Oct. 23, 1934. M. E. HANSON 1,978,081

DRYING CYLINDER

Filed Jan. 29, 1931 2 Sheets-Sheet 1

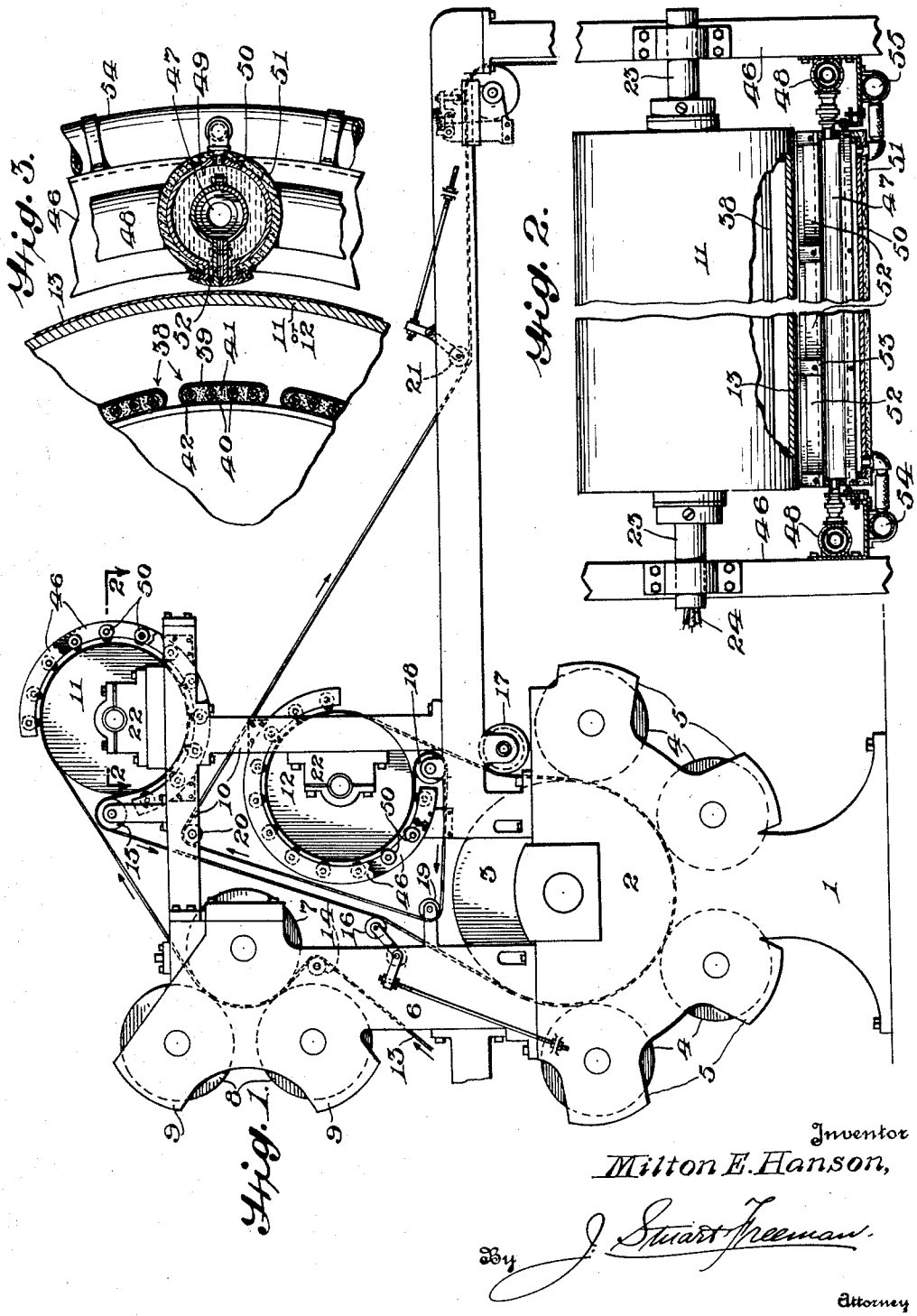


Fig. 3.

Fig. 2.

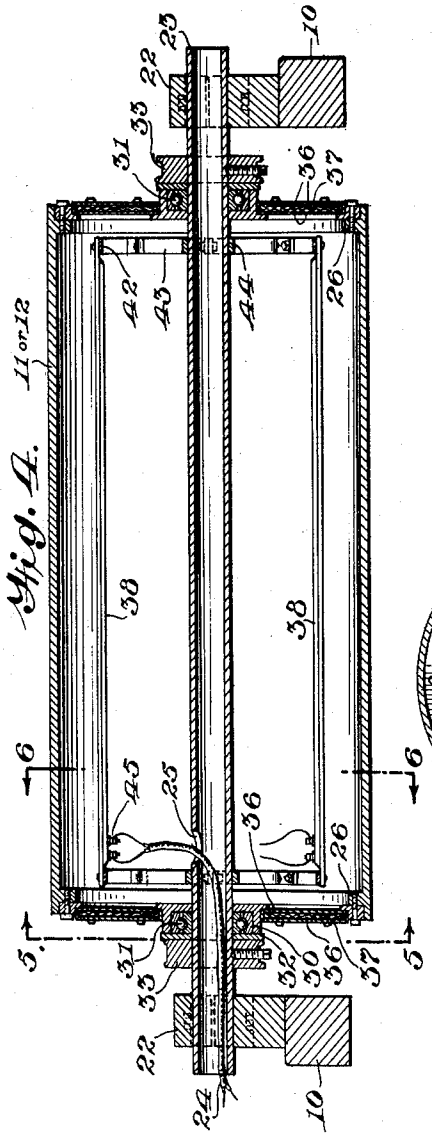
Fig. 1.

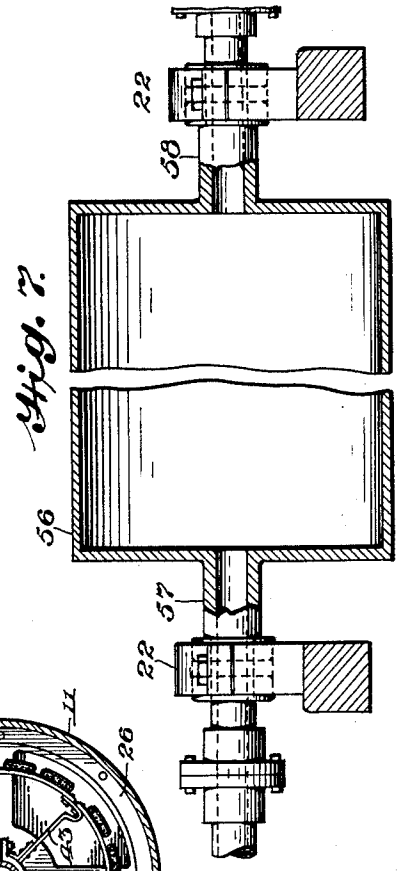
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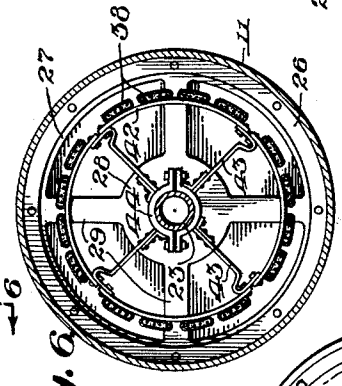
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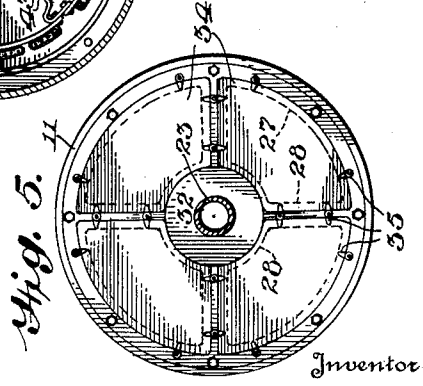
DRYING CYLINDER

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UNITED STATES PATENT OFFICE

1,978,081

DRYING CYLINDER

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Application January 29, 1931, Serial No. 512,078

5 Claims. (Cl. 219—19)

The object of the invention is to provide improvements broadly in drying rolls, but more particularly for and as applied to presses for offset printing. Such rolls as hereinafter described can of course be used upon and as a part of presses of various types, whether for printing webs of paper, textiles, or otherwise, and they may also be used as a part of paper-making machinery and in many other types of machines in which efficiency and rapid drying of a web are desired, the heat being adapted to accurate and constant automatic regulation within a relatively small range.

Another object of the invention is to provide an efficient combination of a printing press or the like with one or more of the improved rolls, and also in operative association with either or both radiant heaters for drying purposes and ozone applicators for oxidizing and/or polymerizing the ink or other substance, such as saturation or impregnation compounds, which may have been applied to the web passing around a given roll.

A further object is to provide an improved roll structure in which there is combined a fixed shaft upon which is rotatably mounted the cylinder or roll proper, while within and surrounded by said cylinder is an arrangement of electric heater units, carried by said shaft is relatively close proximity to the inner surface of the roll, said elements being accessible through openings in the end of the roll which are normally spanned by removable heat-insulating closures.

With these and other objects in mind, the present invention comprises further details of construction and operation which are fully brought out in the following description, when read in conjunction with the accompanying drawings, in which Fig. 1 is a side elevation of a print press equipped with one embodiment of the invention, portions of which are broken away; Fig. 2 is an enlarged plan view of one of the rolls and associated parts, a portion of which grouping is in section on the line 2—2 of Fig. 1; Fig. 3 is a further enlarged transverse section of a fragmentary portion of the elements shown in Fig. 2; Fig. 4 is a longitudinal diametrical section of the electrically heated roll and mounting therefor; Figs. 5 and 6 are transverse sections on the respective lines 5—5 and 6—6 of Fig. 4; and Fig. 7 is a section through a fluid heated roll adapted for use in place of the electrically heated roll of Figs. 4, 5 and 6.

Referring to Figs. 1 to 6 of the drawings, the invention is illustrated as being applied to any representative type of printing press adapted to handle a continuous web, and applied to any desired number of color impressions to one side of said web, after which any desired number of impressions may be applied to the other side of the web. When more than one impression is applied, there is probably always involved the association of two or more different colors which must be accurate with respect to each other.

In the printing press illustrated, particularly in Fig. 1, one of a pair of oppositely disposed frame members is shown as comprising a base portion 1, having an enlarged head 2, which in turn rotatably supports a centrally positioned platen roll 3, about which are also rotatably positioned a plurality of impression rolls 4, rotatably carried by radial extensions 5 from said frame head. Projecting upwardly from and supported by said head is an extension 6, which rotatably supports a second platen roll 7, and a pair of impression rolls 8, rotatably carried by projections 9 from said extension. Angularly related frame members 10 rotatably support drying cylinders 11 and 12, which are illustrated in greater detail in Figs. 2 to 6.

A paper or other form of web 13 is represented as coming from a suitable roll (not shown) and following the path indicated by arrows. First the web passes over an idler 14, thence against the platen roll 7, and while against said roll receives impressions in sequence from the two impression rolls 8. Said web then travels directly to and around a major portion of the circumference of the drying cylinder 11, where the ink or other substance is dried and/or polymerized by means hereinafter described. Said web upon leaving said drying cylinder passes over an idler 15 and thence in contact with a tensioning roll 16 and into contact with the first platen roll 3; while in contact with said last-named roll there are applied to the unprinted or opposite surface of the web impressions from the several impression rolls 4 in sequence. The web then passes about an idler 17 and into contact with the second drying cylinder 12 and after being in contact with said last-named drying cylinder throughout a major portion of its circumference, the web passes around a series of idlers 18, 19 and 20, after which it emerges from among the several platen, impression and drying rolls and cylinders referred to, and after passing about a second tensioning roll or the like 21 continues on towards the usual folding, cutting and counting devices. Each of the drying cylinders 11 and 12 is illustrated in detail by Figs. 4, 5 and 6. Extending between suitable supports 22, carried by

the frame extensions 10 of the press, is a tubular shaft 23 through which insulated electrically conductive wires 24 extend toward and thence radially through a lateral opening 25 within the surrounding cylinders 11 and 12. Adjacent to the opposite ends of each of said cylinders is a radially inwardly extending flange 26, to which is secured by any suitable means the peripheral portion 27 of a spider, which also comprises a hub portion 28, connected to said peripheral portion by means of spokes 29, said hub being provided with a hollow chamber 30 housing suitable anti-friction means 31 and closed by a suitable plate 32, the individual cylinder being prevented from longitudinal movement upon the shaft 23 by adjustably positioned collars 33.

The open work of each of the spiders which span the ends of the respective cylinders is closed by a series of plates 34 which are detachably secured in operative position by any suitable form of clips 35. Each of these plates preferably comprises oppositely positioned discs 36, between which is secured suitable heat-insulating material 37, serving to prevent the escape of heat from within said cylinder. The means for heating each of these cylinders comprises a series of electric heating units 38, each comprising (see Fig. 3) a casing 39, within which is positioned a series of resistance heating coils 40, separated from one another and from the surrounding casing by suitable insulating material 41, the opposite end portions of each such unit being secured to segments 42 of a frame, which also comprises spokes 43 which connect the adjacent end portions of said segments together and to a hub 44 mounted upon the shaft 23.

Each such heating unit is of course provided with terminals 45, to which are connected the ends of the electric wires 24. With this construction, electric current carried by the wires 24 through the shaft and to the several heater units causes the surrounding cylinder to be heated, much of the heat thus produced being radiated from the periphery of the cylinder since its opposite ends are closed by the heat-insulating plates above described. The heat of the cylinder may of course be varied by any well-known form of resistances, and in fact may be maintained at a predetermined temperature by any suitable automatic means such for instance as a thermostat or the like.

Referring to Fig. 1 it will be noticed that each of the cylinders 11 and 12 is partly surrounded by spaced frames 46 between which extend ozone or other fluid applicators, shown in cross section in Fig. 3, and described and claimed in detail in copending application Serial No. 512,079. Each applicator primarily comprises a central tube 47 which communicates with a supply conduit 48, said tube being practically entirely surrounded by cooling fluid 49 such as water contained within a surrounding casing 50, in turn surrounded by a heat-insulating jacket 51, fluid from within said tube being adapted to pass radially outwardly through a channel 52 towards and in close proximity to the adjacent or outer surface of the web 13, supported by the outer surface of one of the drying cylinders 11 and 12. There may be as many of these applicators as desired and their function is to completely dry or polymerize the ink or other material carried by the web in conjunction with the heat given to said web by the adjacent cylinder. The channel 52, as seen in Fig. 2, extends longitudinally of the applicator and is interrupted only by ribs 53, the distance between adjacent ribs defining a section of such channel preferably equal to the width of a printed page upon said web. The cooling fluid 49 may be led into the applicator from any suitable supply conduit 54 and finally emerge into a discharge conduit 55, and the drying, oxidizing, or polymerizing fluid may be led into the tube 47, preferably from both of the opposite ends of the applicator, as also shown in Fig. 2.

In the operation of this device, the web 13 from an original blank roll (not shown) receives impressions from the rolls 8 and almost immediately comes into contact with the fairly hot surface of the first drying cylinder 11, where, in addition to the heating of the web itself, the ink or other substance applied thereto is acted upon by the fluid flowing from the several applicators, with the result that said ink or other substance is completely dried or set before it comes into contact with the platen roll 3, whereupon the opposite or unprinted surface of the web receives impressions from the rolls 4, these last-mentioned impressions being similarly dried or set by virtue of the web immediately thereafter coming into contact with the second drying cylinder 12 and passing adjacent to the applicators partially surrounding said last-named cylinder, after which both of the sides of said web being printed, or otherwise finished, in a desired manner, the web may be at once cut, folded, or otherwise acted upon, depending upon the type or form in which it is to be disseminated, as a folder, pamphlet, book, magazine or the like.

Referring to Fig. 7, there is here shown a hollow cylinder 56 closed at its ends and adapted to be heated by steam, entering through a trunnion 57 and leaving through a trunnion 58, said trunnions comprising means to rotatably support said cylinder with respect to the bearings 22, when such cylinder is employed in lieu of the electrically heated cylinder hereinbefore described. Broadly either type of cylinder will serve to heat a web in contact with its outer surface, but the heat of the first cylinder can be regulated automatically within wide ranges, while the heat of the steam cylinder must in general be maintained at or above the temperature of generation.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. The combination of a stationary shaft, a cylinder rotatably carried by said shaft having an end wall provided with an aperture, a heating unit also carried by said shaft within said cylinder, said aperture permitting access to the heating unit while the latter is in operative position, and displaceable closure means normally spanning said aperture to prevent the escape of heat therefrom, the mounting of the cylinder by said end wall being unaffected by said closure means.

2. The combination of a stationary shaft, a cylinder rotatably carried by said shaft, a heating unit also carried by said shaft within said cylinder, and heat-insulating plates detachably secured to and inclosing the ends of said cylinder, to prevent the escape of heat therefrom and when removed permitting access to said unit within said cylinder, while said cylinder is operatively mounted upon said shaft.

3. The combination of a fixed shaft, a hollow cylinder rotatably carried thereby, apertured closures for the ends of said cylinder, operatively spacing said cylinder from said shaft, a frame member carried by said shaft within said cylinder, heating units carried by said frame in substantially uniform spaced relation with the interior

surface of said cylinder, and independent removable plates normally covering the apertures in said closures, to permit ready access to said units.

4. The combination of a fixed shaft, a hollow cylinder rotatably carried thereby, spaced skeleton frame members carried by said shaft within said cylinder, and each comprising a peripheral portion in substantially regular spaced relation with the inner surface of said cylinder, and heating units carried by and extending between the peripheral portions of said members, and in substantially uniform spaced relation with the inner surface of said cylinder, said cylinder having an end wall provided with an aperture permitting access to the heating unit while the latter is mounted, and means operable to expose and close said aperture independently of the frame members and heating units, the mounting of the cylinder by said end wall being unaffected by said closure means.

5. The combination of a stationary shaft, a hollow cylinder disposed about said shaft, heating units within the cylinder, frame means comprising knock-down sections securing the heating units together about the shaft and mounting them from the shaft, skeleton means mounting said cylinder on said shaft permitting access to said frame means and heating units in their mounted condition, and means operable to open and close the skeleton means while the cylinder is in operative position independently of the mounting of said frame means and heating units.

MILTON E. HANSON.