United States Patent

[11] 3,589,287

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[54] **ROTOGRAVURE INK FOUNTAIN WITH COVER-LIFTING SYSTEM**
9 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** **101/363**
[51] **Int. Cl.** **B41f 1/46**
[50] **Field of Search** 101/157, 335, 340, 330, 331, 349, 350, 355, 356, 360, 363, 364, 365, 366, 367, 344, 347; 118/259, 42

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Primary Examiner—William B. Penn
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ABSTRACT: An ink fountain for a rotogravure press which is pivotally mounted and can be tilted down away from the printing cylinder for cleaning the fountain pan or changing the cylinder. A cover system for enclosing the cylinder when the pan is in its operative position and which will automatically cam off or lift away from the cylinder as the pan is lowered away from it. The cover system is hinged to the pan and can be swung away from the pan so as to uncover the pan and cylinder for easy cleaning and replacement.

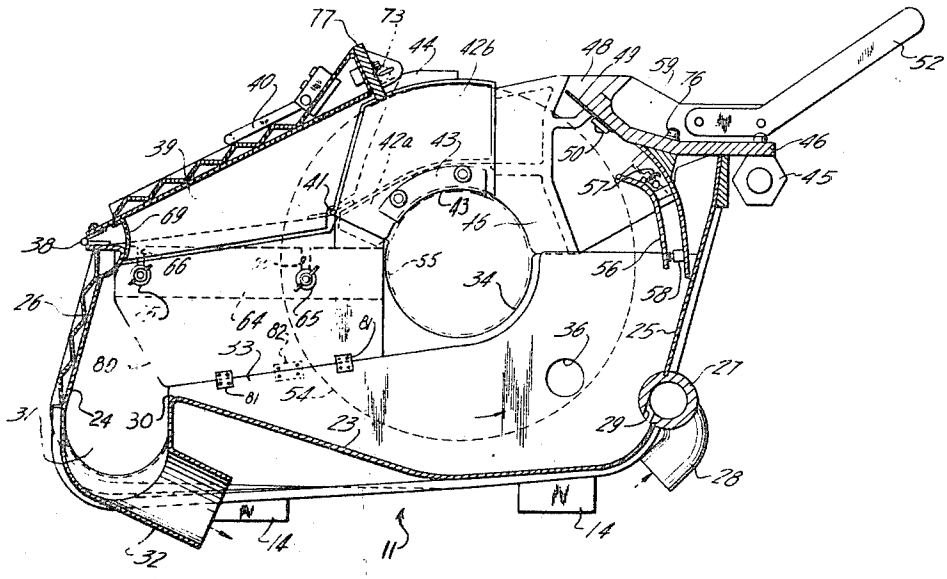

FIG. 1

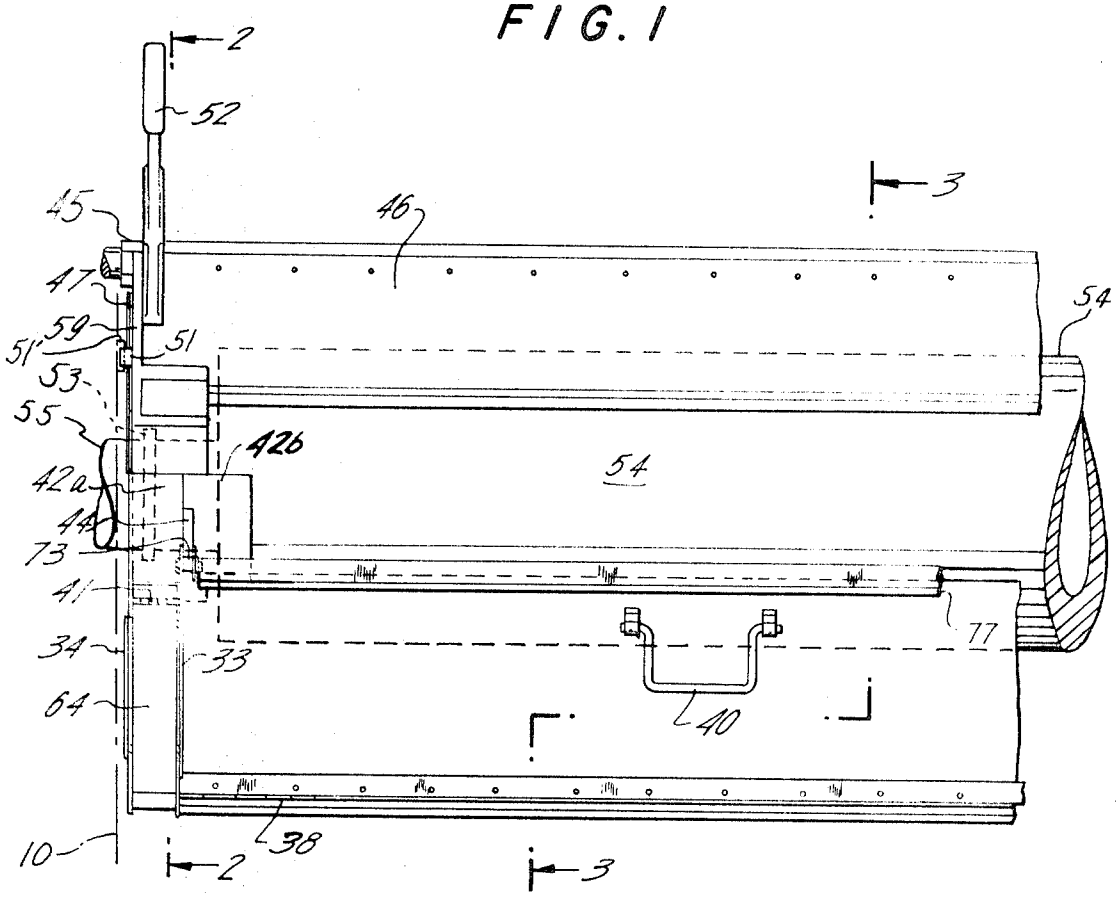
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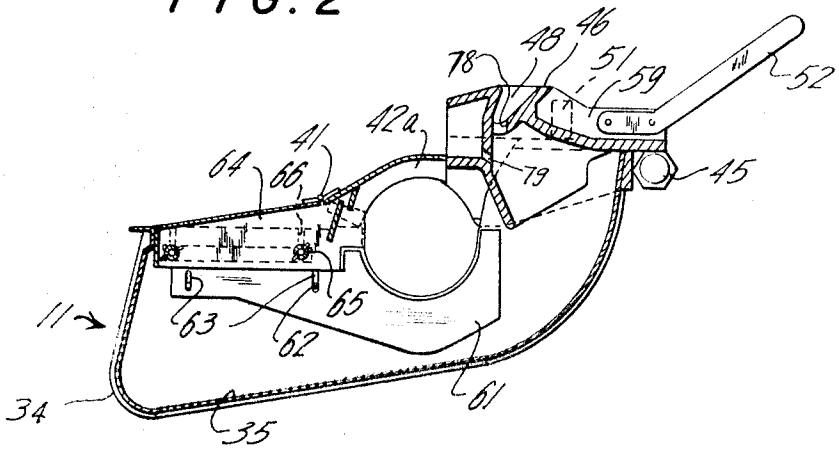
FIG. 2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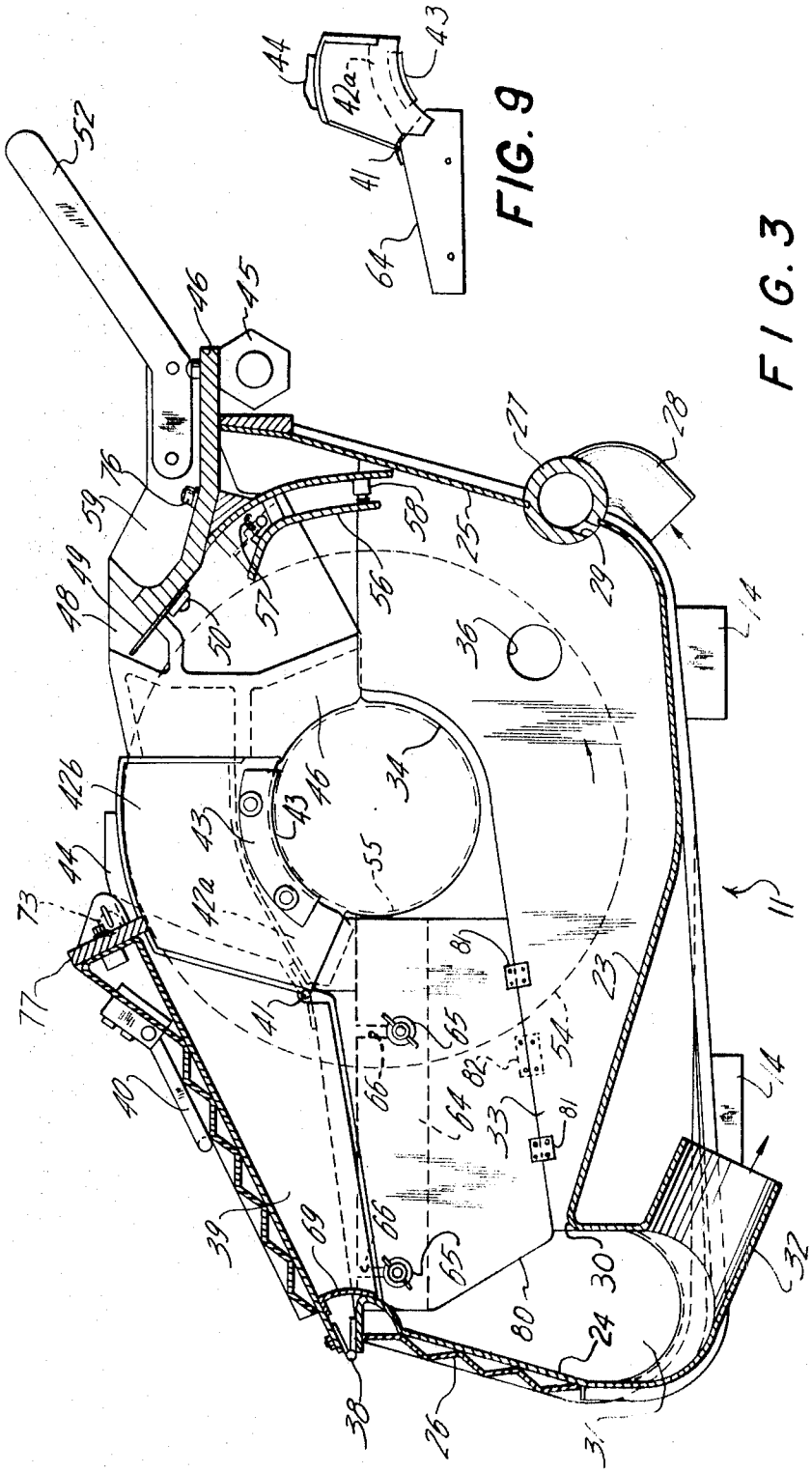
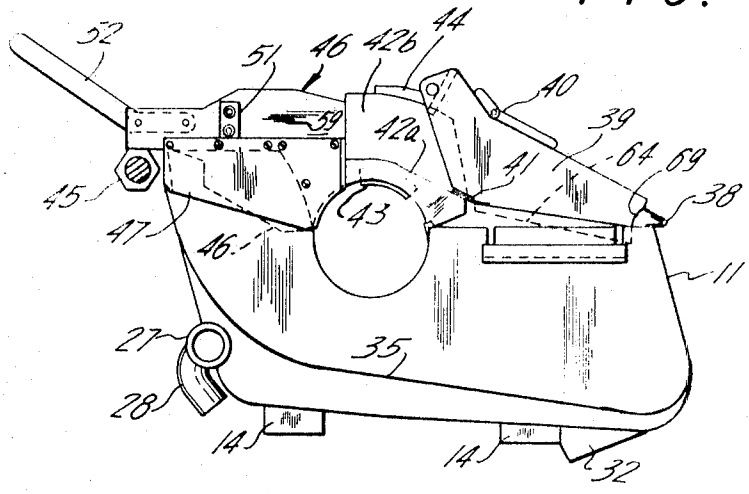


FIG. 3

FIG. 9

FIG. 4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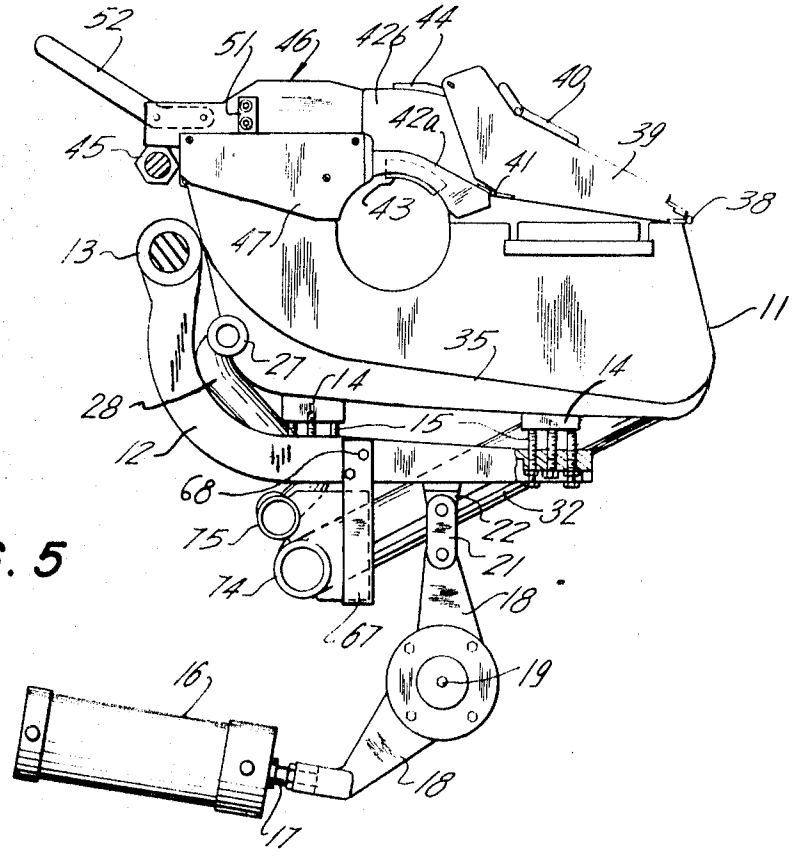
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FIG. 5

FIG. 6

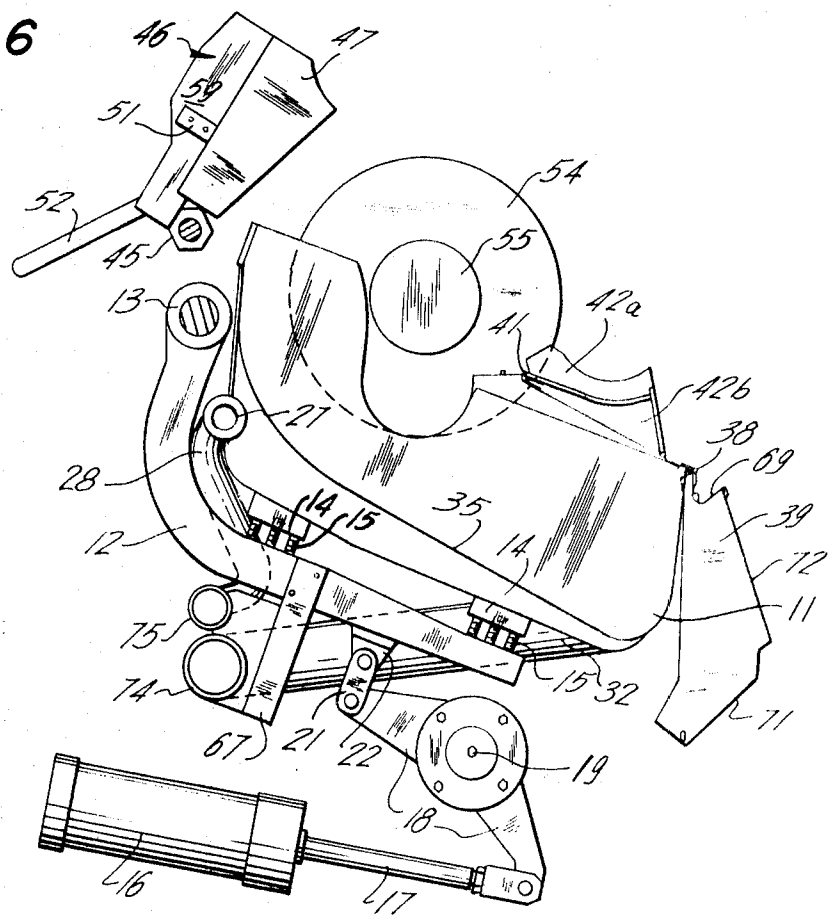
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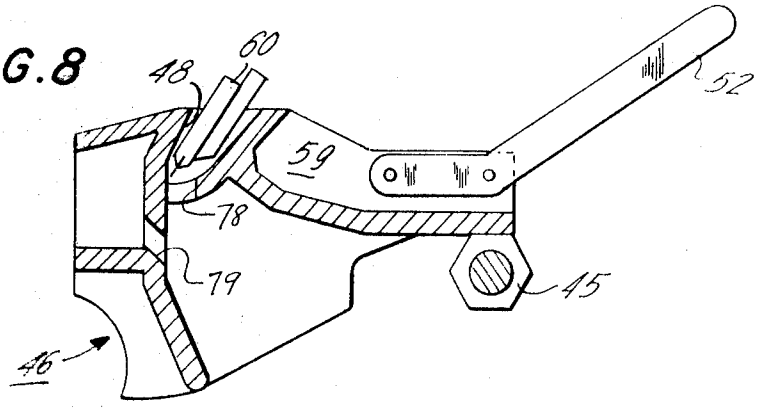
FIG. 8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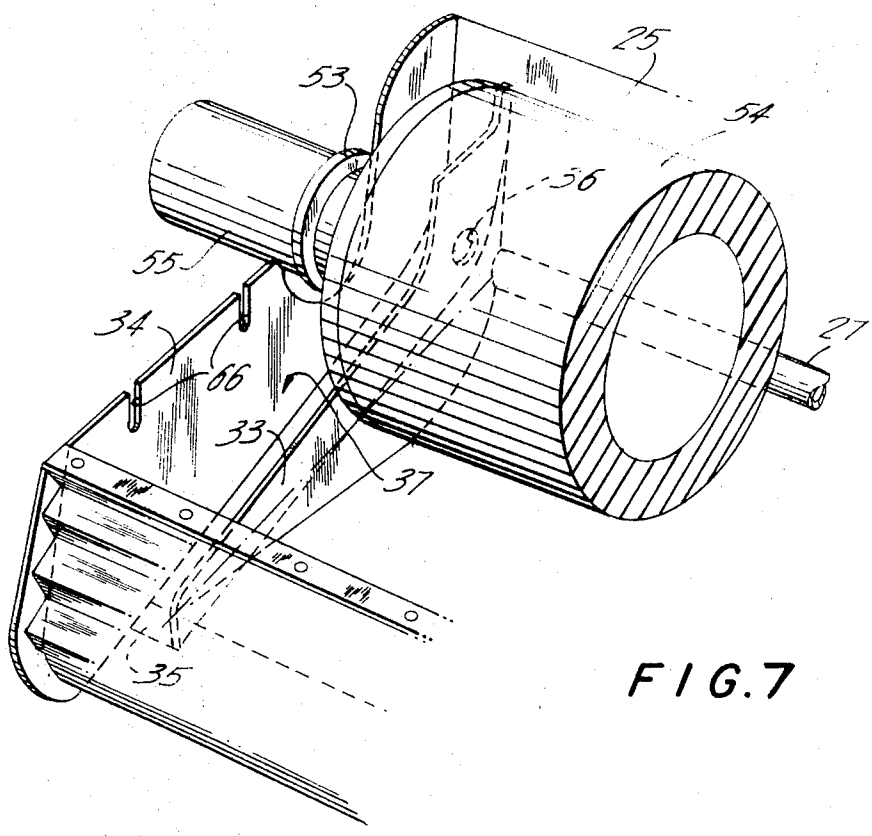

FIG. 7

ROTOGRAVURE INK FOUNTAIN WITH COVER-LIFTING SYSTEM

BACKGROUND OF THE INVENTION

This invention relates generally to rotogravure or rotary intaglio printing presses and more particularly to the inking system of such a press.

It is a general object of the present invention to provide an ink fountain and cover system which is so constructed so as to reduce the makeready time required for beginning a run and to minimize the skills required during the makeready and maintenance operations of the ink fountain system.

When completing a run of the press or beginning a new run it is usually necessary to remove the ink from the fountain pan and to replace it with fresh ink. Obviously, it is also necessary to remove the ink from the pan when changing colors or replacing the printing cylinder. In order to accomplish these changes it has heretofore been necessary for an experienced mechanic with appropriate tools to remove side baffles, cover plates, bearing clamps and other such associated parts in order to scoop out and scrape or pump out or otherwise remove the remaining ink from the stationary fountain pan. The removal of these separate parts is time consuming, difficult because of sometimes large and heavy parts which have to be disassembled, not lost and later replaced and requires certain minimum skills of the mechanic.

An improvement to the tedious task of removing ink from the fountain pan has been accomplished through the use of tiltable fountain pans as shown for example in U.S. Pat. Nos. 2,519,229 and 2,550,454. The time-consuming and difficult task of having to remove the side baffles and cover plates so that the printing cylinder can be removed or replaced or so that the pan can be lowered to drain off the ink still remains a problem. As a result of this tedious job requiring removal of all these parts, at times ink is left in the fountain pans rather than draining the ink after the previous run. This usually results in the ink becoming contaminated and crusty thereby making the task even more difficult by requiring the pan to be scraped.

It is therefore an object of the present invention to provide an ink fountain and cover-lifting system for use on rotogravure printing presses having a construction which will overcome the above-mentioned problems thereby making the removal of ink from the fountain pan a relatively simple task.

Another object of the present invention is to provide an ink fountain wherein the fountain cover, caps and seals will automatically lift away from the fountain roller or cylinder as the fountain pan is lowered or tilted down away from the cylinder.

A further object of this invention is to provide an ink fountain with automatic cover-lifting system as the pan is lowered in which the pan and cover are adjustable to accept a variety of printing cylinder diameters.

Another object of the present invention is to allow for the removal and replacement of the printing cylinder without requiring the removal of any fountain parts and only necessitating a lowering of the fountain pan and lifting of the fountain covers.

Another object of this invention is to provide an ink fountain wherein the panels and ducts are so designed that all ink automatically runs off to the drain system when the pan is lowered.

Other objects, advantages and features of the present invention will become more apparent from the following detailed description in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a partial top view of the present invention;

FIG. 2 is a section view taken along lines 2–2 of FIG. 1;

FIG. 3 is an enlarged section view taken along lines 3–3 of FIG. 1;

FIG. 4 is an end view as seen from the left of FIG. 1;

FIG. 5 is also an end view of the present invention showing the pan and cover in its closed position encircling a printing cylinder, and with means for lowering the pan and lifting the cover;

FIG. 6 is a similar end view showing the present invention in its lowered position exposing the printing cylinder with the pan in its fully lowered position;

FIG. 7 is an isometric view of one end of the pan;

FIG. 8 is a section of the backer cover showing the relative position of a doctor blade mechanism; and

FIG. 9 is a detail view of one portion of the cover system.

DESCRIPTION OF THE INVENTION

Referring now to the particular embodiment of the present invention as illustrated in the accompanying drawings there is shown an ink fountain pan **11** supported by support means comprising an arm **12** which is pivotally supported on rod **13**. At four points along the bottom of pan **11** there is located a pair of support blocks **14**. These blocks are supported on arm **12** by threaded bolts **15** which are adjustable so that the distance between the pan **11** and arm **12** can be varied so that the depth of immersion of a design cylinder in the pan is also variable simply by adjusting the height of the pan.

The means for lowering the pan is shown in FIGS. **5** and **6** as a pneumatic cylinder **16** having its piston rod **17** connected to one end of a lever arm **18** which is pivotally mounted at **19**. The other end of lever arm **18** is connected to hinge **21** which in turn is joined to bracket **22** which is secured to arm **12**. When the cylinder **16** is actuated by a signal, piston rod **17** will be extended causing lever arm **18** to rotate in a counterclockwise direction about pivot point **19** thereby pivoting arm **12** downwardly about pivot bar **13** and consequently the pan **11** along with it.

Using a pneumatic cylinder for lowering the pan is only one of many alternatives and it is therefore not here intended to limit the lowering means to the mechanism shown and described herein. For example, electrical means such as a motor can be used in place of the pneumatic cylinder, and in fact the pan can be lowered manually.

Turning now to the construction of the pan itself, FIG. **3** shows a midsection of the pan generally referred to as numeral **11** having a bottom **23**, a front wall **24** and a backwall **25**. These walls are made of sheet metal and due to the length of the pan, approximately 120 inches, reinforcement of corrugated sheets **26** are required for extra strength. Built into the backwall **25** is an ink manifold **27** for supplying ink into the pan. The ink is supplied from a mixing tank, not shown, by means of connection **28**. The manifold **27** is provided with a slit **29** on its bottom side from which the ink is fed into the pan. The bottom of the tank slopes upwardly to an overflow point **30** and into a drain trough **31** from whence it is returned to the mixing tank via drain **32**.

The connection **28** to the manifold **27** extends from a point where it is held in place by bracket **67** which depends from arm **12** being secured thereto by means of bolts **68** (See FIG. **5**). Since the pan will be in motion this bracket serves to prevent connection **28** from breaking loose or otherwise being damaged. At the end **75** of the connection **28** is a flexible hose, not shown, connected to connection **28** which leads to the mixing tank. Another flexible hose, also not shown, is attached to the end **74** of the drain **32** and also leads back to the mixing tank. Consequently it is not necessary to remove connections with the mixing tank when lowering or raising the fountain.

Each end of the pan is closed off by sidewalls extending upwardly from the bottom of the pan at the opposite ends of the cylinder. Each of these sidewalls is comprised of an inner wall consisting of an inner baffle **33** and an upper extension **80** held to the baffle **33** by brackets **81** and **82**. Between this inner wall and an outer wall **34** there is a space or well **37** for catching any ink drain from the doctor blade or from the guard collar **53** on the shaft **55** of the design cylinder **54**. The bottom **35** of

the well 37 slopes downwardly causing any overflow ink to pass into the drain trough 31 and drain 32. A bleedoff opening 36 is provided in the inner baffle 33 for allowing overflow of turbulent ink entering the pan to drain off into the well 37. This opening 36 is located toward the rear of baffle 33 so as to be in proximity with the entering flow of ink. The bottom of the well 37 leads into the drain system 31, 32. This drain off provides constant wash through of the well 37 to prevent build up of caked ink deposits as the drainings from the doctor blade or shaft collar 53 are meager and do not create a steady flow. While only one such bleedoff hole is shown, it is possible that two or three could be provided if it is found to be necessary.

Mounted on the front lip of the pan 11 is a hinge 38 for supporting a fountain cover 39. This cover is provided with a handle 40 so that it can be manually pivoted about hinge 38 to uncover the pan. This cover has a backwall 69 which forms a protective shield for hinge 38 when the cover 39 is in place thereby forming a dripproof hinge. Ink splash from the rotation of the design cylinder and ink fumes are consequently prevented from escaping through the hinge 38 or contaminating it. A well cover 64 is fitted over the well 37 and secured in place between the outer wall 34 and inner wall 80 by wingnuts 65, passing through slots 66 on outer wall 34 and inner wall 80. This cover is adjustable in height by sliding it up or down, guided in slots 66. As seen more clearly in FIG. 9, this cover is provided with a hinge 41 and has attached thereto a top cap 42 for covering the ends of the cylinder. The cap has a lower and upper part 42*a* and 42*b* respectively, the lower part covers the cylinder shaft 55 and shaft collar 53 while the upper part 42*b* covers the end of the cylinder 54. The lower part 42*a* of the cap is provided with a cam 43. The operation of this cap and well cover will be described more fully in subsequent portions of this description. The cam 43 is preferably a synthetic material substantially unaffected by the solvents used in the printing inks and offers little friction resistance to a metal surface, as the underside of this cam rides on the metal shaft 55 of the design cylinder 54. A second cam element 44 is mounted on the top of cap 42 which provides a surface upon which cover 39 will ride when the pan is being lowered and the cover has not been manually opened. The cover 39 is provided with a roller 73 for resting and riding on cam 44.

Mounted on a pivot support 45 which is secured between the side frames, adjacent to the pan is a backer cover 46 with a side seal plate 47 attached thereto at each end. The backer cover 46 has an abutment element 51 attached to it, and element 51 sits on a stop or support element 51' which is secured to the machine frame 10. The sectional views, FIGS. 2 and 3, reveal that the backer is a casting having an opening 48 extending longitudinally along the length of the backer for receiving the blade and blade holder of a doctor blade mechanism as shown in FIG. 8. The bottom of opening 48 is provided with a drain 78 so that any drippings from the doctor blade will be returned to the pan. A sealing blade 49 is attached, by means of bolts 50, to the casting and extends to the doctor blade in a deflected posture for preventing ink splash from escaping the confines of the pan and pan cover. A second drain 79 is provided in backer 46 for returning any ink splash from the cylinder to the pan. Also mounted on the backer by means 76 is a backer blade 56 which acts as a primary doctor to wipe large amounts of excess ink off the design cylinder surface so that the doctor blade can perform its proper function of wiping the cylinder surface clean. This backer blade 56 is biased forward at its front end by means of spring 57 and its back end is prevented from swinging back by stop 58.

The backer 46 is provided with a handle 52 secured to either or both ends of the backer. For this purpose the backer ends have an extended shoulder 59. By means of handle 52 backer cover 46 and side seal plate 47 attached thereto can be pivoted about bar 45 so as to be swung away from the pan and cylinder to expose the upper back portion of the cylinder and the interior of the pan. The doctor blade mechanism must be moved away from the cylinder, and consequently out of the opening 48 before backer cover 46 can be swung away. It is only necessary, however, to swing the backer cover away from the pan if removal of the cylinder is to be accomplished. In situations where it is only desired to lower the pan and uncover the cylinder so that ink can be removed or replaced and the pan or cylinder washed, it is not necessary to swing the backer cover 46 and side seal plate away. As will be described in more detail in the description of the operation it is only necessary to actuate the mechanism for lowering the pan in order to drain the ink and also uncover the cylinder surface.

The ends of the pan 11 are fitted with an adjustable collar 61 which is held to the inner wall by means of locking nuts 62 in slots 63. By sliding collar 61 up or down, an appropriate fit for different-size cylinder shafts can be achieved so that the side baffle and inner wall properly performs its function of retaining ink within the pan.

OPERATION

In operation, ink enters the pan 11 through opening 29 in manifold 27 coming from a mixing tank via a flexible hose to connection 28. The ink is picked up by the design cylinder traveling in the direction of the arrow and causes turbulence in the ink flow. Excess ink is wiped from the cylinder by backer blade 56, this excess ink falling back into the turbulent flow. The action of the doctor blade against the surface of the cylinder also contributes to the flow of return ink.

The level of ink in the pan is constantly controlled by providing for a steady drain off of ink over point 30 into the drain system 32, back to the mixing tank. In this manner the pan is constantly being replenished with fresh ink.

Excess drippings from the cylinder shaft collar 53 fall into the space between inner wall 33, 80 and outer wall 34. This space is also constantly washed by overflow of ink through the bleedoff opening 36.

The height of the ink level and consequently the depth of cylinder immersion into the ink is variable by means of varying the height of the pan itself with respect to the cylinder. By adjusting the bolts 15 the height of the pan 11 can be changed relative to its supporting arm 12.

When it is desired that the pan be lowered for the purpose of draining out all the ink or cleaning the pan or for changing the cylinder it is no longer necessary for a mechanic to remove side baffles, cover and caps in order to expose the pan and then pump out or scoop out the ink from the pan or manually tilt the pan so as to spill out the ink. It is only necessary to actuate the lowering mechanism, the rest is very simply and almost automatically accomplished.

In the preferred embodiment described herein piston rod 17 is caused to become extended by cylinder 16. Lever arm 18 is thereby rotated counterclockwise about pivot point 19. The lever 18 being hinged to arm 12 pulls the arm downward causing the pan 11 supported thereby to be lowered about pivot bar 13.

As the pan is being lowered well cover 64 is being lowered with it and therefore top cap 42 is being caused to tilt back, riding on its cam 43 over the cylinder shaft 55, about the hinge 41. As the cap 42 is tilting back it is also pushing cover 39 back about its hinge 38 to expose the upper front portion of the cylinder and the interior of the pan. The cover edge 71, cover bottom 72, and roller 73 ride on cap cam 44 as the cap 42 is itself riding back about hinge 41.

When the piston rod 17 has reached its fully extended limit the pan bottom 23 will be in a horizontal or slightly downgraded position so that any ink in the pan or well 37 will spill over into the drain system 31, 32 thereby completely emptying the fountain. The cover 39 is pushed back exposing cylinder 54. The ink having been drained, the pan can now be raised by operating the lowering mechanism in reverse. The top cap 42 will be pushed into its original position and cover 39 will ride forward on cam 44 until it is also in its closed position.

If it is desirable or necessary to clean the inside of the pan or the cylinder the cover can be easily opened while the pan is in its lowered position by means of the handle **40** into the position shown in FIG. **6** by swinging it still further about hinge **38**. If the cover is opened, cap **42** will fall back and rest on the well cover **64**. The pan and cylinder will now be almost fully exposed thereby allowing free access for cleaning. The cover can easily be replaced by manually returning the caps into contact with the cylinder shaft, holding them in place and then lifting the cover into its closed position, the caps now being held in place by the cover. The pan can now be raised as described above.

If it is desirable or necessary to remove the cylinder the additional step of removing the doctor blade out of opening **48** and pivoting backer cover **46** with side seal plate **47** back about pivot support **45** by means of handle **52** will be necessary. When the pan is thus in its lowered position with cover **39** in its opened position, caps **42** in its swung back position and backer cover **46** pulled back, as shown in FIG. **6**, the cylinder can easily be rolled out and replaced. The backer cover can then be swung forward, the caps and cover replaced and the pan raised so that a new run can begin.

With the pan in its lowered and uncovered position (FIG. **6**) if it is also desired to clean the well **37** (space between the inner and outer walls) well cover **64** will have to be removed. This is easily accomplished by loosening wingnuts **65** and lifting the cover **64** out of its position.

If the cylinder and cylinder shaft have a slightly different diameter this fountain is easily adjustable. Collar **61** can be adjusted to the proper change, cover **64** can also be adjusted by varying the relative points at which wingnuts **65** will be tightened in slots **66** and the height of the pan itself can be adjusted by bolts **15** to correct for the proper depth of immersion of the new cylinder.

It can be seen that the present invention provides for an ink fountain having a construction as described above in which the pan can be lowered and uncovered to remove and replace ink or remove and replace the design cylinder without having to physically detach the caps and covers thereby greatly reducing the makeready time for a new run and requiring no special mechanical skills to accomplish the complete uncovering of the pan and cylinder. The lowering operation is easily accomplished without having to detach connections to and from the ink supply or any other components.

While the invention has been described and illustrated with respect to a certain preferred embodiment which gives satisfactory results it will be understood by those skilled in the art after understanding the purpose of the invention that various other changes and modifications may be made without departing from the scope of the invention and it is therefore intended to cover all such changes and modifications in the appended claims.

What we claim is:

1. An ink fountain for a printing press having a printing cylinder mounted for rotation on a shaft extending outwardly from the ends thereof, said ink fountain comprising:

a. a pan for containing ink into which said cylinder is adapted to be partially immersed, said pan comprising:
   1. a bottom underlying said cylinder,
   2. front and back walls extending upwardly from said bottom and generally parallel to the longitudinal axis of said cylinder on opposite sides thereof, and
   3. sidewalls extending upwardly from said bottom at the opposite ends of said cylinder;

b. pan support means for mounting said pan for movement between an upper position in which said cylinder is partially immersed in said ink and a lower position, said pan support means supporting said pan for pivoting movement about an axis disposed adjacent said back wall and extending parallel to the shaft of said cylinder;

c. a fountain cover pivotally mounted at the front wall of said pan for movement between a first position covering the upper front portion of said cylinder and a second position exposing said cylinder and the interior of said pan; and

d. cam means connected to said pan and having a first cam surface engaging and riding on the shaft of said cylinder and a second cam surface engaging and supporting said fountain cover when in said first position, said cam surfaces being shaped to pivot said fountain cover toward its second position upon movement of said pan toward its lower position.

2. An ink fountain according to claim **1** further comprising:

a. ink supply means mounted on the backwall of said pan;

b. an ink drain disposed at the front wall of said pan;

c. outer sidewalls extending upwardly from the bottom of said pan and spaced outwardly from said first mentioned sidewalls to define a well for receiving ink dripping from said cylinder;

d. means for connecting said well to said drain; and

e. an opening in each of the first-mentioned sidewalls adjacent the backwall of the pan to provide a path for ink in said fountain extending through said well and to said drain.

3. An ink fountain according to claim **2** wherein:

a. said pan has upwardly sloped bottom toward the front wall to an overflow point which drops off into the drain running longitudinally along the bottom of said pan whereby a constant level of ink is maintained in said pan in its upper position and whereby all the ink in said pan is drained off into said drain when said pan is moved to its lower position.

4. An ink fountain according to claim **1** further comprising:

a. outer sidewalls extending upwardly from the bottom of said pan and spaced outwardly from said first-mentioned sidewalls to define a well for receiving ink dripping from said cylinder;

b. a well cover removably fitted over each of said wells, said well covers extending from the front wall of the pan toward the cylinder; and

c. a top cap hinged to said well cover adjacent the cylinder for pivoting movement about an axis parallel to the cylinder,
   1. said top cap having a first part covering the cylinder shaft and a second part covering the ends of the cylinder, and
   2. said cap cover having connected thereto said first and second cam surfaces.

5. An ink fountain according to claim **4** wherein said pan support means comprises:

a. a support arm underlying said pan and pivotally mounted for movement about said axis;

b. a plurality of support blocks mounted on the underside of said pan; and

c. a plurality of adjusting screws supporting the blocks on said arm, said screws being adjustable to raise and lower the position of the pan on said support arm to vary the depth of immersion of the cylinder in the ink contained in said pan.

6. An ink fountain according to claim **5** further comprising:

a. a backer cover pivotally mounted adjacent the backwall of said pan for movement between a first position covering the upper back portion of said cylinder and a second position exposing said cylinder and the interior of said pan.

7. An ink fountain according to claim **6** wherein:

a. said fountain cover and said backer cover are each provided with a handle for manually swinging said covers away from said cylinder to thereby expose it.

8. An ink fountain according to claim **7** further comprising:

a. a backer blade supported by said backer cover in said pan in contact with said cylinder surface for scraping said surface clean of excess ink.

9. An ink fountain according to claim **8** further comprising:

a. an adjustable collar for said cylinder connected to each of said sidewalls so that said pan can be fitted to a variety of cylinder diameters by varying the position of said collar.