

Dec. 30, 1941.

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2,267,892

INKING APPARATUS FOR ROTARY INTAGLIO PRINTING PRESSES

Filed July 31, 1940

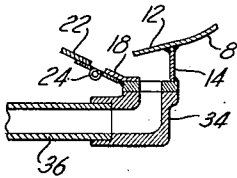


Fig. 3

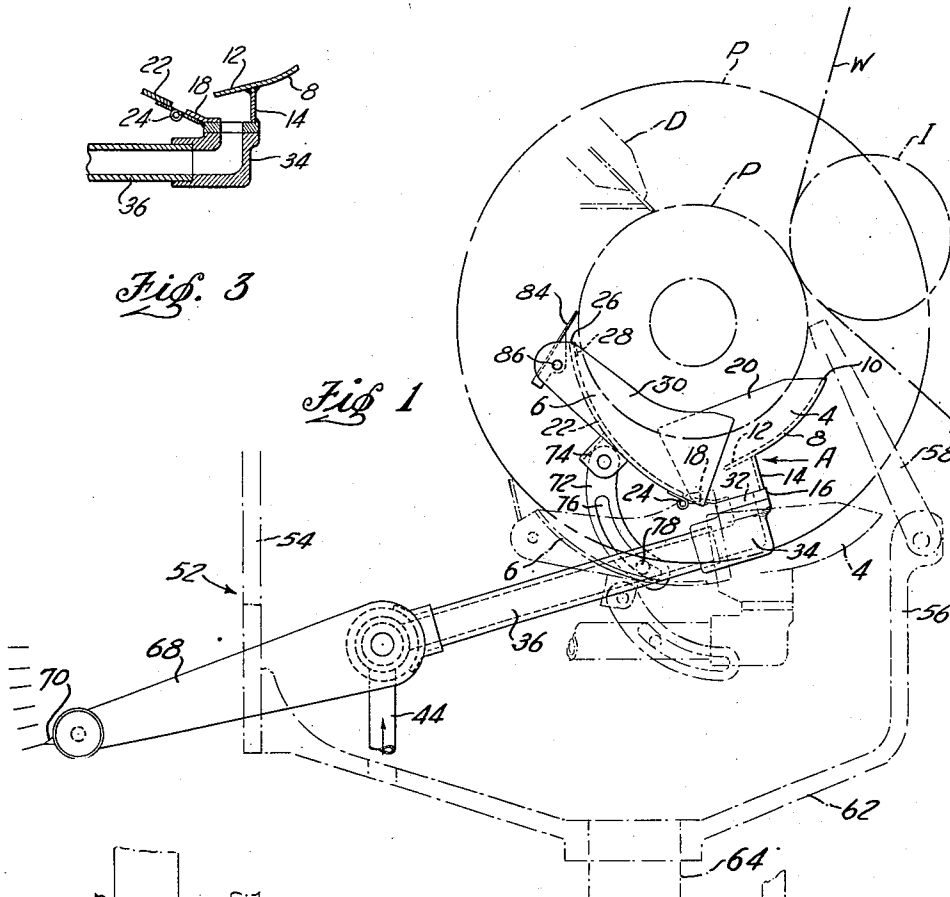


Fig. 1

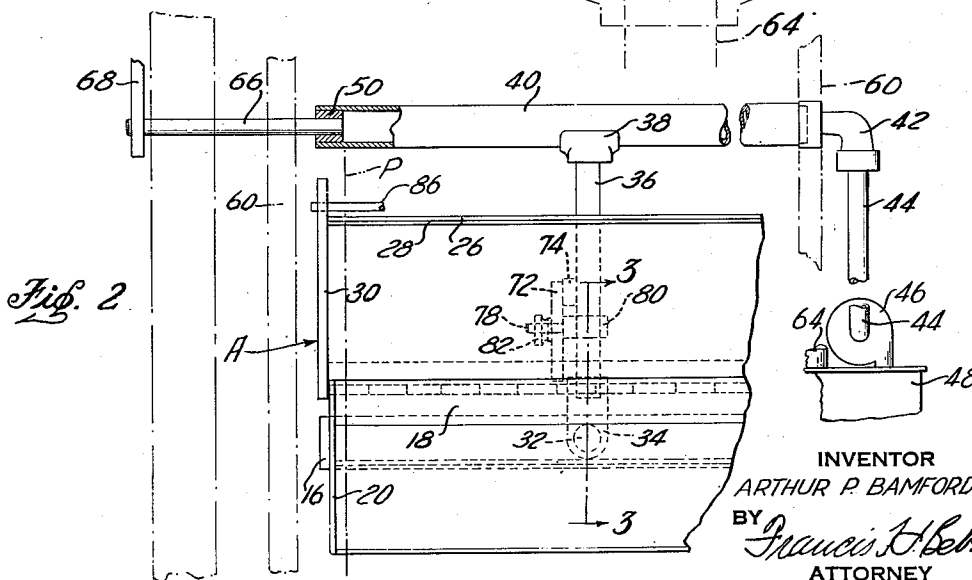


Fig. 2

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2,267,892

INKING APPARATUS FOR ROTARY
INTAGLIO PRINTING PRESSES

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Application July 31, 1940, Serial No. 348,624

10 Claims. (Cl. 101—157)

This invention relates to the art of rotary gravure or intaglio printing and aims to provide an improved method of and apparatus for inking a rotating intaglio printing cylinder.

There are two general methods of inking a rotating intaglio printing cylinder. One of these consists in merely rotating the cylinder in a bath or fountain of the ink so that the cells of the engraving will become filled with ink and the excess may be removed with the usual doctor blade to condition the cylinder for printing. The other method consists in forcing an elongated stream or ribbon of ink against the rotating cylinder, this method now being in common use in the enclosed rotary gravure ink fountains designed for use with quick-drying inks. In modern high speed rotary gravure printing, this second method of inking the rotating cylinder has largely supplanted the old ink bath or fountain. This has been due primarily to the fact that when a printing cylinder rotates at high speed, the ink should preferably be splashed or forced against the printing surface with some pressure to assure the complete filling of the cells of the engraving. There are, however, certain disadvantages in the present known types of pressure inking systems. For example, they are usually formed as part of the inking housing and are therefore somewhat difficult to clean when ink of a different color is to be used. Moreover, in the usual pressure system employing a thin ribbon of ink under pressure, the actual area of contact of the body of ink with the cylinder is small, so that the ink has little opportunity to exert a cleaning action on the cells of the engraving. This has a tendency to cause the cells to become partially filled with dried ink and may seriously affect the quality of the printing.

I have found that the above and other difficulties present in the rotary gravure inking systems now in use may be eliminated and have devised an improved method and apparatus for this purpose.

In accordance with my invention, an intaglio printing cylinder may be effectively inked by rotating the cylinder in a pressure bath or body of ink which includes a relatively non-turbulent cleaning section that effectively washes or cleans the cells of the engraving, and an arcuate wedge-shaped applying section where the ink is maintained against the rotating cylindrical surface with progressively increasing amounts of pressure so that the lowest pressure portion thereof continues the cleaning action and the highest pressure portion effects a complete filling of the

cells of the engraving with ink. The arcuate wedge-shaped body of ink which forces the ink into the cells of the engraving with increasing amounts of pressure toward the thinnest and uppermost portion of said wedge-shaped body also acts to regulate the thickness of the film of ink adhering to the surface of the rotating cylinder as it passes beyond said body of ink and to the doctor blade where it is conditioned, in the usual manner, for printing.

One form of apparatus embodying the apparatus features of my invention and with which the improved method of inking may be practiced, comprises a trough which is adapted to be positioned beneath the rotating printing cylinder so that the cylinder may rotate therein. This trough is provided, preferably in the lowermost parts thereof, with a plurality of spaced inlet orifices through which ink may be supplied under pressure. A baffle disposed above the ink inlet orifices divides the trough into a first or cleaning section and a second or applying section, each of which is substantially arcuate (or partially cylindrical) in shape. The arcuate cleaning section of the trough preferably corresponds substantially to the circumference of the cylinder, that is, it is concentric therewith; while the applying section of the trough is preferably of a larger diameter than the smaller type of cylinder and has the upper end thereof spaced closely to the cylindrical surface so as to form therewith, in effect, an arcuate wedge-shaped chamber for a body of ink. A particularly important feature of my invention consists in having the two sections of the trough hinged to one another so that they may be spread or closed to accommodate printing cylinders of different diameters while maintaining the general relationship of the parts and actions of the two sections of the ink body against the printing cylinder. The ink trough may be conveniently supported in any desired manner beneath the rotating printing cylinder and is preferably used in conjunction with an ink pan which is adapted to catch any ink that may overflow from the fountain or be removed by the doctor blade, and return such ink to the ink reservoir from which it may be pumped back through the applicator.

The above and other features and objects of my invention will become apparent upon consideration of the following detailed description taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a side elevational view of an ink ap-

plicator embodying the essential apparatus features of my invention;

Fig. 2 is a fragmentary top plan view of the ink applicator shown in dot and dash lines in Fig. 1; and

Fig. 3 is a fragmentary vertical sectional view, taken substantially along the line 3—3 of Fig. 2.

In the drawing, I have shown my invention applied to a rotary intaglio printing press of the general type disclosed in Arthur M. Wickwire, Jr. application Serial No. 217,139, filed July 2, 1938. One of the particularly distinctive features of this rotary intaglio printing press consists in the provision of a printing cylinder P and an impression cylinder I arranged substantially at the side thereof, so as to constitute a substantially horizontally disposed printing couple through which a web W may be fed substantially vertically downwardly for printing on one side thereof. Ink is supplied to the printing cylinder P by means of an ink applicator A positioned at the side or at the bottom of said printing cylinder, and excess ink is removed from the printing surface and said surface conditioned for printing by means of a suitable doctor blade D. The ink applicator A, shown in Fig. 1, embodies the apparatus features of my present invention. It is to be understood, however, that the invention is not restricted in its use to a rotary intaglio printing press of the type shown in Fig. 1 but may be used in conjunction with any well-known and available rotary intaglio printing press, such, for example, as the type including a vertically arranged printing couple where the impression cylinder is positioned directly over the printing cylinder.

As shown in Fig. 1, the ink applicator A embodying the essential apparatus features of my invention, is a substantially trough-shaped member positioned beneath the printing cylinder P and comprising a rearward ink distributing and cylinder-cleaning section 4, and a forward adjustable ink-applying section 6. Each section is slightly longer than the printing cylinder P and may be constructed of any suitable thin sheet metal, such as copper or galvanized iron. The rearward ink-distributing and cylinder-cleaning section 4 is composed of an arcuate-shaped bottom wall 8 extending downwardly and forwardly from its rearward open edge 10 on an arc substantially concentric with the printing cylinder surface and terminates in a forwardly projecting baffle portion 12. A substantially vertically disposed rear wall 14 for the distributing part of the section 4 extends downwardly from the arcuate bottom wall 8 at a point rearward from the baffle portion 12 to the rear side of a longitudinally extending base member 16. The ink-distributing and cylinder-cleaning section 4 is completed by a lower and forwardly extending lip portion 18, attached in any suitable manner to the front edge of the base member 16, and a pair of side walls 20, 20, which as indicated in Fig. 2, are positioned immediately adjacent to the end of the printing cylinder P.

Ink applying section 6, in turn, comprises an arcuate-shaped bottom wall 22 which is pivotally connected to the forwardly extending lip portion 18 of the section 4 by means of a suitable substantially fluid tight hinge 24 and extends forward and upward therefrom, terminating in an upper edge 26. To prevent damage to the printing cylinder surface caused by any unauthorized contact of the upper edge 26 of the

applying section therewith, a pad 6 or buffer member 28, composed of some material softer than the printing cylinder surface such as felt, hard rubber or other plastic material, may be attached in any convenient manner to the upper end of the arcuate section 22 adjacent the edge 26. Ink-applying section 6 is completed by a pair of side walls 30, 30 which at their rearward edges are arranged to overlap the side wall 20 of the rearward section 4.

It will be noted that the shapes of the side walls 20 and 30 of the two hinged arcuate sections of the applicator A are such that they suitably overlap one another and extend above the cylindrical printing surface of the printing cylinder P for any position of the applicator A and size of printing cylinder P. In Fig. 1, the applicator A is shown in full lines positioned about the surface of a small printing cylinder and is shown in dot and dash lines in properly adjusted position for a printing cylinder of considerably larger diameter, the hinged sections 4 and 6 being spread open further for this purpose. Fig. 2 shows a plan view of the applicator A in the open dot and dash line position of Fig. 1.

Ink is applied to the applicator A through a plurality of circular orifices 32 provided in the base member 16 and spaced throughout the length of the applicator in any desired number. I have found that for a printing cylinder approximately thirty-one inches in length four orifices 32 are sufficient for a proper distribution of ink. A suitable elbow fitting 34 connected to the base member 16 beneath each orifice and a supply pipe 36 extending from the elbow fitting 34 to a suitable T-fitting 38 mounted on a transversely extending ink manifold 40, serve to convey the ink from said manifold 40 to the applicator through the orifices 32. The right-hand end of the ink manifold 40 is rotatably mounted with a substantially fluid tight connection in a suitable elbow fitting 42 which is connected to a supply pipe or conduit 44 leading to a suitable pump 46 mounted on or associated with an ink reservoir 48. The left-hand end of the ink manifold 40 is closed by means of a suitable plug 50 keyed thereto.

In a printing press of the type in which I have shown my improved ink applicator applied, any excess ink removed by the doctor blade D and overflowing from the applicator A, is caught in a suitable overflow pan 52 mounted for vertical movement up and down beneath the printing cylinder P. This pan may be of any suitable construction, that shown in dot and dash lines in Fig. 1 and 2 comprising an adjustable or removable front wall 54, a rear wall 56 which may have an adjustable sealing member or splash guard 58 pivotally mounted on the upper end thereof, side walls 60, 60 and a bottom wall 62. An ink return pipe 64 connects a drain provided in the bottom wall 62 with the ink reservoir 48 for returning any ink caught in the pan 52 to the reservoir.

I have shown my improved ink applicator A adjustably and removably mounted in this ink overflow pan 52. Thus, the elbow fitting 42 is rigidly mounted in the right-hand side wall 60 of said ink pan so as to provide a bearing for the ink manifold pipe 40. Plug 50 is mounted on or connected to the end of a shaft 66, which is rotatably mounted in the left-hand side wall 60 of the ink overflow pan, extends beyond the printing press frame (as indicated in Fig. 2) and

is provided with an adjusting handle or crank arm 68 at the outer end thereof. Since the plug 50 is keyed into the manifold pipe 40, and said manifold pipe is rotatably mounted in the elbow fitting 42, it will be apparent that by moving the crank arm 68 the applicator A may be moved to any desired adjusted position with respect to the printing cylinder P. A clockwise movement of the crank arm 68 will serve to move the applicator A from the position shown in full lines in Fig. 1 to the dot and dash line position for the accommodation of a larger printing cylinder P. If desired, a pointer 70 may be provided adjacent the handle on the crank arm 68 for cooperation with suitable indicia provided on the printing press frame to indicate the proper position of the crank arm for any desired size of printing cylinder.

Assuming that the ink applicator A is in the position shown in dot and dash lines in Fig. 1 and the printing cylinder is changed to one of smaller diameter and it is desired to move the applicator to the position shown in full lines, the crank arm 68 is turned in a counter-clockwise direction until the arcuate section 4 is positioned substantially concentrically with respect to the printing cylinder surface. It is then necessary to move the ink applying section 6 to a more closed position in which the buffer 28 is spaced about one thirty-second of an inch or less from the printing cylinder surface for providing the desired thickness of ink film thereon. In order to lock or secure the adjustable ink applying section 6 of the applicator in its desired adjusted position, I have provided a plurality of adjustable supporting arms 72 on the underside of the arcuate-shaped section 22. The upper end of each arm is pivotally connected to a lug 74 mounted on the arcuate section 22 and the lower end of each arm is provided with an elongated slot 76 for the reception of a suitable locking screw 78 which may be mounted on a suitable bracket 80 (Fig. 2) provided on one of the pipes 36. An adjusting nut 82 is threaded on the end of the locking screw 78 so that upon movement of the adjustable section 6 to the desired position it may be there locked by tightening the nut 82 to hold the locking screw 78 in its adjusted position in the elongated slot 76. Any desired number of supporting arms 72 may be provided, though two such arms, one positioned at each of the outermost pipes 36, will be sufficient for most printing press widths.

In the operation of my improved ink applicator A, after it has been properly adjusted beneath the printing cylinder P in the manner described above, ink is pumped from the reservoir 48 by means of the pump 46 and passes through supply pipe 44, elbow 42 and manifold 40 to the plurality of conduits 36 leading to the orifices 32 of the applicator. The ink then passes into the ink distributing portion of section 4 of the applicator which is defined by the baffle 12, vertical wall 14, base member 16 and forwardly extending lip 18. The baffle 12 and lip 18 cause the major portion of the ink to flow directly into the wedge-shaped ink applying section formed by the arcuate bottom member 22 and the cylinder surface. However, it will be apparent that some of the ink will flow around the baffle portion 12 into the cleaning section of the applicator formed by the arcuate section 8 and the cylinder surface. The agitation of the ink in this section of the applicator is caused primarily by rotation of the cylinder and permits a sufficient contact of the

cells of the engraving with the ink to cause a thorough soaking or cleaning thereof. I have found that by having the applying section of the applicator shaped to provide a wedge-shaped body of ink in contact with the printing surface of the rotating printing cylinder, high pressure is built up (by the rotation of the cylinder, the action of the pump 46 and the shape of the applying section) so that the ink is effectively forced, with increasing amounts of pressure, into all of the cells of the engraving to the full depth thereof so as to provide a most effective inking of the cylinder.

In the event that rotation of the cylinder is at such a speed, that splashing or passage of ink beyond the upper edge 26 of the applying section occurs, a resilient splash guard of blade 84 may be provided, if desired. This blade 84, which may be constructed of a thin sheet of rubber or flexible steel similar to a doctor blade, may be fixed on a shaft or elongated pivot pin 86 which is rotatably mounted with a frictional fit in the upper ends of the side walls 30 of the adjustable ink applying section 6. Such a blade effectively prevents ink from splashing upwardly toward the doctor blade D and may also be used as an additional regulator for the film of ink adhering to the surface of the printing cylinder so as to reduce the amount of ink required to be removed by said doctor blade D while still maintaining a protective film on said surface.

From the foregoing description, it will be understood that I have provided an improved method of inking a rotary intaglio printing cylinder which assures an effective cleaning of the cells of the engraving immediately after printing and a proper application of ink thereto with sufficient pressure to fill said cells completely with ink and apply to the surface a film of any desired thickness. By constructing the applicator in hinged arcuate sections, effective cleaning and applying action is obtained regardless of the size of the printing cylinder. It will be understood that my improved applicator and method of inking may be used with either an open or closed fountain or inking system.

While I have described a preferred embodiment of the apparatus features of my invention, it will be understood that various changes may be made in the construction and method of inking and certain features or steps thereof may be employed without others, without departing from my invention or sacrificing any of its advantages.

What I claim is:

1. A method of inking the printing surface of a rotating intaglio printing cylinder, which comprises maintaining an arcuate wedge-shaped body of ink in contact with the rotating printing surface, the pressure increasing in said body toward the thinner edge thereof which acts at least partially to regulate the thickness of the film of ink adhering to said printing surface, and feeding ink into said body at the thicker edge thereof.
2. A method of inking the printing surface of a rotating intaglio printing cylinder, which comprises maintaining a body of ink in contact with the rotating printing surface, said body of ink having a rearward arcuate cleaning section substantially conforming to the curvature of the cylinder and a forward arcuate wedge-shaped applying section in which the pressure of ink against the printing surface increases toward the thinnest part thereof.
3. An ink applicator for a rotary intaglio print-

ing cylinder, comprising a trough shaped member adapted to be positioned beneath the printing cylinder and having a rearward arcuate cleaning section including a centrally disposed ink distributing section, and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink.

4. An ink applicator for a rotary intaglio printing cylinder, comprising a trough-shaped member adapted to be positioned beneath the printing cylinder and having a rearward arcuate cleaning section including a centrally disposed ink distributing section, and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink, said forward and rearward sections being hinged to one another so as to accommodate printing cylinders of different size.

5. An ink applicator for a rotary intaglio printing cylinder, comprising a trough-shaped member adapted to be positioned beneath the printing cylinder and having a rearward arcuate cleaning section including a centrally disposed ink distributing section, and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink, said forward and rearward sections being hinged to one another for adjustment to accommodate printing cylinders of different size and having end walls which overlap in any adjusted position of said sections.

6. An ink applicator for a rotary intaglio printing cylinder, comprising a trough-shaped member adapted to be positioned beneath the printing cylinder and having a rearward arcuate cleaning section including a centrally disposed ink distributing section, and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink; and means for supplying ink under pressure to said ink distributing section.

7. An ink applicator for a rotary intaglio printing cylinder, comprising a trough-shaped

member adapted to be positioned beneath the printing cylinder and having a rearward arcuate cleaning section including a centrally disposed ink distributing section, and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink; means for conducting ink to said ink distributing section; and means for directing the major portion of the ink into said forward arcuate ink applying section.

8. Apparatus for inking a rotary intaglio printing cylinder having an ink overflow pan disposed beneath it, comprising a trough-shaped member adapted to be adjustably and removably mounted in said ink overflow pan, and having a rearward arcuate cleaning section, a centrally disposed ink distributing section and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink.

9. An ink applicator for a rotary intaglio printing cylinder, comprising a trough-shaped member adapted to be positioned beneath the printing cylinder and having a centrally disposed ink distributing section, and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink, said centrally disposed and forward sections being hinged to one another so as to accommodate printing cylinders of different sizes.

10. An ink applicator for a rotary intaglio printing cylinder, comprising a trough-shaped member adapted to be positioned beneath the printing cylinder and having a centrally disposed ink distributing section, and a forward arcuate ink applying section which, with the surface of the printing cylinder, is adapted to form a wedge-shaped body of ink, the forward edge of said applying section being adapted to regulate the thickness of the film of ink applied to the printing cylinder, said centrally disposed and forward sections being hinged to one another so as to accommodate printing cylinders of different sizes.

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