

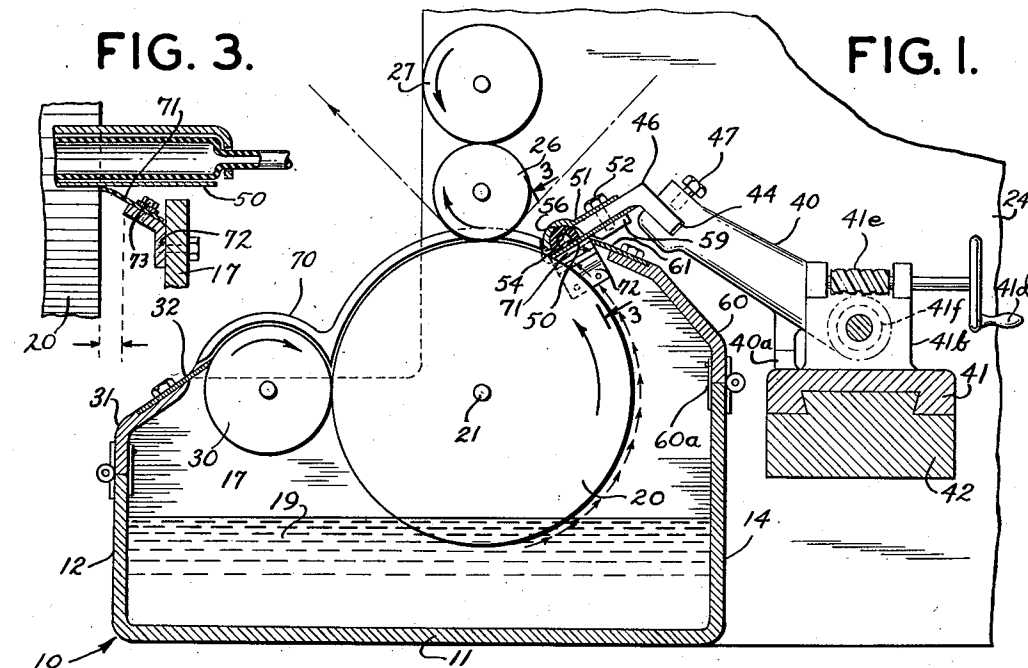
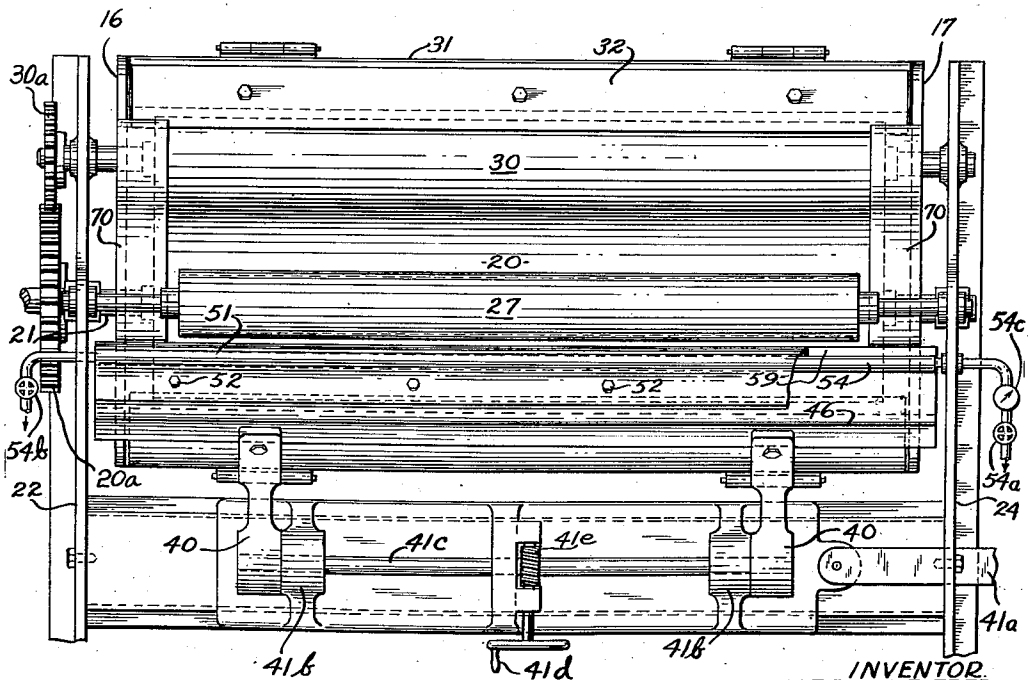
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ENCLOSED GRAVURE FOUNTAIN

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ENCLOSED GRAVURE FOUNTAIN

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The present invention relates to an enclosed gravure fountain, suitable particularly in rotary intaglio printing machines, having as its novel features a construction designed to completely enclose the fountain, one element of which is a fluid pressure means capable of acting upon a doctor blade bearing on the peripheral surface of the printing cylinder in a manner designed to compensate for the uneven wear of the doctor blade.

In intaglio printing, the printing surface has formed in it depressions corresponding to the design to be printed. It is conventional practice in the rotary intaglio printing art to mount a rotatable printing cylinder, the peripheral surface of which is provided with such depressions, in a fountain so as to immerse a portion thereof in the printing fluid. A doctor blade is provided to scrape or wipe the ink off the non-depressed portions of the peripheral surface so that when the latter comes into contact with the web to be printed, the non-depressed portions will be substantially free of ink and a pattern corresponding to the depressions will be printed upon the web.

It has been found that the general uneven distribution of depressions in the surface of the intaglio printing cylinder causes the doctor blade to wear unevenly. In conventional machines, this requires immediate replacement of the doctor blade to avoid uneven wiping of the peripheral surface because the retention of a film of printing fluid on the printing surface after it passes the doctor blade would result in a transfer of the fluid to the web at places not corresponding to the depressions and would therefore effectively destroy the value or desirability of the print.

It has also been found that the printing fluid in the fountain tends to change in consistency during the printing operation due to the evaporation thereof from the fountain and to the accumulation therein of foreign particles. The latter phenomenon is particularly undesirable because the presence of foreign particles in the printing fluid accelerates the uneven wearing of the doctor blade and results in a scratching of the printing surface to such an extent that the number of copies that can be printed with it becomes quite limited.

Attempts have been made in the past to overcome these difficulties. Thus, for example, it has been proposed to mount the doctor blade underneath a second blade that does not come into contact with the intaglio printing surface

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but serves merely as a spring to press the doctor blade against that surface. It has also been suggested to seal the printing fountain from the outside atmosphere by means of a resiliently mounted sealing blade in wiping engagement with the peripheral surface of the printing cylinder in such a manner that a given point on the cylinder successively comes into contact with the doctor blade, the web and the sealing blade. Both suggestions have resulted in cumbersome and complicated designs that have added to the maintenance cost of rotary intaglio printing machines and neither of them has been entirely successful. The suggested spring means for pressing the doctor blade against the printing cylinder is not sufficiently flexible to compensate for the uneven wearing of the doctor blade and the sealing means thus far proposed have afforded merely another instrument capable of damaging, by scratching, the intaglio printing surface. In practice, the so-called seal blades, provided to completely enclose the fountain, have been moved out of wiping engagement with the cylinder to avoid scratching.

The present invention is concerned with an effort to overcome these defects. The doctor blade, in accordance with the present invention, is provided with an overlying fluid pressure tube which, by means of hydraulic or pneumatic pressure, is capable of exerting a uniform pressure along the entire length of the blade so as to maintain all parts of the bearing edge against the peripheral surface of the printing cylinder despite any uneven wear in the bearing edge. The fountain is sealed in part by a combination of a sealing roll having an accurately machined peripheral surface in rolling contact with the peripheral surface of the printing cylinder and a sealing blade in wiping engagement with the peripheral surface of the sealing roll and in part by the doctor blade.

One of the advantages of the present invention is that it provides an extremely simple structure for automatically compensating for any uneven wear of the doctor blade and, at the same time, reducing to a minimum the possibility of scratching or otherwise marring the surface of the printing cylinder.

Another advantage of the invention is that it provides a true seal for the fountain and requires a minimum of maintenance.

These and other advantages, as well as the utility of the invention, will become more apparent from the detailed description that follows

when considered in the light of the accompanying drawing wherein:

Figure 1 is a diagrammatic view in cross section through one embodiment of the invention;

Figure 2 is a plan view of the embodiment shown in Figure 1; and

Figure 3 is a view in section taken on line 3—3 of Figure 1 showing a device for closing the gaps between the ends of the doctor blade and the fountain receptacle.

A fountain 10 having a bottom 11, side walls 12 and 14 and end walls 16 and 17 serves as a container for the printing fluid 19. A rotary intaglio printing cylinder 20 is mounted within the fountain 10 and the shaft 21 thereof may be journaled in the end walls 16 and 17 or in enclosing frame members 22 and 24, as shown in Figure 2. An impression roll 26 and a back-up roll 27 may be mounted above the printing cylinder 20, as shown schematically and by way of example in Figure 1. The elements thus far described with reference to the drawing are conventional and do not form a part of this invention.

A carefully machined seal roll 30 having a non-abrasive peripheral surface is mounted in the fountain 10 parallel to, and in rolling contact with, the printing cylinder 20 and means, such as gears 20a and 30a, are provided to drive the printing cylinder 20 and the seal roll 30 at substantially the same peripheral speed. The side 12 of the fountain 10 is provided with a hinged portion 31 carrying a sealing blade 32 in wiping engagement with the seal roll 30 to complete the sealing of the fountain between the printing cylinder 20 and the side wall 12. The hinging of the hinged portion 31 is not required but is desirable for practical purposes, such as to facilitate inspection or filling of the interior of the fountain 10 and to permit convenient removal of the seal 30 and the cylinder 20.

The track 42 supports a slide 41 which is connected by means of a link 41a to an oscillating mechanism of conventional type (not shown). The Standards 41b are carried on the slide 41 to support the shaft 41c which may be rotated by means of a hand wheel 41d, a worm 41e and a worm gear 41f. The doctor support arms 40 are keyed to the shaft and the stop 40a determines their working position. Each of these arms 40 is provided, at its upper extremity, with an opening designed to receive a leg 44 of a doctor blade support 46, the position of said support relative to the standard being maintained by means of one or more set screws 47 in the upper portion of the standard 40. A flexible doctor blade 50 is secured to the underside, and a grooved member or tube holder 51 is secured to the upper side, of the support 46 by means of one or more bolts or tap screws 52. A flexible, fluid pressure tube 54, connected to a source of fluid pressure 57, is positioned between the doctor blade 50 and the concave portion 56 of the tube holder 51, the tube 54 and tube holder 51 overlying substantially the entire length of the doctor blade 50.

The side 14 of the fountain 10 is provided with a hinged portion 60 having a sealing blade 61 affixed thereto which is adapted to engage the bar 59 underneath the doctor blade support 46 to thus effectively seal the space between the printing roller 20 and the side wall 14 of the fountain 10. The hinged joint between the portion 60 and the side 14 is sealed by a spring blade 60a which is secured to the portion 60 and bears resiliently against the wall 14.

It is to be understood, of course, that the hinged portion 60 is pivotally mounted on the side wall 14, to provide convenient access to the interior of the fountain and that suitable means may be provided to lock it into the operating position shown.

The end walls 16 and 17 of the fountain 10 may suitably be provided with cover plates or lips 70 designed to cover and seal the end portions of the fountain. The cylinder 20 is adjustable endwise for lateral register and the cover plates 70 must extend inwardly a sufficient distance to overlap the ends of the cylinder 20 in all of its adjusted portions.

The gaps at the ends of the doctor blade and the cylinder 20 are closed by flexible sealing blades 11 shown in Figures 1 and 3. A blade 11 is mounted on an angle bracket 72 by means of screws 73 extending through the blade for retaining the blade 11 in engagement with the lower surface of the doctor blade 50 and the end of the cylinder 20. The bracket 72 is secured to the wall 17 of the fountain. A similar sealing blade is mounted in the same way on the wall 16 for cooperation with opposite ends of the doctor blade 50 and the cylinder 20.

In operation, the tube 54 is filled with a fluid under pressure so as to exert a predetermined hydraulic or pneumatic pressure on the doctor blade 50 with the result that every portion thereof will bear upon or be in wiping engagement with the peripheral surface of the printing cylinder 20. The fluid pressure tube, because of its flexible structure, will automatically operate to compensate for any uneven wear of the doctor blade and maintain the entire length of the wiping or bearing edge in wiping engagement with the peripheral surface of the printing cylinder and thus make unnecessary an adjustment or replacement of the doctor blade during the operation of the machine. Furthermore, by controlling the amount of fluid pressure in the flexible tube 54, the operator can effectively control the pressure of the doctor blade 50, as a whole, against the peripheral surface of the printing cylinder 20 so as to obtain a maximum wiping action with a minimum of wear and scratching. The fluid pressure within the tube is controlled by means of a valve 54a, a bleeder valve 54b and is indicated by a gauge 54c.

The fluid pressure means for maintaining the bearing edge of the doctor blade 50 against the peripheral surface of the cylinder 20 has the further function, in cooperation with the bar 59, the seal blade 61 and the end seal blades 71, of providing a substantially air tight cover over the fountain 10 between the printing cylinder 20 and the side wall 14.

The interposition of a seal roll 30 between the printing cylinder 20 and the sealing blade 32 effectively avoids a second wiping action on the printing cylinder and provides a substantially air tight covering over the fountain 10 between the printing cylinder 20 and the side wall 12. The sealing blade 32 has the additional function of removing from the peripheral surface of the seal roll 30 any foreign particles that may have become attached thereto and would tend to injure the peripheral surface of the printing cylinder 20 before the surface of the seal roll 30 comes into contact with the printing cylinder 20.

It is to be understood that many alterations and modifications will readily occur to those

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skilled in the art upon reading the description of this invention.

Thus, for example, it is immaterial whether the shafts for the printing cylinder and the seal roll are journaled in the end walls of the fountain or in an enclosing frame. The fluid within the flexible tube may be a gas or liquid and any suitable means may be employed to control the pressure thereof. The standards for supporting the doctor blade and the elements cooperating therewith may be mounted on the frame or on the fountain itself. The modification illustrated and described specifically is preferred merely because it provides an extremely simple way of obtaining access to the fountain from the side.

The fluid pressure tube may be of substantially uniform cross section throughout its effective length or it may be tapered. It is also possible to provide the sealing blade 32 that is in wiping engagement with the seal roll 30 with a flexible, fluid pressure tube arrangement similar to that provided for the doctor blade in order to still more effectively wipe the seal roll clean and thus still further minimize the possibility of scratching the peripheral surface of the printing cylinder.

These are but a few of the many modifications that will readily occur to those skilled in the art and are intended to be included within the scope of this invention as defined in the appended claims.

I claim:

1. An enclosed gravure fountain comprising a housing having side and end walls for a printing fluid, a rotatable printing cylinder in the housing parallel to and spaced from said side walls and having configurations thereon formed by depressions extending below the peripheral surface thereof, a unitary and flexible doctor blade having a wiping edge bearing on the peripheral surface of the cylinder, an inflatable fluid pressure tube overlying the doctor blade and capable of exerting pressure on said blade to maintain substantially the entire length of the wiping edge against the peripheral surface of the cylinder, means for supporting said flexible doctor blade and said fluid pressure tube, sealing means for covering the space between said supporting means and one of said side walls, a seal roll parallel to said printing cylinder and in rolling contact with the peripheral surface thereof, said roll being disposed between said cylinder and the other of said side walls, means for rotating the printing cylinder and the seal roll at substantially the same peripheral speed, a second seal blade between said other side wall and said seal roll and having a bearing edge in wiping contact with said seal roll, said seal roll and said second seal blade cooperating to cover the space between said cylinder and said other side wall, and sealing means between the end walls and the adjacent ends of the cylinder and seal roll for sealing gaps at the ends of the cylinder and seal roll.

2. In an enclosed gravure fountain comprising a housing having side and end walls for a printing fluid, a rotatable printing cylinder in the housing parallel to and spaced from said side walls and having configurations thereon formed by depressions extending below the peripheral surface thereof, a unitary and flexible doctor

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blade having a wiping edge bearing on the peripheral surface of the cylinder, and means for supporting said flexible doctor blade, the combination of sealing means for covering the space between said supporting means and one of said side walls, a seal roll parallel to said printing cylinder and in rolling contact with the peripheral surface thereof, said roll being disposed between said cylinder and the other of said side walls, means for rotating the printing cylinder and the seal roll at substantially the same peripheral speed, a second seal blade between said other side wall and said seal roll and having a bearing edge in wiping contact with said seal roll, said seal roll and said second seal blade cooperating to cover the space between said cylinder and said other side wall and sealing means on the end walls of the housing overlapping the ends of the printing cylinder and the seal roll to cover the spaces between the ends of the cylinder and roll and the adjacent end walls.

3. In an enclosed gravure fountain comprising a housing having side and end walls for a printing fluid, a rotatable printing cylinder in the housing parallel to and spaced from said side walls and having configurations thereon formed by depressions extending below the peripheral surface thereof, a unitary and flexible doctor blade having a wiping edge bearing on the peripheral surface of the cylinder, and means for supporting said flexible doctor blade, the combination of sealing means for covering the space between said supporting means and one of said side walls, sealing means on the end walls of said housing engaging said doctor blade and the adjacent ends of said cylinder for sealing gaps at the ends of said cylinder, a seal roll parallel to said printing cylinder and in rolling contact with the peripheral surface thereof, said roll being disposed between said cylinder and the other of said side walls, means for rotating the printing cylinder and the seal roll at substantially the same peripheral speed, and a second seal blade between said other side wall and said seal roll and having a bearing edge in wiping contact with said seal roll, said seal roll and said second seal blade cooperating to cover the space between said cylinder and said other side wall.

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