

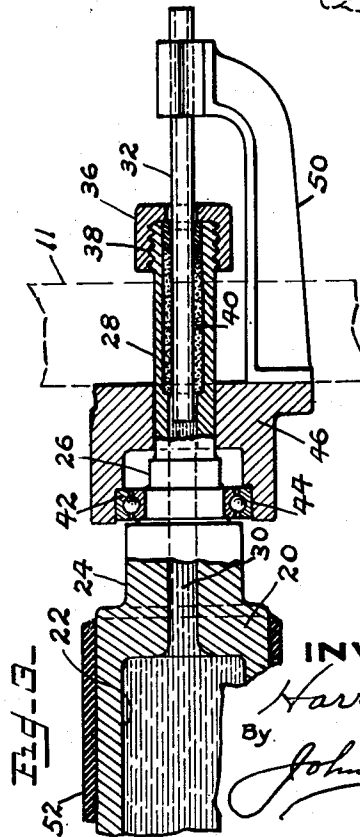
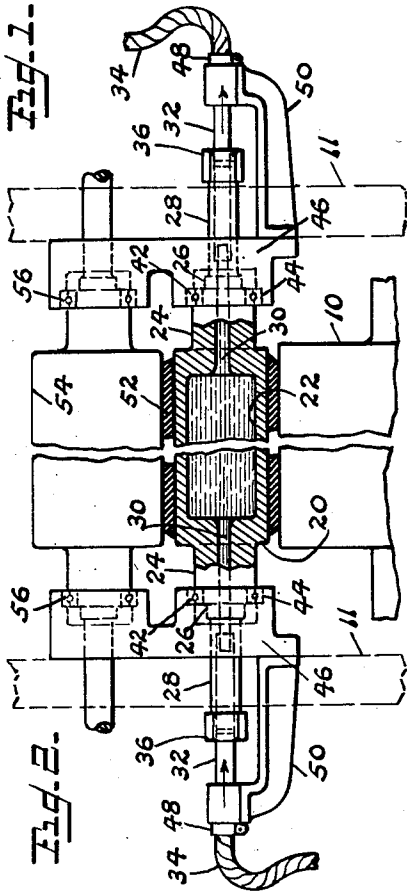
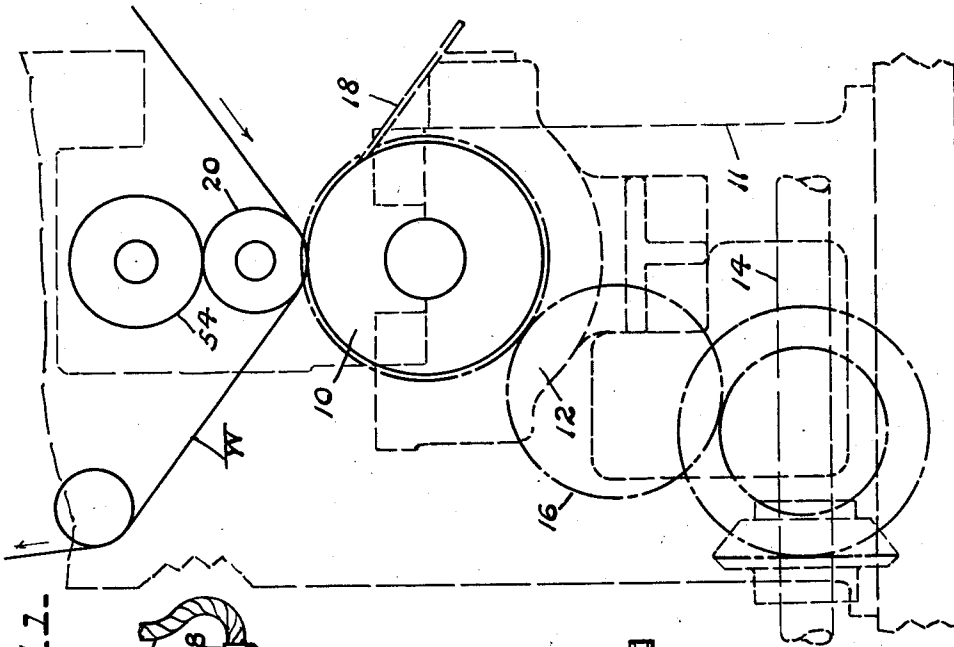
March 8, 1938.

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2,110,302

IMPRESSION CYLINDER FOR PRINTING MACHINES

Filed April 16, 1935



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UNITED STATES PATENT OFFICE

2,110,302

IMPRESSION CYLINDER FOR PRINTING MACHINES

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Application April 16, 1935, Serial No. 16,679

6 Claims. (Cl. 101—157)

This invention relates to printing machines and more particularly to improvement in impression cylinders for use in rotary multicolor intaglio printing machines.

5 In existing multicolor rotogravure or photo-gravure printing machines it is the common practice to subject the web or material being printed to the drying action of a heating instrumentality, such as steam heated cylinders or other suitable devices after each printing impression to thereby dry the ink on the web. It is also a preferred practice in machines of this type to employ an impression cylinder of relatively small diameter in operable association with and between each form cylinder and a re-enforcing or "back-up" roller or cylinder, the back-up roller serving to prevent the small impression cylinder from yielding or bending away from the form cylinder. By this arrangement the width of the flattened area of the resilient or yieldable peripheral portion of the impression cylinder which presses against the periphery of the form cylinder is appreciably less than when a large yieldable impression cylinder is employed, and a definite and relatively great unit area pressure can be attained with less bearing load. However, the heated web or material in coming in contact with the rubber covered impression cylinder and the heat inherently generated in the operation of the printing cylinders produce undesirable effects and injure the cylinder. Attempts have been made to indirectly cool the impression cylinder by cooling the re-enforcing or back-up roller which runs in engagement with the impression cylinder in diametrical opposition to the form cylinder. Such arrangements, however, do not produce the results sought and attained by this invention because the cooled back-up roller engages the peripheral portion of the impression cylinder along a line at one side of the cylinder, and the hot web engages an axially disposed area of the periphery of the cylinder along a line at its opposed side. This unequal distribution or application of heat and cold to the metallic portion of the impression cylinder tends to warp or otherwise distort the cylinder, and it is well understood by those skilled in the art that a nicety of axial alinement, dimensional accuracy and balance, both static and dynamic, are desired and mandatory in impression cylinders employed in high speed printing machines, therefore, my present invention contemplates the provision of means for directly cooling the impression cylinder to produce substantially uniform temperature in and throughout the entire impression cylinder.

It is also an object of this invention to provide means for conveying a suitable cooling fluid, such as water, air and the like to and through the impression cylinder from any suitable source of supply.

Another object of my invention is to provide an impression cylinder of relatively small diameter which is operably mounted for antifriction rotation in relatively large bearings, thereby permitting a cooling medium to be supplied to and conveyed through an axial chamber formed in the cylinder and axially through the bearings and supporting components of the cylinders thus permitting static and dynamic balancing thereof.

A further object of this invention is to provide a relatively small uniformly cool impression cylinder for use in intaglio printing machines in which a back-up roller is employed, and the impression cylinder being of generally improved construction whereby the device will be simple, durable and inexpensive in production, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in form, proportion, and minor details of construction may be made within the scope of the claims without departing from the spirit or sacrificing any advantages of the invention.

For a complete disclosure of this invention, a detailed description of an improved impression cylinder for use in rotogravure printing machines will now be given in connection with the accompanying drawing forming a part of this specification, wherein:

Figure 1 is a fragmental diagrammatic elevation of an intaglio printing machine having the improved impression roller applied thereto;

Figure 2 is a fragmental end elevation of the intaglio printing machine, showing the cooperable relationship between the form cylinder, improved impression cylinder and the re-enforcing or back-up roller, the impression cylinder being shown in sections; and

Figure 3 is a detailed sectional view taken through one end of the improved impression cylinder and its supporting mechanism.

Referring to the drawing, in which similar reference characters designate corresponding parts, there is depicted a conventional intaglio printing machine having a form or plate cylinder 10 rotatably mounted in an ink fountain 12, and

5 this cylinder is driven, in conformity with the usual practice, from a drive shaft 14 through an interposed gear train 16. The usual doctor blade 18 is supported by the fountain 12 or machine frame, and has its free flexible edge in wiping engagement with the peripheral portion of the form cylinder 10 to remove surplus ink therefrom in order that the printing impression may be produced between the form cylinder and the impression cylinder to be hereinafter described. This arrangement conforms to standard practice and forms no part of my present invention.

10 Referring more particularly to the present invention, an impression cylinder 20 of relatively small diameter is provided, and this cylinder has an axially-disposed cylindrical chamber 22 formed therein. This cylinder has axially-extending projections or shaft portions 24 which are reduced in diametric dimensions to provide bearing receiving portions 26, as best shown in Figure 3, and reduced sleeve portions 28 extend axially from the bearing receiving portions 26. The cylindrical chamber 22 communicates with the sleeve portions 28 through axial bores or apertures 30, and each sleeve 28 has a rigid cylindrical terminal fitting or pipe 32 of a flexible conduit 34 positioned therein. In order to produce a water tight joint between each sleeve portion 28 of the improved impression cylinder 20 and the terminal pipe 32 of the flexible conduit 34, a packing nut or gland 36 is threadedly secured to the outer terminal of the sleeve 28, as indicated at 38, and this gland engages suitable packing or stuffing material 40 which surrounds the terminal fitting 32 to prevent the escape of fluid from the cylinder chamber through the joint between each sleeve 28 and the terminal pipe 32. An antifriction bearing 42 of the deep grooved type is positioned on each bearing receiving portion 26, and is received within a recess 44 formed in bearing brackets 46 secured to the machine frame 11 at each side of the machine. Each flexible conduit 34 is secured to its rigid terminal fitting 32 by a suitable clamp 48, and the outer terminal of each pipe 32 is received within and supported by a bracket or supporting arm 50 secured to and extending from the bracket 46.

50 The peripheral surface of the impression cylinder 20 has a suitable yieldable covering 52 which may be formed of rubber, composition or other suitable elastic material. This yieldable covering 52 operatively engages the peripheral portion of the form cylinder 10 at one side of the impression cylinder 20, and engages the peripheral surface of a re-enforcing or back-up roller 54 at its opposed side, and this roller is rotatably mounted in antifriction bearings 56 supported by the brackets 46, as shown in Figure 2.

60 As understood by those skilled in the art, in the operation of a multicolor intaglio printing machine, a suitable heating instrumentality, such as a steam heated drum or other suitable device, is positioned between each printing unit, and, after each printing impression, the web or material being printed is passed around the heating drum thereby drying the ink before it reaches the next or succeeding printing unit, thus preventing the smutting or marking of the printing by the superposition of the subsequently applied color. When the hot web comes into contact or engagement with the yieldable covering of the impression cylinder this heat or the heat in-

herently generated by the alternate compression and expansion of the yieldable covering tends to soften or otherwise injure the covering, and, in order to overcome this difficulty, it is necessary to provide some means for cooling the yieldable covering of the impression cylinder. This has been done heretofore by cooling the back-up roller, or by cooling the web by cold air blast or otherwise, but such arrangements have not proven entirely satisfactory. If the back-up roller is cooled, then this cooled roller engages the impression cylinder along a line at one side of the cylinder, and the hot web engages the opposed side of the cylinder thus manifestly producing unequal temperature areas within the impression cylinder which results in warping or other unwanted effects.

15 In the present invention as the hot web W passes between the form cylinder 10 and the impression cylinder 20, as shown in Figure 1, it tends to heat the impression cylinder, but this invention cools the cylinder so that practically uniform temperature is maintained throughout the cylinder, thus preventing warping or distortion or injury to the yieldable covering 52; thereby resulting in better quality printing. Any cooling fluid such as water, cold air or the like, but preferably water, is conveyed from any suitable source, not shown, through the conduit 34, terminal pipe 32, bore 30 into the chamber 22, as indicated by the arrow at the left of Figure 2. This fluid is conveyed through the axial chamber 22 and out through the bore 30, terminal pipe 32 and flexible conduit 34, as indicated by the arrow at the right of Figure 2, and is conveyed to any suitable destination. By this arrangement the cooling medium is applied to the impression cylinder at the point of heat application or generation, thus reducing the temperature of the applied heat at the point of application, thereby preventing unequal temperature zones or areas within the impression cylinder.

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

1. In a printing machine, a form cylinder having a form of given axial dimension, means for inking the form on the form cylinder, an impression cylinder cooperating with the form and form cylinder to print a heated web or sheet therebetween, a yieldable covering which melts at relatively low temperature surrounding the peripheral surface of the impression cylinder and axially coextensive with the form on the cylinder and engaging the heated web or sheet along an axially extending area, an axially disposed cylindrical chamber formed in the impression cylinder substantially coextensive axially with the yieldable covering and form, and means for conveying fluid axially through the said chamber to thereby immediately cool the yieldable covering directly along the axially extending area which operably engages the heated web thereby preventing the melting of the said yieldable covering of the impression cylinder.

2. In a printing machine, a form cylinder having a form of given axial dimension, means for inking the form on the cylinder, a reenforcing roller, an impression cylinder interposed between and operably engaging the form cylinder and reenforcing roller to print a heated web or sheet between the form and impression cylinders, a yieldable covering which melts at relatively low temperature surrounding the peripheral surface of the impression cylinder and axially coextensive with the form on the cylinder and engaging

the heated web or sheet along an axially extending area, an axially disposed cylindrical chamber formed in the impression cylinder substantially coextensive axially with the yieldable cylinder covering, and means for conveying fluid axially through the said chamber to thereby immediately cool the yieldable cylinder covering directly along the axially extending area which operably engages the heated web thereby preventing the melting of the said yieldable covering of the impression cylinder.

3. In a printing machine, an ink fountain, a form cylinder having a form of given axial dimension and rotatable in the ink fountain to thereby ink the form on the cylinder, a reinforcing roller, an impression cylinder of lesser diameter than the form cylinder or the reinforcing roller interposed between and operably engaging the form cylinder and reinforcing roller to print a heated web or sheet between the form and impression cylinders, a yieldable covering which melts at relatively low temperature surrounding the peripheral surface of the impression cylinder and axially coextensive with the form on the cylinder and engaging the heated web or sheet along an axially extending area, an axially disposed cylindrical chamber formed in the impression cylinder substantially coextensive axially with the yieldable covering and having substantially the same diameter as the cylinder, and means for conveying fluid axially through the said chamber to thereby cool the yieldable cylinder covering directly along the axially extending area of its operable engagement with the heated web thereby preventing the melting of the said yieldable covering of the impression cylinder.

4. In a printing machine, a frame, a form cylinder rotatable in the frame, an impression cylinder having a soft yieldable covering which melts at relatively low temperature, the form and impression cylinders cooperating to print a web therebetween, a cylindrical chamber formed in the impression cylinder axially coextensive with the yieldable covering for the reception of a cooling fluid to thereby cool the said covering, antifriction bearings supported by the frame, reduced cylindrical portions extending axially from the opposed terminals of the impression cylinder and having axial conduits formed therein communicating with the chamber, the reduced cylindrical

portions of the impression cylinder extending through and engaging the antifriction bearings to thereby permit the bearings to rotatably support the impression cylinder, stationary conduits supported by the frame and extending into the axial conduits formed in the reduced cylindrical extension of the impression cylinder, and packing joints positioned between the rotatable axial conduits and the stationary conduits to form a continuous conduit for conveying cooling fluid to and from the cylindrical chamber of the impression cylinder.

5. In a printing machine, a form cylinder having a form of given axial dimension, means for inking the form cylinder, an impression cylinder operably engaging the form on the form cylinder to print a web therebetween, a yieldable covering which softens at relatively low temperature surrounding the peripheral surface of the impression cylinder and operably engaging the form on the form cylinder along an axially extending area, a chamber formed in the impression cylinder and extending axially through a substantial part of the cylinder, and means for conveying fluid axially through the said chamber to thereby immediately cool the yieldable covering directly along the area of its operable engagement with the form on the form cylinder thereby preventing the softening of the yieldable covering of the impression cylinder.

6. In a printing machine, a form cylinder having a form of given axial dimension, means for inking the form on the form cylinder, a reinforcing roller, an impression cylinder interposed between and operably engaging the form cylinder and reinforcing roller to print a web between the form and impression cylinders, a yieldable covering which softens at relatively low temperature surrounding the peripheral surface of the impression cylinder and operably engaging the form along an axially extending area, a chamber formed in the impression cylinder and extending axially through a substantial part of the cylinder, and means for conveying fluid axially through the said chamber to thereby immediately cool the yieldable covering of the impression cylinder directly along the area of its operable engagement with the form on the form cylinder thereby preventing the softening of the yieldable covering of the impression cylinder.

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