Jan. 18, 1938. A. J. HORTON 2,106,029

INKING MECHANISM AND METHOD FOR PRINTING MACHINES

Filed April 16, 1935 2 Sheets-Sheet 1

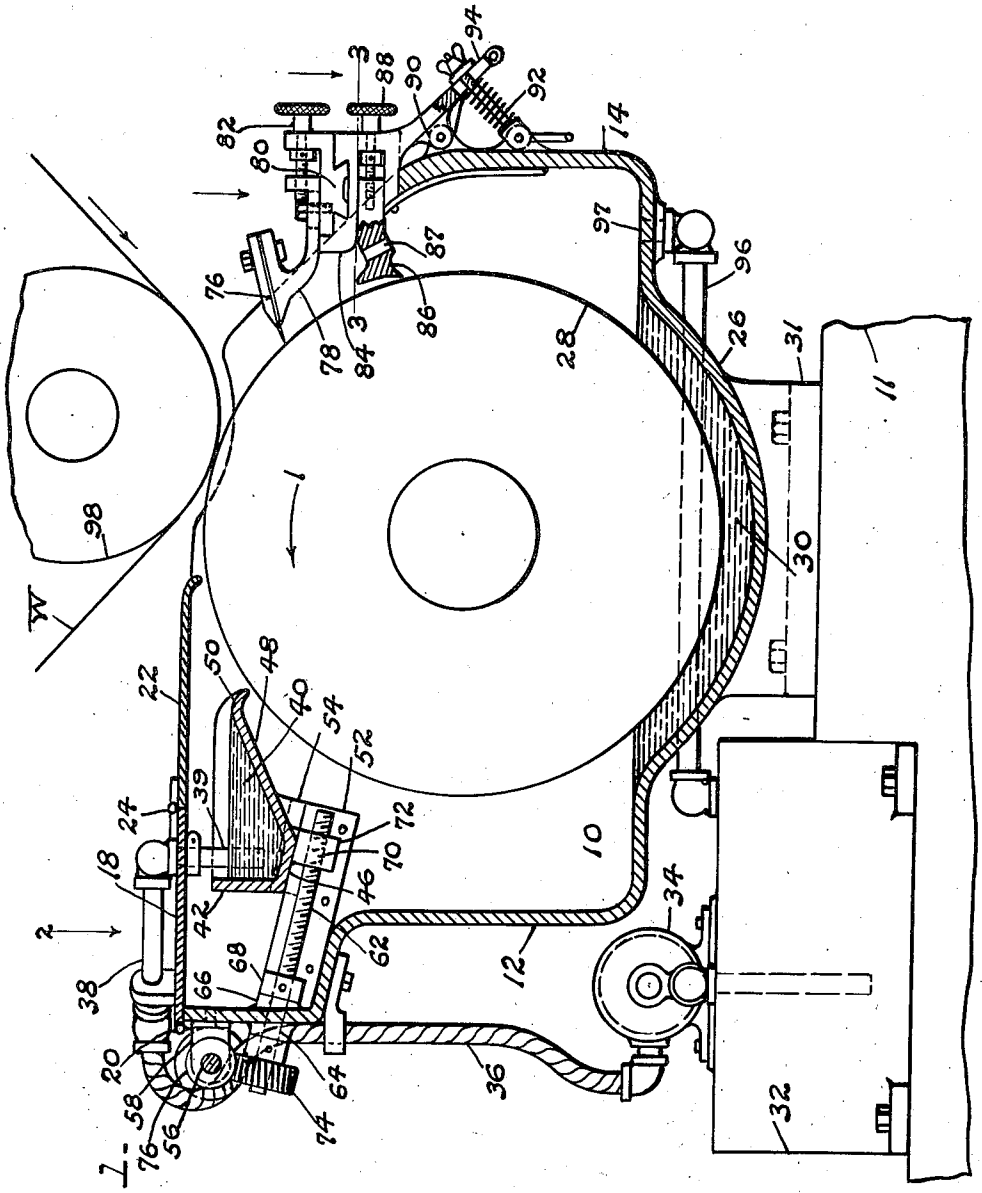


Fig. 1.

INVENTOR.
Albert J. Horton

By John R. Townley

Jan. 18, 1938. A. J. HORTON 2,106,029

INKING MECHANISM AND METHOD FOR PRINTING MACHINES

Filed April 16, 1935 2 Sheets-Sheet 2

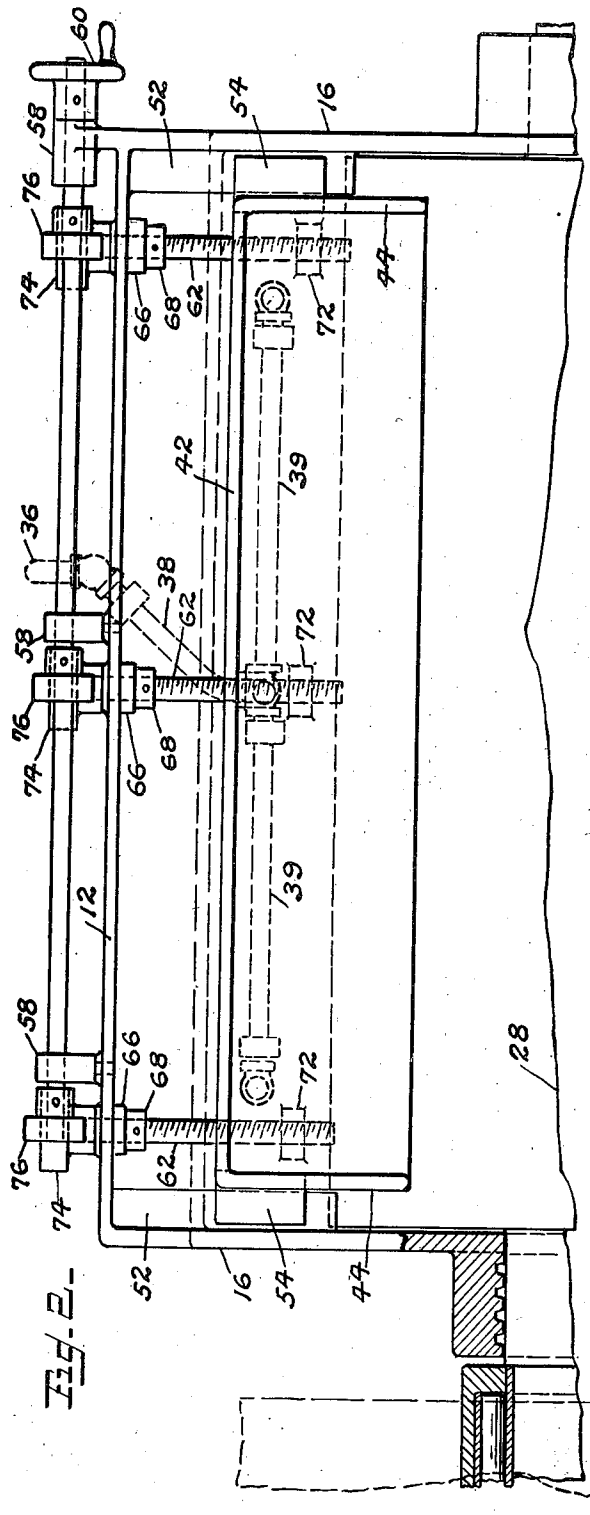


Fig. 2.

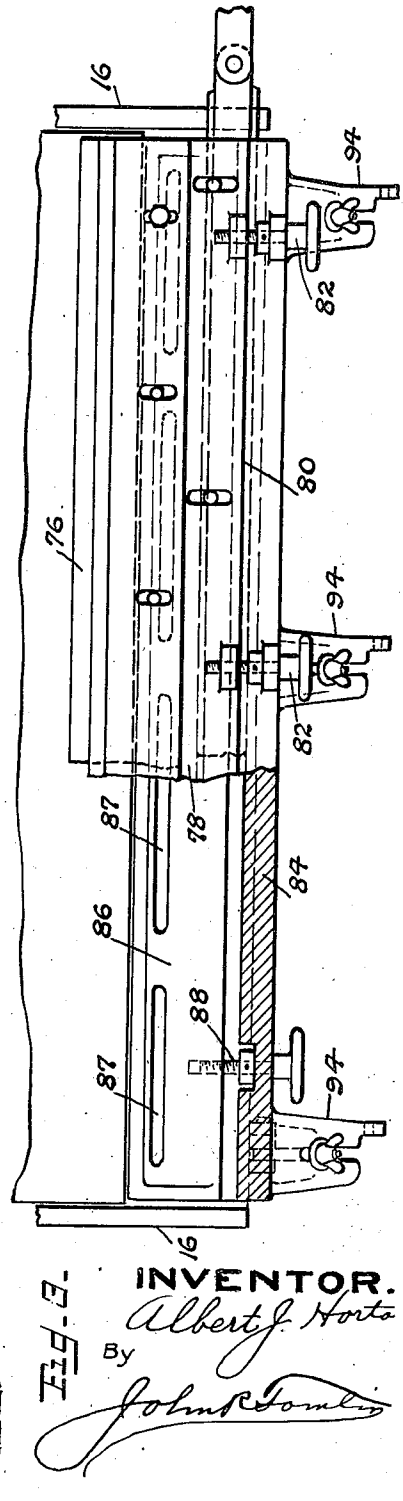


Fig. 3.

INVENTOR.
Albert J. Horton
By
John R. Fowler

Patented Jan. 18, 1938 2,106,029

UNITED STATES PATENT OFFICE

2,106,029

INKING MECHANISM AND METHOD FOR PRINTING MACHINES

Albert J. Horton, White Plains, N. Y., assignor, by mesne assignments, to R. Hoe & Co., Inc., New York, N. Y., a corporation of New York

Application April 16, 1935, Serial No. 16,631

26 Claims. (Cl. 101—157)

This invention relates to printing machines and more particularly to improved inking mechanism and methods for form cylinders of rotary intaglio printing machines.

Heretofore, ink fountains have been provided in the form of receptacles for the reception of printing ink, and the usual intaglio printing cylinder is revolved in the fountain thereby causing ink to be deposited on the periphery of the cylinder and into the intaglio cavities of the design. The surplus ink is then scraped from the smooth peripheral portion of the intaglio printing cylinder, thus leaving the image-producing ink in the image depression of the cylinder, which ink is transferred to the web or sheet to be printed as it passes between the peripheral surfaces of the intaglio printing cylinder and the cooperating impression cylinder. In modern commercial rotary intaglio printing machines there is a definite demand for higher operating speeds and improved printing, and inasmuch as there is relative movement between the image-bearing peripheral portion of a rotating intaglio form cylinder and the body of the ink in which this cylinder rotates, and since an appreciable period of time, although of brief duration, is required for the ink to seek the minute pits and wells of the intaglio image-producing cavities, it is found that better quality printing may be produced by depositing ink on the peripheral portion of the form cylinder above the ink level in the fountain. By this arrangement the ink travels a distance on the peripheral portion of the cylinder without appreciable relative movement between the ink and the cylinder surface, thus prolonging the time for the ink to flow or spread into the remote, minute image-producing intaglio cavities of the form cylinder, and, therefore, an object of this invention is to provide means for depositing a uniform film or spread of ink on the peripheral portion of the intaglio form cylinder in the fountain above the fountain ink level. The very high operating speeds now sometimes employed in intaglio presses result, also, in the throwing of some of the ink thus deposited off the form cylinder surface by centrifugal force and it is important to use a second inking of the cylinder by passing the cylinder through an ink pool, as in the common inking method above referred to, and to flow the excess from the first inking into said pool for such use.

Another object of this invention is to provide an auxiliary fountain or receptacle within an intaglio ink fountain and which is constructed and arranged to deposit a uniform quantity or film of ink axially along the peripheral portion of the cylinder above the ink level within the cylinder, and means for supplying ink to the auxiliary fountain.

A more specific object of my present invention is to provide in an intaglio printing machine fountain an auxiliary fountain or open receptacle which is movably adjustable in the machine fountain relative to the intaglio form cylinder, and which is constructed and arranged to receive a supply of ink and overflow it onto the peripheral portion of the intaglio cylinder along an axially-extending line or area above the ink level within the fountain, the overflowing ink deposited on the cylinder surface also providing the ink supply for the intaglio ink fountain.

It is also an object of this invention to provide for an intaglio printing machine an inking mechanism of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With these and other objects not specifically referred to in view, the invention consists in certain novel parts, arrangements and combinations, which will be described in connection with the accompanying drawings and the novel features pointed out in the claims hereunto appended.

For a complete disclosure of the invention a detailed description of my improved inking mechanism for form cylinders of intaglio printing machines will now be given in connection with the accompanying drawings forming a part of this specification, wherein:

Figure 1 is a vertical sectional view taken through an intaglio ink fountain, showing my invention applied thereto;

Figure 2 is a fragmental plan view taken in the direction and location indicated by arrow 2 in Figure 1, a part of the fountain closure being removed; and

Figure 3 is a fragmental plan view taken at the opposite side of the fountain, as indicated by the arrows, parts appearing in section, the section being taken on a line 3—3 of Figure 1.

Referring to the drawings in which similar reference characters designate corresponding parts, there is shown an ink fountain 10 of an intaglio printing machine, the fountain being of the general type disclosed in the co-pending application of Adolf Zuckerman, filed May 25, 1934, Serial No. 727,556. The fountain includes side walls 12 and 14, end walls 16 and a closure 18 hingedly secured to the fountain, as indicated at 20, the closure 18 having a terminal portion 22 hinged thereto,

as indicated at 24. The bottom of the fountain is provided with an arcuate portion 26 arranged concentrically with an intaglio cylinder 28 which is mounted for rotation within the fountain 10, in conformity with the usual practice, and is spaced a short distance from the peripheral portion of the intaglio cylinder 28 to provide an ink receiving well 30, and the fountain is preferably supported on the machine frame 11 by suitable supporting feet or brackets 31 extending from the bottom of the fountain.

In order to supply ink to the fountain 10 an ink reservoir 32 is provided from which ink is conveyed through a pump 34, flexible conduit 36, terminal conduit 38 into an open auxiliary fountain or receptacle 40, forming a feature of this invention. The auxiliary fountain 40 is preferably trough shaped and is coextensive with the length of the image producing portion of the rotary intaglio cylinder 28, and preferably includes a vertical rear wall 42, end walls 44, annularly-disposed bottom 46, and an upwardly inclined bottom and front wall 48 which has provided at its upper or inward terminal an arcuate ink depositing lip 50 extending throughout the length of the auxiliary fountain 40. This auxiliary fountain 40 is slidably mounted for adjustable movement towards and away from the intaglio cylinder 28 by inclined guide ways 52 extending inwardly from the end walls 16 of the main fountain 10, and supporting ears or lugs 54 extend outwardly from the end walls 44 of the auxiliary fountain and rest on the guide ways 52. In order to adjustably move the auxiliary fountain 40 towards and away from the intaglio cylinder, there is provided an operating shaft 56 which is rotatably mounted in bearings 58 supported by the fountain 10, and this shaft 56 extends longitudinally of the fountain and is provided with a terminal hand wheel 60 positioned at one end of the fountain 10 for convenient manipulation. A plurality of shafts 62 are operably mounted within the fountain 10, and each shaft includes a bearing portion 64 which is received within the bearing 66 formed on the wall 12 of the fountain, and spaced collars 68 are secured to the shaft 62 at each end of the bearing 66, thereby mounting the shaft 62 for rotation within the bearings 66 but it is held against longitudinal motion relative thereto by the collars 68. The inner portion of each shaft 62 is threaded and is received within a threaded bore 70 of a lug or boss 72 extending from the bottom 46 of the auxiliary fountain 40, and the outer end of each shaft 62 has a worm wheel 74 suitably secured thereto, and each worm wheel 74 meshes with a worm 76 supported by the shaft 56.

The terminal fitting 38 of the ink supply conduit 36 is provided with laterally extending manifold branches 39 thus providing means for discharging ink at the central and end portions of the auxiliary fountain 40 to insure even distribution of ink within the auxiliary fountain.

A doctor blade 76 is supported by a bracket 78, and this doctor blade extends axially along the cylinder 28 and engages its peripheral portion to remove surplus ink therefrom, in conformity with the usual practice. The bracket 78 is supported for longitudinal sliding movement by a rail member or carriage 80 which is reciprocated or vibrated in order to move the doctor blade longitudinally relative to the cylinder 28, also in conformity with the usual practice. The doctor blade 76 may be adjusted towards and away from the cylinder 28 by the usual adjusting mechanism, indicated at 82, and the carriage or rail 80 is supported by a bracket 84 that also supports a preliminary ink removing member or scraper 86 which may be adjusted to and from the cylinder 28 by the adjusting mechanism indicated at 88. Longitudinally extending apertures 87 are formed in the member 86 to permit ink to be returned to the bottom of the fountain, as will be hereinafter disclosed. The bracket 84 is pivotally secured to the wall 14 of the fountain 10, as indicated at 90, and helical extension springs 92 are interposed between angularly extending legs 94 of the bracket 84 and the fountain wall 14, thereby exerting tension on the bracket 84 to hold it and its components in proper cooperable relationship with the cylinder 28, in conformity with the practice well understood by those skilled in the art.

A conduit 96 communicates with the ink reservoir 32 and with the bottom portion of the ink fountain 10 in order to return ink from the fountain 10 to the reservoir 32, the conduit communicating with the fountain at the point indicated at 97 to insure a predetermined ink level within the fountain.

The usual impression cylinder 98 cooperates with the intaglio form cylinder 28 to print a running web W between the form and impression cylinders.

In operation, a supply of ink is pumped from the reservoir 32 through the conduits 36, 38 and terminal manifold 39 into the auxiliary fountain 40. After sufficient ink has been supplied to the fountain 40 to raise the ink level to the plane of the arcuate discharge lip 50, the ink flows over this lip onto the peripheral portion of the cylinder 28, and moves downwardly with the peripheral portion of the cylinder without appreciable relative movement to the cylinder surface. The pumping mechanism is adjusted so that the capacity of the pump 34 is greater than the quantity of ink required for filling the intaglio cavities of the form cylinder 28, thereby producing surplus ink which is received within the arcuate well 30 of the fountain 10, and a predetermined ink level is maintained in the well 30, because, when the ink reaches the level of the inner terminal 97 of the return conduit 96, the surplus or overflow ink is then returned to the reservoir 32. By this arrangement a marked advantage is produced in high speed rotogravure printing because, in the ordinary fountain, there is relative movement between the peripheral portion of the rotating form cylinder and the stationary body of ink within the fountain, and inasmuch as a brief but appreciable period of time is required to fill the minute pits and wells of the intaglio cavities produced in the peripheral portion of the cylinder, it is possible for these, at high operating speeds of the cylinder, to pass through the body of ink before the inherent affinity of the cylinder surface for the ink can be satisfied to the extent of filling the smallest intaglio cavity. With applicant's arrangement, however, more ink is supplied from the auxiliary fountain 40, due to the overflow arrangement, onto the peripheral portion of the cylinder 28 than is required for filling the intaglio cavities. Furthermore, the ink supplied from the auxiliary fountain 40 is deposited on the cylinder near the top portion thereof and consequently considerably above the ink level maintained within the main fountain 10, thus permitting the ink to move downwardly with the rotating peripheral

surface of the cylinder 28, in the direction indicated by the arrow 1, in Figure 1, without appreciable relative movement between the ink and the cylinder surface, thus permitting sufficient time for the ink to seek the most remote and minute intaglio cavity, thereby insuring the production of a perfect image when the impression is made on the web W between the form cylinder 28 and the impression cylinder 98. By supplying from the fountain 40 to the upper portion of the cylinder 28 more ink than is required to fill the cavities, and also a quantity of ink in excess of that which can adhere to the cylinder by capillary attraction or the inherent affinity of the cylinder for the ink, the cylinders' inherent affinity for the ink will tend to cause the greatest possible quantity of ink to adhere thereto before rejecting any ink, and this action aids in filling the most remote cavities, because the ink will flow into these cavities before any ink is rejected or discharged into the fountain well 30. After the ink has been discharged from the fountain 40 onto the cylinder 28, the continued rotation of the cylinder will again pass the peripheral portion of the cylinder through the ink within the fountain well 30, and then the surplus ink is removed from the peripheral portion of the cylinder by the member 86, and finally by the doctor blade 76, thus leaving the intaglio cavities filled to produce the image during the printing impression. The excess ink scraped from the peripheral surface of the cylinder by the doctor blade 76 is returned to the fountain well 30 through the apertures 87. After a printing impression is made on the web W between the form cylinder 28 and the impression cylinder 98, the image-producing intaglio cavities have then given up most of their ink in the impression to produce the image, and, consequently, the small quantity of residue ink tends to dry or harden very quickly. This drying action of the ink is prevented in applicant's arrangement, because the auxiliary fountain 10 is positioned immediately adjacent the impression line of the form cylinder 28, thereby replenishing the ink supply to the depleted intaglio cavities before the residue ink therein can dry sufficiently to harden. Since an oversupply of ink is overflowed onto the cylinder surface and into the intaglio cavities near the impression line, the cavities are immediately generally filled with ink and an oversupply is deposited on the surface of the cylinder, therefore, during the period of time in which a given point of the form cylinder surface rotates from the location of the auxiliary fountain to and through the body of ink in the ink well 30 and to the scraper 86, sufficient time has elapsed to permit the most remote and smallest intaglio cavity to completely fill with ink to produce a perfect image.

By simply manipulating the hand wheel 60 the shafts 62 are rotated thereby causing the auxiliary fountain 40 to move to or from the cylinder so that its discharge lip 50 may be located in accurate cooperable relationship with the peripheral portion of the cylinder 28. Furthermore, if it is desired to move the cylinder from the fountain, the hinged portion 22 of the closure 18 may be thrown back about the hinge 24 and the hand wheel 60 manipulated to withdraw the fountain 40 from over the cylinder 28, and the doctor blade and scraper supporting mechanism is moved back about its pivotal point 90 thus permitting the removal of the cylinder 28 from the fountain 10.

Having thus described my invention, what I claim as new and useful is:

1. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, means for supplying ink to the auxiliary fountain, the auxiliary fountain overflowing to discharge ink therefrom by gravity onto the printing cylinder and into the fountain to form an ink body in the fountain in which the cylinder rotates.

2. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, means for supplying ink to the auxiliary fountain, the auxiliary fountain overflowing to discharge ink therefrom by gravity onto the printing cylinder and into the fountain to form an ink body in the fountain in which the cylinder rotates, and means for maintaining the ink body at a constant level in the fountain.

3. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, means for supplying ink to the auxiliary fountain, the auxiliary fountain overflowing to discharge ink therefrom by gravity onto the intaglio printing cylinder in quantities in excess of the quantity of ink which can adhere to the cylinder surface, the excess ink collecting in the fountain to form an ink body in which the cylinder rotates.

4. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, an ink well formed in the lower portion of the fountain, means for supplying ink to the auxiliary fountain, the auxiliary fountain discharging ink therefrom by gravity onto the printing cylinder in excess of the quantity of ink that that can adhere to the cylinder surface, the excess ink flowing into the ink well to form an ink body therein in which the cylinder rotates.

5. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, an ink well formed in the lower portion of the fountain, means for supplying ink to the auxiliary fountain, the auxiliary fountain discharging ink therefrom by gravity onto the printing cylinder in excess of the quantity of ink that can adhere to the cylinder surface, the excess ink flowing into the ink well to form an ink body therein in which the cylinder rotates, and means for maintaining a constant ink level in the ink well.

6. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, means for adjustably moving the entire auxiliary fountain within the fountain relative to the printing cylinder, means for supplying ink to the auxiliary fountain, the auxiliary fountain discharging ink therefrom by gravity onto the printing cylinder and into the fountain to form an ink body in the fountain in which the cylinder rotates.

7. In a printing machine, an ink fountain, a

rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, means for adjustably moving the entire auxiliary fountain relative to the printing cylinder, means for supplying ink to the auxiliary fountain, the auxiliary fountain discharging ink therefrom by gravity onto the printing cylinder and into the fountain to form an ink body in the fountain in which the cylinder rotates, and means for maintaining the body of ink at constant level in the fountain.

8. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an auxiliary ink fountain within the fountain, means operable from a point without the fountain for moving the auxiliary fountain within the fountain towards and away from the printing cylinder, means for supplying ink to the auxiliary fountain, the auxiliary fountain discharging ink onto the printing cylinder and into the fountain.

9. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an ink reservoir, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, means for conveying ink from the reservoir to the auxiliary fountain, the auxiliary fountain discharging ink therefrom by gravity onto the peripheral surface of the printing cylinder and into the fountain to form a body of ink in the fountain in which the cylinder rotates, and means for conveying ink from the fountain back to the reservoir.

10. In a printing machine, an ink fountain, a rotatable intaglio printing cylinder operable in the fountain, an ink reservoir, an auxiliary ink fountain within the fountain and comprising a receptacle of definite capacity, means for bodily moving the auxiliary fountain relative to the printing cylinder, means for conveying ink from the reservoir and uniformly distributing it into the auxiliary fountain, the auxiliary fountain overflowing to discharge ink therefrom by gravity onto the peripheral surface of the printing cylinder and into the fountain to form a body of ink within the fountain in which the cylinder rotates, means for removing surplus ink from the peripheral portion of the rotating printing cylinder, and means for conveying the surplus ink from the fountain back into the reservoir to maintain a constant ink level in the fountain.

11. The method of inking an intaglio printing cylinder, which consists in rotating the cylinder in a body of ink, conveying a controlled quantity of ink in excess of printing requirements to and discharging it above the body of ink onto the peripheral portion of the rotating cylinder, the discharged ink moving downwardly with the peripheral surface of the rotating cylinder into the body of ink, and maintaining the body of ink at a constant level.

12. The method of inking an intaglio printing cylinder having image-producing cavities formed in the peripheral surface thereof, which consists in rotating the cylinder in a body of ink, supplying ink to an auxiliary ink body above the ink body in which the cylinder rotates, discharging ink from the auxiliary ink body onto the cylinder periphery in quantities in excess of the quantity which can adhere to the cylinder and cavity surfaces, the excess ink moving downwardly with the peripheral surface of the rotating cylinder into the body of ink in which the cylinder rotates.

13. In a printing machine, an ink fountain, an intaglio printing cylinder rotatable in the fountain, means for applying ink to the upper portion of the cylinder periphery, the applied ink moving downwardly in the fountain with the cylinder surface and accumulating in the fountain below the point where the ink is applied to the cylinder surface to form an ink body in which the lower portion of the cylinder rotates.

14. In a printing machine, an ink fountain, an intaglio printing cylinder rotatable in the fountain, means for applying ink to the upper portion of the cylinder periphery which moves downwardly during the rotation of the cylinder, the applied ink moving downwardly with the cylinder surface and accumulating in the fountain below the point where the ink is applied to the cylinder surface to form an ink body in which the lower portion of the cylinder rotates.

15. In a printing machine, an ink fountain, an intaglio printing cylinder rotatable in the fountain, means for supplying ink to form an ink body in the fountain in which ink body the cylinder rotates, the supplied ink being first applied to the cylinder surface above the ink body and moving downwardly on the cylinder surface to form the ink body.

16. In a printing machine, an ink fountain, an intaglio printing cylinder rotatable in the fountain, an ink well in the fountain positioned adjacent the lower portion of the cylinder periphery, means for applying ink to the cylinder periphery above the ink well, the applied ink moving downwardly on the cylinder surface and accumulating in the ink well to form an ink body therein in which the lower portion of the cylinder rotates.

17. In a printing machine, an ink fountain, an intaglio printing cylinder rotatable in the fountain, an arcuate ink well positioned adjacent the lower peripheral portion of the cylinder to define a shallow arcuate space between the cylinder periphery and the arcuate surface of the ink well, means for initially applying ink in excess of printing requirements to the peripheral surface of the cylinder at a point above the ink well, the applied ink moving downwardly on the cylinder surface and accumulating in the arcuate ink well to form an ink body in which the peripheral surface of the cylinder rotates.

18. In a printing machine, an ink fountain, an intaglio printing cylinder rotatable in the fountain, an arcuate ink well positioned adjacent the lower peripheral portion of the cylinder to define a shallow arcuate space between the cylinder periphery and the arcuate surface of the arcuate ink well, means for initially applying ink in excess of printing requirements to the peripheral surface of the cylinder at a point above the ink well, the applied ink moving downwardly on the cylinder surface and accumulating in the arcuate ink well to form an ink body in which the peripheral surface of the cylinder rotates, and means for conveying the excess ink back to the point of its initial application to the printing cylinder.

19. In a printing machine, an ink fountain, an intaglio printing cylinder rotatable in an ink body in the fountain, means for applying ink to the surface of the cylinder above the ink body while the surface to which the ink is applied is moving downwardly to the ink body, the cylinder moving downwardly into the ink body after ink has been supplied to its surface, and means for maintaining the ink body.

20. The method of inking an intaglio printing cylinder, which consists in rotating the cylinder in a body of ink, conveying ink to and discharging it above the body of ink onto the peripheral portion of the rotating cylinder, the peripheral portion of the cylinder rotating downwardly into the body of ink after the ink has been discharged thereon.

21. A method of inking a printing press which consists in causing a moving body of ink to contact with the periphery of a rotating printing cylinder, throwing excess ink off said periphery by the centrifugal force produced by the movement of said cylinder and collecting some of said excess ink in the form of a pool which is maintained at a predetermined level, said level being substantially above the bottom of said cylinder, so that a portion of said cylinder is continuously immersed in said pool and the cylinder can be inked by contact with said pool, while transferring excess ink from said pool to said moving body of ink.

22. A method of inking a printing press which consists in causing a moving body of ink to contact with the periphery of a rotating printing cylinder, causing excess ink to flow off said periphery and collecting some of said excess ink in the form of a pool which is maintained at a predetermined level, said level being substantially above the bottom of said cylinder so that the cylinder can be inked by contact with said pool.

23. Mechanism for inking a printing press cylinder comprising means for delivering ink to the periphery of said cylinder above the bottom of said cylinder and in an inking zone which is spaced from the zone of printing, and a trough surrounding a part of said cylinder below said zone of printing, said trough having an outlet which is located above the bottom of the cylinder, so that a pool of ink is maintained in said trough at a predetermined level which is above the bottom of the cylinder and below said inking zone.

24. A method of inking a printing press which consists in causing a moving body of ink to contact with a portion of the periphery of a rotating printing cylinder, throwing excess ink off said periphery by the centrifugal force produced by the movement of said cylinder and collecting said excess ink in the form of a pool which is maintained at a predetermined level, said level being substantially above the bottom of said cylinder so that a portion of said cylinder is continuously immersed in said pool and the cylinder can be inked by contact with said pool.

25. A method of inking a printing press which consists in causing a moving body of ink to contact with a portion of the periphery of a rotating printing cylinder and collecting excess ink flowing from said periphery in the form of a pool which is maintained at a predetermined level, said level being substantially above the bottom of said cylinder so that a portion of said cylinder is continuously immersed in said pool and the cylinder is inked by contact with said pool.

26. Mechanism for inking a printing press cylinder comprising means for delivering ink to the periphery of said cylinder above the bottom of said cylinder and in an inking zone which is spaced from the zone of printing, and a trough surrounding a part of said cylinder below said zone of printing, said trough having an outlet which is located above the bottom of the cylinder, so that a pool of ink is maintained in said trough at a predetermined level which is above the bottom of the cylinder and below said inking zone, an ink reservoir and a pump for supplying ink from said reservoir for delivery to the periphery of the cylinder and to maintain said pool.

ALBERT J. HORTON.