March 23, 1943. C. W. HARROLD 2,314,351

INKING MECHANISM FOR PRINTING PRESSES

Filed Feb. 6, 1940 4 Sheets-Sheet 1

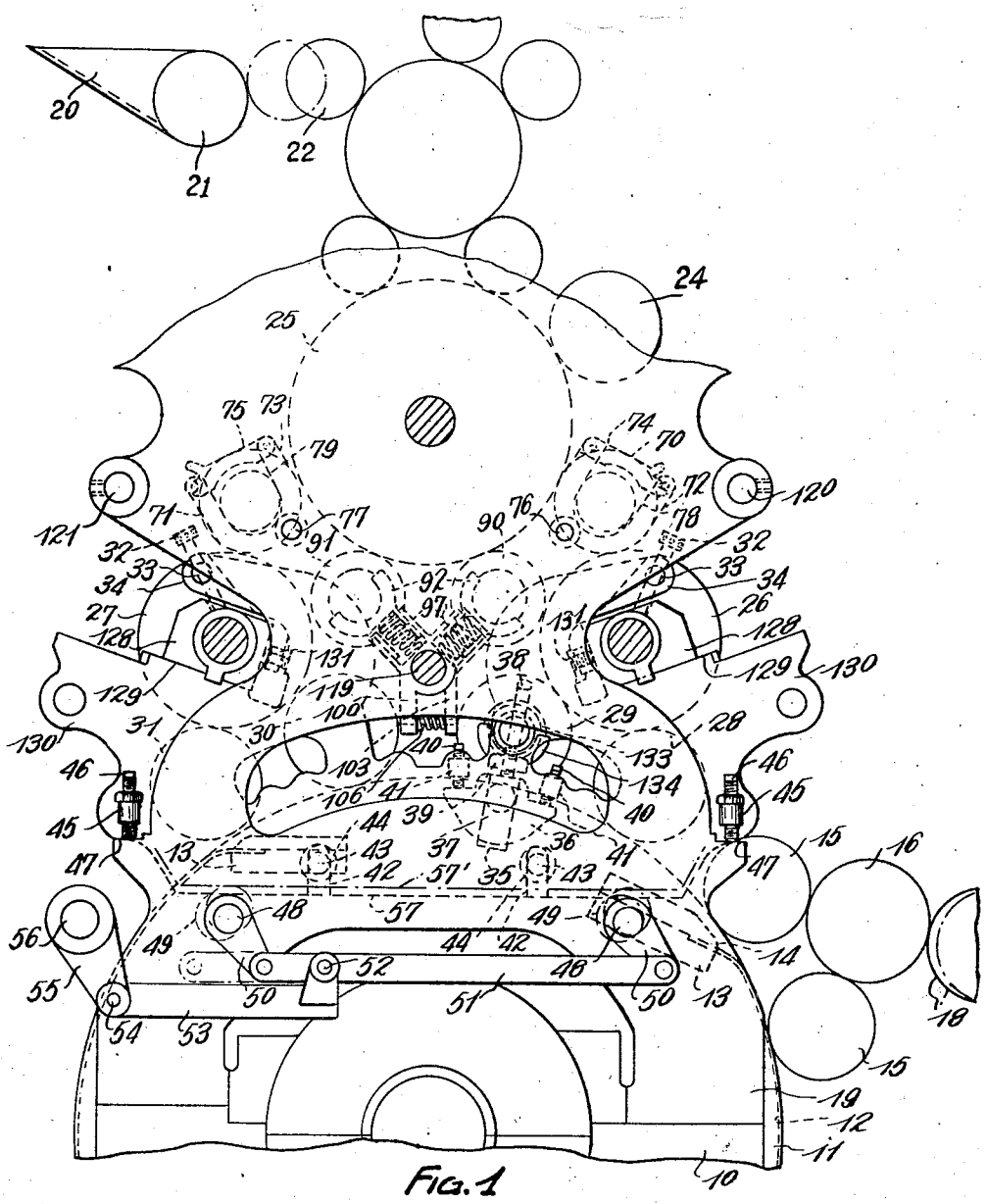


FIG. 1

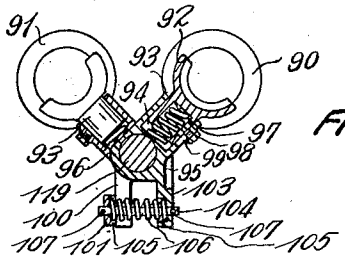


FIG. 5

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INKING MECHANISM FOR PRINTING PRESSES

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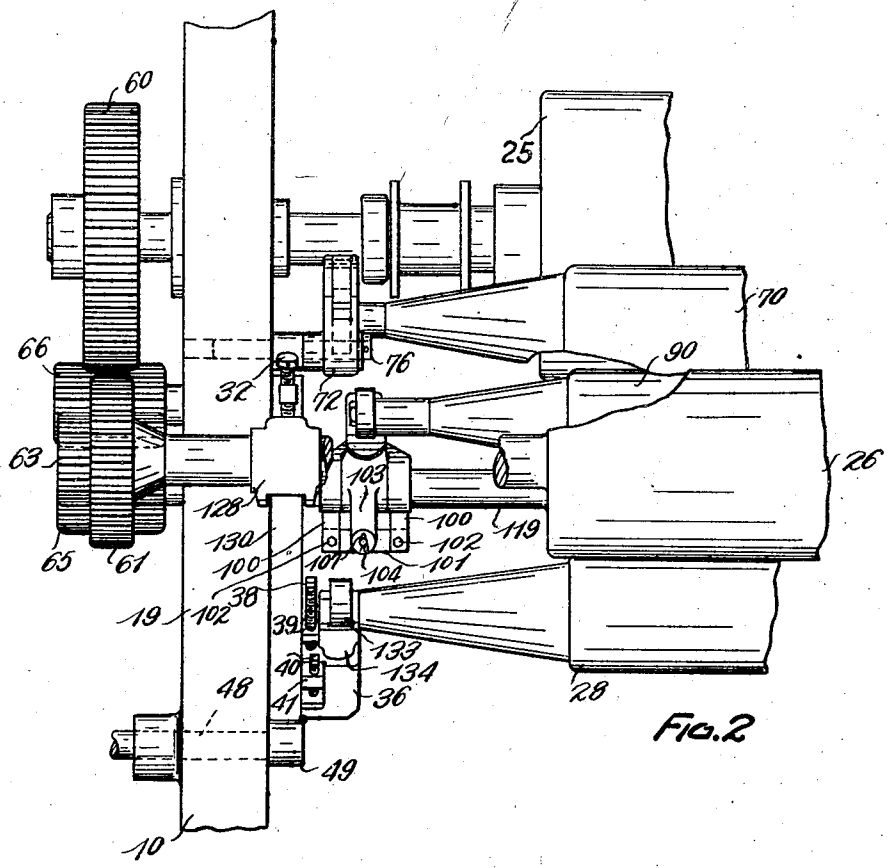


FIG. 2

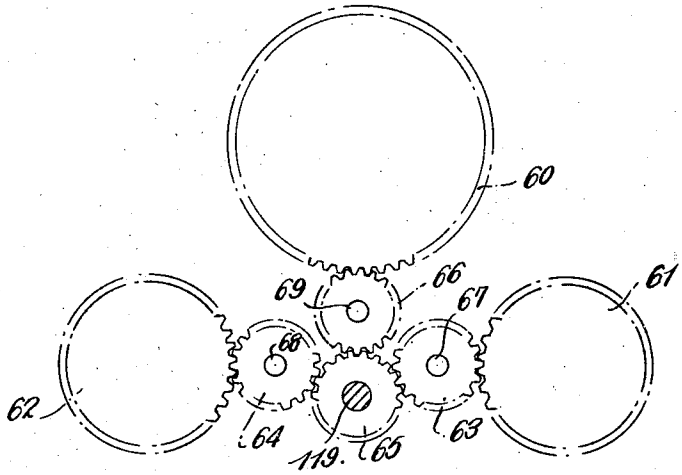


FIG. 4

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INKING MECHANISM FOR PRINTING PRESSES

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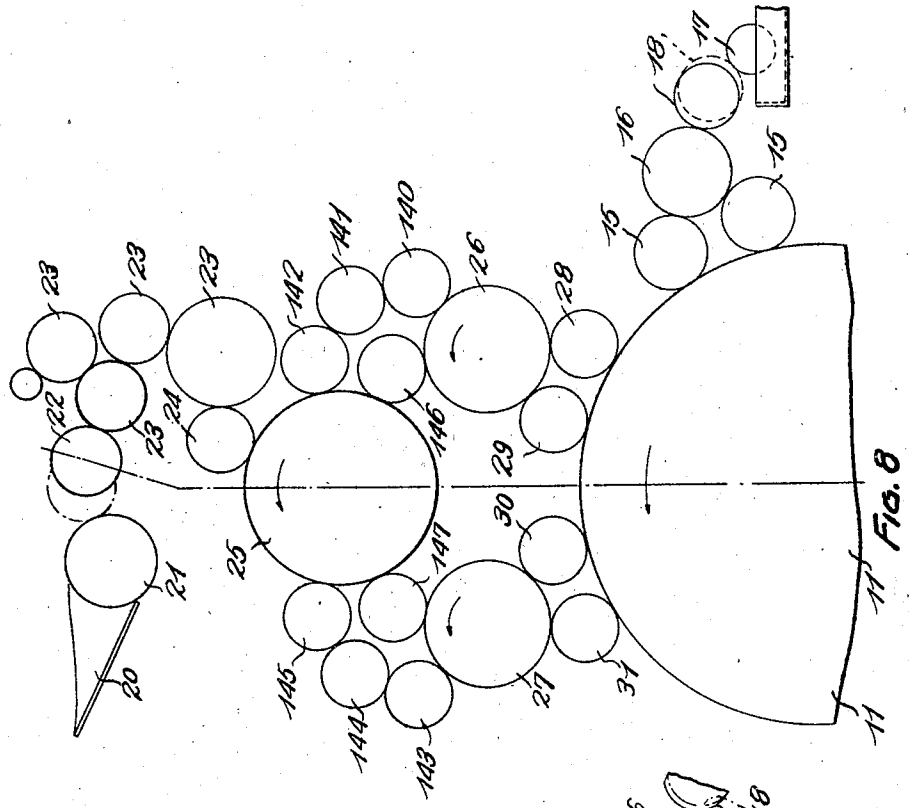


FIG. 8

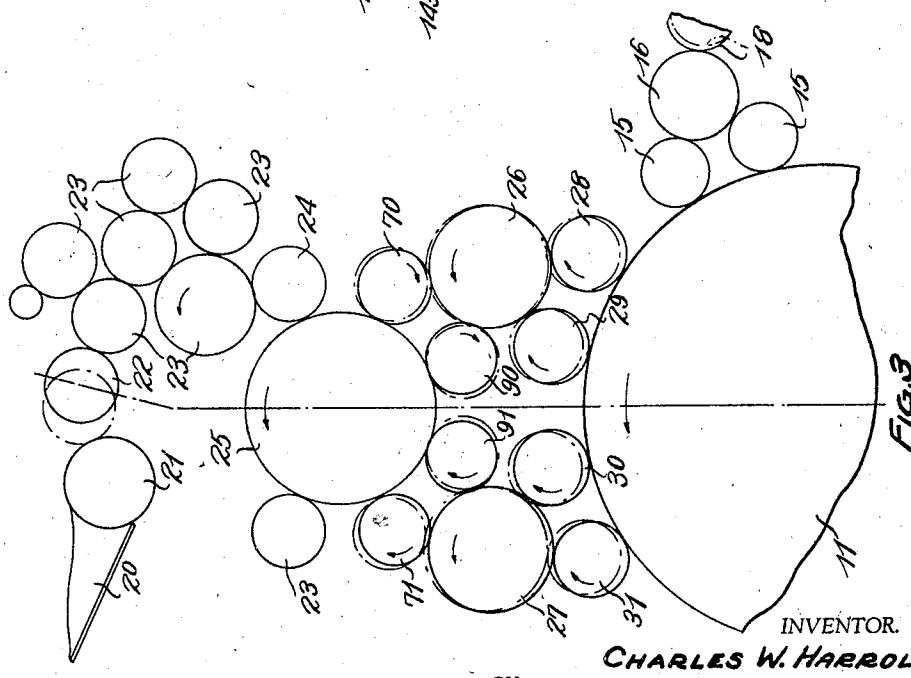


FIG. 3

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INKING MECHANISM FOR PRINTING PRESSES

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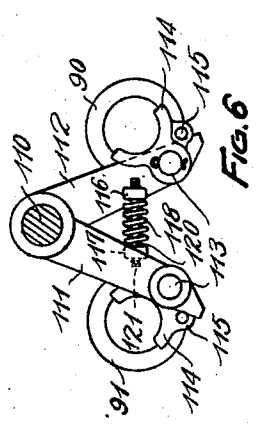


Fig. 6

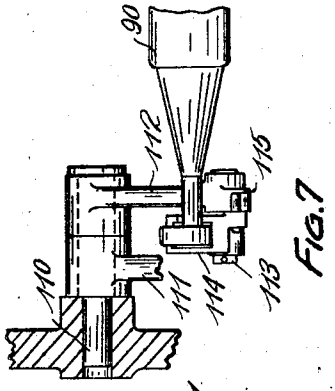


Fig. 7

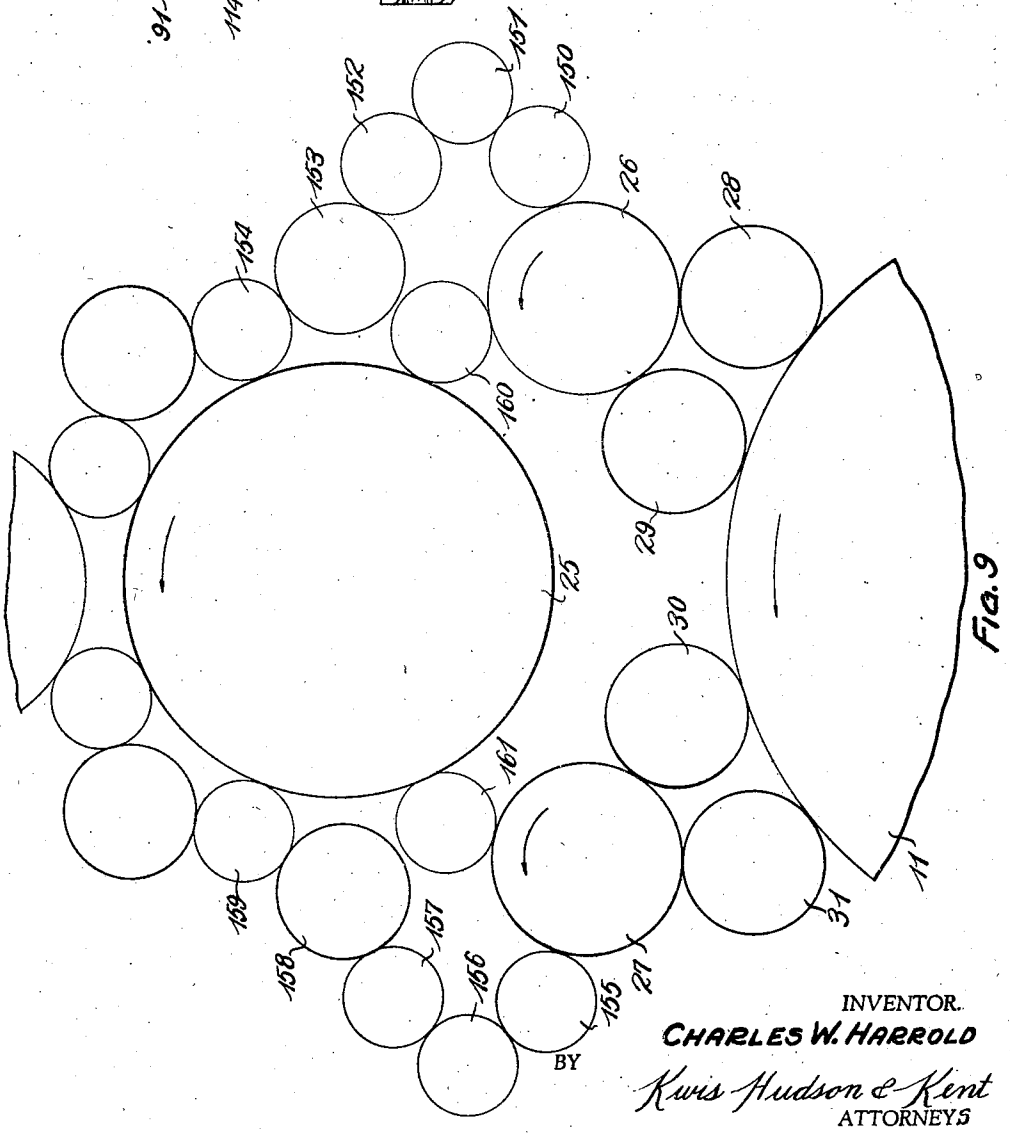


Fig. 9

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Patented Mar. 23, 1943 2,314,351

UNITED STATES PATENT OFFICE

2,314,351

INKING MECHANISM FOR PRINTING PRESSES

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Application February 6, 1940, Serial No. 317,571

16 Claims. (Cl. 101—147)

This invention relates to inking mechanism for printing presses, and more particularly to inking mechanism intended for use with lithographic printing presses, especially those of the sheet fed type.

It is well known to operators of present day lithographic presses that the moisture which is applied to the plate carrying the image to be printed is partially removed from the plate by the inking rollers and carried into the inker where it mixes with the ink and causes more or less diminution or change of the effective printing strength of the ink. This condition is affected somewhat by the composition of the ink, it being true in general that compositions which are water repellent to a considerable degree exhibit less of the difficulty.

A particular manifestation of this difficulty occurs in sheet fed lithographic presses wherein each of the cylinders has a gap in its periphery in which no printing takes place. During the time the gap in the plate cylinder is passing a given form roller that roller receives no moisture from the plate while it continues to receive ink from the other rollers of the inker. During other times the roller is in contact with the plate as well as with the other inking rollers. Thus an irregular condition of the ink on the form roller is created, which condition is manifested in corresponding differences in the printed product. For example, a portion of the printed product corresponding to the area of the form roller which receives no moisture during a given revolution may be stronger in hue than other portions.

Frequently the length of the gap in the cylinder is equal to or greater than the circumference of the form rollers, in which case the entire surface of the latter is inked without receiving additional moisture as the cylinder gap passes it. In this case the form roller in its first revolution over the plate inks the plate with ink received during the passage of the gap past the roller and in its second revolution inks the plate with ink which is mixed with moisture picked up by the roller during its first revolution. Usually the result is a stronger print in the areas of the final product corresponding to the first revolution of the roller than in the areas corresponding to the second revolution.

In accordance with the present invention an arrangement of inking rollers is provided whereby the difficulties mentioned above are to a considerable extent eliminated and a noticeably improved printed product is obtained. In general the arrangement of rollers is such as to provide a greater number of paths of ink flow from the upper portions of the inker to the rollers supplying ink to the form rollers, and correspondingly a greater number of paths of water flow from the form rollers into the upper parts of the inker. Preferably the arrangement is such that the water picked up by the first form rollers to roll over the plate may travel directly into the upper part of the inker without first coming in contact with the rollers which supply ink to the last form rollers to roll over the plate.

The invention furthermore includes a preferred form of arrangement of the rollers which is especially efficient, economical and convenient, and in which particular mounting arrangements are provided that are especially well adapted to hold in place certain of the rollers of this preferred arrangement and to permit easy removal of the same for cleaning purposes.

One of the objects of the invention therefore is the provision of a lithographic printing press capable of producing an improved printed product.

Another object is the provision of mechanism for inking the plate of a lithographic press which, in conjunction with the dampening mechanism of such a press, will render the press capable of producing printing having improved qualities, for example as to uniformity of inking and intensity of color.

Another object is the provision of a simple arrangement of inking rollers for accomplishing the advantages desired.

A further object is the provision of mounting means for certain of said inking rollers suitable for use in presses generally and having particular utility in lithographic presses.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of a portion of a lithographic press showing the essential parts of an inking and dampening mechanism embodying the present invention.

Fig. 2 is a partial end elevation of the inking mechanism of Fig. 1.

Fig. 3 is a diagrammatic view of a complete inking mechanism, showing certain of the inking rollers in on and off positions.

Fig. 4 is a diagrammatic view of gearing operatively connecting the ink drum and storage rollers.

Fig. 5 is a detail view of one form of mounting for certain of the rollers.

Figs. 6 and 7 are detail side and end views respectively of another form of roller mounting.

Figs. 8 and 9 are diagrammatic views of modified forms of the invention.

In the figures, the frame of the press is represented at 10. This frame supports plate cylinder 11 which carries a plate 12 secured to the cylinder in any suitable manner as by clamps 13. The cylinder has the usual gap 14 in its periphery and runs in contact with the usual blanket cylinder, not shown, by which ink from the plate 12 is transferred to the paper or other material to be printed carried by an impression cylinder, also not shown.

Running in contact with the plate are dampening rollers 15 which apply to the plate moisture received from roller 16 which in turn receives moisture from a reservoir roller 17 by way of oscillating duct roller 18. Other forms of dampening mechanism may be employed but the one described is suitable and in common use and will therefore require no further description.

Fixedly supported on press frame 10 are a pair of inker side frames 19 only one of which is shown, the two frames being secured together by suitable tie rods 119, 120, 121 or other transverse members in the usual manner. These two frames support directly or indirectly all of the inking rollers illustrated. Ink fountain body 20, fountain roller 21, ductor roller 22, and distributing rollers 23 and 24, all illustrated in Fig. 3, are supported by the inker frames 19 in any suitable or well known manner and they may be rotated and longitudinally vibrated as usual. Preferably ink drum 25 is journaled directly in frame 19 as shown in Fig. 2.

The inker also includes storage rollers 26, 27 each of which supplies ink to two form rollers 28, 29 and 30, 31 respectively, the latter being arranged to run in contact with the plate on cylinder 11 during operation of the press.

The mounting of the storage rollers and form rollers will now be described, the description being limited to the mounting arrangements at one end of these rollers, it being understood that similar arrangements are provided at the other end.

Each of the storage rollers 26, 27 is journaled at its ends in a block 128 resting on a flattened ledge 129 of a roll supporting plate 130. These blocks are removably and adjustably held in place by adjustable stop screws 131 and capstan screws 32, the latter being threaded through pins 33 which are pivotally supported in the bifurcated ends of the projecting portions 34 of plate 130. Capstan screws 32 engage flat spots on blocks 128 to hold the same firmly in position against stop screws 131. Thus storage rollers 26, 27 are seen to be readily removable for the purpose hereinafter described and may be replaced easily and accurately in operative position.

The mounting for each form roller comprises a ball bearing 133 secured to the end of the roller and resting in socket 134 which has a shank 35 slidably carried in a hole in block 36 which is provided with a laterally extending shank 37 pivotally mounted in plate 130. Adjustment radially of the cylinder is by screw 38 threaded in lug 39 of socket 134 and adjustment around shank 37 is by screws 40 threaded in pins 41 mounted in plate 130.

Plate 130 is provided with four slots 42, which surround studs 43, mounted in inker frame 19, two of the slots and studs being omitted to simplify the drawings. These studs have heads 44 and the plate 130 is loosely confined between these heads and the inside face of inker frame 19. Plate 130 is also provided with pins 45 in which adjusting screws 46 are threaded. The latter screws are arranged to engage flat spots 47 of frame 19 to adjustably limit the lowermost position of plate 130.

In frame 19 are rotatably mounted a pair of studs 48 having eccentrically disposed heads 49 which are arranged to bear against the under surface of plate 130. Each stud 48 has keyed thereto a lever 50 and these levers are joined by link 51 for simultaneous operation. Link 51 carries a pin 52 on which is mounted a further link 53 whose other end embraces pin 54 of lever 55 which is keyed to shaft 56. The latter shaft extends through the press frame to the other side of the press where other connections are provided similar to studs 48, levers 50, links 51, 53 and arm 55.

It will be seen that upon rotation of shaft 56 to produce movement of lever 55 to the left in Fig. 1, the links and levers just described will turn studs 48 so that eccentric heads 49 will engage the bottom edge 57 of plate 130 and raise the same from the indicated lower position of Fig. 1 to the upper position indicated by dotted line 57' in that figure, the extent of the movement being such as to raise the form rollers clear of the plate when it is desired to avoid inking the latter. Storage rollers 26, 27 likewise rise when plate 130 is lifted, maintaining their relation with the form rollers unchanged, but assuming a position closer to drum 25 than during normal operation.

Drum 25, which is driven from the press by any suitable driving connections, is provided with a driving gear 60 which drives storage roller gears 61, 62 through the intermediate gears 63, 64, 65, 66 as shown in Fig. 4. Gears 63, 64, 66 are rotatably carried on studs 67, 68, 69 mounted in frame 19 and gear 65 is rotatably carried on the end of tie rod 119. By means of the drive shown, vertical movement of storage rollers 26, 27 is permitted without appreciably disturbing the mesh of gears 61 and 62 with gears 63 and 64 respectively.

Between drum 25 and storage rollers 26, 27 are located intermediate rollers 70, 71 which are carried at their ends in sockets 72, 73 having retaining caps 74, 75. These sockets are pivotally mounted on studs 76, 77 in frame 19 and are provided with bearing slots 78, 79 for the purpose of permitting the rollers to seat themselves properly between drum 25 and storage rollers 26, 27.

In addition to rollers 70, 71 and contrary to previous practice in inkers for lithographic presses I mount other roller means between drum 25 and at least one of the storage rollers thus providing a greater number of paths of ink flow and water flow between the upper and lower rollers of the inker, specifically between the storage rollers and the upper rollers of the inker. Preferably, and as shown in Figs. 1, 2 and 3, this additional roller means takes the form of intermediate rollers 90, 91, which I shall call bridge rollers, each arranged to contact drum 25 and one of the storage rollers 26, 27. These bridge rollers 90, 91 are located on the sides of the line joining the centers of drum 25 and their respective storage rollers opposite to the side occupied by the usual rollers 70, 71.

Thus the rollers 23, 24, drum 25, intermediate

rollers 70, 71 and bridge rollers 90, 91 together constitute a group of ink transmitting rollers functioning to convey ink from the fountain to the storage rollers 26 or 27, the arrangement being such that each of the intermediate rollers 70, 71 and 90, 91 which are in contact with the storage rollers receives ink from the fountain independently of the other intermediate rollers.

To insure proper contact of rollers 90, 91 with the drum and storage rollers without the necessity of manual adjustment and to facilitate removal of the same, rollers 90, 91 are carried in open bearings 92, having shanks 93 slidably inserted in holes 94 of brackets 95, 96 which are pivotally mounted on tie rod 119. Shanks 93 are made hollow for a portion of their length and compression springs 97 are inserted therein, the springs bearing against the bottoms of holes 94 so that they tend to force bearings 92 outwardly in a radial direction from the center of tie rod 119. Studs 98 secured in the walls of brackets 95, 96 project into slots 99 in the shanks 93 to limit the outward movement of bearings 92.

Bracket 96 is provided with two depending projections 100 to which is secured a plate 101 by screws 102, Fig. 2. Bracket 95 is provided with one depending projection 103. Plate 101 and projection 103 are perforated to receive rod 104 and are provided with sockets 105 for receiving the ends of compression spring 106. Rod 104 is provided with cotter pins 107 outside the projection 103 and plate 101 to limit the expansion of spring 106.

The effect of the spring 106 is primarily to oppose the action of gravity upon the rollers 90 and 91 and their mountings so that these rollers do not bear more heavily upon the storage rollers 26 and 27 than upon the drum 25. Rollers 90, 91 are therefore caused to press yieldingly and substantially evenly against drum 25 and their respective storage rollers regardless of their exact size and without the necessity of positive adjustment. It is to be understood that the parts are so proportioned as to enable rollers 90, 91 to remain in contact with drum 25 and storage rollers 26, 27 in all positions of the latter determined by the raising or lowering of plate 130.

Removal of rollers 90, 91 from the press is readily accomplished by first releasing capstan screws 32 and removing storage rollers 26, 27 together with their bearing blocks 128, and then lifting rollers 90, 91 out of their half open bearings 92.

An alternative form of mounting for rollers 90, 91 is illustrated in Figs. 6 and 7. In this form a stud 110, which is secured to the inker frame 19, loosely carries two similar arms 111, 112 each of which carries a pin 113 pivotally supporting a bearing 114 for the bridge rollers 90, 91. The latter bearings are provided with pins 115 which limit the downward movement of bearings 114 about pins 113 caused by the action of gravity thereon but within the limits permitted by pins 115 these bearings are free to swing about pins 113 to permit the rollers to find their proper position. Arms 111, 112 are provided with lugs 116, 117 between which lies a compression spring 118 surrounding rod 120 which extends through lugs 116, 117 and is provided with cotter pins 121 for the purpose of yieldingly causing separation of arms 111, 112 and opposing inward movement of the arms 111 and 112 due to gravity.

Having described the preferred form of the invention I will now point out what may be a proper explanation of the reasons for the improvement in printing quality resulting therefrom, it being understood that this explanation is offered only to assist in understanding the invention and not to limit the scope or character of the same.

By following the directions of the rollers indicated by the arrows, see particularly Fig. 3, it will be noted that moisture picked up by form roller 28 may travel from the latter to storage roller 26 and thence to intermediate roller 70 and thence to drum 25 without coming in contact with any other rollers, that is, what may be called its primary path is directly to drum 25 by the route just mentioned. Other secondary paths by which the moisture may travel upwardly in the inker may be traced by following the direction of rotation of the rollers.

Similarly the primary upward path of the moisture picked up by form roller 29 is by way of rollers 26 and 70 to drum 25. Likewise the moisture picked up by form rollers 30, 31 travels principally by way of rollers 27 and 91 to drum 25. Roller 28 picks up the greatest amount of moisture, that picked up by rollers 29, 30 and 31 being progressively less.

Thus roller 90 appears to carry less moisture than roller 70, and roller 71 appears to carry less than roller 91, so that the ink which rollers 90 and 71 supply to their respective storage rollers is correspondingly less emulsified or diluted and is of greater strength. It will be noted that this stronger ink is transmitted directly downward to the corresponding storage roller and form rollers without coming in contact with the more moist rollers 70 and 91.

In contrast to the above, if rollers 90, 91 were not provided, all the moisture picked up by form rollers 28, 29 would have to travel upward to drum 25 by means of roller 70 and all of the ink transmitted by drum 25 to those form rollers would have to travel downward by means of the same roller 70 so that a more complete intermingling of moisture and ink would necessarily result than where the primary paths of the two materials are separated. A similar condition obtains with respect to the rollers associated with form rollers 30, 31, the provision of rollers 91, 71 making possible a greater separation of the ink and water paths.

It should also be noted that the rollers 28, 29, 26, 70, 90, being the first to affect the plate, function as a whole to convey moisture into the upper parts of the inker without that moisture coming into contact with the group composed of rollers 30, 31, 27, 71, 91. The latter, being the last to affect the plate, are thus enabled to deposit thereon ink having more nearly its maximum strength, with the result that the plate is more evenly and thoroughly inked than would otherwise be the case.

Furthermore it is generally recognized that the presence of moisture in the upper parts of an inker is less harmful to the quality of the printing than moisture in the lower parts thereof and that evaporation of the moisture is facilitated by the spreading thereof widely throughout the inker. The arrangement of rollers of the present invention, by providing for the greater separation of upward moisture paths and downward ink paths, encourages upward travel of moisture and evaporation thereof.

Whether or not the above explanation is the correct or principal one, it is found that the invention results in a markedly improved printed product particularly from the standpoints of

uniformity of inking and absence of heavier inking at the front end of the plate or corresponding sheet of printed material.

In Figs. 8 and 9 I have illustrated alternative arrangements of rollers which may be employed to carry out the broad aspects of my invention. In Fig. 8, groups of rollers **140**, **141**, **142** and **143**, **144**, **145** perform the functions of rollers **70** and **71** respectively of Figs. 1, 2 and 3; rollers **146**, **147** perform the functions of rollers **90**, **91**. The obvious difference in the two arrangements is that in Fig. 8 all the rollers contacting a given storage roller are on one side of the line joining the center of the latter with drum **25**, and for this reason a greater number of rollers is required.

In Fig. 9 a still larger number of rollers is employed and the flow of ink from the upper rollers of the inker is not entirely by way of drum **25** but in part by-passes the latter drum. Nevertheless at least one general aspect of the invention is present in this form, namely that there are provided a plurality of mutually distinct paths of ink and moisture flow between the upper parts of the inker and each of the storage rollers **26**, **27** whereby the improved separation of moisture and ink in the inker is accomplished. In this embodiment the flow of moisture or ink between the storage rollers **26** and drum **25** may take place either by way of roller **160** or by way of rollers **150**, **151**, **152**, **153** and **154**. Similarly flow between storage roller **27** and drum **25** may take place either by way of the single roller **161** or by way of rollers **155**, **156**, **157**, **158** and **159**.

Having thus described my invention, I claim:

1. In a lithographic printing press, a form cylinder having a gap in its periphery and adapted to support a lithographic plate on the remainder of its periphery, means for dampening said plate, and means for inking said plate comprising a pair of storage rollers, form rollers arranged to contact said storage rollers and said plate for transmitting ink from the former to the latter, an ink supply fountain, and a group of ink transmitting rollers between said fountain and said storage rollers for conveying ink from the former to the latter including three rollers two of which are in contact with one of said storage rollers and the third of which is in contact with the other of said storage rollers, said group of ink transmitting rollers being arranged so that each of said three rollers receives ink from said fountain independently of the other two, whereby the tendency toward uneven inking of the plate resulting from uneven picking up of moisture by the form rollers as they pass alternately over the dampened plate and over said gap is minimized and uniformity of inking is enhanced.

2. In a lithographic printing press, a form cylinder having a gap in its periphery and adapted to support a lithographic plate on the remainder of its periphery, means for dampening said plate, and means for inking said plate comprising a pair of storage rollers, form rollers arranged to contact said storage rollers and said plate for transmitting ink from the former to the latter, an ink supply fountain, and a group of ink transmitting rollers between said fountain and said storage rollers for conveying ink from the former to the latter including four rollers two of which are in contact with one of said storage rollers and the other two of which are in contact with the other of said storage rollers, said group of ink transmitting rollers being arranged so that each of said four rollers receives ink from said fountain independently of the other three, whereby a path for transmission of moisture away from each of said storage rollers is provided, which path is distinct from another path for transmission of ink to said storage roller, for minimizing the effect of the uneven picking up of moisture by the form rollers as they pass alternately over the dampened plate and over said gap.

3. In a lithographic printing press, a form cylinder having a gap in its periphery and adapted to support a lithographic plate on the remainder of its periphery, means for dampening said plate, and means for inking said plate, comprising an ink distributing drum, rollers for distributing ink and applying the same to the surface of said drum, a pair of storage rollers between said drum and said plate, form rollers arranged to contact said storage rollers and said plate for transmitting ink from the former to the latter, roller means for transmitting ink from said drum to one of said storage rollers and a plurality of rollers between said drum and the other of said storage rollers so arranged as to transmit ink from said drum to said last named storage roller and moisture from said last named storage roller to said drum, whereby moisture may be transmitted away from said last named storage roller primarily along one path and whereby ink may be transmitted toward said last named storage roller primarily along an independent path, for minimizing the effect of the uneven picking up of moisture by the form rollers as they pass alternately over the dampened plate and over said gap.

4. In a lithographic printing press the combination claimed in claim 3 wherein the direction of rotation of said drum is the same as the direction of rotation of said plate cylinder.

5. In a lithographic printing press, the combination claimed in claim 3 wherein said roller means comprises a plurality of rollers so arranged as to transmit ink from said drum along two mutually distinct paths to the corresponding storage roller.

6. In a lithographic printing press, a form cylinder having a gap in its periphery and adapted to support a lithographic plate on the remainder of its periphery, means for dampening said plate, and means for inking said plate comprising an ink distributing drum, rollers for distributing ink and applying the same to the surface of said drum, two storage rollers between said drum and said plate, two form rollers arranged to contact each of said storage rollers and said plate for transmitting ink from the former to the latter, and a pair of rollers arranged to contact each of said storage rollers on a side opposite to said form rollers and adapted to transmit to each of said storage rollers along two mutually distinct paths ink which has been distributed upon the surface of said drum, whereby moisture may be transmitted away from each of said storage rollers primarily along one path and whereby ink may be transmitted toward each of said storage rollers primarily along an independent path, for minimizing the effect of the uneven picking up of moisture by the form rollers as they pass alternately over the dampened plate and over said gap.

7. In a lithographic printing press the combination claimed in claim 6 wherein the direction

of rotation of said drum is the same as the direction of rotation of said plate cylinder.

8. In a lithographic printing press, the combination as claimed in claim 6 wherein the two rollers which are arranged to contact each of said storage rollers also contact said drum.

9. In a lithographic printing press, the combination as claimed in claim 6 wherein the two pairs of rollers which are arranged to contact said storage rollers on the side thereof remote from said form rollers also contact said drum and are located on opposite sides of the line joining the centers of said drum and the corresponding storage roller.

10. Inking mechanism for printing presses, comprising an ink drum, two storage rollers angularly spaced about the center thereof, two bridge rollers each in contact with said drum and one only of said storage rollers and each disposed with its center within the angle formed by the lines joining the centers of said storage rollers with the center of said drum, supporting means for said bridge rollers comprising a movable bracket at each end of each roller having a bearing therefor, and a common spring means at each end tending to move said brackets in opposite directions.

11. Inking mechanism for printing presses, comprising an ink drum, two storage rollers angularly spaced about the center thereof, two bridge rollers each in contact with said drum and one only of said storage rollers and each disposed with its center within the angle formed by the lines joining the centers of said storage rollers with the center of said drum, supporting means for said bridge rollers comprising at each end of the rollers a pair of brackets pivotally supported about a common center, a bearing in each of said brackets, and resilient means tending to move each of said bridge rollers into contact with said drum and a storage roller.

12. Inking mechanism for printing presses, comprising an ink drum, two storage rollers angularly spaced about the center thereof, two bridge rollers each in contact with said drum and one only of said storage rollers and each disposed with its center within the angle formed by the lines joining the centers of said storage rollers with the center of said drum, supporting means for said bridge rollers comprising at each end of said rollers a pair of brackets pivotally supported about a common center, bearings for said rollers movably carried by said brackets, and resilient means for counterbalancing said brackets and the rollers carried thereby and holding the rollers up against said drum.

13. Inking mechanism for printing presses, comprising an ink drum, two storage rollers angularly spaced about the center thereof, two bridge rollers each in contact with said drum and one only of said storage rollers and each disposed with its center within the angle formed by the lines joining the centers of said storage rollers with the center of said drum, supporting means for said bridge rollers comprising at each end of said rollers a pair of brackets pivotally mounted about a common center, bearings for said rollers removably carried by said brackets, resilient means for counterbalancing said brackets and the rollers carried thereby, and resilient means tending to move each of said bearings along a line extending radially outward from said common center.

14. Inking mechanism as claimed in claim 10 and including means for raising and lowering said storage rollers relative to said drum, said supporting means for said bridge rollers being arranged to cause the latter to maintain contact with said drum and said storage rollers in all positions of the latter.

15. Inking mechanism as claimed in claim 10 and including bearings for said storage rollers arranged to permit removal of the latter from the press whereby said bridge rollers may be readily removed.

16. In inking mechanism for a lithographic printing press having a cylinder with a gap therein, the cylindrical surface of said cylinder being adapted to carry a lithographic plate and means for dampening said plate, the combination with an ink drum and a plurality of pairs of form rollers, of a pair of removable storage rollers, and roller means for transferring ink from said drum to said storage rollers including a pair of removable bridge rollers each arranged to contact said drum and one only of said storage rollers and each disposed with its center within the angle formed by the lines joining the centers of said storage rollers with the center of said drum.

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