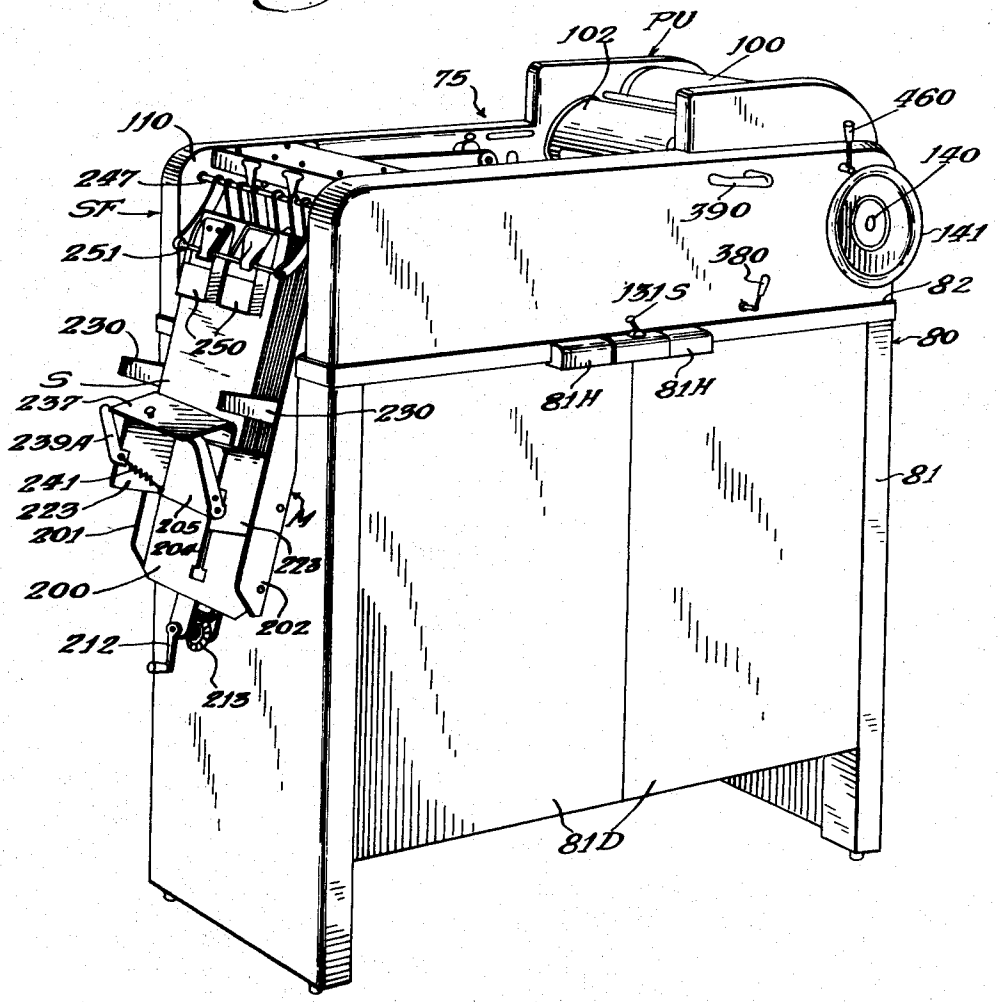
Sept. 21, 1954 F. E. CURTIS 2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 11, 1949

7 Sheets-Sheet 1

Fig. 1.



Inventor:
Franklin E. Curtis
By: Wallace and Cannon
Attorneys:

Sept. 21, 1954 F. E. CURTIS 2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 11, 1949

7 Sheets-Sheet 2

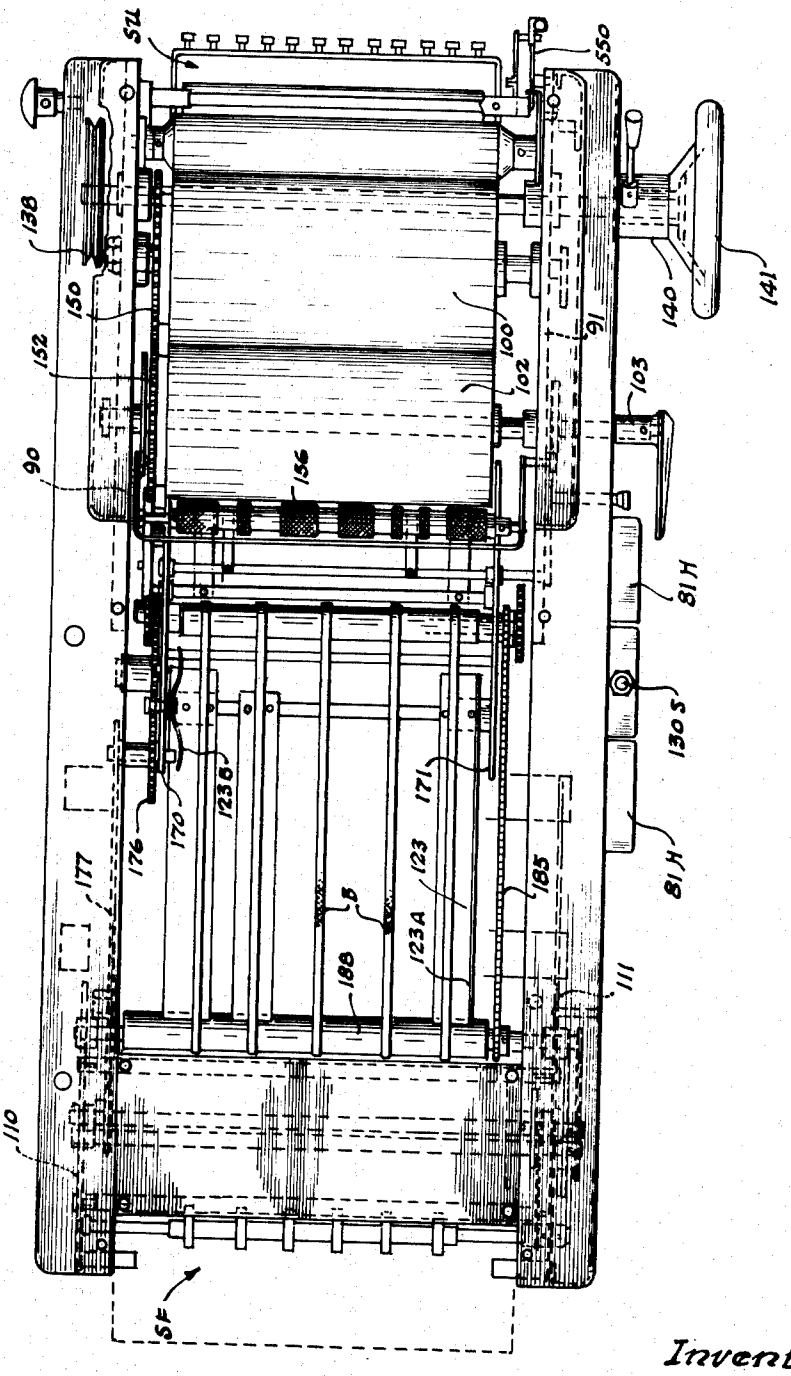


Fig. 2

Inventor
Franklin E. Curtis
By Wallace and Cannon
Attorneys

Sept. 21, 1954 F. E. CURTIS 2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 11, 1949 7 Sheets-Sheet 3

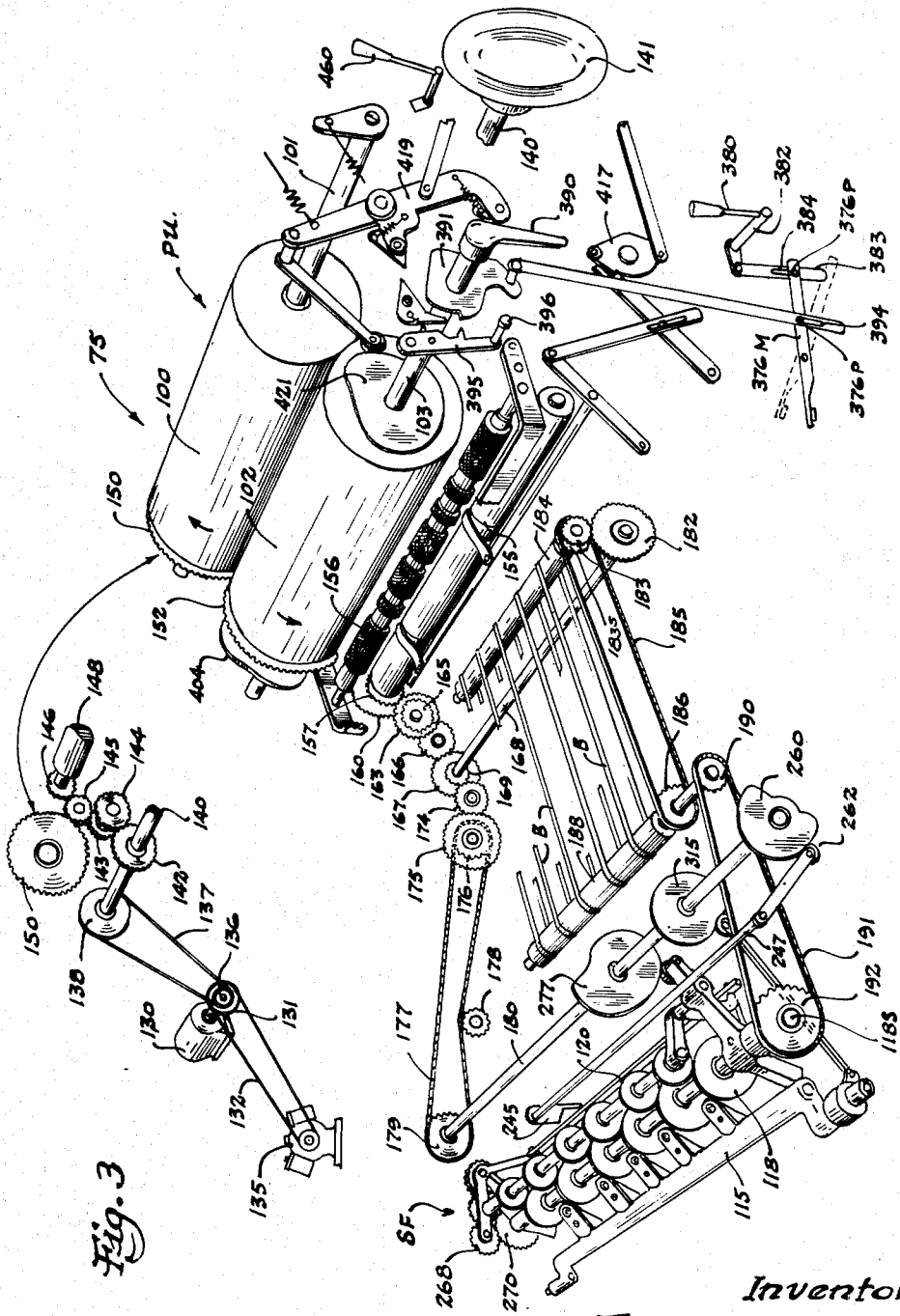


Fig. 3

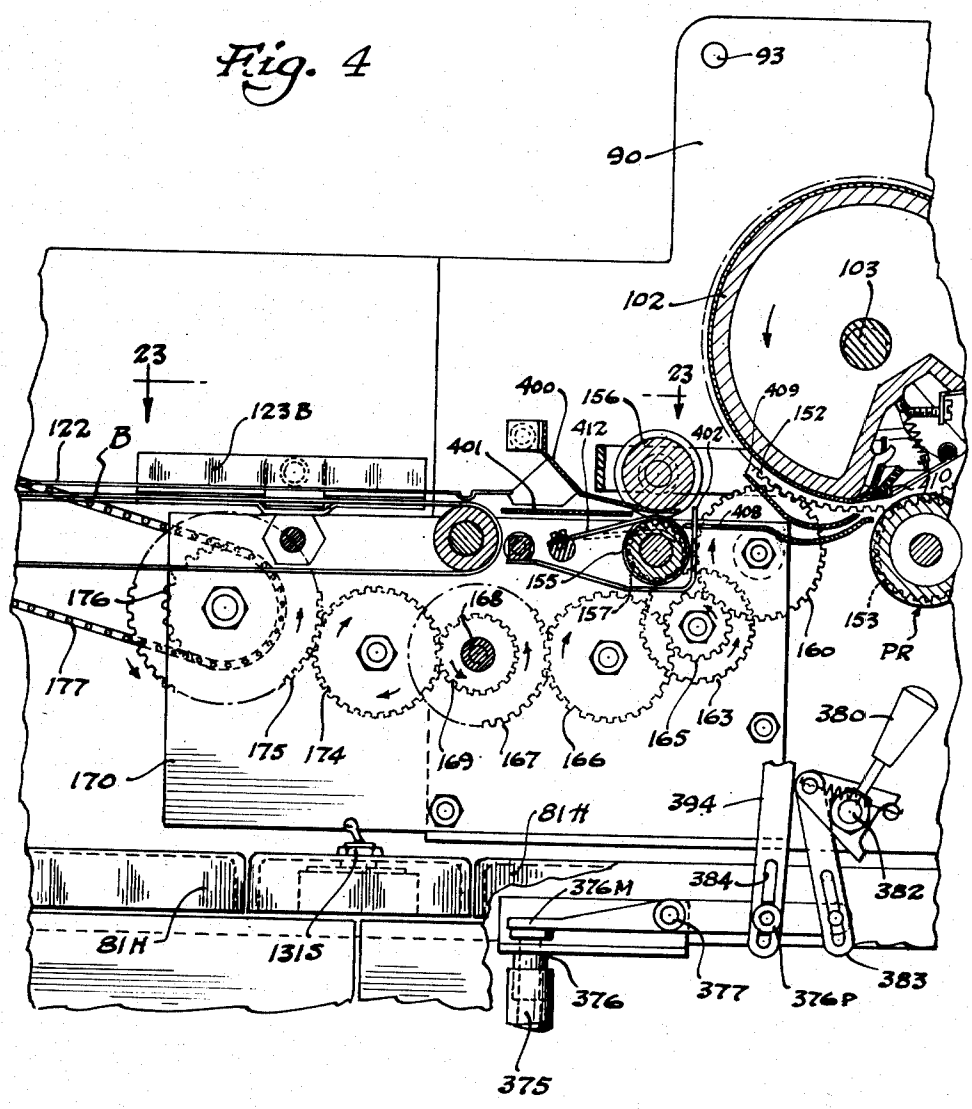
Inventor
Franklin E. Curtis
By Wallace and Cannon
Attorneys

Sept. 21, 1954 F. E. CURTIS 2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 11, 1949 7 Sheets-Sheet 4

Fig. 4



Inventor
Franklin E. Curtis
By Wallace and Cannon
Attorneys

Sept. 21, 1954 F. E. CURTIS 2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 11, 1949 7 Sheets-Sheet 5

Fig. 5

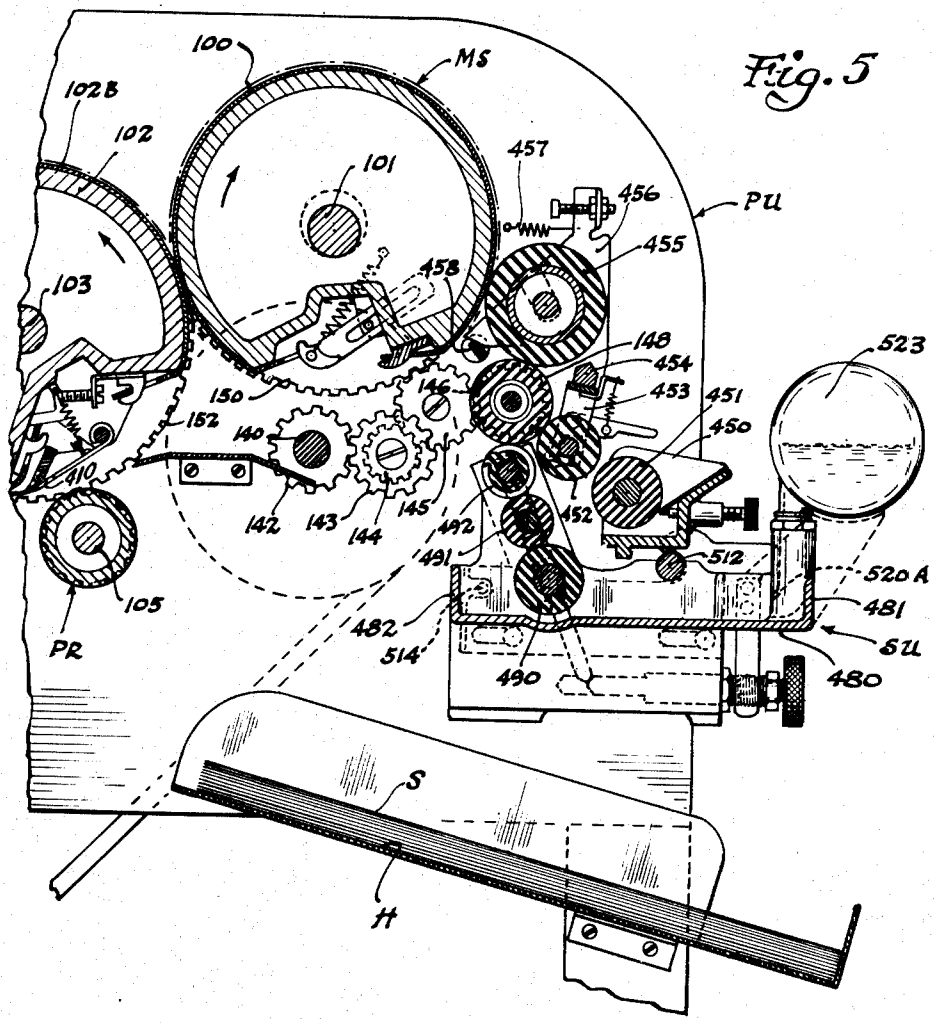
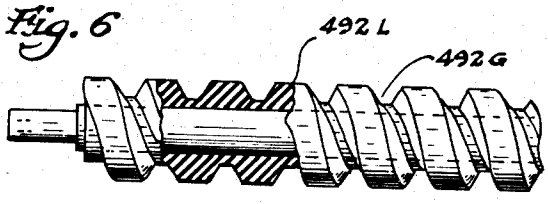


Fig. 6



Inventor
Franklin E. Curtis
By Wallace and Cannon
Attorneys

Sept. 21, 1954 F. E. CURTIS 2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 11, 1949

7 Sheets-Sheet 6

Fig. 7

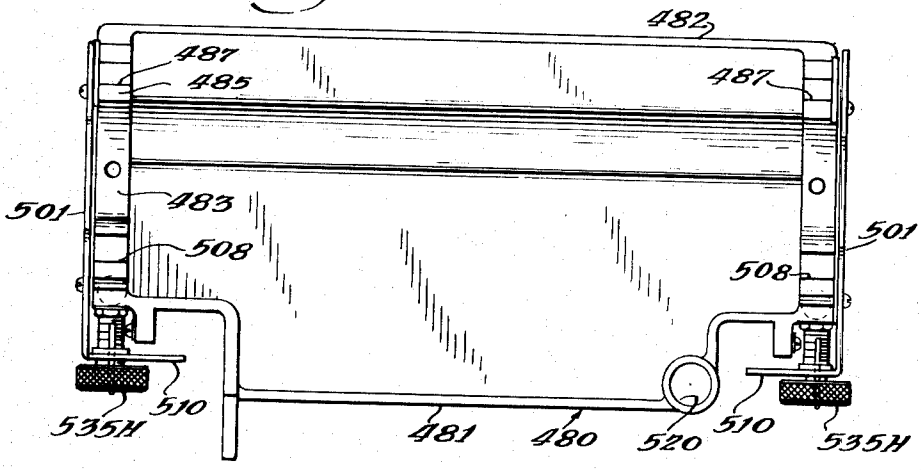


Fig. 8

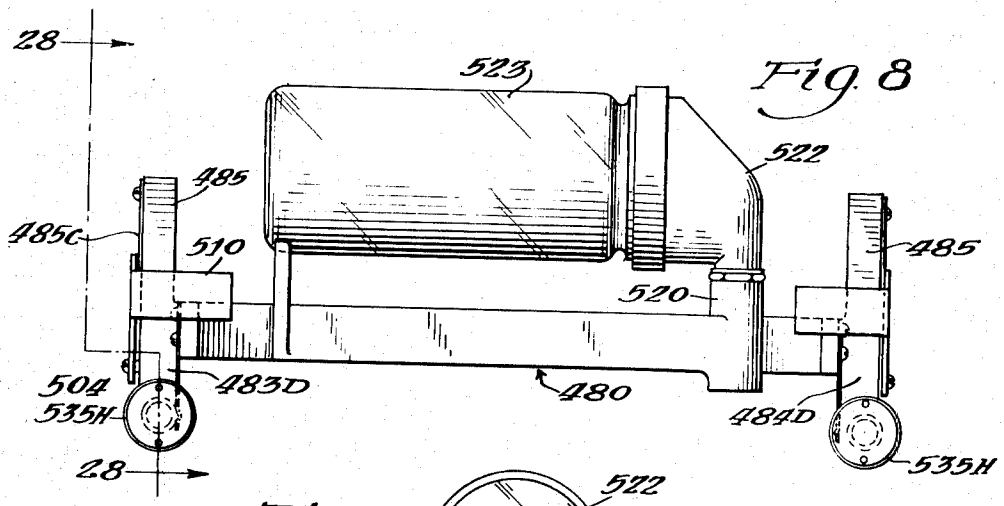
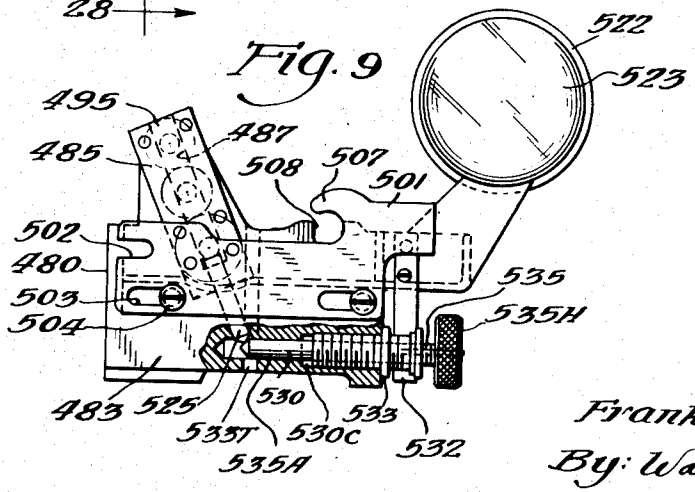


Fig. 9



Inventor:
Franklin E. Curtis
By: Wallace and Cannon
Attorneys

Sept. 21, 1954 F. E. CURTIS 2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 11, 1949 7 Sheets-Sheet 7

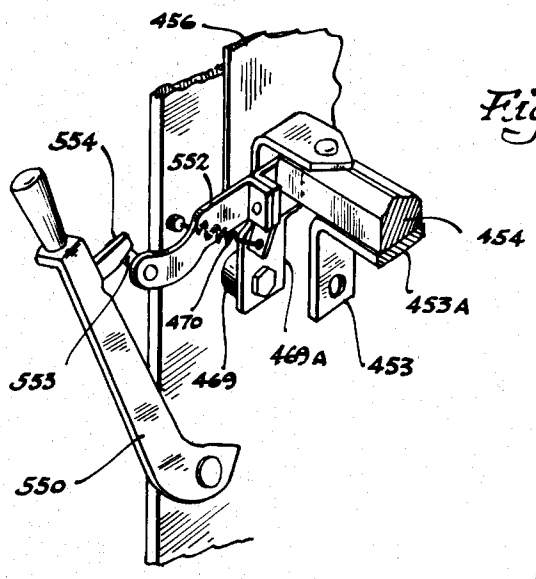


Fig. 10

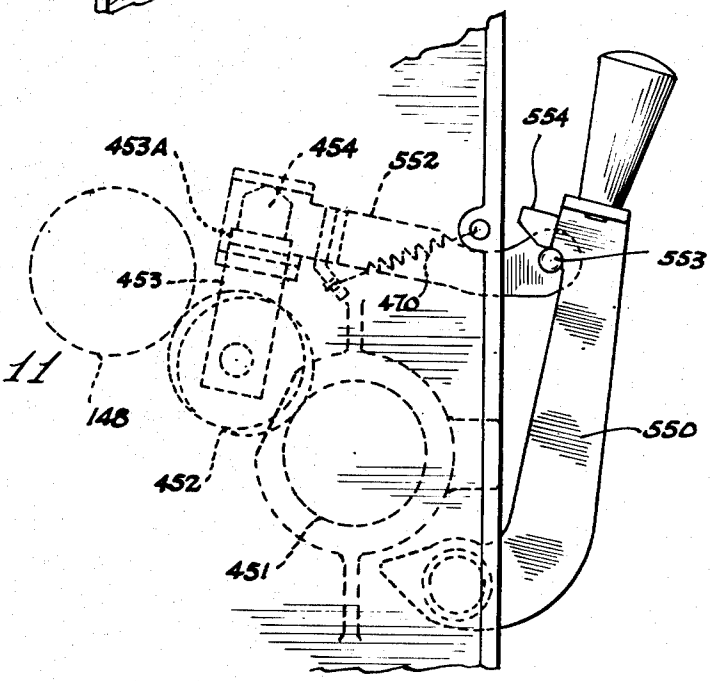


Fig. 11

Inventor
Franklin E. Curtis
By Wallace and Cannon
Attorneys

Patented Sept. 21, 1954

2,689,522

UNITED STATES PATENT OFFICE

2,689,522

INKING AND MOISTENING MEANS FOR ROTARY PLANOGRAPHIC PRINTING MACHINES

Franklin E. Curtis, Willoughby, Ohio, assignor to Addressograph - Multigraph Corporation, Cleveland, Ohio, a corporation of Delaware

Application October 11, 1949, Serial No. 120,776

12 Claims. (Cl. 101—141)

1

This invention relates to printing machines and particularly to rotary printing or duplicating machines operating on the lithographic principle.

Printing machines of the aforesaid character have come into general use in business establishments and the like where they are employed as duplicating machines for the purpose of reproducing copies of letters, business forms and the like, which, in an appropriate manner, are incorporated on so-called masters that are mounted in such a machine when copies are to be reproduced. In such usage, the number of copies to be produced from a particular master varies widely, for in some instances only a few copies are required, while in other instances as many as five to ten thousand copies, or even more, may be required. Furthermore, the image on the various masters employed in the machines varies materially from master to master, for in some instances the image-bearing surface of the master will be almost entirely covered by an image that is to be reproduced, while in other instances but a very small portion of the image-bearing surface will have reproducible image thereon. It is, of course, highly advantageous to arrange a printing machine of the aforesaid character in such a way that adjustment of various elements of the machine will not be required each time a different condition is encountered in variations, such as those described above, and this, of course, can best be realized by so arranging the machine that such adjustment of various elements of the machine as may be necessary will be effected automatically so as to thereby insure that satisfactory copies will be reproduced notwithstanding a rather material change in operating conditions, for example, such as would be encountered when a change was made from a master bearing but a very small image to one that substantially covered the entire image-bearing surface of the master, and to enable these desirable ends to be realized in a novel and expeditious manner is the primary object of the present invention.

Printing machines of the aforesaid character operating on the lithographic principle depend upon the incompatability of oil and water to effect reproduction of images borne by masters mounted in the machine. To this end the image-bearing surface of the master is of such nature as to be water-receptive except in the areas thereof bearing the image, and the image is afforded by a material that is usually oil or grease receptive. Then, in the course of operation of a machine of the aforesaid character, water or other suitable moistening solution is supplied to the

2

surface of the master to be taken up by the unimaged portions of the image-bearing surface of the master, and ink that is supplied to the master is of such a nature that it is picked up by the image but is repelled by the moistened unimaged surfaces of the master. Hence, printing machines of the aforesaid character include so-called fountains from which ink and a moistening solution are respectively supplied to the master that is mounted in the machine. Heretofore it has been customary in machines of the aforesaid character to not only provide independent fountains for the moistening solution and the ink, but also independent means have been employed to transfer the ink and moistening solutions respectively from the fountains into which they are introduced to the surface of the master. With respect to this, however, it is another fundamental object of this invention to enable the moistening solution and ink to be supplied to a master mounted in the machine, from fountains into which ink and moistening solution are respectively introduced, through a single or common means of novel construction and arrangement.

In printing machines of the aforesaid character as heretofore constructed, the ink was supplied to the image on the master through one or more form rollers that were mounted in position to be engaged by the master in the course of rotation of the master with the drum on which the master was mounted in the machine. In such machines the moistening solution was supplied to the masters through so-called molleton-covered rollers which were rollers of suitable arrangement having a molleton cloth covering thereon that was replaced from time to time as it became soiled or was otherwise unsuitable to perform its intended function in the course of operation of the machines. Moreover, it was necessary to prime such molleton-covered rollers when the machine was first placed in operation so as to condition such rollers to render them effective to distribute the moistening solution and such priming was required each time the machine was restarted after having been idle for some time. In the novel machine of the present invention wherein a common means is employed to supply both the moistening solution and ink to the master, only the form roller, or rollers as the case may be, as heretofore employed to supply ink to the masters is utilized to supply both ink and moistening solution to the master, and in this way the use of molleton-covered rollers is avoided and the aforesaid and other objectionable aspects

of the molleton-covered rollers as there were utilized in the machines as these have heretofore been arranged are thereby avoided, and another object of this invention is to enable this desirable result to be realized.

A further object of this invention is the resort to a novel construction which will be effective to supply both ink and moistening solution to a master in a printing machine of the aforesaid character and to so arrange such a construction that the cleaning thereof may be expeditiously effected when and as required.

In printing machines of the aforesaid character wherein a moistening solution and ink are supplied to a master mounted in the machine, it is necessary that a balance be maintained between the ink supply and the moisture supply, for if an excess of one or the other of these is supplied to the master, the quality of the reproductions effected in the machine may be impaired. In machines of the aforesaid character as heretofore constructed, independent adjustments have been provided for the ink and moisture supplies and through manipulation of these adjustments its has been possible to maintain the required balance between the ink and moistening solution supplies. The nature of some of the copy that is reproduced in printing machines of the aforesaid character is such that sometimes it is essential that a very fine balance be established between the ink and moisture supplies, and in some instances appreciable skill has been required in order to establish such a balance. In view of the foregoing and kindred conditions, a further object of this invention is to so arrange the means effective to supply ink and moistening solution to a master that the required balance between the ink and moisture supplied may be automatically maintained, at least insofar as is necessary to enable reproduction of more or less uniform copy from the masters to be effected. Thus it is a further object of this invention to enable an automatic adjustment as aforesaid to be effected which will not require manual or other adjustment of the means so long as masters of the same kind are employed, or also so long as the machines are operated to reproduce so-called direct image copy or to reproduce a photographic image or the like. Since, however, a change in the type of master or a change from the reproduction of direct images to a photographic image may require an adjustment of the means supplying ink and moistening solution to the masters, it is a further object of this invention to arrange a means of this character that such manual adjustment, as may be required in order to enable the means to automatically maintain the above-referred to balance, may be expeditiously effected, and an ancillary object is to afford manually operable adjustments that are simple in construction and operation.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings, which, by way of illustration, show a preferred embodiment and the principles thereof and what I now consider to be the best mode in which I have contemplated applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a perspective view of a lithographic printing machine embodying the features of the invention;

Fig. 2 is a plan view of the machine shown in Fig. 1, the sheet supply magazine having been removed;

Fig. 3 is a schematic perspective view illustrating the driving and control elements of the machine;

Fig. 4 is a vertical sectional view of the right-hand portion of the machine and illustrating the way in which the sheet feeding mechanism is associated with the lithographic printing unit;

Fig. 5 is a vertical sectional view illustrating the ink and moisture supply mechanism of the machine and its association with the master cylinder of the machine;

Fig. 6 is a fragmentary side elevational view of one of the rolls of the moisture supply train;

Fig. 7 is a plan view of a part of the moisture supply unit;

Fig. 8 is a front elevational view of the moisture supply unit;

Fig. 9 is a side elevational view, taken partially in section, and showing further details of the moisture supply unit;

Fig. 10 is a fragmentary perspective view illustrating the way in which the ductor roller of the ink supply unit is controlled and positioned in a cleaning operation; and

Fig. 11 is an end view illustrating the mechanism shown in Fig. 10.

For purposes of disclosure, the invention is herein illustrated as embodied in a lithographic printing machine 75 that is supported on an upstanding rectangular cabinet 80 that embodies a hollow base 81, the top of which affords a horizontal supporting bed 82 in an elevated position. The supporting bed 82 affords a mounting for a lithographic printing unit PU at one end thereof and a mounting for a related sheet separating and feeding unit SF at the other end of the supporting bed. The sheet feeding unit SF includes feed belts B, Fig. 2, whereby individual sheets S that are withdrawn from a stack thereof carried in a supply magazine M are advanced in succession to the printing couple of the printing unit PU, and after the printing operation has been performed, the printed sheets S are discharged into a collecting hopper H that is disposed, as shown in Fig. 5, within the hollow base 81 just below the printing unit PU. The base 81 has a pair of doors 81D on its forward side, and these doors may be opened by handles 81H.

The printing unit PU as herein illustrated is of the offset lithographic type, and in respect to many of its structural characteristics and features, this printing unit PU is constructed in accordance with the disclosure of the copending application of Edward J. Janke, Serial No. 573,280, filed January 17, 1945, issued April 3, 1951, as U. S. Patent 2,547,470, and reference may be had to such copending application for further details of structure and operation insofar as such details may be concerned.

The printing unit PU includes side frames 90 and 91 that are connected by means including a plurality of tie rods. Near the upper right-hand edges of the side frames 90 and 91, a master cylinder 100 is rotatably supported by means including a supporting shaft 101, and this master cylinder 100 is adapted to be engaged on its side surface with a blanket cylinder 102 that is sup-

ported between the side frames 90 and 91 by means including a supporting shaft 103.

Beneath the blanket cylinder 102, a platen roller PR, Fig. 4, is supported by means including a supporting shaft that is extended between the side frames 90 and 91, and in the printing operation, the ink from an image carried on a master sheet MS is transferred to a resilient blanket on the blanket cylinder 102 and then is transferred from the blanket to a sheet S that is passed between the blanket cylinder 102 and the platen roller PR.

In Fig. 3 of the drawings, a schematic perspective view of the primary elements of the machine serves to illustrate the driving, timing and control elements of the present machine. Thus, as shown in Fig. 3, a motor 130 is mounted within the hollow base 81 and this motor drives a pump 135 which, as will hereinafter be described, serves to afford the desired suction to be applied to the sucker bar 115 as well as to afford a source of air under pressure for use in facilitating separation of the sheets by the sheet separating has a pulley 136 which acts through a belt 137 to drive a pulley 138, this pulley being fixed on a shaft 140 that extends through the side frames 90 and 91 just below the master cylinder 100, as shown in Fig. 5. At its other end the shaft 140 has an adjusting handwheel 141 fixed thereon so that the shaft 140 may be manually rotated when this is desired. The motor 130 is controlled by a switch 131S located along the forward side of the machine frame, between the handles 81H, as shown in Fig. 1.

The shaft 140 has a gear 142 fixed thereon so as to mesh with an idler gear 143, this idler gear having another gear 144 of a somewhat smaller size fixed thereto and meshed with a pinion 145. The pinion 145 meshes with a pinion 146 that is associated with an oscillating roll 148 which forms a part of the ink supply means, as will hereinafter be described. The pinion 145 also meshes with a gear 150, this gear 150 being fixed to one end of the master cylinder 100 so that the master cylinder 100 is constantly driven during the operation of the motor 130. The blanket cylinder 102 has a gear 152 fixed thereto and meshed with the gear 150 so that the master cylinder and the blanket cylinder are driven in timed relationship. The platen roller PR has a pinion 153 fixed thereon as shown in Fig. 4, and this pinion is meshed with the gear 152 so that the platen roller PR is driven at a surface speed corresponding with the surface speed of the blanket cylinder 102. The printing unit PU includes a lower driven feed roller 155 and an upper and opposed feed roller 156, and the lower feed roller 155 has a pinion 157 fixed thereto. To drive the feed roller 155, a gear 160 engages the gear 152 of the blanket cylinder, and a cluster gear including pinions 163 and 165 has these pinions meshed respectively with the gear 157 and the gear 160.

The relatively small pinion 165 meshes with an idler pinion 166, this idler pinion being meshed with a gear 167 that is fixed on a transverse shaft 168, this shaft being mounted in a pair of spaced frame plates 170 and 171 that afford support for the gearing unit that includes the gears 163—165 and 167. The gear 167 also has a gear 169 fixed thereto so as to mesh with an idler pinion 174 which in turn meshes with a gear 175. The gear 175 has a sprocket 176 fixed thereto, and a chain 177 associated with the sprocket 176 extends over an idler sprocket 178 and about a sprocket 179 that is fixed on a main transverse cam shaft 180 that is extended between the side frames 110 and 111 of the sheet feeding unit SF. The connection that is thus afforded serves to drive the cam shaft 180 in a one-to-one relationship with respect to the master cylinder 100 and blanket cylinder 102, and since the cam shaft 180 has cam means thereon for governing the operating means of the various elements of the sheet feeding unit SF, and this connection assures that the sheet feeding unit SF will operate in proper timed relationship with respect to the printing unit PU.

The transverse shaft 168 is utilized to drive the belts B and the feed rollers or disks 118—120 of the sheet feeding unit SF, and for this purpose the shaft 168 has a gear 182 fixed thereon so as to mesh with a pinion 183 fixed on the shaft of a roller 184 that supports the belts B adjacent to the printing unit PU. This shaft also has a sprocket 184S fixed thereon, and a chain 185 extended around the sprocket 184S is also extended around a sprocket 186 fixed on the shaft of a roller 188 which supports the other or left-hand ends of the belts B as viewed in Fig. 4. The shaft 188S of the roller 188 has a sprocket 190 fixed thereon, and a chain 191 extended about the sprocket 190 also extends about a sprocket 192 which is fixed on a shaft 118S which supports the feed disks 118. The gear and chain connections that are thus afforded are so arranged that the feed disks 118 and 120 withdraw the sheet S relatively rapidly from the magazine M, and when the feed rollers 118—120 have released the trailing edge of a sheet, this sheet is then advanced by the belts B at a speed slightly greater than the feed speed of the rollers 118—120, this being attained by driving the belts B at a surface speed somewhat higher than that of the feed rolls 118—120.

Under and in accordance with the present invention, the ink supply and the moisture supply are so arranged that the ink and moisture are combined in a single train of rollers so as to be simultaneously applied to the master sheet MS carried on the master cylinder 100. In attaining this result, the machine is provided with an ink fountain 450 that is of the usual construction and embodies a usual fountain roll 451 and the related adjusting means of the usual kind. The fountain roll 451 is operated in the same manner as in the aforesaid Janke application. This fountain roll 451 is disposed adjacent to a ductor roll 452 that is carried by a pair of supporting arms 453 formed at the ends of a U-shaped bracket 453 A, Fig. 9, that has its bar portion fixed to one side of a squared rock shaft 454 which extends between the side frames of the printing unit PU somewhat above the axis of the ductor roll 452. The ductor roll 452 is arranged to be supported and moved laterally by rocking movement of the rock shaft 454 and the arms 453 so as to bring the ductor roll 452 alternately into contact with the fountain roll 451 and an oscillating roll 148, and the ink that is thus taken from the fountain roll 451 by the ductor roll is transferred to the oscillating roll and is then applied to a form roller 455 that engages both the oscillating roll 148 and the master cylinder 100. The form roll 455 is carried in a pair of mounting frames 456 that are pivoted on the axis of the rock shaft 454, and spring means 457 act on the frames 456 so as to urge the form roll 455 into engagement with the master cylinder 100. Such engagement is governed by a cam member 458 that engages arms formed on the respective frames

456, and this cam rod 458 has an operating lever 460 fixed on its outer end as shown in Fig. 1. When the lever 460 is in one position, the form roll 455 is separated from the master cylinder 100, while in another position the form roller 455 engages the moisture cylinder.

The oscillating roller 148 is of the well-known kind which is reciprocated in an endwise direction in the course of operation, and this is attained by affording a driving connection through the gear 146.

Under the present invention, the required moisture for carrying on the lithographic process is applied to the oscillating roller 148, and this is accomplished through a moisture or liquid supply fountain unit SU that is mounted beneath the ink fountain 450 and which has roller means therein to apply liquid in controlled amounts to the oscillating roller 148. The moisture or liquid supplying unit SU is shown in Fig. 5 in association with the ink fountain and the related rollers, and the structure of the liquid supply unit SU is shown in detail in Figs. 7 to 9 of the drawings. Thus, it will be observed that the unit SU has a relatively shallow upwardly opening pan 480 that has front and rear walls 481 and 482 and which has relatively thick end walls 483 and 484, as will be evident in Fig. 7 of the drawings. The end walls 483 and 484 extend downwardly for a considerable distance, as shown at 483D and 484D, and in addition, each such end wall has an upwardly extending bearing arm 485. These bearing arms extend upwardly at somewhat of an angle, as will be evident in Fig. 9 of the drawings, and each such bearing arm has a bearing channel 487 formed therein so as to extend longitudinally of the arms in a downward direction. These channels 487 serve to receive the projecting mounting shafts of a plurality of rolls that are to run in an engaged relationship with respect to each other. Such rolls include a liquid fountain roll 490, an intermediate roll 491, and a final roll 492 that is to engage the oscillating roll 148. These projecting ends of the shafts of such rollers are fitted in relatively small rectangular bearings 495, as shown in Fig. 9 of the drawings, such bearings engaging the sides of the slots 487 but being spaced from each other. Such slots 487 are formed by milling through the upwardly projecting bearing arms 485, and the outer edges of the slots are closed by cap plates 485C that are secured in place by screws.

For the purpose of removably mounting the pan 480 in position in the machine, a pair of shiftable supporting plates 501 are mounted on and against the respective outer faces of the end walls 483 and 484. These mounting plates 501 each have a rearwardly opening horizontal notch 502 in the rear end thereof, and in addition, horizontal securing slots 503 are formed in these mounting plates 501. Screws 504 are extended through the slots 503 and into the end walls 483 and 484, thereby to support the mounting plates 501 for reciprocating movement relative to the pan 480 in a front to rear direction and through a stroke defined by the slots 503. Near their outer ends and at their upper edges, the mounting plates 501 have rearwardly extending hook-shaped arms 507, as best shown in Fig. 9 of the drawings, and when the mounting plates 501 are in their most rearward positions, these arms 501 are disposed directly over upwardly opening positioning slots 508 that are formed in the upper edges of the end walls 483 and 484.

In mounting the unit SU in position in the machine, the two mounting plates 501 are withdrawn to their forward positions by means of inwardly projecting handles 510, Fig. 7, and the pan 480 is moved into position beneath the ink fountain 450 and is then moved upwardly so that the final roll 492 engages the oscillating roll 148 and the slots 508 embrace a transverse tie rod 512 that extends between the side frames of the printing unit PU. When the pan 480 is in this position, the mounting plates 501 are shifted in a rearward direction, and in such movements the horizontal rear slots 502 move into embracing relationship with a pair of projecting studs 514 that are afforded on the inner surfaces of the side plates of the printing unit. In this same movement, the hook-like arms 507 are moved into position over the horizontal tie rod 512, and by reason of the upwardly concaved lower surfaces of the arms 507, as shown in Fig. 9 of the drawings, the weight of the pan 480 serves to hold the mounting plates 501 against undesired forward or releasing movement.

The liquid is supplied to the pan 480 up to a predetermined level, and this is accomplished in accordance with usual practice in that a vertically extending mounting well 520 is provided as a part of the forward wall 481, as shown in Figs. 7 and 8, the well 520 being open at its inner side as at 520A to afford communication with the inside of the pan 480. The well 520 serves as a mounting for a supply fitting 522 that carries a liquid supply bottle 523 in accordance with usual practice. This fitting 522 is normally equipped with a check valve to facilitate insertion and removal of the fitting.

The liquid that is thus supplied to the pan 480 is maintained at a predetermined level within the pan by reason of the downward extent of the fitting 522 within the well 520, and this level is such that when the fountain roll 490 is in position, the lower edge portion of the fountain roll runs in the body of liquid. The liquid that is thus carried upwardly by the fountain roll 490 is transferred to the roll 491 and then to the roll 492, from which the moisture is transferred to the oscillating roll 148 which, of course, also has ink applied thereto by the ductor roll 452.

In attaining proper control of the amount of moisture that is thus supplied and an automatic balancing of the moisture supply with the ink supply, the present invention provides for adjustment of the pressure that is effective between the rolls 490, 491, 492 and 148, and this is accomplished by applying an adjustable upward pressure to the bearings 495 of the fountain roll 490. In order to enable this to be accomplished, a pair of pressure pins 525 are mounted in the end walls 483 and 484 so as to extend downwardly from the lower ends of the channels 487, and means are provided whereby these pressure pins 525 may be forced in an upward direction to apply the desired pressure between the several rolls of the moisture supply train. In accordance with the present invention, the pressure applying means are so arranged that they may be conveniently actuated, and so that the amount of such actuation may be readily and easily controlled and balanced in respect to the two ends of the fountain roll 490.

Thus, as shown in Figs. 7 to 10, the side walls 483 and 484 have horizontal bores 530 extended thereinto from the forward edges thereof, and adjacent the outer portions of these bores, enlarged counterbores 530C are formed, these

counterbores being internally threaded. Into each counterbore 530C, a sleeve 532 is threaded and each sleeve has a locknut 533 thereon which may be locked against the forward edge of the wall. Sleeves 532 are also internally threaded, and an adjusting screw 535 is threaded through each of the sleeves 532. The innermost end of each of these screws has a smooth or unthreaded portion 535A that is rotatably supported within the inner smooth portion of the bore 530. The rear end of each screw 535 has a tapered end 535T that is adapted to engage a correspondingly tapered lower end 525T formed on the related pressure pin 525. Thus, by screwing the adjustment screw 535 in a rearward or inward direction, the related pressure pin 525 may be forced in an upward direction.

When the unit SU is in place, it is desirable to limit the amount of pressure that may be placed on the several rolls that are carried in such unit, and in accomplishing this, the screws 535 are screwed inwardly until the desired maximum pressure has been reached and until the pressure on the opposite ends of the rolls has been properly equalized. The sleeves 532 are then backed outwardly until they contact the adjacent surfaces of actuating heads 535H that are afforded on the adjusting screws 535, and the locknuts 533 are then tightened. The positioning of the various rollers in the unit SU as thus set will give the minimum amount of moisture supply, and the operator may then adjust the screws 535 in an outward direction so as to obtain feeding of additional moisture. To facilitate such adjustment and insure that the adjustments will be uniformly attained in respect to the opposite ends of the rolls, each of the heads 535H is provided with a pair of pins 535P disposed at diametrically opposite points on the head 535H and extended inwardly along opposite sides of the screw 535. Thus, the two pins 535P on each such head 535H are adapted in the rotative movements of the adjusting screws 535 to successively engage a retaining spring 538, one such retaining spring being afforded for each adjusting screw 535. The end of each such spring 538 which is to contact the pins 535P is provided with a slight indentation that by engagement with one of the pins 535P, will serve to retain the adjusting screw 535 in set position and against accidental rotative displacement. The adjusting operation may be performed by rotating two screws 535 through the same number of half-turns and in the same direction, and this enables the operator to readily and easily adjust the pressure between the rolls of the unit SU.

Under and in accordance with the present invention, further means are afforded for limiting and controlling the amount of liquid or moisture that is fed into the ink train while at the same time assuring a quality of even distribution of such moisture. Such means are afforded by the roller 492 which, as shown in Figs. 5 and 6, is formed with a spiral groove 492G that extends throughout the length of the outer surface of the roller 492. The groove 492G serves to afford a continuous spiral land 492L, and the widths of the land and the groove are so related that the land constitutes substantially fifty percent of the area of the roller. Through this arrangement, the amount of moisture that may be transmitted to the oscillating roller 148 is limited, and yet the moisture is uniformly distributed on the roller 148.

It might be pointed out that in the ink train and the moisture train of the printing unit of the present invention, all of the rolls are of what might be termed a solid material, as distinguished from fabric materials and the like that have heretofore been required for at least some of the rollers in machines of this general character. Thus, the oscillating roller 148 and the ink fountain roller 451 are made from relatively hard moldable material such as hard rubber, while all of the other rollers in the ink and moisture trains are made of a moldable material such as soft rubber, or more specifically of a rubber or other material that is somewhat softer than the materials used for the rollers 148 and 451.

It is desirable, periodically, to clean the rolls that enter into the application of the moisture and the ink to the master cylinder, and this may be accomplished readily and easily in the present machine by securing an absorbent cleaning sheet on the master cylinder 100 in the position normally occupied by the master sheet MS. The machine is then started with the form roller 455 out of contact with respect to the master cylinder, and the operator applies a considerable quantity of a cleaning solution to the form roller 455. This moisture, due to the continuous rotation of the several rolls caused by the rotation of the oscillating roll 148, is spread downwardly through all of the rolls that are in contact, and it should be pointed out that in the present machine this cleaning action may also be applied to the ductor roll 452 by holding this roll in contact with the oscillating roll 148 during the cleaning operation. This is accomplished by a cleaning control handle 550 that is pivoted on the tie rod 512, this handle 550 being shown in Figs. 10 and 11 of the drawings. The rock shaft 454 upon which the ductor roll 452 is mounted is provided with a forwardly extending arm 552 that has a laterally projecting pin 553 adjacent its forward end, and by applying a downward force to the end of the arm 552, the ductor roll may be held against the action of its spring 470 and against the oscillating roll 148. The cleaning control handle 550 has a projecting cam tooth 554 formed thereon that may be moved into position over the pin 553, and when this is done, the parts maintain this relationship and the ductor roll 452 is held in engagement with the oscillating roll 148.

When the cleaning solution has spread through and about all of the contacted rolls, the handle 460 is operated to place the form roll 455 in contact with the master cylinder 100, and when this is done, the absorbent cleaning sheet that has been placed on the master cylinder 100 is effective to take up the cleaning solution and the dirt carried thereby so that after a short period of operation the rolls are left in a clean and dry condition, after which the form roll 455 may be retracted and the machine may be stopped. If desired, the ink fountain may then be removed and the fountain roll 451 cleaned in the usual manner.

From the foregoing, it will be evident that the present invention may be advantageously employed in various planographic processes, of which the lithographic machine herein illustrated affords but one example. It will also be evident that the present invention materially simplifies the operation of planographic or lithographic printing machines and that it assures continued production of high quality reproductions even when the percentage of reproducible copy on a master sheet varies quite widely from the percentage of copy on previously used master sheets.

More specifically, it will be apparent that the present invention enables a proper and effective balance to be maintained automatically between the ink and the moistening solutions during the operation of the machine, and that because of this maintenance of an automatic balance between the ink and the moistening solutions, the operation of the machine is materially simplified and the quality and uniformity of the reproductions are materially improved.

It will also be apparent that the present invention affords a planographic or lithographic machine in which the cleaning of the operating elements is materially simplified, thereby to greatly increase the range of usefulness of machines of this general character.

Thus, while I have illustrated and described the preferred embodiment of my invention, it is to be understood that this is capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a planographic or analogous printing machine wherein ink and a moistening solution are fed to a master in a machine to enable reproductions of an image on the master to be effected, a fountain into which ink may be introduced, a fountain into which a moistening solution may be introduced, at least one roller engageable with the master, a roller effective to pick up ink from the fountain therefor, another roller effective to pick up moistening solution from the fountain therefor, roller means for transferring ink to said at least one roller from the roller effective to pick up ink from said ink fountain, other roller means each slidably mounted in a pair of guide slots for transferring moistening solution to said one roller from the roller effective to pick up moistening solution from the fountain therefor, and means for regulating the pressure of at least selected of the rollers one on the other in the roller means effective to transfer moistening solution to said at least one roller to thereby regulate the amount of moistening solution withdrawn from the fountain therefor, said last-named means including pressure pins in said guide slots adapted to adjust the lower of said rollers slidably mounted therein, and adjusting screws having ends engaging the lower ends of said pressure pins, the engaging ends of said pressure pins and said adjusting screws being tapered to permit, through adjustment of said screws, selective movement of the pressure pins relative to said lower roller.

2. In a planographic or analogous printing machine wherein ink and a moistening solution are fed to a master in a machine to enable reproductions of an image on the master to be effected, a fountain into which ink may be introduced, a fountain into which a moistening solution may be introduced, a form roller engageable with the master, a distributing roller engaged with the form roller, a roller effective to pick up ink from the fountain therefor, another roller effective to pick up moistening solution from the fountain therefor, roller means including a ductor roller for transferring to the distributing roller ink picked up by the roller effective to pick up ink from the ink fountain, a train of rollers for transferring moistening solution to the distributing roller from the roller effective to pick up moistening solution from the fountain therefor, the rollers in said train of rollers each being slidably mounted in a set of opposite guide slots, means for regulating the amount of ink withdrawn from the fountain therefor, and means for regulating the pressure of the rollers in the roller train one on the other to thereby regulate the amount of moistening solution withdrawn from the fountain therefor, the last-named means including a pair of pressure pins one in each of the guide slots to apply selective pressures to the opposite ends of the rollers in said train of rollers, and a pair of adjusting pins mounted in the moisture fountain for selectively moving the pressure pins in said guide slots, said pins being engaged at tapered ends thereof with tapered ends of the pressure pins.

3. In a planographic or analogous printing machine wherein ink and a moistening solution are fed to a master in a machine to enable reproductions of an image on the master to be effected, a fountain into which ink may be introduced, a fountain into which a moistening solution may be introduced, at least one roller engageable with the master, a roller effective to pick up ink from the fountain therefor, another roller effective to pick up moistening solution from the fountain therefor, roller means including a ductor roller for transferring ink to said at least one roller from the roller effective to pick up ink from said ink fountain, other roller means for transferring moistening solution to said one roller from the roller effective to pick up moistening solution from the fountain therefor, said other roller means being mounted for sliding movement in a pair of guide slots, one of the rollers in said other roller means having a spiral groove formed in the periphery thereof to thereby reduce the peripheral area thereof and thus restrict the quantity of moistening solution transferred by said grooved roller from one roller to another in said other roller means so as to regulate the amount of moistening solution withdrawn from the fountain therefor by said other roller means, and means effective to regulate the pressure exerted by one roller on the other in said other roller means whereby further regulation of the quantity of moistening solution transferred by said other roller means may be effected, the last-named means including a set of pressure pins mounted in said guide slots for applying selected pressure to said other roller means, the lower ends of said pressure pins being tapered, and a set of adjusting screws having tapered ends engaged with the tapered ends of said pressure pins to permit selective adjustment of the pressure pins in said slots.

4. A unit for supplying moistening solution to means effective to distribute the same on a master in a planographic or analogous printing machine, a fountain, a plurality of rollers respectively engaged one with another and of which one is effective to pick up moistening solution from said fountain, bearing arms extended in an upward direction from opposite sides of the fountain and having guide slots extended downwardly therein in adjacent faces thereof and in which the end portions of said rollers are disposed to thereby be supported for rotation in engagement one with the other, one of said rollers having a spiral groove formed in the periphery thereof to thereby reduce the peripheral area thereof whereby the quantity of moistening solution transferred by such grooved roller from one to another of the rollers engaged therewith is restricted whereby the quantity of moistening solution transferred from said fountain may be

regulated, adjustment means mounted on said fountain and including a pair of manually operable adjusting screws disposed in an accessible position on said fountain, said screws having tapered inner ends extending in toward the lower of said rollers, and means interposed between said adjustment screws and said rollers and effective under control of said adjustment screws to cause said rollers to slide in said bearing arms to thereby regulate the pressure exerted by said rollers one on the other to thereby afford an adjustable regulation of the quantity of moistening solution transferred from said fountain, the last-named means including pressure pins mounted in each of said guide slots and having the lower ends thereof tapered and in engagement with said tapered ends of the adjusting screws.

5. In a planographic or analogous printing machine wherein ink and a moistening solution are fed to a master in the machine to enable reproductions of an image on the master to be effected, a fountain into which ink may be introduced, a fountain into which a moistening solution may be introduced, a form roller engageable with the master, a distributing roller engaged with the form roller, a roller effective to pick up moistening solution from the fountain therefor, roller means including a ductor roller for transferring to the distributing roller ink picked up by the roller effective to pick up ink from the ink fountain, a train of rollers for transferring moistening solution to the distributing roller from the roller effective to pick up moistening solution from the fountain therefor, and means for regulating the pressure of the rollers in the roller train one on the other to thereby regulate the amount of moistening solution withdrawn from the fountain therefor, the last-named means including bearing supports having inclined slots therein in which the rollers in a train of rollers are mounted for movement individually and as a body toward and away from said distributing roller, pressure pins in each of said slots adapted to apply pressure to the opposite ends of the lower of the rollers in said slots, and a pair of adjusting screws having ends engaged with lower ends of said pressure pins, said engaged ends of the pins and screws being tapered to permit selective adjustment of the pressure pins through the screws.

6. In a planographic or analogous printing machine wherein ink and a moistening solution are fed to a master in a machine to enable reproduction of an image on the master to be effected, a fountain into which ink may be introduced, a fountain into which a moistening solution may be introduced, at least one roller engageable with the master, other rollers respectively engaged one with the other and with said at least one roller and of which one is operative to pick up ink from the fountain therefor and of which another is effective to pick up moistening solution from the fountain therefor whereby ink and moistening solution are transferred to said at least one roller and thence to the master, means for regulating the pressure of at least selected of said rollers one on another to thereby regulate the amount of material withdrawn from the fountain therefor, the last-named means including a pair of bearing arms having vertical guide slots therein mounting the opposite ends of said selected rollers for sliding movement therein, pressure pins arranged vertically in said slots substantially at right angles to and independently of the ends of said selected rollers for applying vertically applied pressure to said selected rollers, and manually operable adjusting pins arranged independently of and substantially at right angles to said pressure pins and having ends engaging ends of said pressure pins for selectively regulating the amount of pressure applied to said selected rollers by the pressure pins.

7. In a planographic or analogous printing machine wherein ink and a moistening solution are fed to a master in said machine to enable reproductions of an image on the master to be effected, a fountain into which ink may be introduced, a fountain into which a moistening solution may be introduced, at least one roller engageable with the master, a roller effective to pick up ink from the fountain therefor, another roller effective to pick up moistening solution from the fountain therefor, other rollers engaged one with another and interposed between said at least one roller and the rollers respectively associated with said fountains and which other rollers are effective to transfer ink and moistening solution to said at least one roller and thence to the master, and means for regulating the pressure of at least selected of said rollers one on the other to thereby regulate the amount of moistening solution withdrawn from the fountain therefor, the last-named means including a pair of bearing arms having guide slots therein mounting the opposite ends of said selected rollers for sliding movement therein, pressure pins disposed in said slots substantially at right angles to the axes of said selected rollers and independently of the ends of said rollers for bearing against and applying pressure to said opposite ends of the selected rollers, and manually operable adjusting pins arranged independently of and at a substantial angle to the axes of said pressure pins and adapted to bear against said pressure pins to thereby permit selective regulation of the amount of pressure applied to said selected rollers by the pressure pins.

8. A unit for supplying moistening solution to means effective to distribute the same on a master in a planographic or analogous printing machine comprising a fountain, a plurality of rollers respectively engaged one with another and of which one is effective to pick up moistening solution from said fountain, bearing arms extended in an upward direction from opposite sides of the fountain and constituted and arranged to slidably receive said rollers to thereby support the same for rotation, adjustment pins mounted on said fountain and each including a manually operable end portion disposed in an accessible outboard position on said fountain, and pressure pins interposed between the other ends of said adjustment pins and said rollers and engaging said other ends of the adjustment pins and said end portions of said rollers so as to be effective under control of said adjustment pins to cause said rollers to slide in said bearing arms to thereby regulate the pressure exerted by said rollers one on another, said pins being mounted independently of each other and of said rollers and defining between them an included angle of approximately ninety degrees.

9. A unit for supplying moistening solution to means effective to distribute the same on a master in a planographic or analogous printing machine comprising a fountain, a plurality of rollers respectively engaged one with another and of which one is effective to pick up moistening

solution from said fountain, bearing arms extended in an upward direction from opposite sides of the fountain and having guide slots extended downwardly therein in adjacent faces thereof and in which the end portions of said rollers are slidably disposed to thereby be supported for rotation in engagement one with the other, adjustment means mounted on said fountain and including a set of manually operable adjusting pins disposed in an accessible position on said fountain, and other adjusting pins disposed in said guide slots at an angle to the first-named pins and interposed between the end portions of said rollers and the ends of the first-named adjustment pins and in engagement with said end portions of said rollers and said ends of the first-named pins so as to be effective under control of the first-named adjusting pins to cause said rollers to slide in said bearing arms to thereby regulate the pressure exerted by said rollers one on another, the second-named set of pins being mounted independently of said end portions of said rollers which they engage.

10. A unit for supplying moistening solution to means effective to distribute the same on a master in a planographic or analogous printing machine comprising a fountain, a plurality of rollers respectively engaged one with another and of which one is effective to pick up moistening solution from said fountain, bearing arms extended in an upward direction from opposite sides of the fountain and having guide slots extended downwardly therein in adjacent faces thereof and in which the end portions of said rollers are disposed to thereby be supported for rotation in engagement one with the other, pressure pins mounted vertically in said slots substantially at right angles to the axes of said rollers and independently of said end portions of said rollers so as to be adapted to be pressed upwardly to engage and regulate the pressure on either side of said rollers mounted in said guide slots, one of said rollers having a spiral groove formed in the periphery thereof to thereby reduce the peripheral area thereof whereby the quantity of moistening solution transferred by such grooved roller from one to another of the rollers engaged therewith is restricted and whereby the quantity of moistening solution transferred from said fountain may be regulated, and adjustable pressure regulating means engaging the lower ends of said pressure pins at an angle so as to be effective to regulate selectively the pressure applied to each of the pressure pins along a line at an angle to the axes of said pressure pins.

11. A unit for supplying moistening solution to means effective to distribute the same on a master in a planographic or analogous printing machine comprising a fountain, a plurality of rollers respectively engaged one with another and of which one is effective to pick up moistening solution from said fountain, bearing arms extended in an upward direction from opposite sides of the fountain and having guide slots extended downwardly therein in adjacent faces thereof and in which the end portions of said rollers are disposed to thereby be supported for rotation in engagement one with another, one of said rollers having a spiral groove formed in the periphery

thereof to thereby reduce the peripheral area thereof whereby the quantity of moistening solution transferred by such grooved roller from one to another of the rollers engaged therewith is restricted and whereby the quantity of moistening solution transferred from said fountain may be regulated, adjustment means mounted on said fountain and including a pair of manually operable adjusting pins disposed in an accessible position on said fountain, and another pair of pins disposed in said guide slots independently of said rollers so as to be in position to bear against said rollers and interposed between said rollers and said adjustment means and effective under control of said adjustment means to cause said rollers to slide in said bearing arms to thereby regulate the pressure exerted by said rollers one on another to thereby afford an adjustable regulation of the quantity of moistening solution transferred from said fountain.

12. A unit for supplying reproducing solution to means effective to distribute the same on a master in a planographic or analogous printing machine comprising a fountain, a plurality of rollers respectively engaged one with the other and of which one is effective to pick up solution from said fountain, bearing arms extended in an upward direction from opposite sides of the fountain and having guide slots extended downwardly therein in adjacent faces thereof and in which the end portions of said rollers are disposed to thereby be supported for rotation in engagement one with the other, and pressure means effective on said rollers to maintain the same in engagement one with the other, the last-named means including a pair of pressure pins slidably mounted in said slots independently of said rollers and having ends for engaging and applying pressure to said opposite ends of the selected rollers, and manually operable adjusting pins having ends for engaging the corresponding ends of and selectively regulating the amount of pressure applied to said pressure pins along a line which is at a substantial angle to the axes of said pressure pins.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
660,149	Deutsch	Oct. 23, 1900
694,570	North	Mar. 4, 1902
999,510	Main	Aug. 1, 1911
1,142,268	Pearce et al.	June 8, 1915
1,535,567	Bornschein	Apr. 28, 1925
1,807,865	Novick	June 2, 1931
1,974,544	Rowell	Sept. 25, 1934
1,988,970	Hotchkiss	Jan. 22, 1935
2,018,373	Maxwell	Oct. 22, 1935
2,110,216	Goedike	Mar. 8, 1938
2,144,881	Huck	Jan. 24, 1939
2,162,248	Delaplane	June 13, 1939
2,165,235	Curtis	July 11, 1939
2,238,050	Goedike	Apr. 15, 1941
2,274,797	Kluge	Mar. 3, 1942
2,314,351	Harrold	Mar. 23, 1943
2,369,814	Worthington	Feb. 20, 1945
2,383,970	Huck	Sept. 4, 1945
2,402,442	Perry	June 18, 1946
2,547,471	Janke	Apr. 3, 1951