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INTAGLIO PRINTING MACHINE

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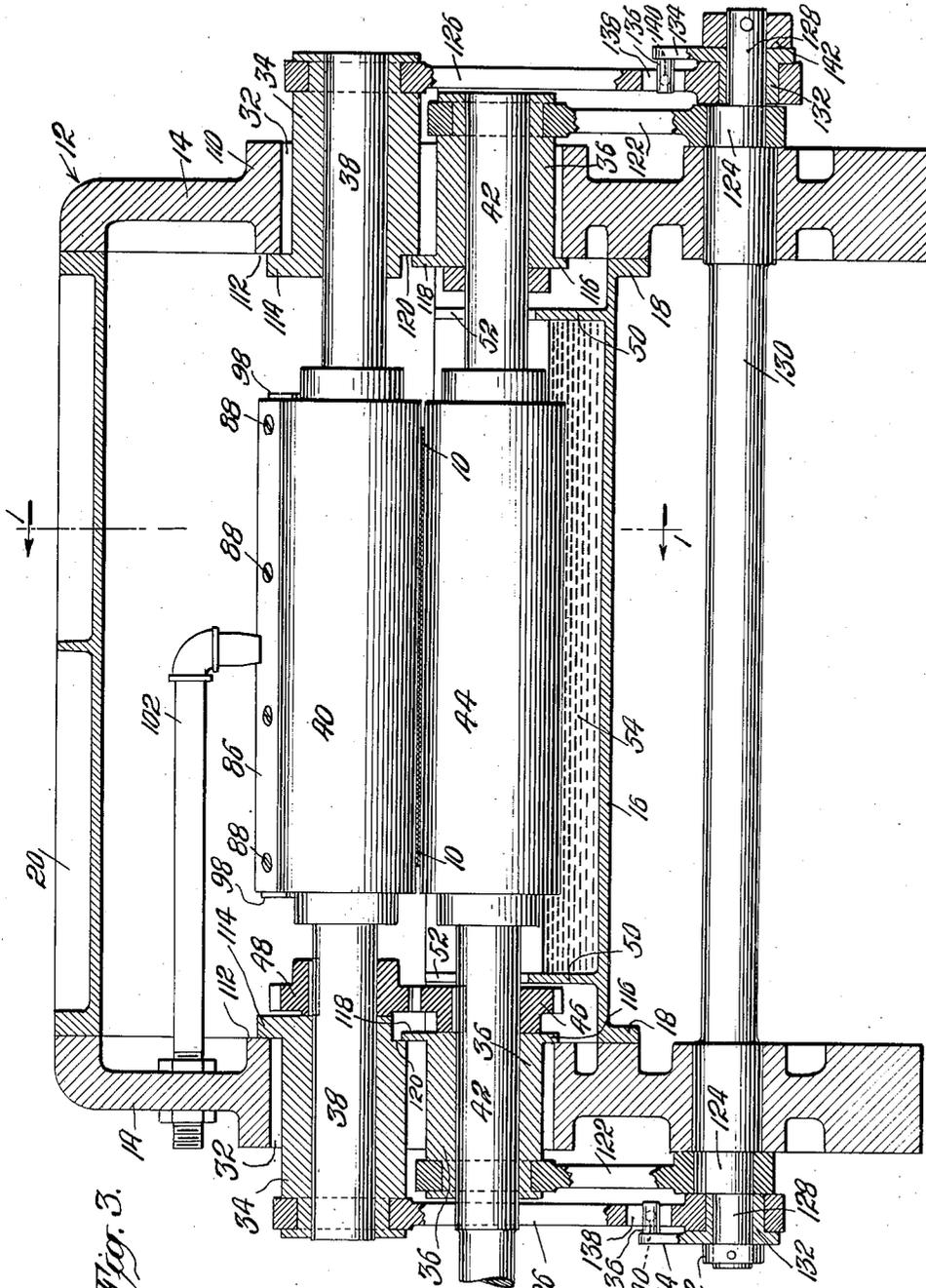


Fig. 3.

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INTAGLIO PRINTING MACHINE

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mesne assignments, to Interchemical Corpora-
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5 Claims. (Cl. 101—157)

This invention relates to the art of printing and aims to provide an improved printing or marking press of the intaglio type in which a web may be imprinted on both sides simultaneously with a quick drying marking material.

In conventional gravure or intaglio printing, the marking cylinder or engraving usually has its lower portion running in a bath or fountain of ink. Excess ink is removed by means of a doctor blade bearing against the cylinder, and the web of paper or other material to be marked is brought into contact with the engraving by means of a resilient impression cylinder. If both sides of the web are to be printed, it is necessary to provide a sufficient length of web between impressions to permit the first applied impressions to dry. Then the web may be fed through a second printing unit where the unprinted side will be brought into contact with a second marking cylinder. With such an arrangement and procedure, difficulties are always encountered in adjusting the web lengths so that the later applied impressions will be in register with those first applied. When ordinary inks are used, a considerable length of web must be left between units to permit drying and this renders the problem of register even more difficult.

Furthermore, when relatively heavy stock, such as is used in the manufacture of various types of cartons and containers, is to be imprinted, it is impractical to thread the web through any usual course to provide the desired web length necessary for drying. In fact, it is advantageous to feed webs of such stock through the press in a horizontal position so as to avoid bending or otherwise damaging the stock. Such feeding of the web requires that the marking and impression cylinders be arranged vertically or one above the other.

Due to usual ink cells or depressions in intaglio printing cylinders and the manner in which such cylinders must be inked, it has been thought impossible heretofore to provide for simultaneous intaglio printing on both sides of a horizontally fed web, particularly when volatile or quick-drying marking material is employed. I have discovered, however, that effective printing pressure can be obtained with opposed intaglio cylinders, and that both cylinders can be properly inked with quick-drying materials, so that simultaneous intaglio printing may be effected on both sides of a web.

In accordance with my invention, both sides of a horizontally fed single web, or the exposed surfaces of a plurality of superimposed webs, may be

simultaneously printed, by passing them between opposed vertically arranged engraved or marking cylinders, where each marking cylinder acts as the impression cylinder for the other, and the construction is so simple mechanically that the entire printing mechanism may be completely enclosed in a substantially gas-tight housing. The lower marking cylinder may be inked and doctored in any customary manner; while a combined doctor blade and ink fountain, having improved means for maintaining the desired and necessary contact with the engraving, is provided for inking the upper cylinder. My invention also includes suitable means for supplying the ink or marking material for both cylinders, and maintaining it at the desired level; a housing for enclosing the entire printing mechanisms so that volatile or other quick drying marking material may be utilized; and means for adjusting the pressure between the cylinders and for separating said cylinders one from another in such a manner that the web will not contact either of them when the press is not in operation. Other features and advantages will appear as the following description proceeds.

A specific embodiment of apparatus for carrying out my invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a vertical sectional view through an intaglio printing press in which impressions may be applied simultaneously on the top and bottom of a horizontally fed web, the view being taken substantially along the line 1—1 of Fig. 3;

Fig. 2 is a plan view, with certain portions broken away, of a part of the apparatus shown in Fig. 1, and illustrating certain details of the upper fountain construction;

Fig. 3 is a vertical sectional view of the apparatus, taken substantially along the line 3—3 of Fig. 1, and with the support for the upper fountain omitted; and

Fig. 4 is a fragmentary plan view of a modification of the upper fountain construction.

The present invention has been shown embodied in a press which may be used for applying a quick drying adhesive marking material to predetermined areas of both sides of a web of carton stock. It is to be understood, however, that the invention is not restricted in its use to such a press, or such marking material, but the principal features thereof may be included in printing presses generally, and particularly intaglio printing presses.

As shown in the drawings, a web 10 is fed in a substantially horizontal position to receive

markings on the top and bottom thereof in an intaglio marking unit 12. I have shown a plurality of webs 10 which will have the exposed surfaces thereof marked in the unit 12, and these are fed from any previous marking or treating unit or directly from a conveniently located source of supply. The marking unit 12 comprises side frame members 14 spaced at a suitable distance one from another by means of a lower housing member 16 which may be provided with flanges 18 and secured to the side frame members 14 in any convenient manner. If desired, the housing may be closed by means of front and rear cover members 20 and 22, respectively, which are hinged at 24 and 26 to the side frames 14, so that they may be raised, as shown in dotted lines in Fig. 1, to gain access to the inside of the housing. When the housing is closed in this manner, the lower portions of the covers are cut away to provide front and rear horizontally disposed slots 28 and 30, respectively, through which the web 10 may be fed.

This construction provides a substantially completely closed and gas tight housing, since the slots 28 and 30 are practically closed by the web. Such a housing is particularly useful when marking material containing volatile solvents is used in the press, for it becomes quickly saturated with solvent vapors so that further evaporation and loss of solvents is reduced to a minimum. Moreover, the housing may be made large enough to enclose the marking cylinders completely, thus eliminating all complicated inking mechanism and preventing evaporation from the entire surface of each cylinder.

Each side frame 14 is provided with a substantially centrally located rectangular opening 32 (Fig. 3) having slidably mounted therein upper and lower bearing members 34 and 36, respectively. These bearing members are slidably and adjustably mounted in the openings in a manner to be explained more fully hereinafter. Journalled in the upper bearing member 34 is a shaft 38 of an upper engraved or intaglio marking cylinder 40; and journalled in the lower bearing member 36 is a shaft 42 of a lower engraved or intaglio marking cylinder 44. If desired, either or both of these cylinders may be heated or cooled in any conventional manner, depending upon the type of marking material and web used and the effect to be obtained. In Fig. 3, the left hand end of the shaft 42 is shown broken off, but it may be extended to suitable gearing and motor (not shown) to receive rotative movement at the desired speed. Such rotative movement is transmitted to the upper intaglio cylinder by means of a gear 46 keyed to the shaft 42 and meshing with a gear 48 keyed to the shaft 38 so that both of the intaglio cylinders will be rotated at the same speed. As mentioned above, upper intaglio cylinder 40 acts as an impression cylinder for the lower cylinder 44, while, at the same time, the lower intaglio cylinder 44 acts as an impression for the cylinder 40; and it is between these two cylinders that the web 10 is passed to receive markings simultaneously on the upper and lower sides thereof.

Marking material such as ink, adhesive, wax or the like, may be applied in liquid form to the lower intaglio cylinder in any convenient manner. I have shown the lower housing 16 provided with side walls 50 spaced from the frame members 14 and having cut out portions 52 therein to accommodate the shaft 42. These side walls, together with the lower portion of the

member 16 form a receptacle in which a bath 54 of the marking material may be contained and, if necessary, heated or cooled in any suitable manner. The housing 16 may be provided, in the lower portion thereof, with an inlet section or chamber 56, into which a supply pipe 58 may open, and from which a drain pipe 60 may lead. These pipes may form part of an ink circulating system for both the lower and upper fountains, as will hereinafter appear. A screen 62, or other suitable straining device, may separate the inlet chamber from the rest of the receptacle, and thus prevent foreign matter from coming in contact with the engraving.

The marking material is constantly maintained at a sufficiently high level so that the intaglio cylinder 44 will rotate in it and the cells thereof be properly filled. Excess marking material is wiped from the engraving by means of a laminated doctor blade 64 removably mounted by set screws 66 in a doctor blade holder 68 which is rotatably mounted in side frames 14. Crank arms 70 may be connected to the doctor blade holder 68 at each side thereof and outside of the frame members 14; and weights 72 may be suspended from these arms to produce the desired pressure of the doctor blade against the engraving. If desired, the doctor blade 64 may be reciprocated in any conventional manner.

In order to supply marking material to the upper intaglio cylinder, I have provided a combined doctor blade and fountain 74, which will now be described. As shown in Figs. 1 and 2, this comprises a main supporting member or fountain base 76 which includes an angularly disposed table 78 and integral supporting brackets 80, by means of which the base may be secured in any convenient manner to the side frames 14. The table 78 is substantially the same length as the upper cylinder 40 and at the upper edge thereof is provided with a raised portion 82 to which is secured a resilient doctor blade 84 by means of a clamping bar 86 and screws 88. Doctor blade 84 extends downwardly substantially parallel to the surface of the table 78 and into contact with the surface of the intaglio cylinder 40. A plurality of adjusting screws 90 are threaded through the lower portion of the table 78 and emerge in closely spaced tapered openings 92 beneath the doctor blade 84. These adjusting screws are provided with tapered ends 94 which are adapted to bear against the lower side of the doctor blade and urge it into contact with the intaglio cylinder with the desired pressure. Due to the close spacing of these adjusting screws, the contact of the doctor blade with the intaglio cylinder is maintained uniform throughout the length thereof. Knurled heads 96 may be provided on each adjusting screw so that said screws may be easily turned to effect the desired adjustment.

Also included in the combined doctor blade and fountain 74 are end retainer plates 98, one being provided at each end of the table 78 and secured thereto in any convenient manner. These end plates have cutout portions 100 and are so mounted and constructed that they will have a snug fit with the ends of the cylinder; and together with the doctor blade and the face of the cylinder form a trough shaped fountain. Marking material may be supplied to the fountain through a supply pipe 102 which passes through the side frame 14 and extends inwardly to a suitable point above the fountain. The end of this pipe outside the housing may be connected

to a suitable source of supply and the material pumped into the fountain in the desired quantities. If it is desired to use the same type of marking material in both fountains, the pipe 102 may be connected to a pump obtaining material from the lower fountain or the source of supply therefor. Then an overflow pipe 104, connected to one of the end retainer plates 98 and extending downwardly so as to empty into the bath 54, may be provided for maintaining the marking material at the desired constant level, and returning any excess material to the lower fountain. By having the two fountains interconnected in this manner and circulating the marking material between them, the consistency of the marking material in both fountains will be maintained uniform. In case of any leakage of marking material from the trough shaped fountain, a drip pan 106 may be provided to prevent the marking material from dropping upon the incoming web 10. As shown, the pipe 104 is connected with a pipe 108 which passes through the drip pan and is fastened thereto.

Should it be desired to reciprocate the upper doctor blade, the construction thereof may be modified as indicated in Fig. 4. Instead of having end plates 98 which engage with the ends of the cylinder, the entire supporting frame or fountain base may be shortened and provided with end walls or plates 99 which are shaped to fit the cylinder surface and provided with suitable packings or pads 101 which bear against the surface and prevent the marking material from flowing through. The entire fountain and doctor blade may then be freely supported upon a track 103 by means of standards 105 having rollers 107 engaging with the track. Track 103 is secured to the side frames 14 and the doctor blade and fountain may be moved back and forth therealong in any suitable manner, such as by connecting the mechanism with the lower reciprocating doctor blade 64.

In order to produce sufficient pressure between the cylinders 40 and 44 to effect a proper transfer of marking material to the web 10, the bearing members 34 and 36 are slidably mounted in the side frames 14, as mentioned above, and provided with suitable adjusting means. Moreover, when the marking material comprises an adhesive substance, it is particularly desirable to permit the cylinders to be separated one from another so that the web may be easily threaded through the press, and also may be arranged so that it will not contact the cylinders during any period when the press is not in operation. In Figs. 3 and 4 it will be noted that the opening 32 is provided with a peripheral reinforcing wall 110, the inside edge of which forms a suitable bearing surface 112 for flanges 114 provided on the upper bearing members 34, and flanges 116 provided on the lower bearing members 36. Lower bearing member 36 is also provided with a flange 118 on the upper edge thereof which engages with a suitable shoulder 120 provided on the bearing member 34. The construction of these flanges, the size of the bearing members 34 and 36 and their manner of mounting in the opening 32 is such that the upper member 34 may be moved upwardly and the lower member 36 moved downwardly in a sliding fashion within the opening 32.

In order to effect such movement of the bearing members, the lower bearing member 36 is connected, by means of a link 122 outside of the

frame member 14, to an eccentric 124. Similarly the upper bearing member 34 is connected by means of a link 126 to an eccentric 128. Both of the eccentrics form part of a shaft 130 which is journaled beneath the lower housing 16 in suitable bearings provided in the side frame members 14. Rotation of the shaft 130 will then, through the eccentrics and links, move the upper bearing members upwardly and the lower bearing members downwardly any desired distance, sufficient to space the intaglio cylinders one from another so that they will not contact the web 10.

Each eccentric 128 includes as a part thereof a collar member 132 having an upwardly extending arm 134. A pin 136 is fixed to the end of each arm and projects into an opening 138 provided in the link 126. Adjusting screws 140 are threaded into the link at each side of the opening 138 and extend into said opening 138 and into contact with the pin 140. All of the parts may be held on the shaft by means of retaining collars 142. Thus, by turning the adjusting screws 140, the eccentric shaft 130 will be partially rotated so that the intaglio cylinders 40 and 44 may be moved through small distances for producing the desired pressure upon the web 10. It is through this means that the necessary minute adjustments of pressure between intaglio cylinders may be effected for obtaining simultaneous printing of good quality with two such cylinders, and without the usual resilient impression cylinders.

It will be understood that, if desired, the above described separation of the intaglio cylinders may be arranged to take place automatically when the press stops, by providing any suitable type of electric throw-off device on the shaft 130, and arranging it to operate at the desired time for rotating the shaft; or if the shaft is to be rotated manually, a suitable crank may be provided at either end thereof. Various other changes may be made in the construction and certain features thereof may be employed without others, without departing from my invention or sacrificing any of its advantages.

What I claim is:

1. In an intaglio printing press for simultaneously printing upon both sides of a web, the combination of opposed intaglio marking cylinders between which the web may be fed; means for applying marking material to both of said cylinders; and means for simultaneously separating said cylinders and moving them in opposite directions one from another.

2. In an intaglio printing press for simultaneously printing upon both sides of a web, the combination of spaced side frames; opposed intaglio marking cylinders between which the web may be fed; bearing means for the shafts of said cylinders slidably mounted in and having sealing engagement with said spaced side frames; and means for simultaneously moving said bearing means relatively to one another so as to separate said cylinders.

3. In an intaglio printing press for simultaneously printing upon both sides of a web, the combination of spaced side frames; opposed intaglio marking cylinders between which the web may be fed; bearing means for the shafts of said cylinders slidably mounted in and having sealing engagement with said spaced side frames; means for applying marking material to both of said cylinders; housing means mounted in sealing engagement with said spaced side frames and

adapted to enclose said cylinders and said marking material applying means; and means for simultaneously moving said bearing means relatively to one another so as to separate said cylinders.

4. In an intaglio printing press for simultaneously printing upon both sides of a web, the combination of a first intaglio marking cylinder; a second intaglio marking cylinder disposed beneath said first cylinder in cooperative relation therewith and having a marking material receptacle arranged on the under side thereof; a combined doctor blade and marking material fountain in operative engagement with said first cylinder; means for supplying marking material in excess quantities and to said marking material fountain; and means for maintaining the marking material at a constant level in said marking material fountain, such maintaining means being arranged so that the excess marking material will flow into the receptacle for said second cylinder.

5. In an intaglio printing press for simultaneously printing upon both sides of a web, the combination of upper and lower intaglio marking cylinders between which the web may be fed; means for applying marking material to said lower cylinder; means for wiping excess marking material from the surface of said lower cylinder; and an ink fountain for said upper cylinder comprising a support, a resilient blade secured to said support and extending into wiping contact with the surface of said cylinder, means for adjusting the pressure of contact of said blade against said cylinder at any desired point substantially throughout the length of said blade, and retainer plates disposed at the ends of said blade and having a snug fit with said blade and the surface of said cylinder near the ends thereof so that said ink fountain may be reciprocated on the surface of said cylinder.

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