April 2, 1963 R. BIRK ET AL 3,083,642

FEED-CONTROLLING ROLLER

Filed Dec. 7, 1960

Fig. 1

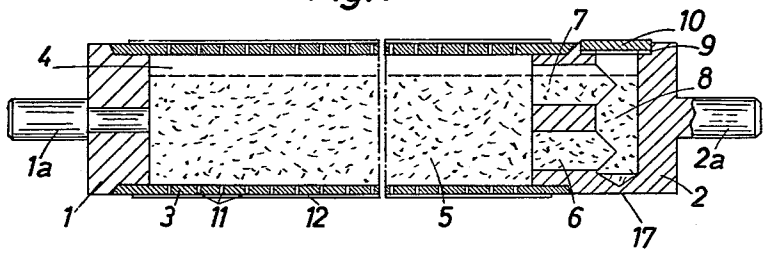


Fig. 2

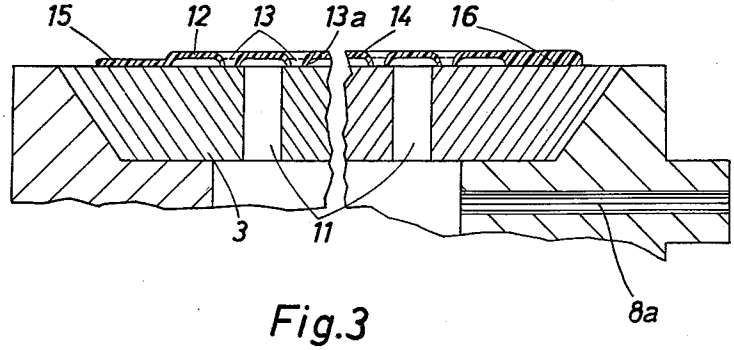
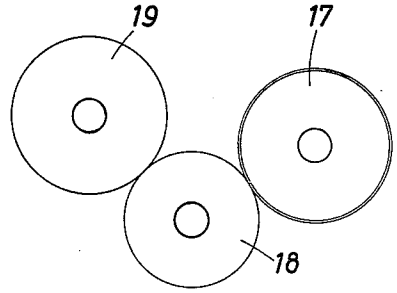


Fig. 3



INVENTORS

RICHARD SCHWAB
RUDOLF BIRK
HELMUT KÄUFER

BY

United States Patent Office

3,083,642

Patented Apr. 2, 1963

3,083,642

FEED-CONTROLLING ROLLER

Rudolf Birk, Munich, and Helmut Kaufer and Richard Schwab, Grunwald, near Munich, Germany, assignors to Agfa Aktiengesellschaft, Leverkusen-Bayerwerk, Germany, a corporation of Germany

Filed Dec. 7, 1960, Ser. No. 74,365
Claims priority, application Germany Dec. 10, 1959
10 Claims. (Cl. 101—367)

This invention relates to a roller which feeds a supply of an adherent fluid medium from its hollow interior onto its surface, and it more particularly relates to an inking roller of this type for a printing machine.

Most existing inking rollers used in printing machines, such as offset printers, are covered by a layer of an absorbent porous substance such as felt or sponge rubber. This absorbent surface layer retains a supply of ink fed into it from holes extending through the hollow cylinders upon which these layers are applied. This ink is picked up from the feeding cylinder by transfer rollers, and it is then either directly or indirectly applied to the material to be printed. The pores of the absorbent layer must be arranged in accordance with the viscosity of the ink that is being fed, which is usually a liquid, to allow the ink to be easily picked up by the transfer roller without dripping from the storage cylinder when it is not being operated. This type of roller has not been fully successful in achieving a completely uniform ink distribution because the feeding channels and storage spaces of the absorbent layer easily clog after they have been operated for a short time particularly during inoperative intervals. These clogging deposits are not easily washed away, and it is difficult to either completely or uniformly remove them from the entire surface of the roller.

In another type of existing inking device air pressure is applied to the storage cylinder either periodically or continuously to permit it to operate at a constant supply pressure. This distributes the ink more uniformly and increases the ability of the machine to be prepared for immediate operation at all times. However, this type of inking device uses a prohibitively great amount of ink. Also, this pressurized arrangement is only suitable for applying liquids but not pastes. Furthermore, the perforations through the storage cylinder must be made in only a single line which must be positioned at the top of the roller whenever it is stopped to allow the liquid to feed only during the inking operation.

An object of this invention is to provide a simple and economical roller for feeding an adherent fluid medium which uniformly distributes the medium over its surface and does not drip when it is not operating.

In accordance with this invention an elastic tube of plastic material is fitted closely over the surface of a perforated storage cylinder. This plastic tube incorporates holes which are disposed out of alignment with the perforations in the cylinder for controlling the flow of the medium from the hollow interior of the cylinder onto the surface of the tube. These perforations are preferably uniformly distributed over the surfaces of the tube and cylinder and are particularly effective when the spaces within which the ink might deposit or crystallize are maintained as small as possible. These demanding requirements are fulfilled by an elastic plastic tube made of polypropylene or polycarbonate having a wall thickness ranging from 0.05 mm. to 0.5 mm. These plastic materials are strong, durable and resistive to abrasion and surface wear. Moreover, they are easily deformed under the pressure of a transfer roller to cause any ink lying under them to be squeezed out through the holes in their surface. Furthermore, it is not necessary to regulate the pressure within the interior of the storage cylinder because the holes through the cylinder and tube do not clog during operation, and air easily flows back through them into the storage cylinder to compensate for any loss in pressure that might be caused by the outflow of the medium. However, it should be noted that the characteristics of the medium being fed, particularly its viscosity, affect the optimum thickness of the plastic tube as well as the size of the holes in it and the cylinder.

The holes in the tube are staggered out of alignment with the perforations in the storage cylinder. Furthermore, in accordance with another feature of this invention annular projections are formed upon the inner surface of the tube around the holes in it to help uniformly feed the ink with minimum frictional resistance. These annular projections form a space between the walls of the tube and the surface of the cylinder which has an insignificant storage volume, but is capable of always maintaining the holes in the tube fully supplied with medium. This space increases the elasticity of the tube in the direction of feed, and the optimum height of these projections is preferably at least one-half of the thickness of the tube but no greater than this thickness.

In accordance with another aspect of this invention the ends of the tube are made imperforate for sealing the ends of the space provided by the annular projections extending between the surface of the cylinder and the inner wall of the tube. In this connection the diameter of the unstretched plastic tube can be originally made smaller than the outer diameter of the surface of the storage cylinder to permit the ends of the tube to be stretched tightly over the surface of the cylinder. It is also possible to provide flat rings extended within the ends of the tube to facilitate their sealing contact over the ends of the cylinder. The medium such as ink may be supplied into the hollow interior of the storage cylinder through an aperture in the surface of the tube or through a hollow axle where automatic feeding is desired.

Novel features and advantages of the present invention will become apparent to one skilled in the art from a reading of the following description in conjunction with the accompanying drawings wherein similar reference characters refer to similar parts and in which:

FIG. 1 is a longitudinal cross sectional view taken through one embodiment of this invention;

FIG. 2 is a partial enlarged view of a portion of a modification of the embodiment shown in FIG. 1; and

FIG. 3 is a diagrammatic side view in elevation of an embodiment of this invention in its operating relationship.

In FIG. 1 is shown a roller 17 made in accordance with this invention which includes circular ends 1 and 2 joined by a cylindrical member 3. Parts 1, 2 and 3 are, for example, made of a relatively strong resinous plastic material such as polyvinyl chloride. Roller 17 includes a pair of axles 1*a* and 2*a*, and it also includes a hollow interior 4 which is filled with an adherent fluid medium 5 such as ink. This medium is fed into hollow space 4 through longitudinal passageways 6 and 7 supplied from a radial passageway 8 which in turn is supplied through an aperture 9 in the surface of roller 17 which is sealed by cover 10. Adherent fluid medium 5 is, for example, a liquid ink. However, pastes are also suitable inking material. It is also possible to provide a hole 8*a* similar to passageway 8 axially disposed through axle 1*a* or 2*a* to permit the medium to be continuously fed as the roller is rotated in operation.

Cylinder 3 may, for example, have a mean diameter ranging from 20 mm. to 40 mm. and a wall thickness of approximately 2 mm. A number of perforations 11 are, for example, uniformly distributed over the surface of cylinder 3. These holes 11 are, for example, approximately one-half mm. in diameter. A plastic tube 12 fits

closely over the surface of storage cylinder 3 and, it for example, is approximately 0.1 mm. in wall thickness. This tube is, for example, made of a strong and abrasion resistant elastic plastic material such as polypropylene or polycarbonate. Tube 12 incorporates holes 13 which are preferably uniformly distributed over the surface in staggered relationship out of alignment with holes 11. These holes 13 are formed, for example, by applying pressure from outside to inside of tube 12 to form annular projections 13*a* upon the inner surface of tube 12 around holes 13. These annular projections 13*a* form a space 14 between the inner wall of tube 12 and the surface of cylinder 3. The diameters of holes 13 and the height of projections 13*a* are for example, slightly greater than the wall thickness of tube 12. When plastic tube 12 in the unstretched condition has an inside diameter slightly less than the outside diameter of cylinder 3, the ends 15 and 16 of the tube are stretched tightly into contact over cylinder 3. However, this close fit may be assured without undue stretching of tube 12 by providing inwardly extending flat rings 15 and 16 within the ends of the tube; but in either case the ends of the space 14 between tube 12 and cylinder is sealed by the tightly stretched contact of the ends of tube 12 about cylinder 3.

In FIG. 3 are shown feeding roller 17, transfer roller 18 and printing roller 19. Transfer roller 18 oscillates in an axial direction as well as rotating. For ease of representation, the driving mechanisms for it and the other rollers are not shown; and roller 18 can act directly upon either roller 17 or 19.

As the rollers rotate, an adherent fluid medium such as ink, for example incorporating a dyestuff, is driven by the applied centrifugal force through perforations 11 in cylinder 3 to substantially uniformly fill space 14. Ink 5 is forced from space 14 into holes 13 by the radial pressure exerted by transfer roller 18 at its point of contact with roller 17. This ink spreads over the surface of plastic hose 12 radially about holes 13. This ink need not extend completely over the surface of the entire plastic tube to provide a uniform distribution of ink over printing roller 19. However, the radial pressure of transfer roller 18 causes the entire surface of plastic tube 12 to be covered substantially uniformly with a coating of ink within two or three revolutions. This uniform distribution is aided by the longitudinal reciprocation of roller 18.

During rotation of roller 17, each longitudinal area of plastic tube 12 is alternately compressed and released. During compression the ink is squeezed from space 14 into holes 13, and during relaxation space 14 refills itself with ink which is draws through openings 11. In addition air easily flows into the hollow interior 4 of cylinder 3 through holes 13, space 14 and holes 11. This flow of air restores any pressure which might be lost within the cylinder when ink is drawn from it.

Should the inking roller be inoperative for some time even for several days the particles of ink remaining upon the surface of tube 12 in holes 13 and in space 14 ordinarily dry and crystallize, however, the entire amount of these crystal-like particles is so small that they are easily flushed away after a few revolutions when the roller is again put into use. It is therefore not necessary to utilize any special cleaning process before restoring the roller to operation, and any loss in time to accomplish this is avoided.

Instead of intermittently feeding ink through aperture 9 into interior 4 of cylinder 3, one of axles 1*a* or 2*a* may be concentrically bored to permit the medium to be continuously fed into it as it is being rotated. Furthermore, annular projections 13*a* are not absolutely required to make a roller of this type operative. An operative tube may also be provided by one without these projections if it is fitted tightly over cylinder 3. The centrifugal force created during rotation is still able to force the ink through holes 11 and 13 and to maintain a fine film between tube 12 and cylinder 3 in a smaller space 14 which is still of sufficient magnitude to uniformly supply a flow of ink to holes 13. This is particularly true when adherent fluid mediums such as thin liquids having low viscosity are being fed. However, as previously mentioned, the optimum configurations of the tube, the cylinder and their perforations are dependent upon the type of medium that is being fed and applied.

What is claimed is:

1. A roller for feeding an adherent fluid medium comprising a perforated hollow storage cylinder, an elastic tube of plastic material fitted closely over the surface of said storage cylinder, and said plastic tube incorporating holes which are disposed out of alignment with the perforations in said cylinder, and portions of said plastic tube contacting said surface of said storage cylinder between substantially all of said holes and all of said perforations to provide a resilient seal that separates said holes from said perforations for controlling the flow of said medium from the hollow interior of said cylinder onto the surface of said tube.

2. A roller as set forth in claim 1 wherein said perforations and holes are uniformly distributed over the surface of said cylinder and tube.

3. A roller as set forth in claim 1 wherein said elastic plastic material is tough and durable and ranges in thickness from 0.05 mm. to 0.5 mm.

4. A roller as set forth in claim 1 wherein annular projections are disposed around said holes upon the inner surface of said tube, and said annular projections providing said contacting portions of plastic tube and forming a space between the inner wall of said tube and the surface of said cylinder.

5. A roller as set forth in claim 4 wherein the height of said annular projections is at least one-half the thickness of the wall of said tube.

6. A roller as set forth in claim 4 wherein the ends of said tube are imperforated for sealing the ends of the space provided by the annular projections, and the sealed space formed thereby providing a reservoir for storing said medium within said tube.

7. A roller as set forth in claim 6 wherein the ends of said tube incorporate inwardly extending flat rings which facilitate their sealing contact over the ends of said cylinder.

8. A roller as set forth in claim 1 wherein a passageway extends through the surface of said cylinder extending into its hollow exterior to provide a means for filling it.

9. A roller as set forth in claim 1 wherein said cylinder incorporates at least one hollow axle, and the interior of said hollow axle communicates with the hollow interior of said cylinder to provide means for continuously supplying said adherent fluid medium to said roller as it is being rotated.

10. A roller as set forth in claim 3 wherein the diameters of said holes are substantially equal to the thickness of said elastic plastic material of said tube.

References Cited in the file of this patent

UNITED STATES PATENTS

242,977	Porter	June 14, 1881
1,731,739	Du Belle	Oct. 15, 1929
2,185,342	Keller	Jan. 2, 1940
2,217,552	Horton	Oct. 8, 1940