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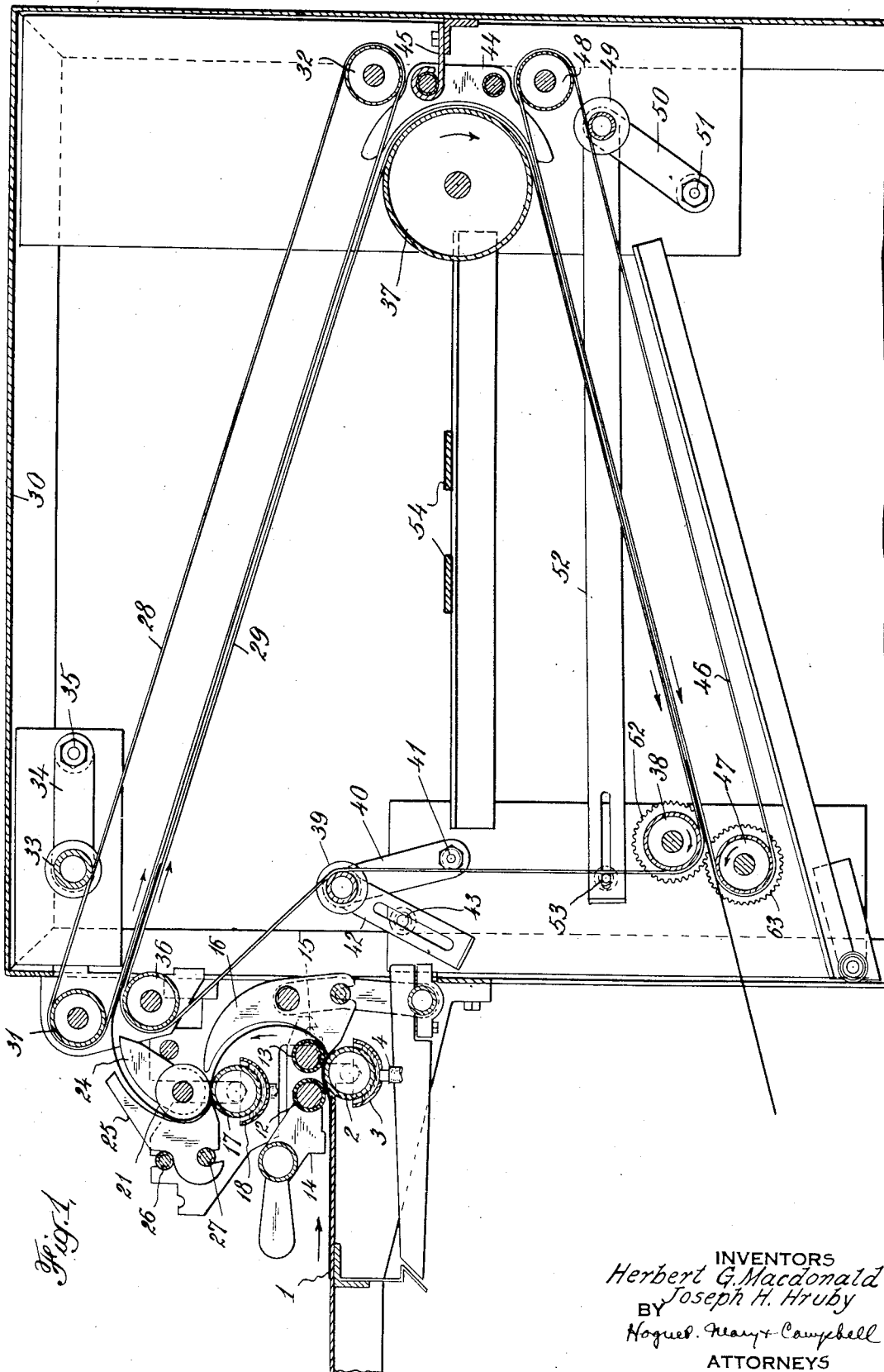
H. G. MACDONALD ET AL

2,336,875

DEVELOPING DEVICE

Filed Oct. 18, 1940

3 Sheets-Sheet 1



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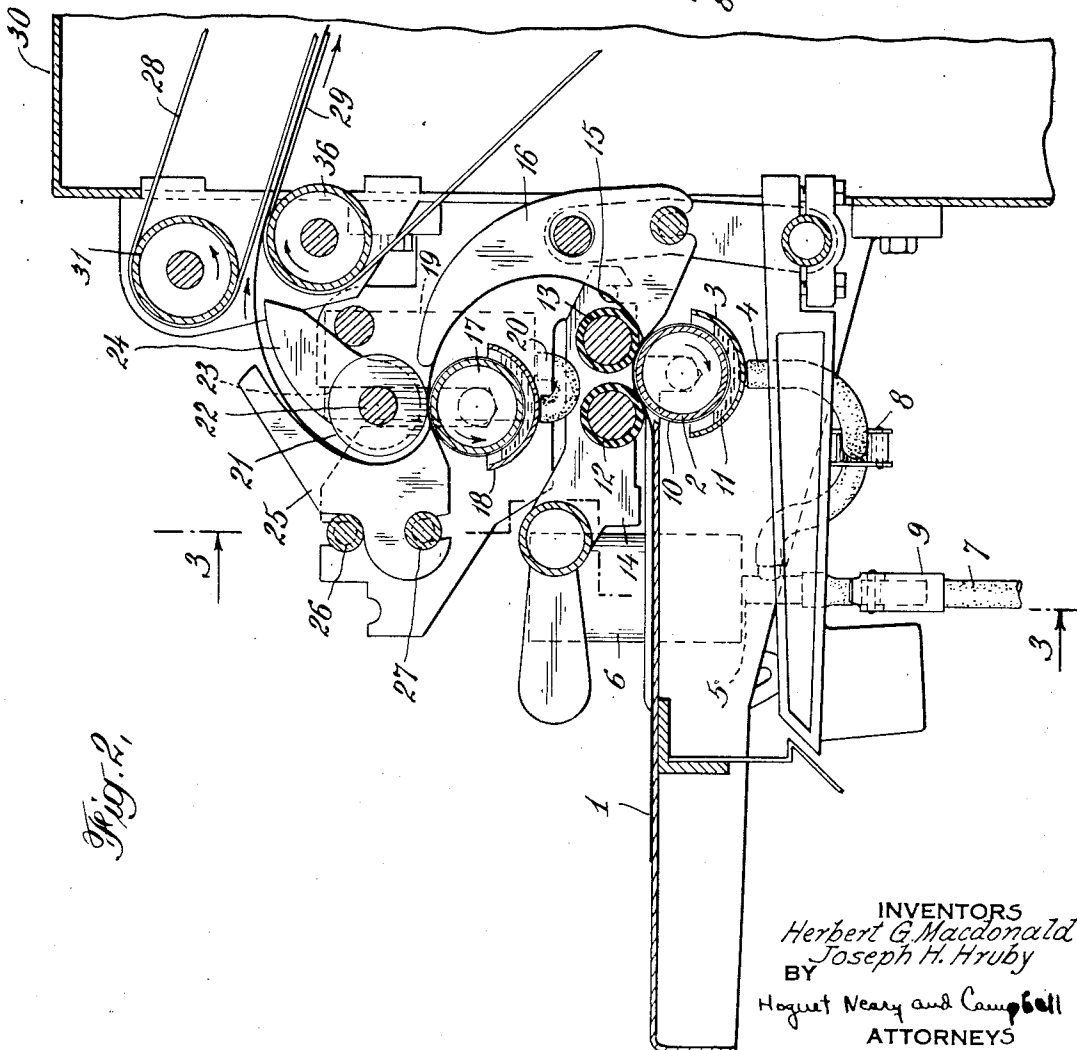
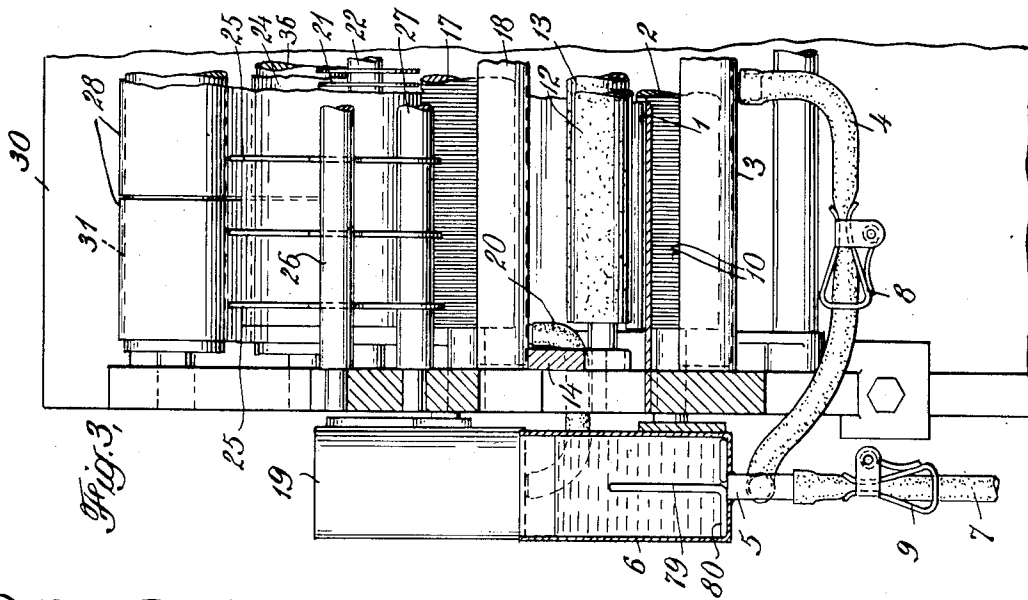
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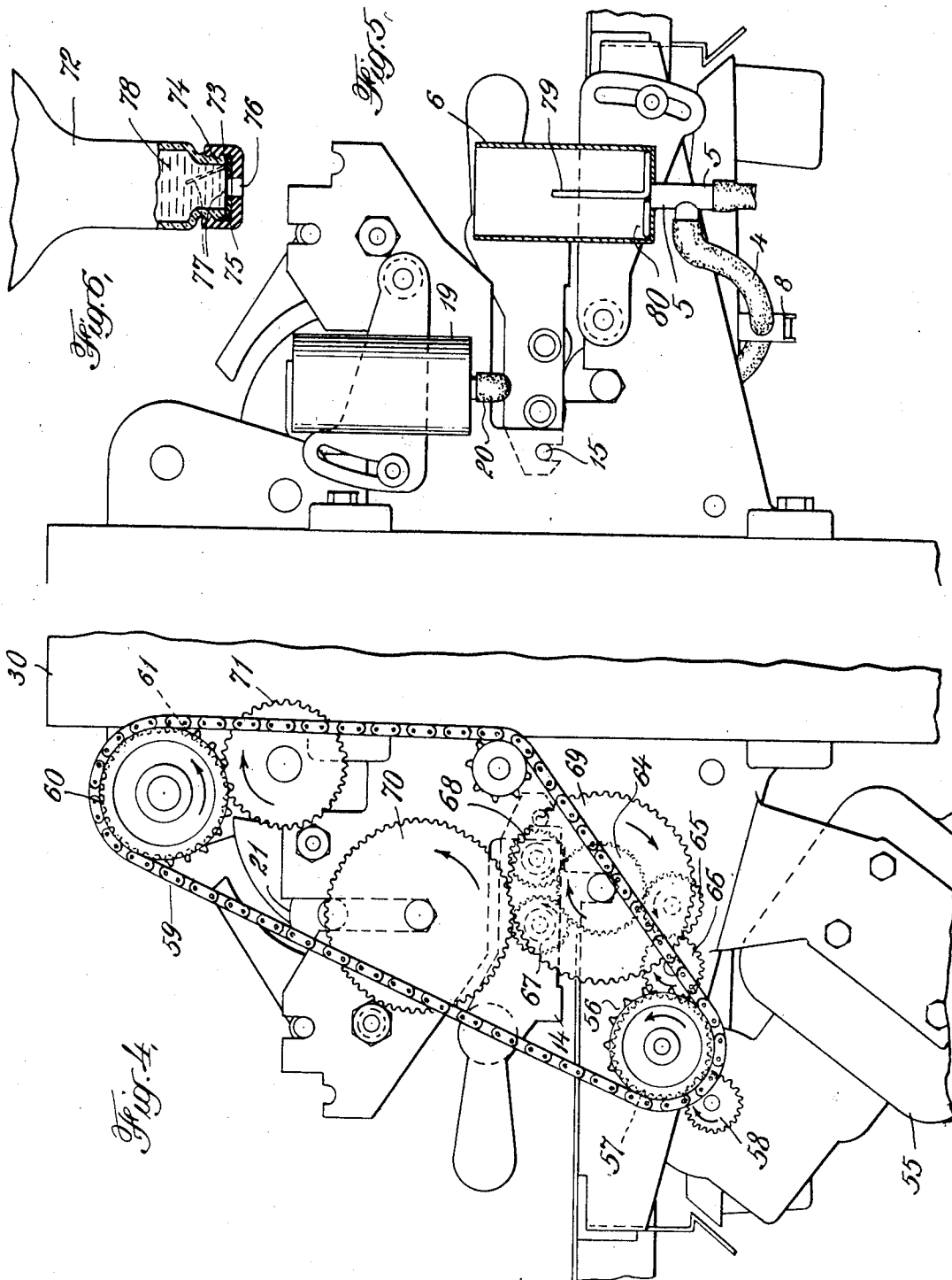
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UNITED STATES PATENT OFFICE

2,336,875

DEVELOPING DEVICE

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Application October 18, 1940, Serial No. 361,658

2 Claims. (Cl. 95—94)

The present invention relates to developing apparatus and, more particularly, to an improved device for developing photoprints effectively.

In accordance with the art of developing photoprints, it is desired to moisten one side of the print with developing liquid and, subsequently, to moisten the reverse side with water, after which the print is passed through a heating or drying zone. Prior to our invention, the apparatuses utilized for applying liquids to the print have been found to have many disadvantages, particularly when operated at high speeds, and it is the purpose of our invention to provide improvements in the prior art devices which render these devices effective and convenient to operate at all times.

A particular object of our invention is to provide an improved feeding means whereby the print may be introduced into the device in a convenient and effective fashion.

A further object of our invention is to provide an improved arrangement of the feed rolls and the developing liquid applicator roll whereby application of the liquid to only one side of the print is insured.

Another object of our invention is to provide an applicator roll having an improved contacting surface whereby uniform and effective application of liquid to the print may be accomplished.

Another object of our invention is to provide an improved stripping means whereby the print may be conducted away from the applicator rolls without the formation of undesirable beads of liquid and wet edges on the print.

A further object of our invention is to provide an improved device for supplying liquid to the applicator roll reservoirs.

We accomplish the above objects, as well as others, in accordance with the following description of a particular embodiment of our invention shown in the accompanying drawings, in which:

Figure 1 is a side view, partially in cross-section, of the assembled device;

Figure 2 is an enlarged side view of the feed and liquid applying mechanism;

Figure 3 is a cross-sectional view taken along the line 3—3 of Figure 2 and looking in the direction of the arrows;

Figure 4 is a side view of the driving mechanism;

Figure 5 is a view, partially in cross-section, of the side opposite to that shown in Figures 1-4; and

Figure 6 is a cross-sectional view of a closure device utilized with the liquid containers.

Referring to the drawings, the print 1 is fed directly to a developing liquid applicator roll 2 which is immersed in a reservoir 3 communicating by means of a rubber conduit 4 with an outlet tube 5 provided on a bottle holder 6, to be described more particularly hereinafter. The outlet tube 5 also communicates with a rubber drainage conduit 7, which conduit and rubber conduit 4 are provided with suitable clamps 8 and 9. The outer surface of the applicator roll 2 is provided with grooves 10 which assist in conveying developing liquid 11 from the reservoir 3 to the surface of the print 1.

The bottle holder 6, shown more fully in Figures 3 and 5, is cylindrical in shape and is adapted to receive the neck of a bottle 12. It is preferred to utilize a bottle provided with a cap 13 secured thereto by any suitable means, such as the threads 14. The cap 13 and washer 15 are provided with a central aperture 16 which normally is closed by a gate 17 adapted to be held in closed position by the weight of the liquid 18 contained in the bottle 12. To open the gate 17 when the bottle 12 is placed within the holder 6, the holder 6 is provided with a centrally located rod 19 held in an upright position by any suitable means such as the coiled extension 20. It will be apparent that by the use of the above devices, the supply of liquid to the reservoir 3 is insured and the bottle 12 may be withdrawn from or inserted into the holder 6 without any waste of its contents.

Positioned immediately above the applicator roll 2, are two rubber covered feed rolls 12 and 13 which are mounted on an arm 14 pivotally mounted at 15. The normal resting position of arm 14 is such that the feed rolls 12 and 13 are spaced from the applicator roll 2 whereby the rolls 12 and 13 will not be wetted by the applicator roll 2 when a print is not being fed to the device, and which prevents the subsequent application of developing liquid to the reverse side of the print. The distance between the rolls 12 and 13 and the applicator roll 2, however, is sufficiently small to insure engagement of the print therebetween during normal operation.

The print 1 upon being withdrawn from between the applicator roll 2 and feed roll 13, is conducted in an arcuate path by means of a plurality of fingers 16 to a water roll 17 operating in the reverse direction to that of the applicator roll 2. It is important to remove the print from the applicator roll at as nearly a right angle as possible. We have discovered that the tangential removal of the print as practiced in the

prior art devices causes the formation of an undesirable meniscus, i. e., a relatively large amount of liquid adheres to the surface of the paper and is carried along thereby, thus forming undesirable beads and causing non-uniform wetting of the print. This may be avoided by causing the print to undergo an immediate change in direction after it leaves the roll, as set forth above.

The water roll 17 is immersed in a water reservoir 18 which communicates with a bottle holder 19 by means of the conduit 20. The print passing over the roll 17 is maintained in contact therewith by a plurality of rotatable disks 21 which are mounted on a shaft 22 received within a slot 23 whereby the shaft and disks are adapted to move away from the roll 17 in accordance with the thickness of the print. A plurality of guide members 24 are also provided on the shaft 22.

The print is taken off the roll 17 in an arcuate path defined by a series of fingers 25 releasably mounted by the rods 26 and 27. It is to be noted that the print again is removed from the roll at an angle as nearly 90° as is possible to avoid the formation of beads on the print as described above. In this connection, it is to be observed that the fingers 16 and 15 are formed on a common element and thus a unitary instrumentality performs both the functions of stripping and curling the paper.

The print coming from the water roll 17 is received between a plurality of endless belts 28 and 29 and conducted into the heating chamber 30. The upper endless belts 28 are positioned by the drive roll 31 and an idler roll 32 and are maintained under tension by the weight of roll 33 mounted on the arm 34 pivoted at 35. The intermediate endless belts 29 are disposed around the drive roll 36, idler roll 37, and roll 38. The endless belts 29 are maintained under tension by a roll 39 which is rotatably mounted on the arm 40 pivoted at 41 and is held against the belts 29 by means of a bracket 42 adjustably mounted at 43. A plurality of guide members 44 are provided adjacent the roll 37 and are supported pivotally on brackets 45. A plurality of endless belts 46 are provided below the intermediate endless belts 29 and are supported on drive roll 47 and idler roll 48. Drive roll 47 and roll 38 are interconnected by means of gears 62 and 63. Tension is maintained in the lower endless belts 46 by means of a roll 49 mounted on an arm 50 pivoted at 51 and which is urged toward the belts 46 by means of a bracket 52 adjustably mounted at 53. Heating elements 54 are disposed within the intermediate endless belts 29.

It is an advantage of the above described arrangement of endless belts, that the adjacent portions between which the print is received may be spaced a convenient distance apart. This may be accomplished even though it is desired to return the print to a point adjacent the feed means. We have discovered that undesirable wrinkling of the print frequently occurs when the belts are spaced sufficiently close together to exert a pressure upon the print.

It is desired to operate the moving parts in contact with the print at the same constant speed to avoid placing a strain upon the print. This may be carried out, for example, by an arrangement of gears as shown in Figure 4. Referring to Figure 4, a motor 55 operates a sprocket 56 by means of the gears 57 and 58. Sprocket 56 engages an endless chain 59 which in turn engages an idler sprocket and a sprocket 60 mounted on the drive roll 31 supporting the upper endless belts 28. Drive roll 31 and drive roll 36 are interconnected by means of gears 61 and 71.

Gear 57 operates a gear 64 mounted on the applicator roll 2 by means of idler gears 65 and 66. Gear 64, in turn, operates gears 67 and 68 mounted on the feed rolls 12 and 13, respectively. A second gear 69 mounted on the applicator roll 2 engages a gear 70 carried by the water roll 17.

It is intended that our invention shall include within its scope all such variations and equivalents as will be apparent to one skilled in the art.

We claim:

1. In a print developing device, a roll having a surface for applying liquid to one side of a print, means for placing a print on said surface, and means spaced transversely of the roll and extending into the zone between the roll and the print placing means for removing the print thereafter from the surface of the roll at substantially a right angle to a tangent to the surface of said roll at the zone of removal to break a meniscus of liquid and prevent the carrying away of drops.

2. In a print developing device, a roll having a surface for applying liquid to one side of a print, a second roll adjacent thereto having a surface for contacting the reverse side of the print, and finger means for abruptly changing the direction of movement of the print so as to direct the print away from the surface of the liquid applying roll as it leaves said roll, whereby the amount of liquid retained in the zone between the print and liquid applying roll is insufficient in amount to form drops or beads of liquid on the print.

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