Oct. 22, 1935. E. J. SMITH 2,018,193

INKING MECHANISM AND METHOD

Original Filed Aug. 27, 1931 4 Sheets-Sheet 1

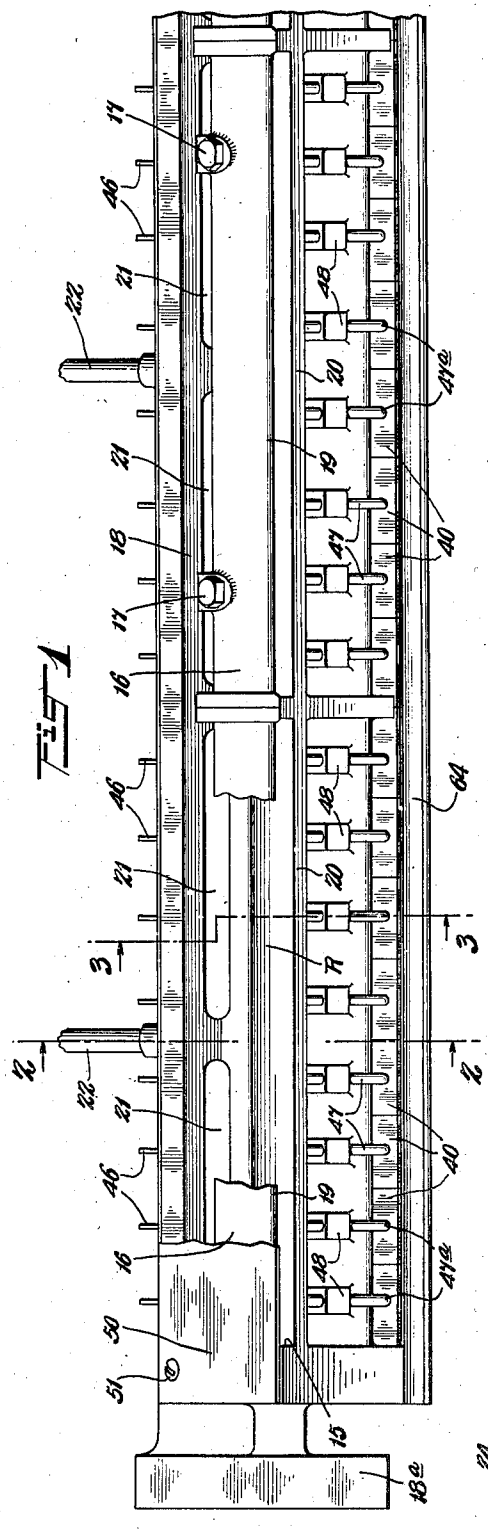

Fig. 1

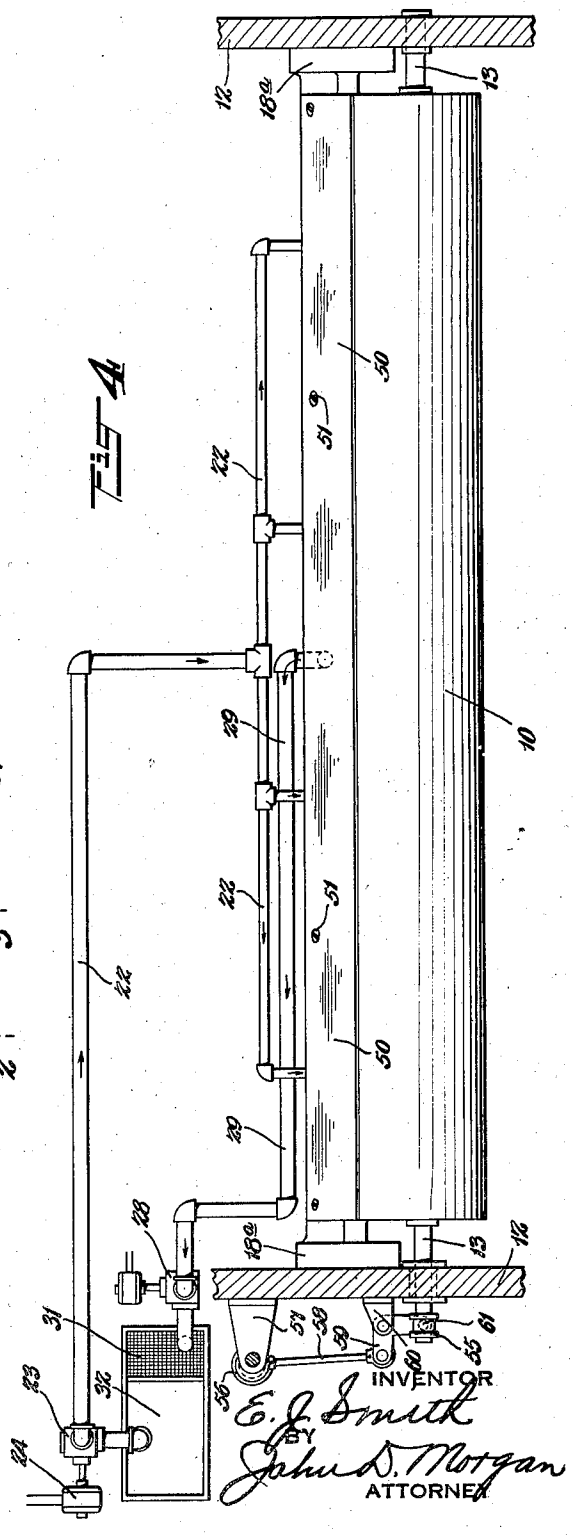

Fig. 4

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INKING MECHANISM AND METHOD

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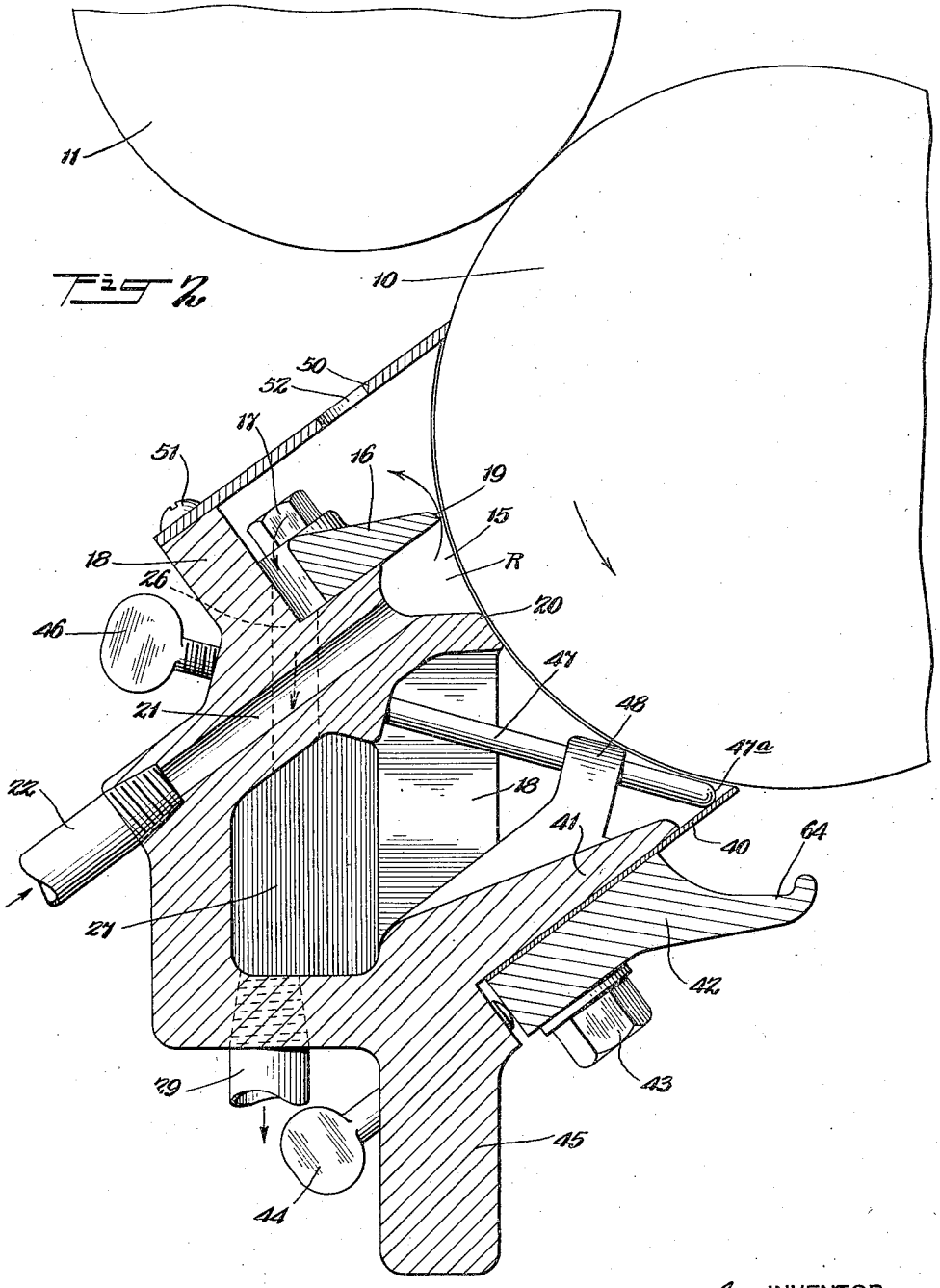

Fig 2.

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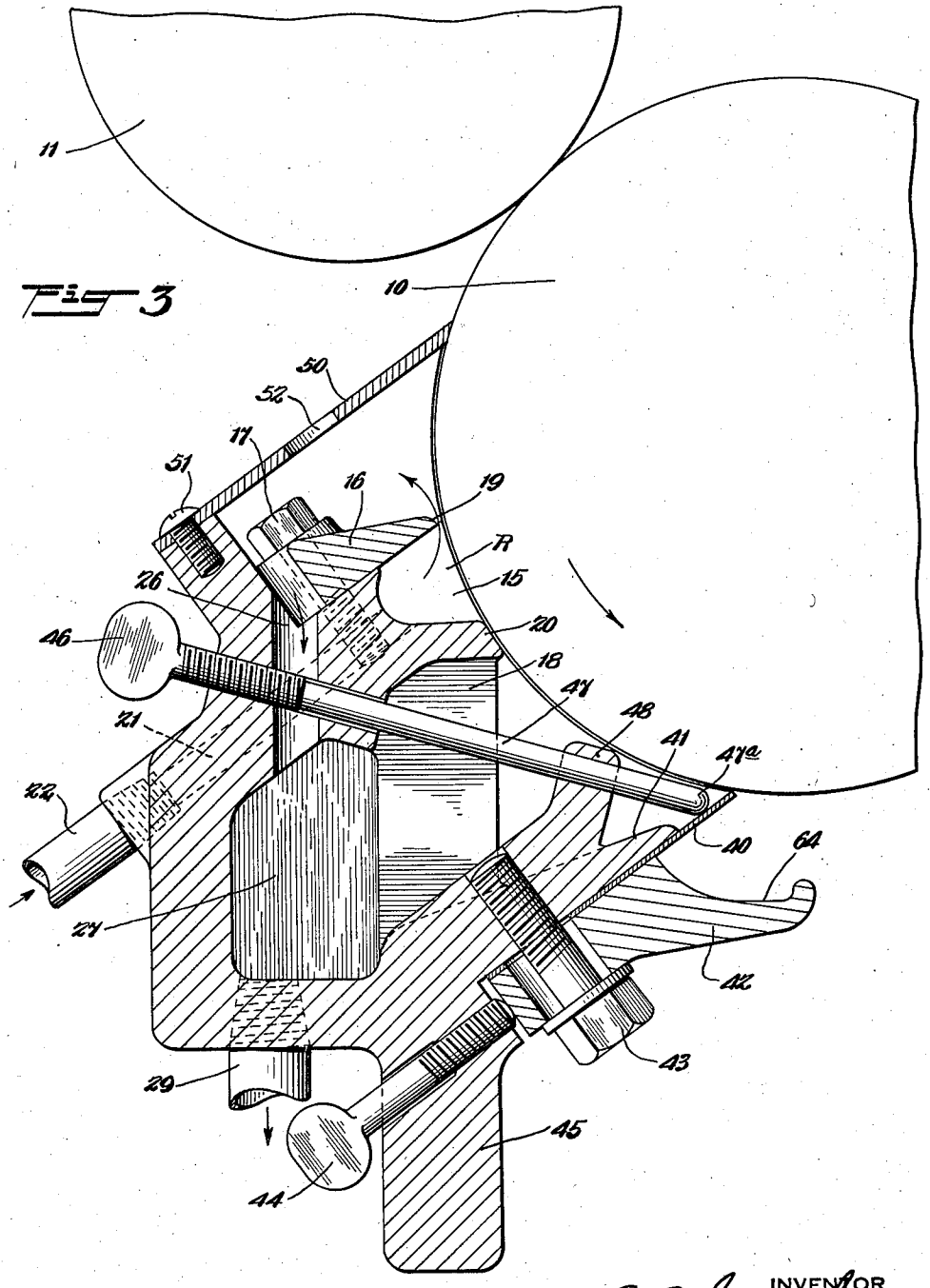
Fig 3



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INKING MECHANISM AND METHOD

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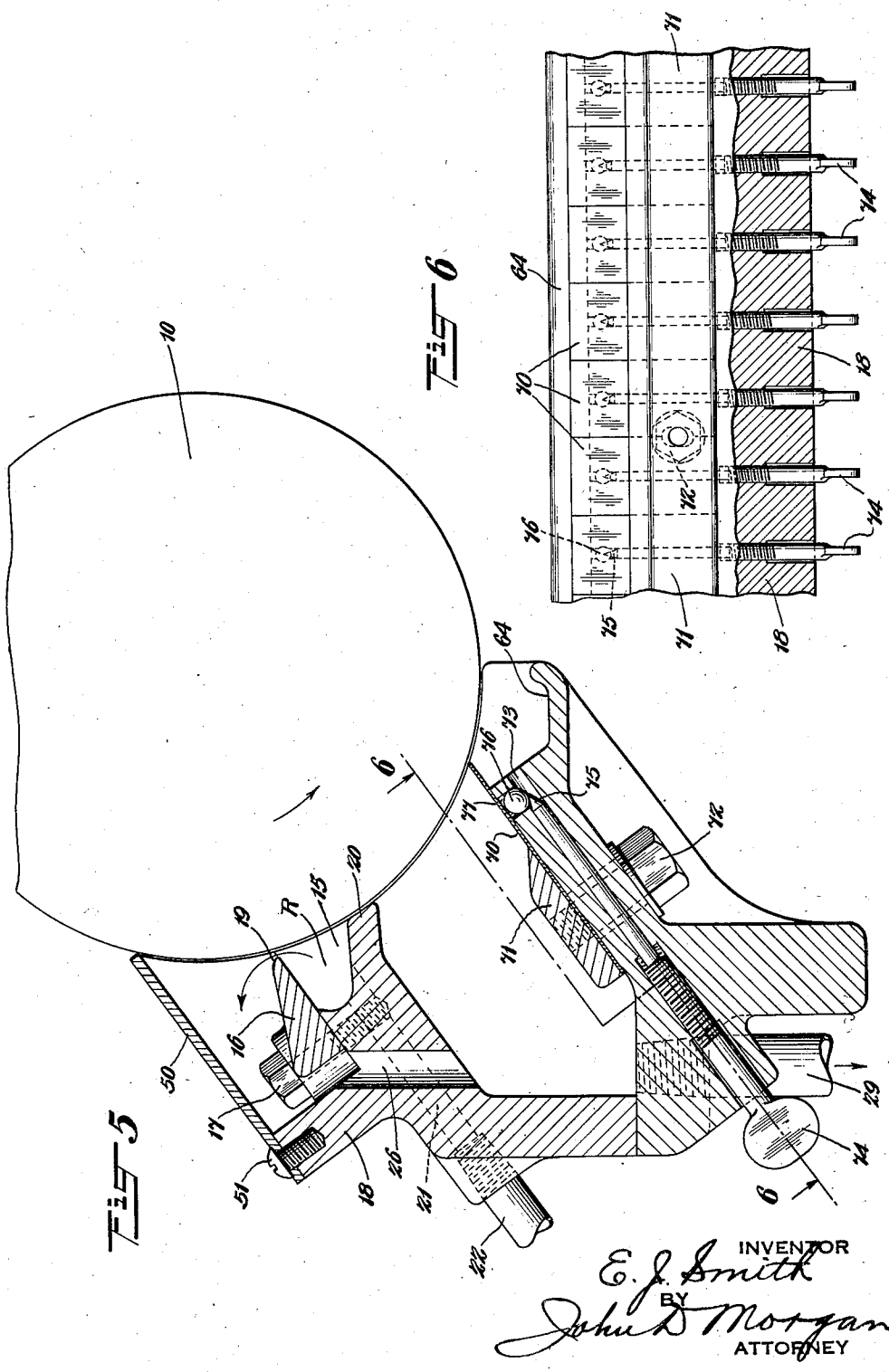

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2,018,193

INKING MECHANISM AND METHOD

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Application August 27, 1931, Serial No. 559,717
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29 Claims. (Cl. 101—366)

The present invention relates to a novel and useful inking mechanism and method and more particularly to such a mechanism and method particularly adapted for use with high speed rotary presses.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate two embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Figure 1 is a fragmentary plan view of one of the embodiments of the inking mechanism of the present invention, with the ink drum omitted and other parts broken away to show the structure more clearly;

Figure 2 is an enlarged detail sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a similar sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a side elevation of the inking mechanism of the present invention, with certain parts diagrammatically indicated;

Figure 5 is a detailed vertical section of a modified embodiment of inking mechanism of said invention; and

Figure 6 is a sectional view taken on the line 6—6 of Figure 5.

The present invention has for its object the provision of an improved inking mechanism particularly adapted for use with high speed rotary printing machines. A further object of the invention is the provision of an inking mechanism in which the ink is continuously and uniformly supplied to an inking drum or other cylinder to be inked. Another object is the provision of an inking mechanism of the kind referred to in which the ink is maintained in a thoroughly mixed condition. Still another object is the provision of a novel and improved method of supplying ink to a press.

In accordance with the present invention a cylinder to be inked such as an ink drum is provided and is preferably rotated at substantially the same peripheral speed as the plate cylinder of the press. Adjacent to the drum and supplying ink thereto is a small reservoir extending along the length of the drum and to which ink is supplied under pressure. The reservoir is preferably provided with a longitudinal edge, closely fitted to the drum and is also provided with a rigid, relatively wide edge, spaced a slight distance from the drum, which serves to limit the thickness of the film of ink applied to the drum, renders the film of ink uniform and insures thorough coating of the drum with ink. The ink under pressure may flow past the first edge reversely to the movement of the drum, while it is firmly pressed against the drum by the second edge. A regulable blade is also provided to remove a predetermined and variable amount of the ink from the drum surface, this blade being preferably capable of adjustment throughout its length to vary the amount of ink as required by different sections of the plate cylinder.

The surplus ink removed by the regulable blade is removed from the fountain and is pumped through a filter after which it is returned to the pressure reservoir adjacent to the drum. For the purpose of cleaning the surface of the drum, after transfer of the ink therefrom, a scraper blade may be provided, and in order to secure even greater uniformity in the ink film, the ink drum may be vibrated.

It will be understood that the foregoing general description and the following detailed description as well, are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the present preferred and illustrative embodiment of the invention as shown in Figures 1 to 4 of the drawings, a cylindrical inking drum to be inked 10 extends across the width of the press and is rotated at press speed, being rotatably journalled in the press frames 12 by means of shaft 13. While drum 10 may be of any suitable construction, it is preferably provided with a relatively hard surface which readily accepts the ink applied to it.

Closely adjacent to the drum 10 is mounted an ink reservoir R provided with end walls 15 at either end, substantially at the ends of the drum, the edges of the the walls being curved correspondingly to the contour of the drum 10 to form a relatively tight seal between the edge and drum. Along the upper side of the reservoir is provided a relatively heavy and rigid blade 16, securely fastened by bolts 17 to the casting 18 forming the base of the reservoir. Casting 18 is securely

mounted on the side frames 12 by the end plates 18a. The edge 19 of the blade 16 extends to within a relatively small distance of the inking drum 10, providing a narrow, and preferably fixed, passageway between the edge 19 and the drum 10 throughout the entire length of the reservoir.

At the bottom edge of the reservoir, the wall 20, forming the lower edge of the reservoir, is positioned very close to the surface of the drum and is also curved to correspond with the surface of the drum, providing a rigid distributing and regulating member of substantial width. This edge limits the amount of ink retained on the surface of the drum as the drum rotates past the reservoir, and also serves to press or wedge the ink against the drum with a relatively high degree of pressure.

Means are also provided for maintaining the reservoir filled with ink under pressure, and if desired for supplying to the reservoir a quantity of ink sufficient to maintain a slight flow past edge 19 in a direction reverse to that of the rotation of the drum 10. As embodied, the reservoir R is formed with a plurality of downwardly-extending passageways 21, which are attached at their lower ends to pipes 22, receiving ink under pressure from a pump 23 driven by motor 24. Pump 23 has sufficient capacity to supply considerably more ink to the reservoir than is required by the drum, although it need not be operated at full capacity.

Means are provided for collecting and returning the excess ink supplied to the reservoir and the ink flowing between edge 19 and drum 10 drains through passageway 26 into a collecting chamber 27, from which it is removed by motor-driven pump 28 through pipes 29. If desired, a single pump may be employed instead of the separate pumps 23 and 28.

Pumps 23 and 28, in addition to their function of circulating ink to and from the reservoir, also serve to maintain the ink in a thoroughly mixed, uniform condition, thereby preventing settling of the pigment from the relatively thin vehicle generally employed in inks used on high speed presses.

In order to maintain the ink clean and free of specks, grit and other foreign matter, which would cause imperfection in the printed product, the ink removed from the reservoir or cavity adjacent to the drum 10 is filtered before it is returned to the reservoir. As embodied, pump 28, receiving the excess ink from the reservoir, forces the ink through a suitable filter 31 and into a storage tank 32, from which it is withdrawn and returned to the reservoir by pump 23. As ink is used, additional ink may be supplied to the inking mechanism by adding it to the tank 32.

To regulate the amount of ink supplied to the press, and to vary this longitudinally of the ink drum 10 in accordance with the individual requirements of the various sections of the plate cylinder, a regulable blade is provided, mounted on the fountain below the reservoir, and contacting with the surface of the ink drum. As embodied, blade 40 comprises a relatively thin resilient member, rigidly fastened to a longitudinally extending ledge 41 by means of plate 42 and screws 43. These parts are so positioned that the normal resiliency of the blade 40 presses it into firm contact with the drum. Means are also provided for moving the blade toward and away from the drum, to take up wear in the blade, and these means comprise a plurality of thumb screws 44, threaded in the casting 45, and bearing against the lower or rear edge of the plate 42. By loosening the screws 43 and turning the thumb screws 44, the blade may be moved toward the drum 10.

For variably positioning the blade 40, and thereby regulating the amount of ink retained on the inking drum 10 and transferred to the press, a plurality of uniformly spaced thumb screws 46 are threaded in the upper part of the casting, with their relatively long shanks 47 projecting downwardly through supporting guides 48, and their rounded ends 47a bearing against the upper side of the free end of the blade 40. By turning the thumb screws 46, the free end of the blade 40 is moved back and forth, and the thickness of the film of ink retained on the ink drum 10 is thereby varied throughout the length of the cylinder.

For the purpose of securing better individual regulation of the ink supplied to the various longitudinal sections of the drum, the blade 40 is formed in a plurality of similar contiguous sections, having their upper or drum-contacting edges alined, the individual blades being so positioned relatively to the thumb screws 46 that the ends 47a bear against the middle portions of the blades near the edge.

In order to clean the surface of the ink drum immediately prior to the application of ink thereto, for the purpose of eliminating lint and any other foreign matter which may collect on the surface of the inking drum, a relatively stiff scraper blade 50 is provided to contact with the surface of the inking drum immediately prior to the application of ink thereto and after transfer of ink from the drum to the inking roll 11. As embodied, blade 50 extends along the length of the inking drum 10, and is mounted on the casting 18 immediately above the reservoir by means of screws 51, the front end of the blade 50 being permanently pressed into contact with the drum 10 by the resiliency of the relatively stiff blade. Blade 50 may also be provided with drain holes 52.

The end walls 15 are in closely abutting relation with the blades 40 and 50 and, as previously described, are curved correspondingly to the contour of the drum to form a relatively tight seal. Preferably the end walls 15 are provided with a relatively wide face abutting the blade ends so as to minimize any tendency of ink to leak.

For securing uniform distribution of the ink over the surface of the drum 10, means may be provided for longitudinally vibrating the drum. As embodied, drum 10 is longitudinally movable with respect to the side frames 12, and at one end of shaft 13 is provided a collar 55 fixed to the shaft. An eccentric 56, mounted on a bracket 57 on the corresponding press frame 12 is connected by pitman 58 to a bell crank 59, which is pivotally mounted in bracket 60 on frame 12. At the other end of the bell crank, a roller 61 is rotatably mounted to run in the groove of collar 55, so that as eccentric 56 is driven at a relatively slow speed from the press, bell crank 59 is oscillated, thereby vibrating inking drum 10.

In order to collect any ink which may drip from drum 10 adjacent to the point of its contact with blade 40, the blade-securing plate 42 is formed with a forwardly-extending lip 64, directly beneath the forward end of blade 40, lip 64 terminating slightly in front of the lowermost portion of drum 10.

The modified embodiment of the invention, illustratively shown in Figures 5 and 6 of the drawings, is generally similar to that previously described. In this embodiment, ink is supplied

to the reservoir by means of pipes 22 connected with pump 23, sufficient ink being provided to maintain the desired pressure in the reservoir and to cause a small flow of ink between edge 19 and drum 10 in a direction opposite to that of the rotation of the drum. The relatively wide edge 20 limits the amount of ink retained on the drum 10 at the passage past the reservoir. The surplus ink supplied to the reservoir collects in the chamber 27, is removed by pump 28 and after mixing and filtering, it is returned to the reservoir by pump 23.

The regulation of the amount of ink supplied to the press is effected by means of a resilient blade 70, securely fastened to the fountain casting 18 by means of plate 71 and screws 72, the plate, blade and screws being movable toward and away from the drum. Casting 18, in this embodiment, is provided with a plurality of relatively long apertures 73 extending substantially parallel to blade 70 and substantially uniformly spaced from each other corresponding to the individual sections of the plate cylinder. To secure better individual regulation of the ink supplied to the several longitudinal sections of the plate cylinder, the blade 70 may be formed as a plurality of narrow, contiguous members, each corresponding in width to the sections of the plate cylinder. Thumb screws 74, having pointed ends 75 and threadedly secured in the apertures 73 are provided, and their pointed ends 75 contact with small balls 76 seated in apertures 77 communicating with apertures 73. Balls 76 support the under side of the blades 70, so that the blades may be variably positioned relatively to the drum to regulate the pressure of the blade against the cylinder and thereby control the supply of ink.

In accordance with the method forming part of the present invention, which may be carried out by mechanism of the type described above, the ink drum 10 is rotated at substantially the same speed as that of the printing press cylinder, its surface being continually cleaned and adherent foreign matter being removed therefrom by means of the relatively stiff scraper blade 50. The clean surface of the drum is then contacted with a mass of ink under pressure in reservoir R, and the initial contact of the surface with this ink may be made while the ink is flowing relatively fast in a direction opposite to the direction of rotation of the surface of the drum past edge 19 and thoroughly coats the drum. After application of the ink in this manner, all but a small uniform quantity of the ink is removed from the surface of the drum, this small quantity being firmly pressed or wedged against the surface of the drum by passage of the drum past the relatively wide rigid edge 20. A substantial part of the adherent film of ink is then removed leaving only the desired and easily regulable amount of ink on the drum which corresponds substantially exactly with the requirements of the press. The regulable removal of the surplus ink is accomplished by means of the blades 40, which can be variably tensioned against the surface of the drum. Due to the fact that only a small quantity of ink is contained in the reservoir R, only a relatively small amount of ink is subjected to the disintegrating action of the ink drum, thereby maintaining the ink in a homogeneous condition for a much longer period of time. As only a small quantity of ink is removed by the blade, no large quantity of ink can build up against the blade tending to vary the position of the blade.

The excess ink, comprising the ink removed by the regulable blade 40, as well as the excess ink flowing past edge 19, is collected in chamber 27 from which it is drained by motor driven pump 28, and after filtering through filter 31, is recirculated to the ink reservoir R under pressure by means of motor-driven pump 23, pumps 23 and 28 each serving to thoroughly mix the ink and maintain it in a uniform condition thereby avoiding any settling of the pigment from the vehicle which might otherwise occur.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. In an ink fountain, the combination of an ink drum, a pressure cavity having a pair of edges closely adjacent to the drum and extending axially thereof one of said edges being closer to the drum than the other, one edge permitting only a predetermined amount of ink to remain on the drum, while the other permits surplus ink to flow out of the cavity and means for supplying ink under pressure to the cavity.

2. In an ink fountain, the combination of an ing drum, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity whereby the surface of the drum is provided with a film of ink as it passes one edge of the cavity and surplus ink flows over the other edge of the cavity, means for regulably removing the surplus portion of the film carried by the drum surface and means for collecting the surplus ink, remixing it and returning it to the supplying means.

3. In an ink fountain, the combination of an ink drum, a pressure cavity having a pair of rigid edges closely adjacent to the drum, means for supplying ink under pressure to the cavity in excess of the requirements of the press whereby the surface of the drum is provided with a film of ink as it passes one edge of the cavity and means for vibrating the drum.

4. In an ink fountain, the combination of an ink drum, a pressure cavity having a pair of rigid edges closely adjacent to the drum surface, means for supplying ink under pressure to the cavity for applying ink to the surface of the drum, one of said edges serving to remove all but a uniform film of ink from the drum surface, a blade for regulably removing a portion of said film of ink, and means for collecting the removed ink and returning it to the supplying means.

5. In an undershot ink fountain, the combination of an ink drum, an ink reservoir to supply ink to said drum and a fountain blade to regulate the amount of ink retained on the drum surface, said blade being positioned apart from the reservoir and supporting none of the ink in the reservoir.

6. In an undershot ink fountain, the combination of an ink drum, an ink reservoir to supply ink to said drum, a fountain blade positioned below and spaced from the reservoir to regulate the amount of ink retained on the drum surface, said blade supporting none of the ink in the reservoir, and means for permitting the ink to drain away from the point of contact of said blade with the drum.

7. In an undershot ink fountain, the combi-

nation of an ink drum, means for applying ink to the drum, a fountain blade positioned below and away from the ink applying means, and means for withdrawing surplus ink from the blade, means for filtering the withdrawn ink, and means for returning the withdrawn ink to the applying means.

8. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity, means for collecting the ink as it overflows from the cavity, means for regulably removing surplus ink from the drum, means for remixing the ink removed from the drum and means for returning it to the supplying means.

9. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity whereby the ink flows with and reversely to the movement of the ink drum, and means for regulably removing a portion of the ink carried by the surface of the drum away from the cavity.

10. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity whereby the ink flows in both directions away from the cavity, a regulable blade for removing surplus ink from the drum surface and means for collecting the surplus ink and overflow ink and returning it to the supplying means.

11. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity whereby the ink flows in both directions away from the cavity, and means for filtering a portion of the ink flowing from the cavity and returning it to the supplying means.

12. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity whereby the ink flows in both directions away from the cavity, and means for remixing a portion of the ink flowing from the cavity and returning it to the supplying means.

13. In an undershot ink fountain, the combination of an ink drum, a pressure cavity having a pair of edges closely adjacent to the drum but differently spaced therefrom, the edge adjacent the advancing side of the drum being the farthest away of the two, and means for supplying ink to the pressure cavity to contact it with the drum, whereby a fixed quantity of ink is allowed to remain on the cylinder and ink flows out of the cavity past the edge spaced farthest away and reversely to the movement of the drum.

14. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum but differently spaced therefrom, the edge adjacent to the advancing side of the drum being farthest from the drum, means for supplying ink under pressure to the cavity to apply ink to the drum and means for regulably removing surplus ink from the drum, the edges of the cavity acting to allow the ink to flow both with and reversely to the movement of the drum.

15. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum but differently spaced therefrom, the edge adjacent to the advancing side of the drum being farthest away from the drum and means for supplying ink under pressure to the cavity to apply it to the drum.

16. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity, means for collecting the ink as it overflows from the cavity and returning it to the supplying means.

17. In an undershot ink fountain, the combination of an ink drum to be rotated, a pressure cavity having a pair of edges closely adjacent to the drum, means for supplying ink under pressure to the cavity, means for collecting the ink as it overflows from the cavity, and means for filtering, remixing and returning the ink to the supplying means.

18. The method of supplying ink to a rotating cylindrical member of a printing press which includes maintaining a relatively large amount of ink under pressure in contact with the surface of the cylinder, rotating the cylinder, obstructing the flow of ink with the cylinder so that only a thin film of ink remains on the cylinder and obstructing the flow of ink reversely to the rotation of the cylinder to a lesser extent.

19. An inking mechanism for rotary printing presses including in combination a rotatable cylinder to be inked, an ink discharge means opening onto the cylinder, a scraper blade for cleaning the surface of the cylinder prior to inking, a flexible blade for removing surplus ink from the cylinder, end walls forming with the blades and cylinder a tightly sealed chamber within which the ink is applied to the cylinder, means for collecting the surplus ink applied to the cylinder, a filter for removing foreign matter from the ink and motor driven pump means for recirculating the filtered ink.

20. An inking mechanism for rotary printing presses including in combination a rotatable cylinder to be inked, an ink discharge means opening onto the cylinder, a removable scraper blade positioned in advance of the opening for cleaning the surface of the cylinder, a flexible blade positioned on the other side of the opening, said flexible blade extending throughout substantially the entire length of the cylinder, means adjacent to the ends of the cylinder and cooperating with the scraper and flexible blades for forming a tightly sealed chamber enclosing the ink discharge opening, means for variably positioning the flexible blade with reference to the cylinder, and means for collecting and recirculating all of the surplus ink supplied to the cylinder.

21. An inking mechanism for rotary printing presses including in combination a rotatable cylinder to be inked, an ink discharge means opening onto the cylinder, a removable scraper blade positioned in advance of the opening for cleaning the surface of the cylinder, a flexible blade positioned on the other side of the opening, said flexible blade extending throughout substantially the entire length of the cylinder, means adjacent to the ends of the cylinder and cooperating with the scraper and flexible blades for forming a

chamber enclosing the ink discharge opening, means for variably positioning the flexible blade with reference to the cylinder, and means for collecting and recirculating all of the surplus ink supplied to the cylinder.

22. In an inking mechanism, a cylinder to be inked, an ink cavity for holding ink adjacent to said cylinder, a pump to supply ink continuously to said cavity, a flexible doctor blade for variably regulating the amount of ink retained on the cylinder surface and a rigid member positioned between said cavity and blade for regulating the amount of ink on said cylinder preliminarily to its regulation by the doctor blade, and drainage means between said cavity and blade for collecting surplus ink and returning it to the reservoir.

23. In an inking mechanism, a cylinder to be inked, an ink cavity for holding ink adjacent to said cylinder, an ink reservoir, a pump to supply ink continuously to said cavity, a flexible blade for variably regulating the amount of ink retained on the cylinder surface, a rigid member of substantial width closely adjacent to the cylinder for limiting the amount of ink to be removed by the blade, and drainage means between said cavity and blade for collecting surplus ink and returning it to the reservoir.

24. In an inking mechanism, a cylinder to be inked, an ink cavity for holding ink adjacent to said cylinder, an ink reservoir, a pump to supply ink continuously to said cavity, a flexible blade for variably regulating the amount of ink retained on the cylinder surface, a rigid member closely adjacent to the cylinder for limiting the amount of ink on the cylinder and to be removed by the blade, drainage means between said cavity and blade for collecting surplus ink and returning it to the reservoir, and means extending the length of the cylinder and having an edge closely adjacent to the cylinder and on the other side of the cavity from the blade for covering a substantial part of the upper cylinder surface.

25. An inking mechanism for rotary printing presses including in combination a rotatable cylinder to be inked, a plurality of parallel edges closely adjacent to the cylinder and spaced from each other, one of said edges serving to form a substantial seal with the cylinder, another edge serving to regulate the amount of ink retained on the cylinder, an ink reservoir, a pump for supplying and recirculating ink from said reservoir between certain of said edges whereby it is applied to said cylinder and forced thereagainst in a plurality of places by a plurality of said edges, and means for returning surplus ink to said reservoir.

26. In an inking mechanism for rotary printing presses the combination of a rotatable cylinder to be inked, a reservoir, a pump for supplying ink from said reservoir to the surface of said cylinder, a plurality of parallel, spaced apart means for regulating the amount of ink retained on the cylinder surface, the last of said means being regulable to regulate the amount of ink to be transferred from said cylinder, and means for returning excess ink to said reservoir from all of said regulating means.

27. In an inking mechanism for rotary printing presses the combination of a rotatable cylinder to be inked, a reservoir, a pump for supplying ink from said reservoir to the surface of said cylinder, and a plurality of parallel, spaced apart means for repeatedly applying the ink to the cylinder surface, one of said means being regulable to regulate the amount of ink to be transferred from said cylinder and a sealing member closely against the cylinder on its side opposite the flexible blade.

28. In an inking mechanism for rotary printing presses the combination of a rotatable cylinder to be inked, an ink reservoir, a plurality of axially parallel members for successively forcing ink against the cylinder surface, a pump for pumping ink from said reservoir to a point in advance of said plurality of members, one of said members being flexible and regulable to vary the amount of ink retained on said surfaces, and means immediately in advance of said plurality of flexible members for collecting excess ink and returning it to the reservoir.

29. In an inking mechanism for rotary printing presses the combination of a rotatable cylinder to be inked, a reservoir, a pump for supplying ink from said reservoir to the cylinder surface, a plurality of axially parallel spaced apart members closely adjacent to the cylinder surface for applying, confining and regulating ink on the cylinder surface, the last of said members comprising a regulable flexible blade, means for collecting and returning excess ink to the reservoir and a screen through which the excess ink is passed.

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