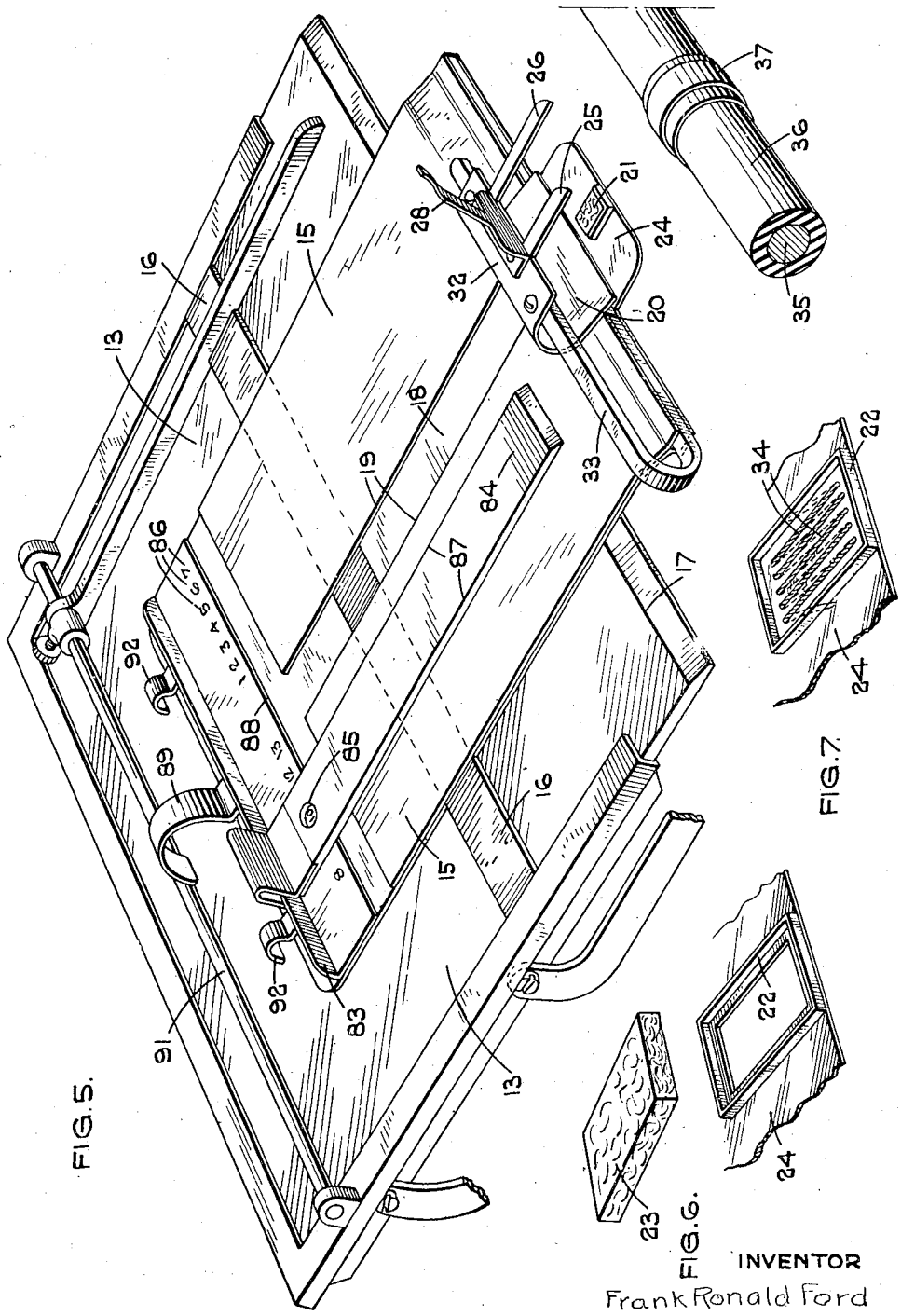


FIG. 5.

FIG. 7.

FIG. 6.

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Patented Dec. 13, 1949 2,491,369

UNITED STATES PATENT OFFICE

2,491,369

LINE PRINTING DEVICE FOR DUPLICATING MACHINES

Frank Ronald Ford, Sparkbrook, Birmingham, England

Application July 31, 1945, Serial No. 607,964
In Great Britain March 9, 1944

Section 1, Public Law 690, August 8, 1946
Patent expires March 9, 1964

6 Claims. (Cl. 101—132.5)

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This invention relates to duplicating machines of the kind comprising a cylinder for receiving a master sheet bearing in reverse the matter to be reproduced, a pressure roller adapted to bear on the cylinder, means for moistening copy sheets and a feed tray or table over which the copy sheets can be fed to the moistening means and thence to the line of contact between the cylinder and the pressure roller.

One of the objects of the present invention is to provide a dual purpose machine which can be used as most machines of this type are used for making complete copies of a master and which can be used alternatively for reproducing one or more selected items from a master.

A further object of the present invention is to provide means whereby items from a master sheet can be reproduced on to a copy sheet in the correct position thereon when an interval occurs between the reproduction of the items on the copy sheet during which the copy sheet is removed from the machine. For instance it is proposed to make provision in connection with "pay as you earn" income tax for the reproduction at weekly intervals on to a sheet of items selected from a master consisting of a wages sheet.

A machine constructed in accordance with the present invention comprises a pressure roller and one or more sleeves mounted on the pressure roller, which sleeve or sleeves can be moved along the pressure roller and retained either in an out of use position or in any one of a number of in use positions for line or paragraph reproduction, and one or more displaceable feed trays movably mounted on a main feed tray or otherwise movably mounted so that it can be adjusted parallel to the axis of the cylinder, the adjustable feed tray having means for engaging with the sleeve or sleeves for positioning purposes and having guiding means for the copy sheet, and also having moistening means of line or paragraph width so that the machine may be used alternatively for reproducing the whole of the master or for reproducing one or more selected lines or paragraphs therefrom.

In such a machine in order to allow the sleeve or sleeves to be moved along the pressure roller, the latter is first moved away from the periphery of the cylinder when the latter is in the neutral position by the existing pressure controlling mechanism for the pressure roller and after the sleeve has been moved into the desired position opposite to the item on the master sheet which it is desired to reproduce and retained in such position, and when the machine is restarted the

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pressure roller is restored automatically to its position bearing on the periphery of the cylinder with the requisite pressure. This is done by providing a lever pivoted on the frame of the machine and carrying a roller at one end engaging with a cam notch in a flange or disc rotating with the cylinder, the said lever engaging at its other end with a crank fixed on a shaft which carries means operating the mechanism controlling the movements of pressure of the pressure roller.

Alternatively a flat or recess can be made in the cylinder, its position being underneath the pressure roller when the machine is at rest.

The moistening means on the adjustable tray may receive its liquid from the main moistening pad which extends for the full length of the cylinder and may include a thin masking sheet covering the part of the main pad over which that part of the copy sheet which is receiving an item passes, but having an opening in which a small absorbent pad is placed to produce a narrow strip moistening, the lower side of the small absorbent pad bearing on the main moistening pad and its upper side being engaged by the copy sheet.

Alternatively for producing narrow strip moistening on the copy sheet, a sliding sleeve may be mounted on the damping roller which presses the copy sheet on to the main moistening pad, this sleeve being used in conjunction with a thin masking plate having an opening and mounted to move with the tray.

Also according to the present invention a machine of the kind to which the invention relates may provide for a selected line or paragraph reproduction upon a copy sheet which is long enough to receive a plurality of such items and for this purpose the machine may have a holder for a copy of the master sheet in a visible position and in register with the master sheet on the cylinder and the feed tray may have a laterally adjustable guide co-operating with a marked scale on the adjustable tray so that the guide can be adjusted for positioning the copy sheet in relation to the master sheet to enable it to receive in the correct position a copy of the selected item on the master sheet. This provision may be made on a two purpose machine i. e. general duplicating and line or paragraph reproduction, or it may be made on a one purpose machine designed for line or paragraph reproduction only.

In such machines some of the copies will be made on narrow strips or sheets and some of the copies will be made upon wider or longer sheets and the machine may be equipped with a pair of

receiving trays or members and with means operating automatically to deliver the narrow copy sheets to one receiving tray and the wider and longer copy sheets to the other receiving tray.

Referring to the drawings:

Figure 1 is a view in side elevation.

Figure 2 is a plan view.

Figure 3 is a sectional view in side elevation.

Figure 4 is a section on line 4—4 of Figure 2.

Figure 5 is a perspective view showing the main and auxiliary trays.

Figure 6 is a perspective view showing one form of local moistener.

Figure 7 is a perspective view showing another form of local moistener.

Figure 8 is a perspective view showing the device for separating copy sheets of different sizes.

Figure 9 is a sectional view in side elevation of the device shown in Figure 8.

In the drawings the invention is shown applied to a standard machine having a cylinder 10, a pressure roller 36 which is above the cylinder, a moistening pad 12 of a length approximately equal to that of the cylinder, a copy sheet pressure bar or roller 9, and main feed and receiving trays 13, 14, and to this machine a number of additions are necessary.

These additions are in the first place a secondary or adjustable feed tray 15 mounted on the main feed tray 3. More than one such adjustable tray may be provided if desired. The main feed tray is provided with a strip 16 on its surface extending from side to side, and the adjustable tray 15 is grooved on its underside so that it is guided on this strip and can be moved laterally in relation to the main tray.

The adjustable tray 15 extends over the forward edge 17 of the main tray and it is provided with a sunk channel 18 formed between two plates 19 the sunk channel 18 extending to its front edge, and the sides of this channel forming guides for the narrow copy strips.

At is forward edge opposite to the end of the channel 18, a paper guide 20 is provided which may be downwardly inclined and is adapted to guide the paper down on to the local moistening device 21 which is associated with the adjustable tray and which consists of a thin sheet 24 of metal having a housing 22 in which is located a small absorbent pad 23, the underside of which bears on the surface of the main moistening pad 12 and the upper side of which is engaged by the copy paper. An alternative form of local moistening is shown in Figure 7 wherein the housing 22 instead of being open at the bottom is provided with a number of holes through which is threaded an absorbent member 34.

An alternative form of local moistening may be used if desired, consisting of a thin masking sheet carried by the movable tray and having an opening through which a part of the main moistening pad is exposed and a sleeve mounted on the copy sheet pressure bar or roller and movable along it.

The adjustable tray is further provided with a pair of forwardly projecting spring fingers 25, 26 adapted to engage with the ends of a sleeve 37 slidably mounted on the pressure roller 11, this sleeve being used for the purpose of applying pressure over a narrow width on the master sheet on the cylinder 10.

In addition the adjustable tray is provided with an indicating finger 28 extending upwardly and having its end situated adjacent an indicator sheet which can be mounted in a slit tubular

holder 29. The indicator sheet may be adjusted endwise against a stop 30 which can be adjusted to any desired position along a rod 31 and retained in the desired position.

The fingers 25, 26 on the adjustable tray which project forwardly for the purposes described are mounted on a sheet metal bracket 32 which also incorporates the paper guide 20, which bracket is secured to a U shaped bracket 33 having one arm to which the bracket 32 is secured extending parellel to and above the forward edge of the adjustable tray and the other arm secured to the forward edge of the tray so that copy sheets can be passed between the arms without obstruction. The main pressure roller of the machine has a spindle 35 on which is mounted a hard rubber or other covering 36, and mounted on this roller are two sleeves 37, 38 for use in reproduction of a line or paragraph.

The side plates 39 of the machine are provided with brackets 40 which carry members 41 of inverted U shape adjacent the ends of the main pressure roller 36, and when the sleeves 37 and 38 are not required for use they can be moved along the main pressure roller on to the supports 41. The two sleeves 37 and 38 are of different forms. The sleeve 37 is for reproducing a single line whereas the effective part of the sleeve 38 is wide enough to reproduce three lines.

When it is desired to use either of these sleeves, the pressure roller is moved away from the cylinder and the sleeve is moved along the roller to the appropriate position, after which the two fingers 25, 26 on the adjustable tray are engaged with its ends so as to locate the tray in relation to the item to be reproduced.

The spindle 35 of the main pressure roller is mounted in bearings 42 which can slide up and down in guides 43 provided in the side plates 39 of the machine. These bearings 42 are controlled by rods 44 each having a sleeve 45 to which is pivoted at 46 a lever 47 on a cross shaft 48. This cross shaft extends through one of the side plates and is there provided with a lever 49 which can be rocked by a lever 50 pivoted at 51 in the known manner. The lever 50 operates over a quadrant 52 in the known manner and can adjust the lever 49 into various positions for adjusting the pressure between the pressure roller 36 and the cylinder 10. In addition the lever 50 can be operated so as to raise the bearings 42 to bring the pressure roller away from the cylinder 10.

The ends of the sleeve 45 bear upon springs 53, 54 which engage nuts 55, 56 on the threaded rod 57 forming a continuation of the rod 44 so that the pressure between the pressure roller 36 and the cylinder 10 will be resilient pressure.

The levers 47 controlling the position of the rods 44 and bearings 42 may be operated automatically by a lever 58 on the shaft 48. The lever 58 can be engaged by a screw 59 carried by a lever 60 pivoted at 61, the lever 60 having a roller 62 adapted to engage the periphery of a disc 63 on the cylinder shaft 64.

The disc 63 is provided with a recess 65 so that in the neutral position which is passed through after each copy has been made the roller 62 engages in the recess 65 causing the screw 59 to leave the lever 58 and to allow the shaft 48 to oscillate and rock the levers 47 so as to raise the bearings 42 and bring the pressure roller away from the cylinder. This upward movement is effected by springs (not shown) but applied to one or more of the levers controlling the movement.

The lever 60 is only in operation when reproducing line or paragraph width. During full width reproduction the lever 50 is operated to bring the bearings 42 into a lower position in which the pressure roller 36 bears continuously on the cylinder, and when in such position the lever 58 leaves the end of the screw 59.

The copy sheet pressure roller 9 is carried by a pair of arms 66 mounted in levers 67 pivoted at 68, the levers being provided with arms 69 which are acted upon by springs 70.

The bearings 42 are provided with brackets 71 which engage the lower ends of adjustable screws 72 carried by the levers 67 so that when the bearings 42 are raised to bring the pressure roller away from the periphery of the cylinder 10 to allow either of the sleeves 37 or 38 to come into use the levers 67 are raised. During the operation of the machine for line or paragraph width reproduction the lever 60 operates to lower the bearings 42 during reproduction, and this lowering of the bearings 42 automatically allows the moistening roller 9 to move down on to the upper side of the copy paper and press it on to the local moistener.

When operating the machine for full width reproduction, however, the moistening roller 9 must move down further into contact with the main moistening pad, and this is permitted during such operation by reason of the fact that the lever 50 is moved before such operation commences to lower the bearings 42. During full width operation the levers 67 are raised at the end of each cycle by the usual cam 73 on the end of the cylinder so as to raise the moistening roller and to permit of the insertion of a fresh copy sheet.

The rod 68 carrying the levers 67 is provided on the frame of the machine and extends parallel to the axis of the cylinder 10 and behind the pressure roller and mounted on this rod is the automatic sorting device which consists of a sheet metal deflector 77 having two spaced arms 78, connected at 79, which deflect the wider sheets downwardly and a central narrow tongue 80 which deflects the narrow copy sheets upwardly, or alternatively all sheets can be deflected downwardly into the lower tray.

A receiving tray 14 may be placed at the back of the machine while the wider sheets may pass downwardly into a chute 81 and finally in a second receiving tray (not shown).

The sheet metal deflector 77 which is adjustable along the length of the rod 68 may be provided with a finger piece 82 and may engage with the ends of the sleeve 37 or 38 on the pressure roller.

The secondary feed tray 15 is provided with a rail 83 extending parallel to the axis of the cylinder, and a guide strip 84, the edges of which are at right angles to the said axis and the guide strip is adjustably mounted on this rail and can be locked in any adjusted position.

This guide strip 84 is provided with an opening 85 which can be brought into register in turn with the markings 86 on a scale on the secondary feed tray, and these markings may correspond with the weeks (one to thirteen) in a quarter. Both edges 87 of this guide strip are used in turn for positioning the sheet used for the wage records of an individual over one quarter to ensure that the wage record each week is reproduced on this sheet in the space appropriate to that week.

The secondary tray may be provided with a shoulder 88 near its back edge extending from side to side of the tray to provide for registration with the back edges of the copy sheets. Further the said tray may be provided with a finger piece 89 whereby it may be moved and it may also be guided for lateral movement and supported on the top of the tank 90 containing the moistening liquid for the moistening pad.

Further, the main feed tray 3 may be provided with a rod 91 parallel to the axis of the cylinder, and one edge of the secondary feed tray 15 is provided with hooks 92 so that the secondary feed tray can be lifted somewhat at its back edge, drawn back and hooked back on to the rod 91 into and out of use position when the machine is used for page reproduction as distinct from line or paragraph reproduction.

The machine is particularly suitable for use in connection with the reproduction of records of factory wages including "pay as you earn" income tax amounts and in operating the machine for such a purpose in a factory, the first step is to make a master sheet showing the wages records of all employees for a given period, say one week.

This master is mounted on the cylinder and two or more copies are taken from it. This is done with the sleeve on the pressure roller and the sleeve on the damping roller (if used) in the out of use position and with the adjustable tray retained in a backward position so that the machine is used as an ordinary spirit duplicator and reproduces the whole of the master on the master sheet.

One of these copies may be used for office records and the other is placed in the holder in a visible position in register with the master sheet so as to serve as an indicator.

The pressure roller of the machine is now moved away from the cylinder and the sleeve on the pressure roller is moved along the pressure roller until it is opposite to the item it is desired to reproduce. This item will be the wages record of one week of a particular individual and it is necessary to reproduce this upon a sheet which serves for a number of weeks. This sheet may be designed to hold the records for say thirteen weeks and the item now to be reproduced on that sheet must be reproduced thereon in the position reserved for a particular week which may be any one of the thirteen.

When the sleeve has been moved along the pressure roller to a position opposite to the item to be reproduced, the movable tray is moved along and is mechanically engaged with the moistening provision on the tray directly opposite to the item to be reproduced.

The adjustable tray is provided with a guide which is brought into register with one marking upon a scale provided on the adjustable tray, thus ensuring that the guide which engages one edge of the copy sheet is in the right position to bring the copy sheet into correct position for recording the item in the space reserved for the appropriate week.

The sheet for the individuals weekly wages records is then put through the machine and the operation of the machine automatically restores the pressure to the pressure roller. A second copy may be taken which can be retained by the firm, the first copy being forwarded to the revenue authorities at the end of the quarter, i. e. when the sheet is full.

The next step is to pass through the machine a narrow strip of paper just wide enough to

receive one item so that a record is made thereon which can be put in the worker's pay packet.

Finally the pay packet itself may be passed through the machine. This will usually be of relatively small area and in passing through the machine will receive the worker's name and possibly factory number.

It should be observed that the individual worker's sheet upon which the wages records of thirteen weeks are eventually produced will be much wider or longer than the strip used for the pay packet and the automatic sorting device comes into action so that the wider sheet is delivered to one receiving tray and the narrower sheets to another delivery tray.

The construction of the essential parts of the machine such as the cylinder, the pressure roller, the damping roller, the mechanism controlling the movements of the damping roller and the pressure of the pressure roller and the main feed and receiving trays and the main moistener and the frame may be in accordance with prior U. S. Patent No. 2,048,543.

What I claim then is:

1. A duplicating machine of the kind specified comprising a pair of side plates, means connecting said side plates in spaced relationship, a cylinder shaft mounted for rotation in and extending between said side plates, a cylinder for receiving the master sheet on said cylinder shaft means for moistening copy sheets, said side plates having guides, bearings mounted for up and down sliding movement in said guides, rods connected to said bearings for controlling said up and down movement, a spindle mounted in said bearings, a pressure roller on said spindle, a sleeve on said pressure roller and adjustable along its length means for retaining the sleeve either in an out of use position, or in any one of a number of in use positions for line or paragraph reproduction, said pressure roller and said sleeve both being capable of cooperating with the cylinder, a disc rotating with the cylinder, said disc having a recess in its periphery, a cross shaft mounted in the side plates, an arm on the cross shaft, a sleeve on each of said rods, abutments on said rods spaced above and below said sleeves, springs on said rods operating between the ends of the sleeves and the abutments, levers on the cross shaft pivotally engaging said sleeves, means for rocking said levers by hand to raise or lower the bearings, a lever pivoted to one of the side plates, said lever having means engaging the periphery of the disc and having means for engaging the arm on the cross shaft for rocking the cross shaft once per revolution of the cylinder and a displaceable feed tray mounted for movement parallel to the axis of the cylinder, the displaceable feed tray having means for engaging with the sleeve for positioning purposes and having guiding means for the copy sheet and also having moistening means of line or paragraph width so that the machine may be used alternatively for reproducing the whole of a master, or for reproducing one or more selected lines or paragraphs therefrom.

2. A duplicating machine of the kind specified comprising a pair of side plates, means connecting said side plates in spaced relationship, a cylinder shaft mounted for rotation in and extending between said side plates, a cylinder for receiving the master sheet on said cylinder shaft means for moistening copy sheets, said side plates having guides, bearings mounted for up and down sliding movement in said guides, rods connected to said bearings for controlling said up and down movement, a spindle mounted in said bearings, a pressure roller on said spindle, a sleeve on said pressure roller and adjustable along its length means for retaining the sleeve either in an out of use position, or in any one of a number of in use positions for line or paragraph reproduction, said pressure roller and said sleeve both being capable of cooperating with the cylinder, means for operating said rods automatically to raise the bearings once per revolution of the cylinder, a rod carried by the side plates and disposed parallel to the cylinder, levers in said rod carrying a pressure-applying member for pressing the copy sheets onto a moistening pad, abutments on said levers, means on said bearings for engaging said abutments so as to raise the levers when said bearings are raised and a displaceable feed tray mounted for movement parallel to the axis of the cylinder, the displaceable feed tray having means for engaging with the sleeve for positioning purposes and having guiding means for the copy sheet and also having moistening means of line or paragraph width so that the machine may be used alternatively for reproducing the whole of a master, or for reproducing one or more selected lines or paragraphs therefrom.

3. A duplicating machine of the kind specified comprising a pair of side plates, means connecting said side plates in spaced relationship, a cylinder shaft mounted for rotation in and extending between said side plates, a cylinder for receiving the master sheet on said cylinder shaft means for moistening copy sheets, said side plates having guides, bearings mounted for up and down sliding movement in said guides, rods connected to said bearings for controlling said up and down movement, a spindle mounted in said bearings, a pressure roller on said spindle, a sleeve on said pressure roller and adjustable along its length means for retaining the sleeve either in an out of use position, or in any one of a number of in use positions for line or paragraph reproduction, said pressure roller and said sleeve both being capable of cooperating with the cylinder, a bracket on one of said side plates extending above one end of said spindle, a support on said bracket for holding said sleeve when it has been slid off the end of the pressure roller and a displaceable feed tray mounted for movement parallel to the axis of the cylinder, the displaceable feed tray having means for engaging with the sleeve for positioning purposes and having guiding means for the copy sheet and also having moistening means of line or paragraph width so that the machine may be used alternatively for reproducing the whole of a master, or for reproducing one or more selected lines or paragraphs therefrom.

4. A duplicating machine of the kind specified comprising a pair of side plates, means connecting said side plates in spaced relationship, a cylinder shaft mounted for rotation in and extending between said side plates, a cylinder for receiving the master sheet on said cylinder shaft means for moistening copy sheets, said side plates having guides, bearings mounted for up and down sliding movement in said guides, rods connected to said bearings for controlling said up and down movement, a spindle mounted in said bearings, a pressure roller on said spindle, a sleeve on said pressure roller and adjustable along its length, a main tray for copy sheets diposed at the front of the machine, a guide on the main

feed tray, said guide being parallel to the cylinder, an adjustable feed tray engaging said guide, said adjustable feed tray having a sunk channel disposed at right angle to the cylinder, said adjustable feed tray extending over the rear edge of the main feed tray, a paper guide on said adjustable feed tray, a local moistening device on said adjustable feed tray, and means on said adjustable feed tray for engaging said sleeve so that it moves endwise when the adjustable tray is moved along said guide so that the machine may be used alternatively for reproducing a whole master, or for reproducing one or more selected lines or paragraphs therefrom.

5. A duplicating machine of the kind specified comprising a pair of side plates, means connecting said side plates in spaced relationship, a cylinder shaft mounted for rotation in and extending between said side plates, a cylinder for receiving the master sheet on said cylinder shaft means for moistening copy sheets, said side plates having guides, bearings mounted for up and down sliding movement in said guides, rods connected to said bearings for controlling said up and down movement, a spindle mounted in said bearings, a pressure roller on said spindle, a sleeve on said pressure roller and adjustable along its length, a main tray for copy sheets disposed at the front of the machine, a guide on the main feed tray, said guide being parallel to the cylinder, an adjustable feed tray engaging said guide, said adjustable feed tray extending over the rear edge of the main feed tray, a paper guide on said adjustable feed tray, a local moistening device on said adjustable feed tray, means on said adjustable feed tray for engaging said sleeve so that it moves endwise when the adjustable tray is moved along said guide, a rod carried by the side plates and disposed parallel to the cylinder, a copy sheet deflector on said rod, said deflector having two spaced arms for deflecting wider sheets downwardly, and a central narrow tongue disposed in the space between said arms for deflecting narrow sheets upwardly, said deflector engaging said sleeve and being moved thereby when the sleeve is moved axially so that the machine may be used alternatively for reproducing a whole master, or for reproducing one or more selected lines or paragraphs therefrom.

6. A duplicating machine of the kind specified comprising a pair of side plates, means connecting said side plates in spaced relationship, a cylinder shaft mounted for rotation in and extending between said side plates, a cylinder for receiving the master sheet on said cylinder shaft means for moistening copy sheets, said side plates having guides, bearings mounted for up and down sliding movement in said guides, rods connected to said bearings for controlling said up and down movement, a spindle mounted in said bearings, a pressure roller on said spindle, a sleeve on said pressure roller and adjustable along its length, a main tray for copy sheets disposed at the front of the machine, a guide on the main feed tray, said guide being parallel to the cylinder, an adjustable feed tray engaging said guide, said adjustable feed tray having means for guiding narrow copy sheets, said adjustable feed tray extending over the rear edge of the main feed tray, a local moistening device on said adjustable feed tray, means on said adjustable feed tray for engaging said sleeve so that it moves endwise when the adjustable tray is moved along said guide, a rail on said adjustable feed tray, and a guide strip on said adjustable feed tray, said guide strip engaging and being movable along said rail, said rail being parallel to the cylinder and said guide strip being at right angles to the cylinder so that the machine may be used alternatively for reproducing a whole master, or for reproducing one or more selected lines or paragraphs therefrom.

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