Sept. 9, 1941. L. B. CASE 2,255,410

INK DISTRIBUTING DEVICE

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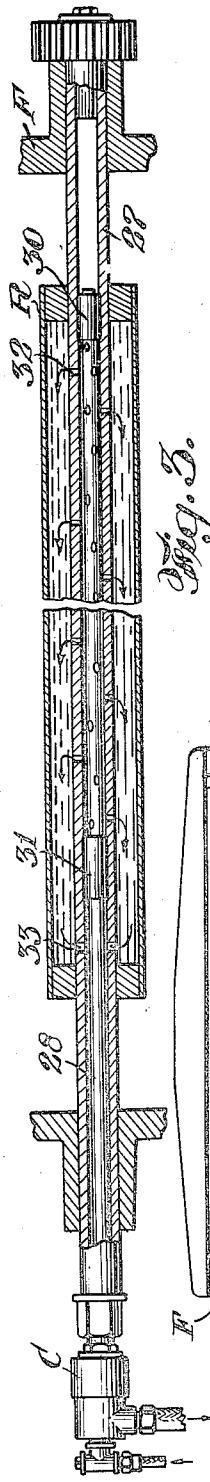


Fig. 3.

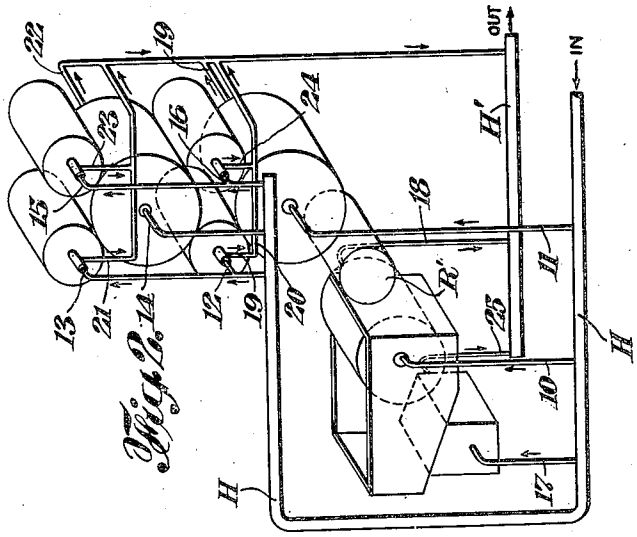


Fig. 2.

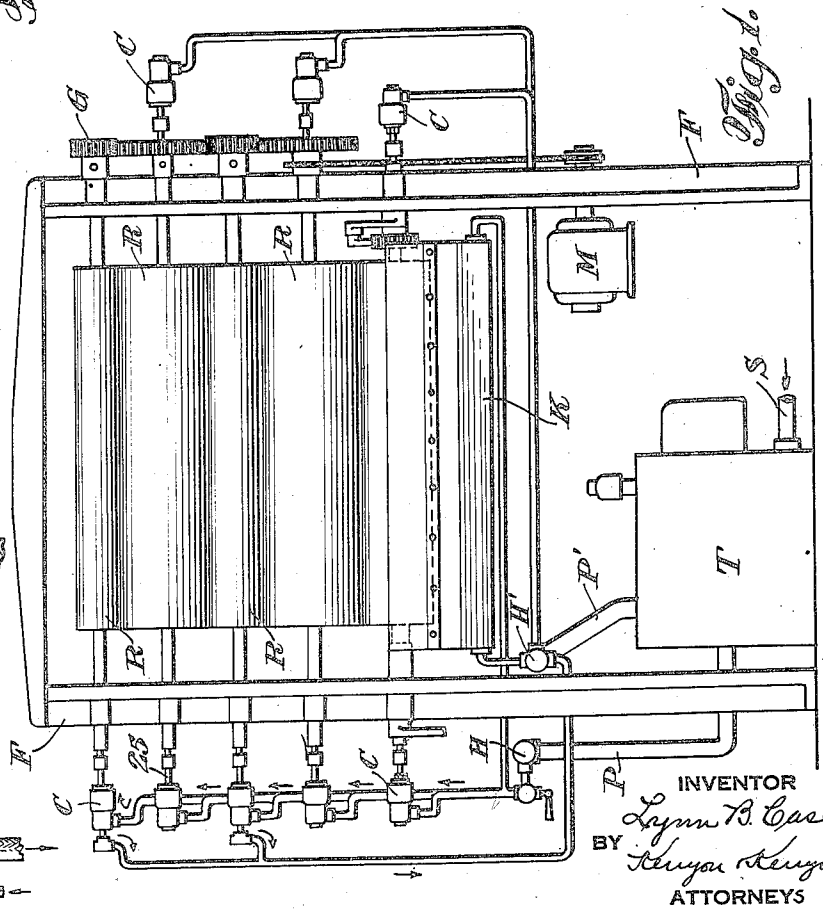


Fig. 1.

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INK DISTRIBUTING DEVICE

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4 Claims. (Cl. 91—67.8)

This invention relates to ink distributing devices for printing machines and more especially to ink distributors using ink solid at normal temperature and liquid at elevated temperature, such ink commonly being known as hot melt ink.

Heretofore, printing machines have almost universally used soluble inks and the ink distributors for such machines consist of a number of suitably arranged rolls of hollow construction. The use of hot melt ink in an ink distributor having hollow rolls requires provision for maintaining the surfaces of the rolls at substantially uniform temperature lengthwise thereof in order to obtain uniform printing laterally of the web to be printed.

An object of this invention is to provide the hollow rolls of an ink distributor with heating equipment effective to maintain the surface of the rolls at substantially uniform temperature lengthwise thereof.

According to the invention, means are provided for circulating a large volume of hot liquid through such rolls at a high rate to furnish to each roll an evenly distributed mass of heat sufficient to maintain substantially uniform temperature at the surface of the roll lengthwise thereof. In order to maintain surface temperature up to a temperature not materially in excess of the boiling temperature of water, this invention contemplates the use of hot water for supplying the required heat, it being understood that when temperatures somewhat in excess of 212° F. are desired, hot water under suitable pressure is used. In the event that a surface temperature materially in excess of 212° F. is desired, other liquids than water will be used rather than operate the apparatus with water under the pressure which would be required to maintain it in liquid form at such temperature. Preferably, the liquid used will have a vaporization temperature higher than the temperature desired at the periphery of the roll, although as in the case of water a somewhat higher temperature of the liquid may be obtained by subjecting the liquid to pressure. Each roll is maintained full of hot liquid and the hot liquid is supplied to the roll at such rate that the desired surface temperature is maintained and the roll is heated with sufficient uniformity that the temperature differential lengthwise of the roll is too insignificant to affect the quality of the printing at different points laterally of the web being printed.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawing, wherein:

Fig. 1 is an elevation of an ink distributor, the rolls of which are equipped with heating means embodying the invention;

Fig. 2 is a schematic view of the ink distributor rolls and the liquid circulating system, and

Fig. 3 is a sectional view of one form of roll.

Fig. 1 illustrates a typical ink distribution device having a plurality of different size hollow rolls R rotatably supported in a frame F and provided with gears G for effecting the rotation of the rolls in timed relation. A driving motor M supplies power through a chain drive to one of the roll shafts. An ink fountain K is supported by the frame with one roll dipping into it and a roll R' co-operates with the fountain roll and one of the remaining rolls for transferring ink from the former to the latter, from which the ink is distributed over the remaining rolls in the well-known manner. A plate or printing cylinder (not shown) is supplied with ink by certain of the rollers R. For such an ink distributor to be used in connection with hot melt inks, provision must be made to maintain the roll surfaces at substantially uniform temperature throughout their length. According to this invention, hot liquid is provided in the rolls in contact with the entire inner surface thereof to supply heat to the roll surface in sufficient quantity to maintain such surface at the desired temperature and is also supplied to the ink fountain to liquefy the ink. In some instances, the water is supplied to and discharged from the same end of the roll while in other instances, it is supplied to one end of the roll and is discharged from the other end. In still other instances, heat is supplied to a body of liquid retained in the roll without circulation.

Referring to Figs. 1 to 3 inclusive, a body of liquid is heated in the tank T by means (not shown), and is supplied by a pump (not shown) through the pipe P to a header H. From the header H, pipes 10, 11, 12, 13, 14, 15, 16 and 17 lead to seven different rollers and to a compartment in the ink fountain. Pipes 18, 19, 20, 21, 22, 23, 24 and 25 lead from the various rolls to the header H' which communicates through the pipe P' with the tank T. Each of the pipes is connected to a roll through a coupling C rotatably connected to the roll shaft and of proper arrangement for establishing communication between the pipe and a bore in the shaft. Such a coupling is a standard article of merchandise and is not described here in detail as the particular construction of such coupling forms no part of this in-

vention. In some instances, a coupling C is supplied at each end of the roll so that the liquid enters one end of the roll and leaves the roll at the other end, while in other instances, a somewhat different coupling is supplied only at one end of the roll so that the liquid both enters and leaves the roll at the same end.

In Fig. 3, the roll R is supported by a hollow shaft 27 journalled in the frame F. A hollow rod 28 extends from the coupling C through the shaft 27 to the end of the roller opposite the coupling C. This rod is connected by the coupling C to the input pipe and is provided with a plurality of apertures 29 through which liquid is discharged from the interior of the rod 28 into the space between the rod 28 and the inner face of the shaft 27. Abutments 30 and 31 are provided on the rod 28, the abutment 30 being at approximately the right end of the roll R and the abutment 31 being slightly spaced from the left end of the roll R. Apertures 29 are arranged between the two abutments 30 and 31 which snugly fit the interior of the shaft 27 and define a chamber into which liquid is discharged from the rod 28 through the holes 29. The shaft 27 is equipped with a plurality of holes 32 arranged between the abutments 30 and 31 and serving to conduct liquid into the chamber provided by the shaft 27 and the interior surface of the roll R. Also, the shaft 27 is provided with apertures 33 arranged between the abutment 31 and the left end of the roll R. The space to the left of the abutment 31 between the rod 28 and the shaft 27 communicates through the coupling C with the liquid return pipe.

Hot liquid is supplied through the pipe 28 and is discharged at uniform intervals through the apertures 29 into the chamber defined by the rod 28 and shaft 27 in combination with the abutments 30 and 31. From this chamber, the hot liquid is delivered into the space exterior of the shaft 27 through the apertures 32 and is distributed substantially uniformly over the length of the roll R. The liquid escapes from the roll through the apertures 33 and flows around the rod 28 to the coupling C. Because of the uniform supply distribution, the temperature of the surface of the roll R is maintained substantially uniform throughout its length.

In the operation of the above-described apparatus, each of the rolls R is kept full of hot liquid so that heat is supplied to the roll uniformly over the entire surface thereof with the result that the exterior peripheral surface of the roll is maintained at substantially uniform temperature. Any air that may be initially trapped in a roll is gradually worked out of the roll at its ends and is vented from the system, complete removal of the air being effected after a short period of operation. In the apparatus of Fig. 1, the head of liquid required to maintain the rolls full of liquid and to maintain the liquid under superatmospheric pressure if a temperature in excess of 212° F. is desired, is provided by connecting the tank T through the pipe S to any suitable source of liquid under pressure. Where water is the liquid used the connection may be to a water supply system, stand pipe, pressure tank or the like. The circulation of the liquid through the rolls is so regulated as to supply a sufficient mass of heat to maintain the roll at the desired temperature and a sufficiently high circulation rate is maintained that the temperature differential between ends of a roll is too slight to have any noticeable effect upon the quality of the printing effected by a printing cylinder supplied with ink from such roll.

While the invention has been specifically disclosed in connection with an ink distribution system, it is apparent that the invention is equally applicable to any apparatus or device embodying a hollow roll, the surface of which it is desired to maintain at uniform temperature. Also, it is to be understood that various modifications may be made in the structure above described, without in any way departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In an ink distributor for hot melt ink, a hollow roll, a hollow shaft for said roll, a tube in said shaft, means sealing said shaft and tube at approximately one end of said roll, means sealing said shaft around said tube in spaced relation to the opposite end of said roll, apertures in said tube wall and shaft wall between said sealing means and in said shaft wall adjacent the last-named end of the roll, means for supplying liquid to the open end of said tube, means for draining liquid from said shaft around said tube, and means for heating the liquid supplied to said tube.

2. In an ink distributor for hot melt ink, a hollow roll, a hollow shaft for said roll, a tube in said shaft, means sealing said shaft and tube at approximately one end of said roll, means sealing said shaft around said tube in spaced relation to the opposite end of said roll, apertures in said tube wall and shaft wall between said sealing means and in said shaft wall adjacent the last-named end of the roll, means for supplying liquid to the open end of said tube, and means for draining liquid from said shaft around said tube.

3. A device of the character described comprising a hollow roll, a hollow shaft for said roll, a tube in said shaft, said tube being of less overall diameter than the interior diameter of said shaft, means sealing said shaft and tube at approximately one end of said roll, means sealing said shaft around said tube in spaced relation to the opposite end of said roll, apertures in said tube wall and shaft wall between said sealing means and in said shaft wall adjacent the last-named end of the roll, and means for supplying liquid to the open end of said tube.

4. A device of the character described comprising a hollow roll, a hollow shaft for said roll, a tube in said shaft, said tube being of less overall diameter than the interior diameter of said shaft, means sealing said shaft and tube at approximately one end of said roll, means sealing said shaft around said tube in spaced relation to the opposite end of said roll, apertures in said tube wall and shaft wall between said sealing means and in said shaft wall adjacent the last-named end of the roll, means for supplying liquid to the open end of said tube, and means for heating the liquid supplied to said tube.

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