

March 28, 1939.

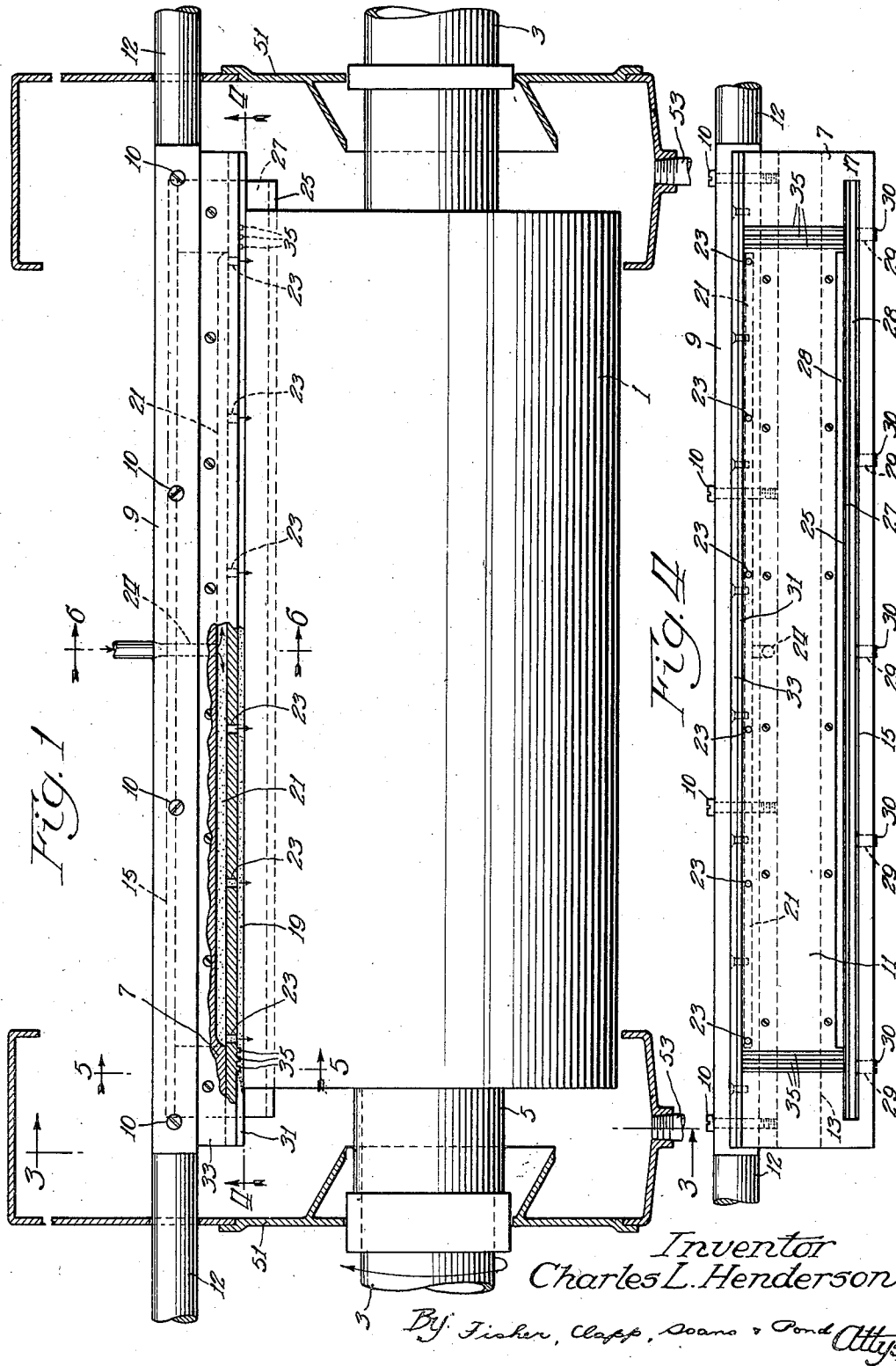
C. L. HENDERSON

2,151,968

FOUNTAIN DOCTOR

Filed July 27, 1936

4 Sheets-Sheet 1



March 28, 1939.

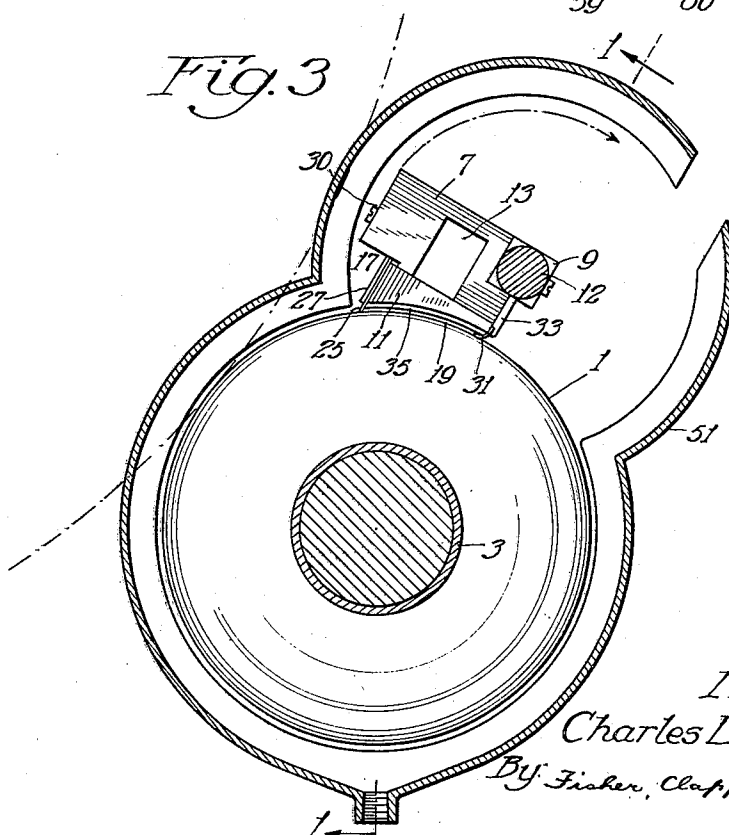
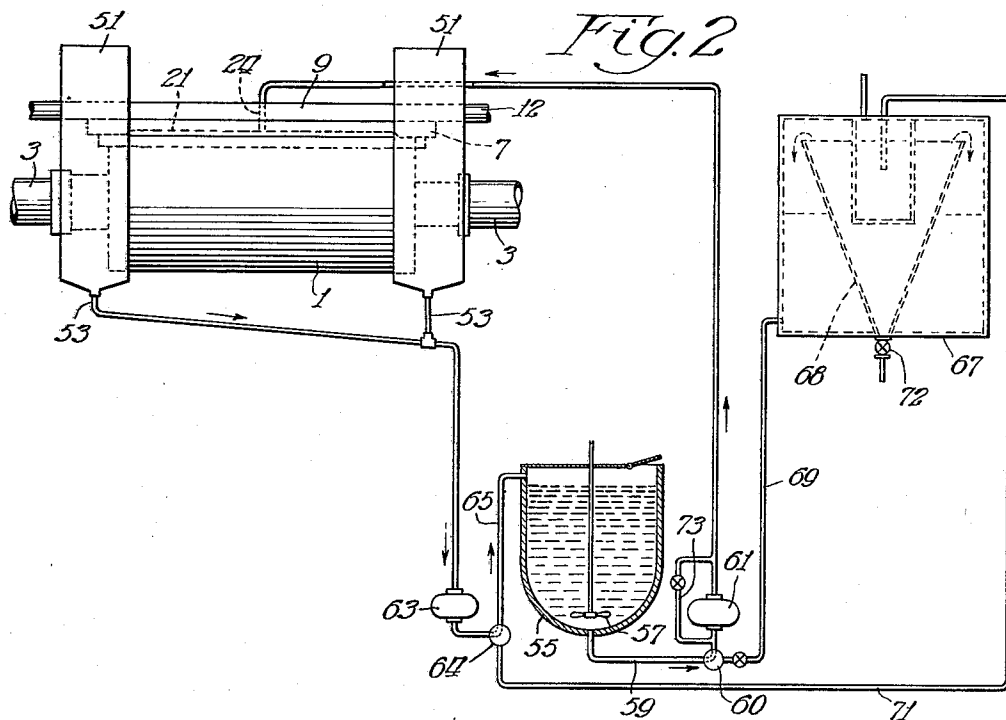
C. L. HENDERSON

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FOUNTAIN DOCTOR

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4 Sheets-Sheet 2



Inventor
Charles L. Henderson
By Fisher, Clapp, Soane & Bond
Attys.

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C. L. HENDERSON

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Fig. 5

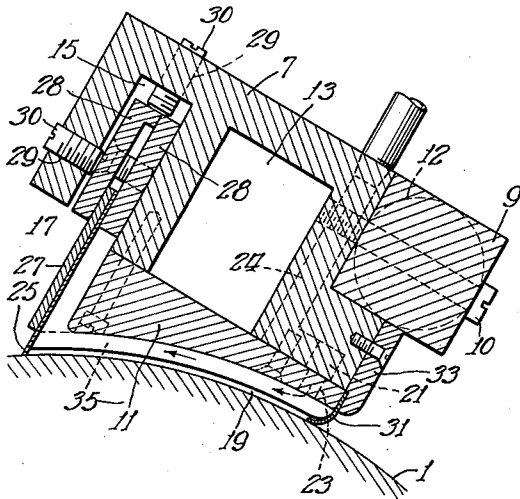


Fig. 6

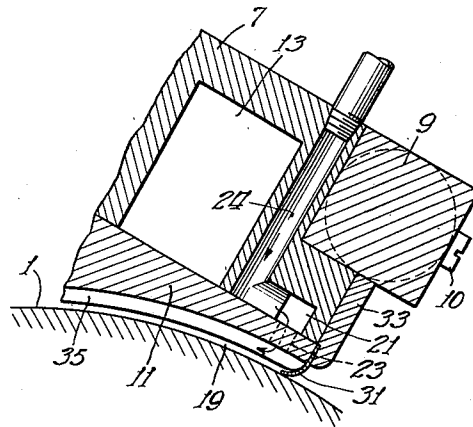


Fig. 7

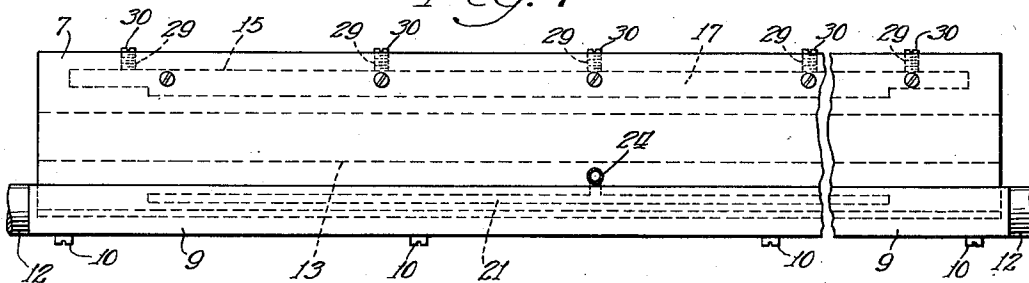
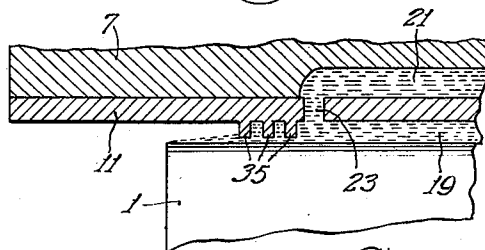


Fig. 8



Inventor
Charles L. Henderson
By: Fisher, Clapp, Seane & Pond
Attys

March 28, 1939.

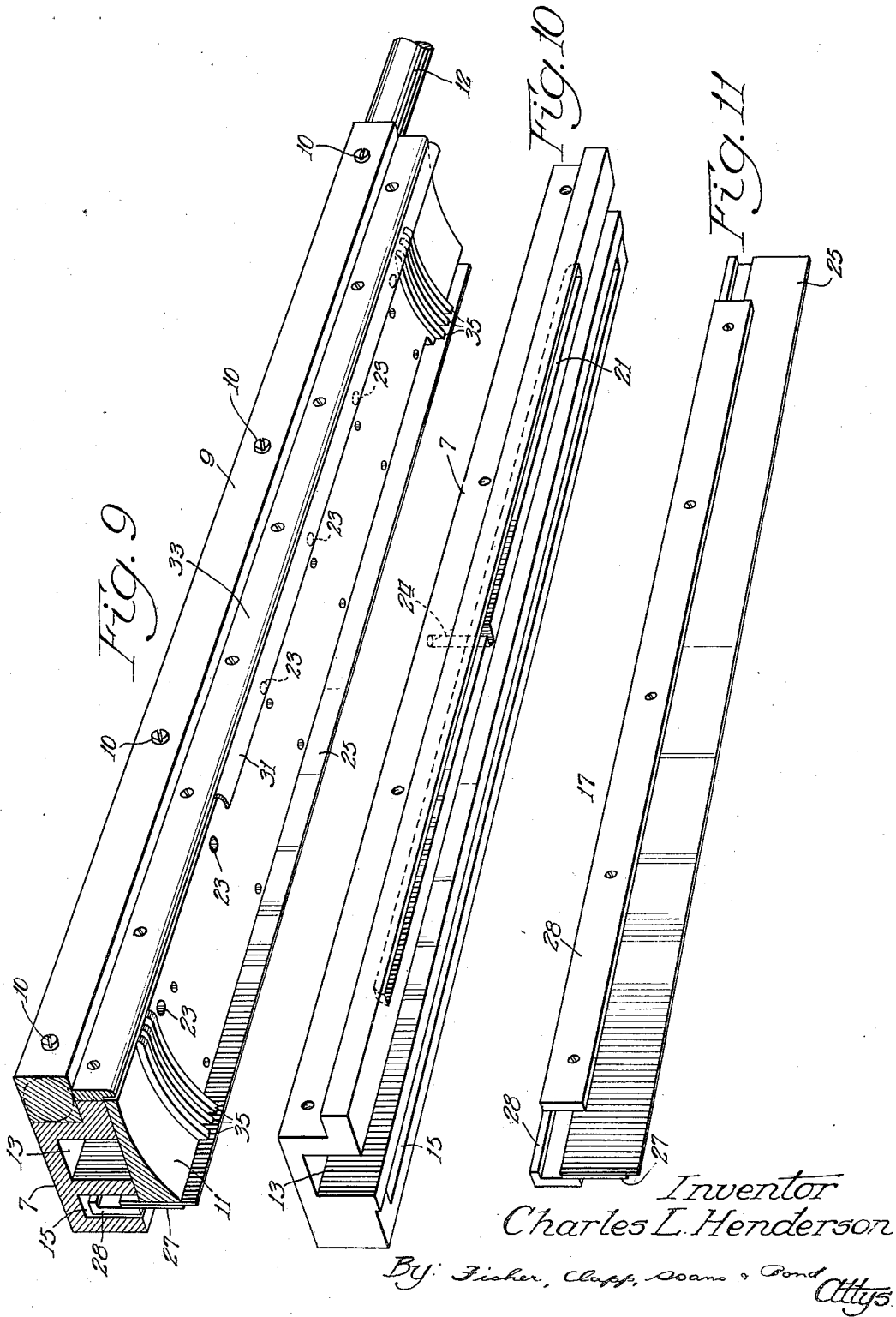
C. L. HENDERSON

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FOUNTAIN DOCTOR

Filed July 27, 1936

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UNITED STATES PATENT OFFICE

2,151,968

FOUNTAIN DOCTOR

Charles L. Henderson, Appleton, Wis., assignor,
by mesne assignments, to Standard Process
Corporation, Chicago, Ill., a corporation of Del-
aware

Application July 27, 1936, Serial No. 92,801

15 Claims. (Cl. 101—157)

My invention relates generally to inking mechanisms and particularly to devices of this type which are used in conjunction with rotary printing presses, as for example, those used in roto-
5 gravure printing.

The principal object of the present invention is to provide an improved inking mechanism for use with rotary printing presses which shall be simpler in design, more satisfactory in operation,
10 and less expensive to construct and to maintain in operative condition than the inking mechanisms heretofore known to the art.

More specifically, it is an object of the present invention to provide a practical inking mechanism for use with that type of multi-color, high speed, rotogravure press in which a plurality of etched printing cylinders are grouped around a single impression drum. Heretofore considerable difficulty has been experienced in
15 accomplishing satisfactory inking of the etched printing cylinders of presses of this type. The ordinary open type fountain, for example, is unsatisfactory and impractical due to the fact that high speed printing requires a rapid drying ink which evaporates so rapidly in open type
20 fountains that it is practically impossible to maintain proper ink consistency so as to prevent clogging of the ink retaining recesses in the etched printing cylinders. Similarly, closed type fountains in which the etched roller is enclosed in an air tight casing are not adaptable to high speed, multi-color presses using a single impression drum for the printing cylinders.

Other objects of the invention are to provide a simple, practical inking mechanism wherein the doctor blade assemblage and the ink fountain shall be combined into a single unitary structure, in contrast with the separate fountain and doctor blade heretofore in general use; to provide a novel type of inking mechanism wherein the ink shall be applied to the surface to be inked under a slight pressure; to provide an improved inking mechanism in accordance with the above stated objects which shall occupy
25 the minimum possible amount of space and which shall be readily applicable to existing rotogravure printing apparatus of any type; to provide an improved inking mechanism the use of which shall materially reduce the time required to change printing cylinders and start the printing operation; and generally to improve inking mechanisms of the subject type.

One preferred embodiment of the invention is illustrated in the accompanying drawings,
30 wherein—

Figure 1 is an elevational view, partially in section, illustrating an inking mechanism in accordance with the present invention as applied to an etched printing cylinder;

Figure 2 is a schematic view of the inking mechanism and the associated printing cylinder shown in detail in Figure 1 and one form of ink supply system which may be used in conjunction therewith;

Figure 3 is a sectional view on the general line 3—3 of Figure 1 and illustrates the relative position of the etched cylinder, the inking mechanism, and the impression cylinder during use of the inking mechanism;

Figure 4 is a plan view of the under side of the inking mechanism. The view is on the general line 4—4 of Figure 1;

Figure 5 is a sectional view on the general line 5—5 of Figure 1;

Figure 6 is a fragmentary sectional view on the general line 6—6 of Figure 1;

Figure 7 is a top view of the inking mechanism;

Figure 8 is a fragmentary sectional view illustrating the features of the labyrinth seal used in conjunction with the inking mechanism of the invention;

Figure 9 is a perspective view, partially in section, of the complete inking mechanism;

Figure 10 is a perspective view of the main frame portion of the inking mechanism illustrated in Figure 9; and

Figure 11 is a perspective view of the doctor blade assemblage forming a part of the inking mechanism illustrated in the other figures of the drawings.

The inking mechanism according to the present invention comprises, generally, an elongated structure which includes means for defining the walls of an elongated ink supply channel or passageway open along one of its sides and so arranged that this open side is normally closed by the etched printing surface of the printing roll or the like which it is desired to ink, and an ink supply system used in conjunction with this structure for continuously circulating ink through the supply channel under pressure. Preferably, a predetermined slight pressure is maintained in the ink supply channel at all times.

In Figure 1 an etched printing cylinder of conventional form is indicated at 1. The cylinder is mounted upon a suitable mandrel 3 and is locked into position by the usual locking sleeve 55

5. The ends of the mandrel are journaled in suitable bearings (not shown).

The inking mechanism proper includes an elongated main support member 7 which is mounted upon a suitable frame member 9 by means of four cap screws 10, and an elongated plate member 11 which is bolted or otherwise affixed to the bottom of the main support member 7. The frame member 9 is provided with cylindrical bearing portions 12 at the ends thereof which are journaled in the support bearings for the inking mechanism. In order to decrease the weight of the doctor blade assemblage as a whole, while at the same time maintaining sufficient rigidity for the purposes of the invention, the main support member 7 is of generally U-shaped construction, as is illustrated particularly in Figures 3, 5, and 10, a rectangularly shaped slot 13 of suitable width extending the full length of the support member.

A narrow rectangular slot 15 extends centrally of the outer side portion of the main support member 7 for receiving the doctor blade assemblage 17 which performs the dual function of forming one of the sides of the ink supply channel 19 and of removing surplus ink from the printing surface of the printing roll or cylinder 1 used in conjunction with the inking mechanism. As mentioned previously, the etched printing surface of the printing cylinder forms another of the sides of that channel.

The inner side portion of the main support member 7 is provided with a shallow groove or slot 21 extending along the bottom thereof. This groove 21 has a length somewhat greater than the width of the etching on the printing cylinder 1 and communicates with the ink supply channel 19 through a plurality of spaced openings 23 formed in the bottom plate 11 which defines the upper side of the ink supply channel 19. The groove 21 communicates with the ink supply system through a suitable drilled passageway 24 located centrally of the main support member and constituting, as will be described later, a portion of the conduit through which ink is supplied to the surface of the etched printing cylinder.

The doctor blade assemblage 17 is illustrated particularly in Figures 4, 5, and 11 and includes a main blade 25 which is adapted to bear directly upon the outer surface of the printing cylinder and a stiffening blade 27 which is of the same length as the doctor blade. Both the stiffening blade and the doctor blade proper are provided with an elongated frame 28 rigidly affixed to the upper edge thereof. The frames 28 are normally fastened together by screws, and the proportions of these frames are such that when the inking mechanism is assembled, the several elements of the doctor blade assemblage assume the positions shown in Figures 1, 5, and 9.

A plurality of threaded passageways 29 are formed in the outer side portions of the support member 7, these passageways 29 extending into the slot 15 in that portion of the main support member 7 at right angles to each other. Set screws 30 positioned in these passageways engage the frame portions 28 of the doctor blade assemblage 17 and provide convenient means for adjusting the doctor blade and locking it in position.

During the normal operation of the inking mechanism, ink is admitted into the ink supply channel 19 through the passageways 23. The supply channel is generally trapezoidal in cross

section, and since only three of the sides thereof are defined by the doctor blade 25, the bottom plate 11, and the etched surface of the printing cylinder 1, some means must be provided for preventing the ink from running down the surface of the printing cylinder. This means constitutes a relatively flexible sealing strip 31 which is adapted to bear directly upon the etched surface of the printing cylinder and thus define the fourth side of the ink supply channel 19. This sealing strip 31 may be formed of very thin spring steel (.002" steel ribbon has been used satisfactorily) or of a non-metallic composition and is held in place by a clamping plate 33 affixed to the support member 7 by flat headed screws or the like.

It is contemplated that the ink shall be continuously circulated through the ink supply channel 19 under pressure during the operation of the inking mechanism, this continuous circulation being made possible by the fact that the ends of the ink channel 19 are normally open. To keep the rate of flow of the ink within reasonable limits, and to assure that the ink channel is completely filled with ink under at least a slight pressure during the inking operation, the bottom surface of the bottom plate 11 has a series of relatively closely spaced, raised bands 35 formed integrally therewith adjacent its ends. These bands 35 form, in effect, a labyrinth seal which materially impedes the free discharge of ink from the ends of the ink channel. The lower surface of these sealing bands 35 are arcuate in form and follow the contour of the printing cylinder at close proximity thereto but are not in actual contact therewith.

Inasmuch as the sealing bands 35 do not entirely close the ends of the ink supply passageway 19, some means must be provided for taking care of the surplus ink which flows out the ends of the ink passageway 19 and is thrown off the ends of the printing cylinder 1 during the operation of the printing press. This means constitutes an ink guard 51 of suitable form arranged about each end of the printing roll or cylinder 1. These guards 51 serve to substantially enclose the ends of the printing cylinder 1 and to collect the ink which is thrown off the printing cylinder during the operation of the device. This ink which is collected by the ink guards 51 is returned to the ink system through suitable pipes 53 opening into the bottom of the ink guards.

The ink circulating system is not an important part of the present invention, however, the system illustrated diagrammatically in Fig. 2 has been found to be particularly satisfactory for use in conjunction with an ink supply mechanism according to the present invention. This system includes a reservoir 55 wherein the supply of ink is normally retained and kept in suspension by an agitator 57. Suitable piping 59 extends from the ink reservoir 55 to a three-way valve 60 and thence to an ink pump 61 which moves the ink through other piping 62 to the inking mechanism. The return flow of ink is from the guards 51 through the piping 53 to a second pump 63 which in turn connects with the ink reservoir 55 through a three-way valve 64 and other piping 65.

This arrangement permits automatic washup of the entire ink system and includes a settling tank 67 which normally contains an ink solvent and which is provided with a cone shaped settling basin 68 for separating the ink from the return mixture of ink and solvent. During the washup operation, the three-way valve 60 intermediate

the pipe 69 which connects the tank 67 with the pipe 59 leading from the ink reservoir 55 is turned to admit the washup solvent to the pipe 62 which normally conducts the ink from the pump 61 to the inking mechanism. This solvent thus flows through pump 61, pipe 62 and to the ink mechanism proper. After flowing longitudinally through the ink passageway 45 and across the surface of the printing cylinder 1 the ink escapes through the guards 51 to the piping 53. Thence it flows to the other pump 63 and is thereby relayed by the three-way valve 64 and the piping 71 to the settling basin 68 within the tank 67. Ink which settles in the settling basin is drawn off through valve 72 and salvaged.

The inking mechanism is not completely airtight since the guards 51 which catch the surplus ink from the ends of the printing cylinder are not completely sealed. However, the only part of the ink that is exposed to evaporation is the small amount that is being continuously discharged at the ends of the printing cylinder. At no time during the operation of the inking mechanism is there any substantial amount of ink in the entire system. The ink supply piping is preferably kept small ($\frac{1}{4}$ inch pipe being a satisfactory size for most present day installations) for the dual purpose of keeping the amount of ink in the pipe as small as possible and of insuring high velocity flow of the ink and of the ink solvent thereby preventing any tendency of the ink to adhere to the walls of the pipe.

The ink on the printing cylinder in passageway 19 is kept under a slight pressure which I have found to give improved printing results. This pressure is controlled by by-pass valve 73 around pump 61.

From the foregoing it will be seen that I have disclosed the features of a novel type of inking mechanism particularly suitable for use in conjunction with multi-colored rotogravure presses employing a plurality of printing cylinders and a single impression drum. While particularly intended for use in conjunction with this type of rotogravure press, the novel form of inking mechanism disclosed is also suitable for use with other types of rotary presses. The novel inking mechanism of my invention occupies a very small amount of space, due to the fact that the ink supply source and the doctor blade assemblage comprise a unitary structure. At the same time the mechanism accomplishes highly efficient inking of the printing roll, which result is due, at least in part, to the fact that the ink is applied to the etched printing surface of the printing cylinder as a flowing stream and under a slight pressure.

The inking mechanism of my invention may be mounted at practically any angle upon the printing cylinder with which it is used, thus readily adapting itself for use in conjunction with multi-cylinder presses and also making possible a substantial decrease in the space occupied by the printing apparatus as a whole. The inking mechanism is relatively simple in structure and inexpensive to manufacture. It may be readily taken apart for cleaning or servicing, and it may be readily applied to existing printing equipment at a very low cost. Further, use of the structure of the invention accomplishes substantial reductions in the amount of time required to change printing cylinders, since at the completion of a run it is necessary merely to turn off the ink, turn on the washup solvent, and when the washup is complete, swing the inking mechanism back so as

to permit free removal of the printing cylinder.

Various modified forms of inking mechanisms embodying the principles disclosed in the foregoing may of course be evolved, and it is my intention, therefore, that the claims shall be accorded the broadest reasonable construction consistent with the state of the art.

I claim the following as my invention:

1. In apparatus of the class described, a unitary structure for accomplishing the continuous inking of a moving printing surface which includes a doctor blade, a sealing blade spaced some distance therefrom, said spaced blades defining two of the sides of an elongated, relatively narrow ink passageway which is open at the ends thereof, and means for supporting said blades in such manner that both bear on the moving printing surface to be inked, that surface forming another of the sides of said ink passageway and the longitudinal axis of said passageway being arranged generally at right angles to the normal direction of movement of the printing surface, and means for causing liquid ink to flow longitudinally through said ink passageway in contact with said printing surface and out the open ends thereof.

2. In apparatus of the class described, a source of supply of liquid ink, a doctor blade and a sealing blade spaced some distance therefrom, said spaced blades defining two of the sides of an elongated ink passageway which is open at the ends thereof, means for supporting said blades in such manner that both bear on the moving printing surface with which said mechanism is used, this moving printing surface constituting another of the sides of said ink passageway, and the longitudinal axis of said passageway being arranged at generally right angles to the normal direction of movement of the printing surface, and means for causing liquid ink to flow longitudinally through said ink passageway in contact with the printing surface and out the open ends thereof to accomplish the continuous inking of that surface during the printing operation, said last mentioned means maintaining said ink in contact with said printing surface under predetermined pressure.

3. An inking mechanism for use in conjunction with a rotating printing cylinder comprising a source of supply of liquid ink, a doctor blade, an elongated main support member having a slot formed therein for receiving said doctor blade and means for adjustably positioning said doctor blade within said slot, an ink retaining blade supported on said main support member so as to form with said doctor blade and said support member an elongated ink passageway which extends transversely to the direction of movement of the printing surface of said printing cylinder and which is open at its ends and at one of the sides thereof, a portion of the moving printing surface of said printing cylinder being adapted to close this open side of said passageway, means for causing liquid ink to flow longitudinally through said passageway to effect the continuous inking of the printing surface, and a housing means for substantially enclosing the ends of the printing cylinder and said ink passageway so as to catch the ink which flows out the ends of the said ink passageway during the operation of said apparatus and to permit the reuse of said ink.

4. The method of continuously inking the moving printing surface of a printing cylinder which consists in subjecting a relatively narrow section or the printing surface of the cylinder to a transversely flowing stream of liquid ink which stream is directed against the printing surface

of the cylinder and is maintained in contact therewith under at least a slight pressure by a pair of transversely extending spaced blades which bear directly upon the surface of the cylinder, and removing said stream adjacent the ends of the cylinder.

5. In apparatus for accomplishing the continuous inking of a moving printing surface, a source of supply of liquid ink, means for subjecting said printing surface to a substantially enclosed relatively narrow stream of ink which flows along said printing surface transversely to the direction of movement of said printing surface to accomplish the inking thereof, means for removing surplus ink from said printing surface prior to the printing operation and means for collecting said stream of ink at the edges of said printing surface.

6. In apparatus for accomplishing the continuous inking of the printing surface of a rotating printing cylinder, means for defining the walls of a relatively narrow ink passageway, the longitudinal axis of which extends generally parallel to the axis of rotation of said cylinder, said passageway being open along one of its sides and at its ends, said open side being adapted to be closed by said moving printing surface, and means for causing liquid ink to flow longitudinally through said passageway and out the open ends thereof whereby the moving surface of said cylinder is subjected to a relatively narrow flowing stream of ink which flows in a direction transversely to the direction of movement of said printing surface, said wall defining means including means for removing surplus ink from the printing surface of said cylinder prior to the printing operation.

7. In the combination set forth in claim 6, means in said passageway adjacent opposite ends of said printing cylinder for restricting the flow of ink from said passageway.

8. Apparatus for supplying ink to a moving printing surface comprising means defining a walled ink conducting chamber extending transversely of the direction of motion of said surface, said surface forming one wall of said chamber, means for directing a stream of ink through said chamber in contact with said printing surface and means at opposite side walls of said chamber for preventing surplus ink from escaping from said chamber intermediate the edges of said printing surface.

9. Apparatus for supplying ink to the moving printing surface of a rotating printing cylinder comprising means defining a walled open-ended ink conductor chamber extending substantially longitudinally of said printing cylinder, the printing surface of said cylinder forming one wall of said chamber, means for directing a stream of ink along said surface through said chamber,

means at one side wall of said chamber for preventing ink from escaping from said chamber at that side, and means at another side wall of said chamber for removing surplus ink from said surface but permitting said surface to retain sufficient ink for printing purposes.

10. In the combination as set forth in claim 9, wherein said ink stream is directed over an edge of said cylinder after traversing said printing surface, means at the end of said cylinder for collecting said ink as it falls over said edge.

11. Apparatus for supplying ink to a moving printing surface comprising means defining a walled ink conducting chamber extending transversely of the direction of motion of said surface, said surface forming one wall of said chamber, and transversely extending conduit means associated with a chamber wall distinct from said surface, said chamber being in fluid communication with said conduit means for continuously receiving a stream of fresh ink and open at an end for discharging ink which has passed over said surface.

12. Apparatus for supplying ink to a moving printing surface comprising means defining a walled chamber extending transversely of the direction of motion of said surface, said surface forming one wall of said chamber, conduit means in another wall of said chamber extending generally parallel to said chamber and means for conducting ink from said conduit means to said chamber.

13. Apparatus for continuously inking the moving printing surface of a rotary printing cylinder comprising means defining a walled chamber extending generally longitudinally of said cylinder, said surface forming a wall of said chamber, conduit means in another wall of said chamber extending generally longitudinally of said cylinder, means including a plurality of apertures in said wall for conducting ink from said conduit means to said chamber, said chamber being open at opposite ends for the discharge of ink which has passed therethrough along said surface.

14. Apparatus for continuously inking a moving printing surface comprising means extending generally longitudinally of said cylinder and defining a walled chamber having its opposite ends open, said printing surface forming one wall of said chamber, means for introducing ink into said chamber to flow over the edges of said cylinder, and ink collecting means at the edges of said cylinder, said chamber having its opposite ends extending into said ink collecting means.

15. In the combination set forth in claim 14, wherein said ink collecting means extends over and partially houses the ends of said printing cylinder.

CHARLES L. HENDERSON.