Feb. 13, 1934. W. PRUSSING 1,947,170

PRINTING PLATE FOR COLLAPSIBLE TUBES

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Fig. 2

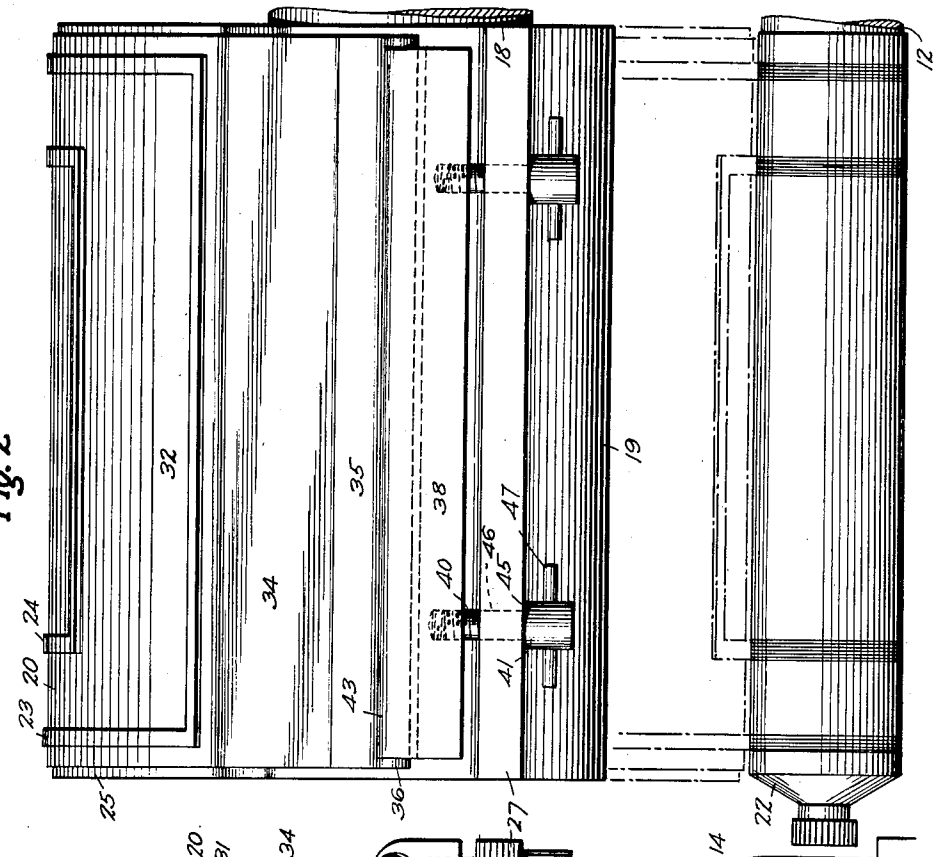


Fig. 1

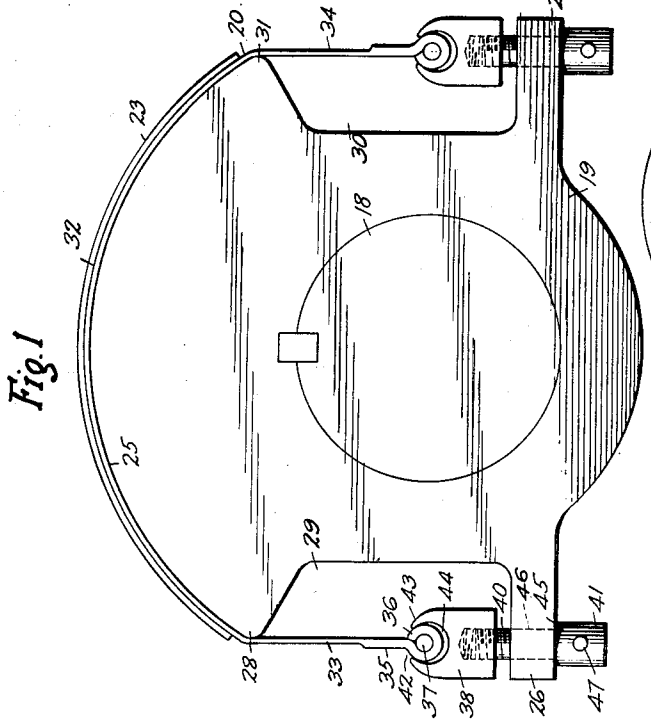
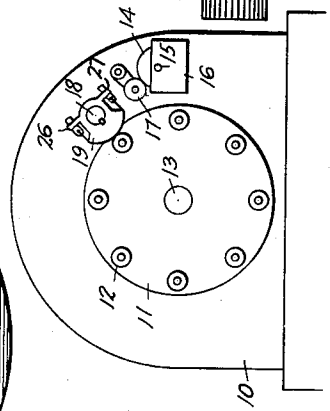


Fig. 3



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PRINTING PLATE FOR COLLAPSIBLE TUBES

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13 Claims. (Cl. 101—415.1)

This invention relates to machines for printing thin collapsible tubes which are usually made of soft metal and designed to hold pasty material such as tooth-paste, shaving cream and the like.

Difficulty has been experienced heretofore in holding the plate on which the printing ink is deposited, in the proper position to print a collapsible tube, particularly, where comparatively large areas of solid color are to be applied to the tube. This has been due not only to the lack of resiliency of the metal of which the printing plate has been made but to the difficulty of applying the proper tension or pressure to the plate to hold it permanently in the proper position for printing solid colors.

Much time has heretofore been lost in securing the plate in position and adjusting the plate, and in substituting a new plate of different design for the printing of tubes bearing a different design.

My invention therefore contemplates the provision of simple and efficient means for adjustably and removably maintaining a printing plate in the proper position on its support, and for thereby applying the ink to a collapsible tube in such a manner as to print the same uniformly irrespective of the extent of the areas to which the color is to be applied.

My invention further contemplates the provision of simple means for holding the plate in its proper position, which means permits the removal of the plate and the substitution of a different plate quickly and easily.

The various objects of my invention will be clear from the description which follows, and from the drawing, in which

Fig. 1 is an end view of my improved printing plate and of the supporting and adjusting means.

Fig. 2 is a side view of the same, showing in dotted lines, the positions assumed by the parts during the printing operation, and

Fig. 3 is an end view of a typical printing machine to which my invention has been applied.

In that practical embodiment of my invention which I have illustrated by way of example, the printing machine 10 includes an intermittently revoluble turret 11 which is given a step by step rotary movement about the axis of the shaft 13 in a manner which is well known in the art and hence which need not be further described nor shown. Said turret 11 carries a plurality of collapsible tube holding mandrels 12 which mandrels are loosely mounted in the turret for rotation therein during the printing operation. Printing material is supplied to the printing plate by means of a suitable roller 14 rotating about the shaft 15 in the ink box 16, and guiding the intermediate supply roller 17 which rotates against the roller 14. On the shaft 18 is arranged the support 19 for the printing plate 20 so that the printing plate comes in contact with the supply roller 17 at predetermined intervals. The timing and relation of the parts is such as to cause said plate to properly print a tube 22 carried by that particular mandrel which has been forwarded to the printing position.

The outstanding areas 23 and 24 of the printing plate receive the ink and apply it to the tube in the desired designs. To insure, however, that said portions 23 and 24 contact throughout their entirety with the surface of the tube to be printed and with the supply roller 17, I have found it desirable to so support the printing plate 20 as to allow adjustment of the pressure which holds the plate to the support. By so adjusting the pressure, I am further able to vary the curvature of the printing plate and to maintain said plate in its properly curved position.

Toward this end, the support 19 is provided with a segmental cylindrical surface 25 arranged on one side of the center of the shaft 18 and of less width from the edge 28 to the edge 31 than the total width of the printing plate. The support 19 is further provided with arms 26 and 27 opposed to each other and arranged on the other side of the center of the shaft 18. Between the terminal edge 28 of the surface 25 and the arm 26 is a re-entrant recess 29, a similar recess 30 in the support being provided between the edge 31 and the arm 27. The operative central portion 32 of the plate 20 is supported by the surface 25 of the support, said portion 32 terminating in substantially flat sides 33 and 34 arranged at the recesses 29 and 30, respectively, and being at all times out of engagement with the support 19.

I prefer to so shape the terminal portions of the sides 33 and 34 as to strengthen them materially and to enable the desired pressure or tension to be put thereon. The terminal portion 35 of the plate side 33 is therefore thickened so as to make it of substantially greater thickness than the remainder of the side 33 or of the plate portion 25.

In addition to thickening the terminal portion of the side, I prefer to bend or enlarge the peripheral edge portion of said side into the shape of a hollow cylinder as 36 or in the shape

of an elongated eye. The other side 34 is similarly thickened and bent and therefore, the above description of one side will suffice for both. In order to stiffen the eye 36 so as to prevent its distortion under stress, I prefer to insert a stiffening bar 37 into the eye.

Said eye 36 is inserted into the recessed eye engaging member 38 which is suitably threaded at spaced intervals along one edge for the reception of the threaded ends 40 of the adjusting screws 41. The other edge of the member 38 is provided with a cylindrical recess as 44 open at the top as at 42 and thereby providing constricted portions 43. The enlarged heads of the screws 41 provide shoulders as 45 engaging the arms 26 and 27 and thereby serving to connect the members 38 to the support 19, said screws passing through suitable perforations as 46 in the arms. Cross pins as 47 may extend through and beyond the heads of the screws 41 to provide means whereby the screws may be rotated and adjusted.

In order to secure the plate 20 to the support 19 therefor, the screws 41 are rotated in the proper direction to move the recess members 38 upwardly, as viewed in Figs. 1 and 2. The eyes 36 of the plate are then inserted in the recess 44 by moving the plate longitudinally or parallel to the axis of the shaft 18, and thereby moving the plate over the surface 25 of the support. The screws 41 may now be rotated in the proper direction, thereby bringing the constricted portions 43 into contact with the eyes 36 and drawing said eyes downwardly and tensioning the sides 33 and 34.

It will be understood that the portion 32 of the plate has first been curved as nearly as possible into the proper position to perform its function before the plate is arranged on its support. By adjusting the screws 41, greater or less tension may be put upon the sides 33 and 34 of the plate and therefore, greater or less substantially radial pressure may be brought to bear on the curved portion 32 of the plate to retain it in place and to shape it substantially to the proper curvature. In addition, shims or inserts may be arranged between the curved portion of the plate and the surface 25 of the support at the proper places in much the usual manner.

I prefer to make the printing plate 20 of copper or other metal having a certain amount of resiliency greater than the resiliency found in zinc, tin, lead or alloys of these metals, and greater than the resiliency of what is known as type or plate metal. The resiliency inherent in such a metal as copper enables the adjustment of the plate to the required accuracy, and further makes it possible to retain the plate in the position into which it has been adjusted.

It will be seen that my improved printing plate may not only be accurately adjusted quickly and easily but that it may be readily removed from its support and a new plate substituted at any time without material loss of time.

It will further be seen that I have provided simple and efficient means easily insertable into place, and easily removable, and which can be accurately adjusted to print areas of solid colors with great accuracy.

While I have shown and described certain preferred embodiments of my invention, I do not wish to be understood as limiting myself thereto but intend to claim my invention as broadly as may be permitted by the state of the prior art and the terms of the appended claims.

I claim:

1. In a machine for printing thin collapsible tubes, a revoluble support for a printing plate, said support having a segmental cylindrical surface on one side of the axis of rotation of the support, a pair of opposed arms, each having openings therethrough, extending from the support in spaced relation to the surface and on the other side of the axis, said support having a recess therein between each arm and the surface, threaded adjusting and securing members passing through the perforations of the arms, a pair of engaging members each having a substantially cylindrical recess along one edge thereof, said recess being constricted at the top, the threaded members being screwed into said engaging members, a resilient copper printing plate bent to fit the segmental surface of the support and having depending sides, the peripheral portions of said sides being of greater thickness than the remainder of the sides, and terminating in thickened cylindrical eyes inserted into the recesses of the engaging members and held therein by the engagement thereof with the constricted parts of the recesses, and stiffening rods in said eyes.

2. In a machine for printing thin collapsible tubes, a shaft, a plate support on the shaft having a segmental surface arranged coaxially of the shaft and having side recesses therein, a comparatively thin printing plate on and extending past the surface, thickened cylindrical eyes at the edges of the plate, recessed members in the side recesses of the support for receiving and retaining said eyes, the recess of each of said members being cylindrical and of greater diameter than that of the eye and communicating at the top thereof with a slot of less width than the diameter of the eye, and adjusting and securing screws engaging the support and the recessed members for moving said members and therethrough moving said eyes in a direction effective to loosen or tighten the plate against the segmental surface of the support.

3. In a machine for printing collapsible tubes, a printing plate of comparatively thin resilient metal, said plate having thickened integral terminal cylindrical eyes, a revoluble support for the plate, means for tensioning the plate to force the plate against the support comprising recessed members for receiving and retaining the eyes, and means carried by the support for moving the eyes relatively to the support.

4. In a machine for printing collapsible tubes, a thin copper printing plate terminating in thickened edge members bent into cylindrical form, a revoluable segmental cylinder for supporting the plate, recessed members for receiving and retaining the edge members of the plate, and adjusting screws engaging the recessed members and the segmental cylinder for varying the tension upon the edge members and upon the plate, and securing the plate in printing position on the support.

5. In a machine for printing collapsible tubes, and means for printing the tubes including a comparatively thin copper plate having a cylindrical central portion and thicker depending sides, and adjusting screws operatively connected to the sides for varying the pressure upon the plate.

6. In a machine for printing collapsible tubes, a revoluble support for a printing plate, a print-

ing plate having a central portion engaging said plate support, and having sides out of engagement with the plate support and of greater thickness than the central portion, means for engaging and holding the terminal portions of the sides, and means for connecting the engaging and holding means to the plate support and for varying the tension upon the sides of the plate.

7. In a machine for printing collapsible tubes, and means for printing a tube carried by the mandrel comprising a revoluble plate support, a plate having a thin portion pressed against the support and having thickened integral sides free of the surface of the support, and adjusting screws operatively connected to the sides and engaging the support to hold the plate removably to the support and to vary the tension upon the sides.

8. In a machine for printing collapsible tubes, a revoluble plate support having a segmental cylindrical surface at one side of the center thereof and having outwardly extending arms on the other side of the center and having inwardly extending recesses therein between the surface and the arms, a plate having a thin curved portion drawn against the cylindrical surface of the support and having integral and substantially flat thicker sides beyond said surface and at the recesses, and elongated recessed members in which the terminal edges of the sides are inserted adjustably secured to the arms of the support.

9. In a machine for printing thin metal collapsible tubes, a one-piece copper printing plate having a curved portion and substantially flat thickened side portions, and a revoluble means for adjustably and removably supporting the plate and tensioning the side portions thereof.

10. In a machine for printing thin metal collapsible tubes, a thin sheet copper printing plate, thickened edge portions on the plate, a revoluble support for the plate, and means spaced from the support for removably holding the peripheral edge portion of the plate and for varying the tension thereon.

11. The combination with a revoluble support having a curved outermost surface and having opposed side recesses and perforated arms, of a comparatively thin metallic resilient printing plate having thickened side portions terminating in eyes, and adjustable recessed retainers at the recesses of the support for removably holding said eyes.

12. The combination with a partly flat and partly curved thin printing plate of resilient metal and of substantially uniform thickness throughout the curved part thereof, of an adjustable recessed retainer for receiving and holding the flat part of the plate, the recess of the retainer being constricted, said flat part having a terminal portion longitudinally slidable into and out of the recess, and being of greater thickness than the constricted part of the recess to prevent transverse removal thereof from the recess.

13. The combination with a revoluble support having perforated arms thereon and having a curved surface opposite the arms, of a printing plate of comparatively resilient metal, said plate having a thin curved portion fitted on the curved surface of the support and having thicker integral flat sides substantially free of the support, retainers, each having a longitudinal recess therein constricted at the top for the reception of the terminal portion of the flat side of the plate by a longitudinal inserting movement, the constricted portion of the recess being of less width than the thickness of the terminal portion of the plate held therein, and screws passing through the perforations of the arms and adjustably connecting the retainers to the support.

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