

May 21, 1940.

W. M. POLLOCK

2,201,452

INTAGLIO PRINTING MECHANISM

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2 Sheets-Sheet 1

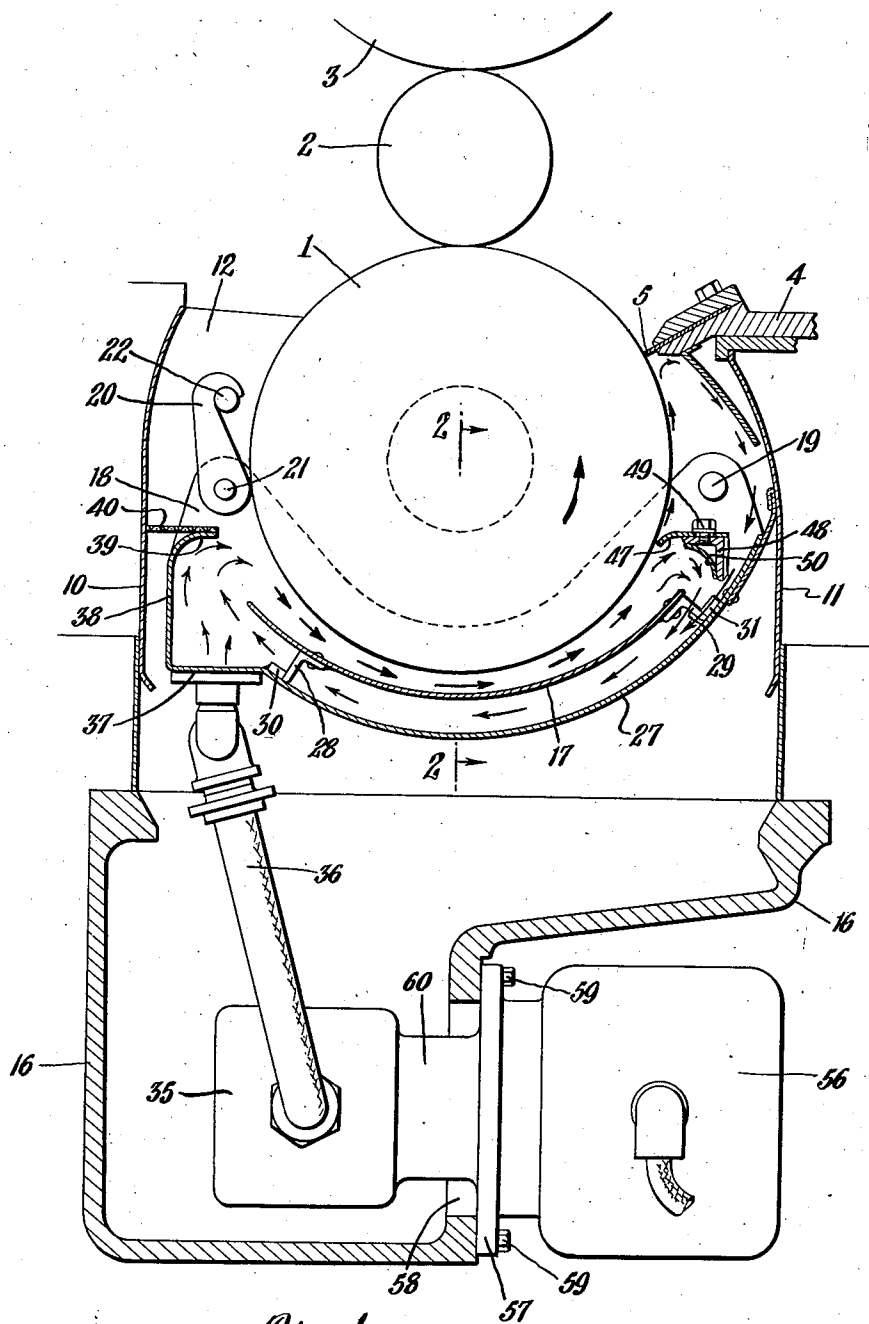


Fig. 1.

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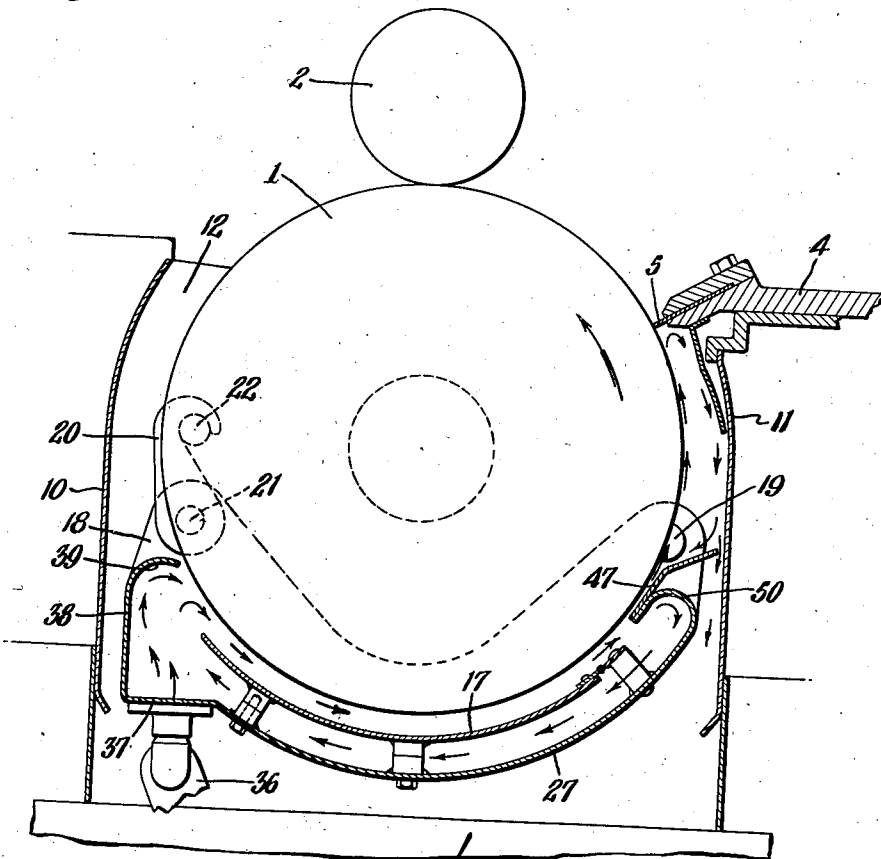
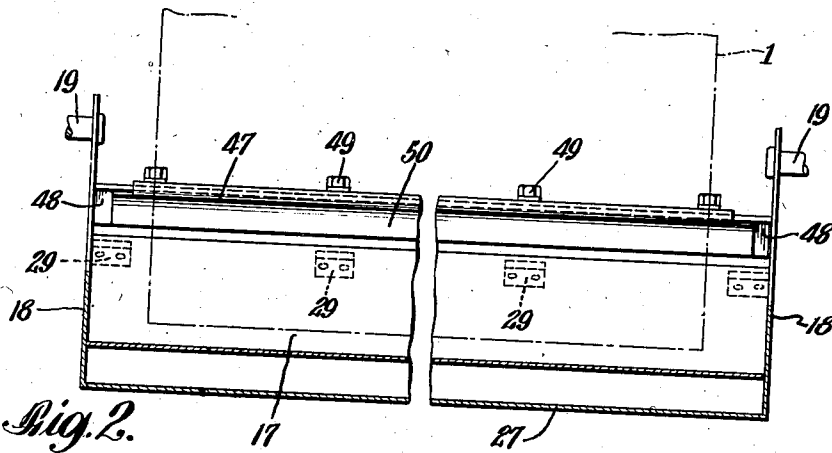
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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INTAGLIO PRINTING MECHANISM

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Application September 11, 1937, Serial No. 163,336

8 Claims. (Cl. 101—157)

The invention relates to new and useful improvements in inking mechanisms for rotary intaglio printing presses, and more particularly to improvements in process and mechanisms for maintaining a flowing stream of ink in contact with a very large part of the rotating design and for controlling and directing the return flow of the ink stream, and guarding against evaporation from the ink stream.

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

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

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

Of the drawings:

Fig. 1 is an elevation, partly in section and partly diagrammatic, of a mechanism embodying the invention;

Fig. 2 is a transverse vertical section, taken on line 2—2 of Fig. 1; and

Fig. 3 is similar to Fig. 1 but showing a modified form.

Objects of the invention are to provide more efficient inking for rotary intaglio presses and more especially to improve inking efficiency in rotary intaglio presses running at high speed and using highly volatile inks; to maintain continuously an adequate supply of ink over a very large extent of the design on the rapidly rotating cylinder, and over a relatively large part of the periphery of the cylinder in order to prolong the inking action on all parts of the design, and at the same time to project a continuous ink stream against the design, and to maintain the ink stream in flow and also in movement relatively to the design; to maintain a circulating body of ink in continuous flowing contact over a large part of the design and to maintain this circulating stream out of contact with the air, thereby to reduce the evaporation of highly volatile inks to a minimum; and to provide simple and reliable mechanism to effect the objects pointed out.

With these and other objects in view, a press is provided having an intaglio design cylinder, and positioned beneath the cylinder a curved ink

fountain of radius such as to permit a stream of ink of desired and usually of substantial thickness to pass between the rotating design and the fountain bottom. Along and adjacent the rear edge of the fountain, a wide stream of ink is projected against and usually throughout the width of the design and into the passageway between the rotating cylinder and fountain bottom. Near the forward edge of the fountain, and back of the doctor blade, this ink stream, flowing forwardly in its closed channel and in contact with the design, is deflected away from the rotating cylinder and its direction reversed. The stream is directed through another closed channel, flows backwardly under its own inertia, and is redelivered into the stream of ink being delivered against the design. Thus a large moving volume of ink is continuously projected onto the rotating design, there is a large and abundant flowage of ink over a very large part of the design, and a large body of the ink is continuously maintained in circulation out of contact with the air, and evaporation is thereby greatly reduced and largely prevented. Replenishment of the ink from a further fountain is provided, and at the same time a total larger volume of ink than the immediate stream is kept in circulation. This is effected by means of a pump which maintains a circulation of ink between the two fountains, projects the ink stream against the design, and also maintains the flow or head on the ink stream in the circulating system above described. Novel features of the ink circulating system and pump will likewise be later pointed out and claimed herein.

Other objects and advantages of the invention will be pointed out later herein, and it will be understood that the foregoing general description, and the following detailed description as well, are illustrative and exemplary but are not restrictive of the invention.

Referring now in detail to the embodiment of the invention illustrated by way of example in the accompanying drawings, a rotogravure or other intagliated design cylinder 1 is journaled in the press frame (not shown) and cooperating therewith is an impression roll 2, which may be of usual or other suitable form, and rotating in contact with the impression roll is a backing cylinder 3. A suitable doctor blade mechanism is employed, which may be of any standard or other suitable form, and such a mechanism is shown fragmentarily at 4, with the doctor blade 5 cooperating with the design cylinder in the usual manner.

The inking mechanism, in so far as concerns certain general features thereof, may be of any desired form, and as shown a general fountain structure or casing surrounds the design cylinder 1, and comprises side walls 10 and 11 behind and in front of the design cylinder 1, and end walls 12 connected to the side walls and enclosing the ends of the design cylinder. Located beneath this fountain casing, as shown, is a replenishing fountain 16. In accordance with the present invention a continuous stream of ink is projected against the design on the rotating cylinder 1, throughout the length thereof, and as far away circumferentially from the impression line of the cylinders 1 and 2 as practicable, and a large, flowing stream of ink is maintained in contact with the design in quantity throughout a very large extent of the circumference of the rotating cylinder. Furthermore, in accordance with one feature of the invention, a continuous and endless stream of ink is maintained, having the functions just described, and this circulating stream of ink is maintained out of contact with the atmosphere substantially throughout its entire path, and, consequently, the evaporation of highly volatile inks is reduced to and maintained at a minimum.

Means are provided for projecting the stream of ink against the rotating design throughout the length of the cylinder, for maintaining the flowing stream of ink in contact with the rotating design, and for directing the stream of ink away from the design before reaching the doctor blade and directing it back to the place of projection against the design; and cooperating therewith are means for replenishing the ink stream from a reservoir to such extent as required or as found most efficient. In the embodied form, a suspended fountain is provided having a curved bottom 17, beneath and spaced away from the bottom of the design cylinder 1, and having end walls 18, the lower part of the design cylinder rotating within the fountain. This fountain is removably supported within the surrounding casing, and as shown is sustained by pivotal supports 19 for the side walls 18 at the front end thereof, the supports 19 being mounted in the end walls 12 of the fountain casing. At the rear ends of the side walls 18, respectively, hooks 20 are pivotally mounted at 21, and hook over pins 22 mounted in the casing side walls 12. The embodied form of return path for the ink stream, whereby it is returned back to the place of projection against the design, comprises a curved bottom plate 27, located beneath and spaced away from the plate 17. The plates 17 and 27 are maintained in spaced position to provide the double passageway for the ink stream by means of angle bars 28 and 29 pivoted to the underside of the plate 17 and projecting downwardly therefrom, the bottom of the angle bars fitting within bars 30 and 31 fixed to the inner side of the plate 27.

The embodied form of the means for projecting the ink stream against the design and forwardly along the rotating design through the passageway between the cylinder 1 and the bottom plate 17, and of the means for replenishing and renewing the ink stream, comprises a pump 35, located within the reserve ink fountain 16, the pump being normally immersed in the ink in the fountain 16. A flexible hose 36 connects from the pump to a header 37, extending across the design cylinder at the rear edge of the fountain, and located also at the rear end of the forward and return passageways for the ink stream. Con-

nected to the header are the means for directing the flowing ink against the design cylinder and into the forward passageway formed between the design cylinder and the curved member 17, said means comprising a plate 38 seated on the header, and extending vertically upward, and then being curved inwardly at 39 to direct the return of the ink stream. An opening is thus provided between the curved top edge of plate 38 and the rear edge of plate 17, which usually extends throughout the length of the design cylinder. Through this opening the ink stream of substantial thickness and volume is directed against the design, throughout the width thereof, and is also directed forwardly into the channel beneath the design cylinder. A screen plate 40 closes the top of the opening at the back of the plate 38.

At the forward end of the forward flow passageway for the ink stream are the means for deflecting the stream away from the design and into the return passageway, which conducts it back to the place of projection against the design. Said means, as embodied, comprises a horizontally disposed curved deflector plate 47, extending along the surface of the design cylinder somewhat to the rear of the doctor blade. The deflector plate 47 is mounted on an angle bar 48, extending across between and supported by the end walls 18 of the fountain, and the deflector plate 47 has bolt and slot connections 49 with the bar 48 whereby the distance between the edge of the plate 47 and the design may be varied, and the amount of ink deflected and the amount allowed to remain on the design and removed by the doctor blade, may be nicely regulated, as indicated diagrammatically by the arrows. A curved deflector plate 50 is mounted on the underside of the angle bar 48 to further direct and reverse the ink stream into the return passageway. In Fig. 3 of the drawings, a somewhat different form of the passageway structure is shown, wherein the adjustment between the deflector plate and the design surface is omitted, and a spillage passage for the ink returned from the doctor blade is provided between the rear edge of the deflector plate and the vertical wall 11 of the fountain casing, whereby the ink returned from the doctor blade will flow directly downward into the reserve fountain 16. Any other convenient form of overflow or spillage means may be provided whereby a part of the ink is returned from the circulating stream to the reserve fountain and the stream is replenished from the reserve. In accordance with one feature of the invention, the pump, usually a centrifugal pump, is located in the ink in the reserve fountain, and the motor 56 therefor is located outside the fountain. As shown, the base plate 57 of the motor is also used as a closure for an opening 58 in the side of the fountain, the plate being attached thereto by bolts 59 to form a tight closure, and the connections between the motor and pump are within the casing 60 and extend through the opening 58.

It will be noted that a large volume of ink is continuously projected against the face of the design, acting to keep the design clean and clear, and the stream of ink flows along in contact with the rotating design through a relatively large part of its path, the ink stream at the same time having relative motion with respect to the design, all of which tends to maintain thorough inking and clear printing. The deflecting means at the forward end of the path of the ink stream

not only deflects it into the return channel, but acts to prevent a pumping and dragging action by the design upon the ink stream which would tend to draw the ink from the rear and pile it up forwardly and sometimes against the doctor blade. The amount of the ink stream deflected and the amount permitted to remain on the design to the doctor blade may be nicely regulated as desired for the particular printing. The mechanism also utilizes the inertia of the forwardly flowing ink stream to return it under considerable head to the projection locus, where it is again turned into the stream of ink impinging on the design. The maintenance of this large flow of ink, in active coaction with the design, and almost completely out of contact with the atmosphere practically eliminates evaporation of the ink and greatly reduces the emanation of fumes. The pump may be regulated to establish not only replenishment of the ink stream, but also to maintain a circulation between the active ink and the replenishment reservoir in the desired proportion or degree.

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

What I claim is:

1. An intaglio printing press including in combination a design cylinder, a fountain surrounding the bottom of the design cylinder, means at the rear of the fountain for projecting ink in a stream along the cylinder and against the design, means for confining and guiding the ink stream about the lower part of the cylinder in contact with the design, a baffle for deflecting and reversing the stream of ink flowing forwardly about the cylinder and within the fountain, and means for unobstructedly returning the flowing stream of ink to said projecting means at the rear of the fountain by the inertia of the ink moved by the rotating cylinder.

2. An intaglio printing press including in combination a design cylinder, a fountain having a curved bottom surrounding the bottom of the cylinder, means for applying ink between the cylinder and said curved bottom, a passageway of relatively large cross section beneath the fountain with one end adjacent to said ink applying means, and means for directing ink from said stream into said passageway to return the ink stream to said place of application under the inertia developed in the ink by the fast rotating cylinder.

3. An intaglio printing press including in combination a design cylinder, a doctor blade, a fountain having a curved bottom surrounding the bottom of the cylinder, means at the rear of the fountain for applying ink between the cylinder and fountain bottom, a passageway beneath the fountain with one end adjacent to said ink applying means, and means to the rear of the doctor blade for reversing the ink stream and directing it into said passageway to return the ink stream to the other side of the fountain, said curved bot-

tom and passageway having their ends at about the same level and filled with ink so that the rotating cylinder may act to circulate the ink.

4. An intaglio printing press including in combination a design cylinder, inking means including devices for directing a stream of ink in an endless path the ends of which are at approximately the same level, along a part of which path the stream of flowing ink is in contact with and impelled by the surface of the rotating cylinder, and along a part of which path the stream of ink is flowing out of contact with said cylinder, and means for applying the ink stream against and throughout the width of the design on the cylinder and impelling it along its path of flow in the direction of rotation of the cylinder.

5. An intaglio printing press including in combination a design cylinder, inking means including devices for directing a stream of ink in an endless path having its ends at approximately the same level and out of contact with the atmosphere throughout most of its length, along a part of which path the stream of flowing ink is in contact with the design on the rotating cylinder so as to be impelled thereby, and along a part of which path the stream of ink is flowing out of contact with said cylinder, and means for supplying additional ink into the stream of ink circulated by the cylinder.

6. An intaglio printing press including in combination a design cylinder, a fountain having a curved bottom surrounding the bottom of the cylinder, the space between said cylinder bottom and said fountain bottom constituting part of an enclosed passageway for a stream of ink which flows in contact with the design, a return conduit of large cross section for returning the ink stream to the beginning of said passageway by inertia of the ink, means for deflecting the returned ink towards the cylinder at the beginning of said passageway and means for supplying additional ink to said stream.

7. An intaglio printing press including in combination a design cylinder, a fountain having a curved bottom surrounding the bottom of the cylinder, the space between said cylinder bottom and said fountain bottom constituting an enclosed passageway for a stream of ink which is moved by contact with the design, a passageway for returning the ink stream by inertia to the entrance to said passageway, an ink reservoir receiving ink from said passageways, and a means for supplying ink from said reservoir into said stream.

8. An intaglio printing press including in combination a design cylinder, means at the rear of the impression line for projecting a stream of ink towards the cylinder and in the direction of rotation of the cylinder, means for confining said stream of forwardly flowing ink as a solid stream about the cylinder and in contact with the design and means of relatively large cross section for deflecting said stream and unobstructedly returning it to the point of projection to be again projected towards the design.

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