Nov. 26, 1935. H. P. ELLIOTT 2,022,539

ROTARY STENCIL PRINTING APPARATUS

Original Filed June 14, 1932

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FIG. 1.

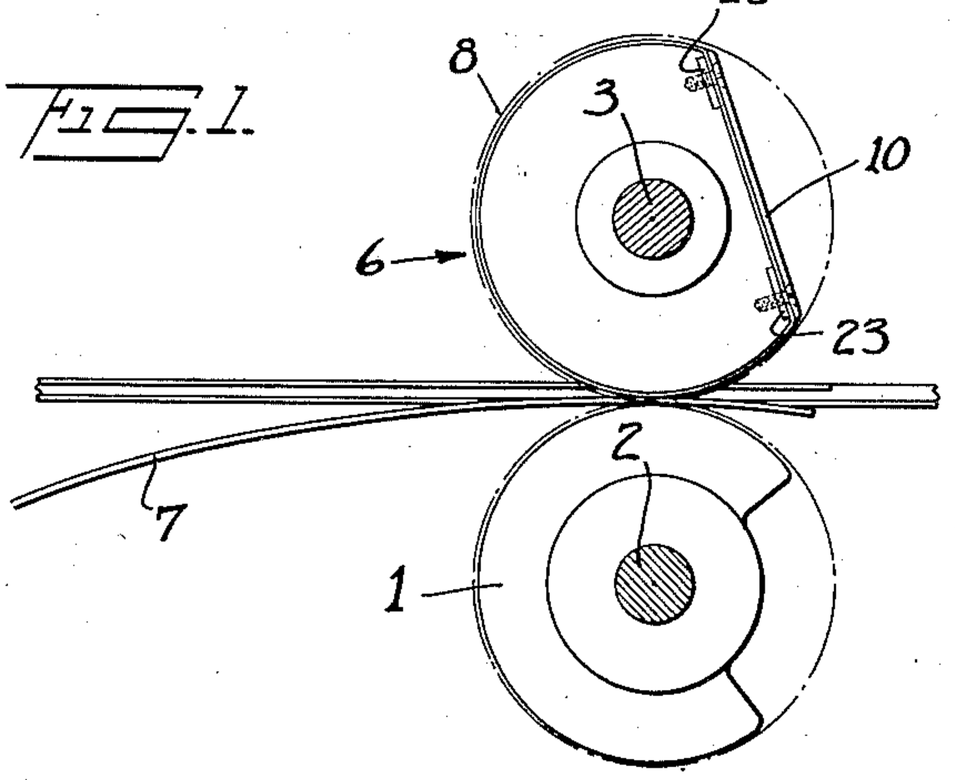


FIG. 5.

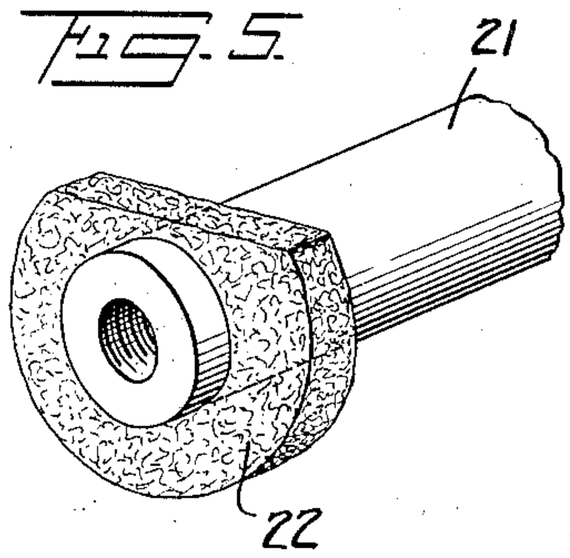


FIG. 2.

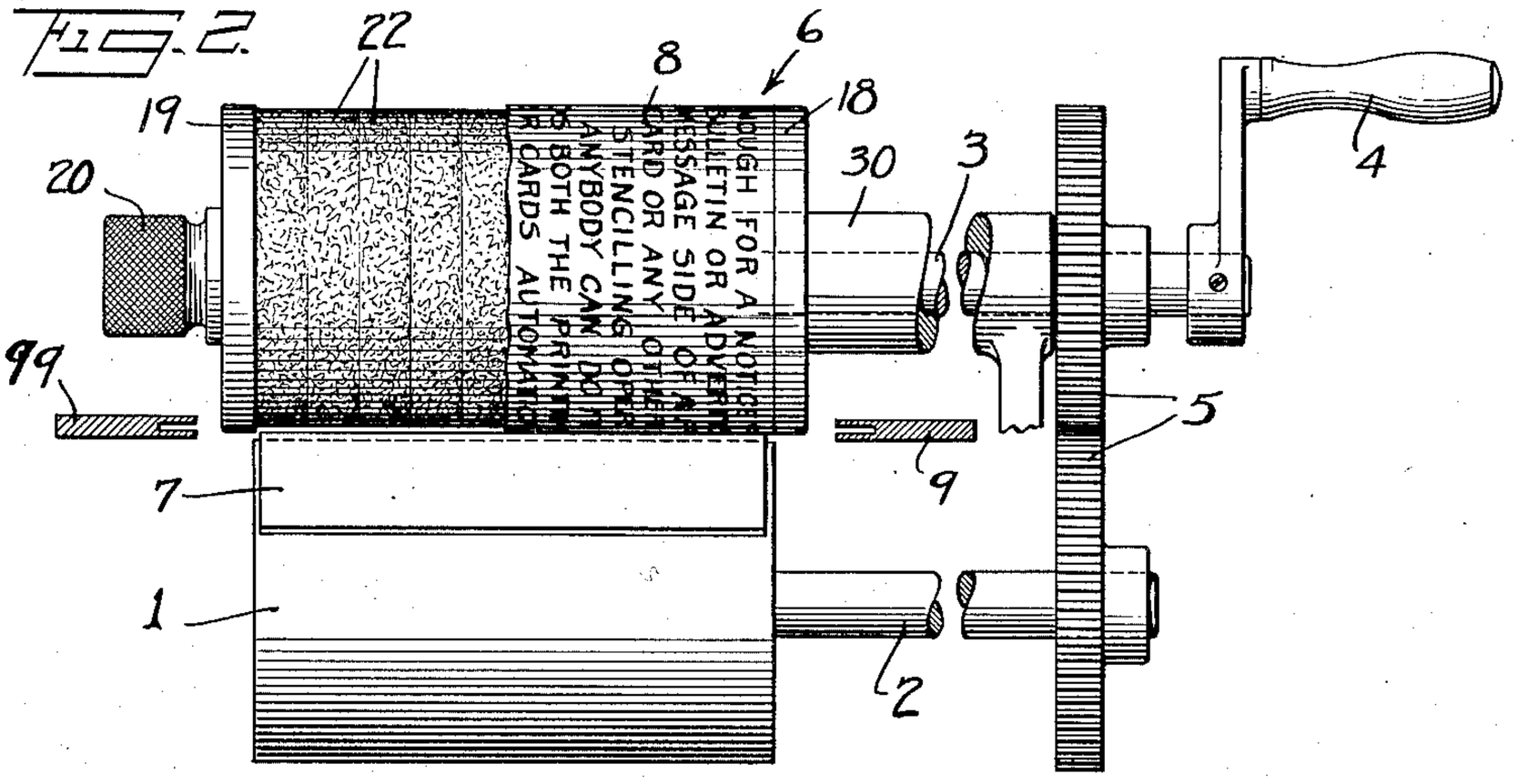


FIG. 3.

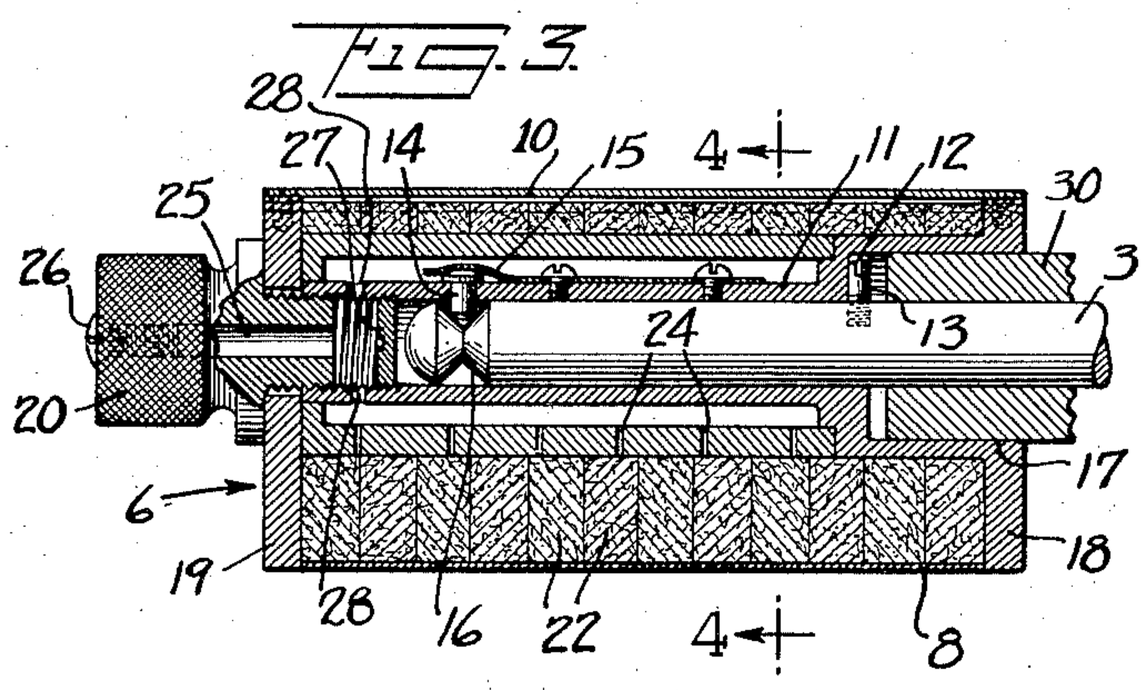
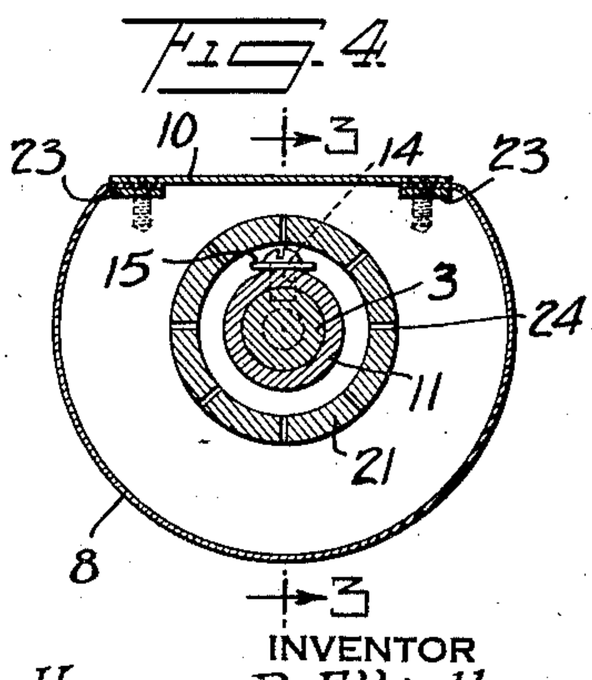


FIG. 4.



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ROTARY STENCIL PRINTING APPARATUS

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Application June 14, 1932, Serial No. 617,089
Renewed April 26, 1934

8 Claims. (Cl. 101—116)

This invention relates to printing by means of flexible sheet stencils and is particularly designed to produce a simple attachment which can be slipped on to, or off of, an addressing machine which normally uses a series of card stencils to successively print a series of names and addresses on a series of postcards or envelopes, and which attachment when in position on such addressing machine apparatus transforms it into a little printing press, or rotary duplicator, which can be used to print a uniform message or legend on the other side of all the addressed postcards, or on letter sheets to be mailed in the addressed envelopes.

The invention can, however, in its broader aspects be used to advantage on other forms of stencil duplicating machines, and when so employed on any type of such apparatus makes it possible to operate them with liquid ink; whereas heretofore all such machines comprising stencil wrapped members in which ink is fed to the inner surface of the stencil from reservoirs in such stencil-carrying base members, have only been commercially operative with paste ink.

Such paste ink is always objectionable because it dries very slowly on the printed page so that great care must be exercised not to rub the printed surface against any other surface (such as the back of another sheet) until the paste ink has had ample time in which to dry. Furthermore, only a light printing pressure is permissible when paste ink is used, and only relatively faint printing can be produced with it, because if pressures are used sufficiently high to exude a large quantity of the paste ink through the stencil on to the surface on which the printing is being done, the delay in drying thereof, and the intervening liability to smudging thereby, are both aggravated.

As contradistinguished from all this, liquid ink dries quickly even if enough is used to produce extra clear and sharply defined printing, but, prior to the present invention, it has been practically impossible to use it with stencil wrapped printing cylinders, or other stencil-carrying member supplying such liquid ink to the inner faces of the stencils, because it has been impossible to so graduate and regulate the supply thereof as to adequately control the amount of ink deposited on the surface to be printed. Consequently, deliveries of it in excess, or in uneven, quantities have developed new smudging difficulties and other printing defects.

With the present invention, however, both the before-recited classes of difficulties are overcome. A thick, absorbent body of fibre or similar material sufficiently dense in body and smooth of surface to form a satisfactory support for the stencil sheet is substantially saturated with liquid ink and supplies sufficient and evenly distributed quantities thereof through the openings cut in the stencil sheet to produce uniform, clearly defined printing, but the ink so deposited on the printed surface dries quickly, and will not smudge if the printed sheets are handled with the same degree of care required in handling the products of the ordinary printing press.

I am aware, of course, as above stated, that many unsuccessful attempts have heretofore been made to feed liquid ink from an interior reservoir having curved perforated walls to the stencil wrapped about such reservoir, together with a thin layer of cloth or paper not much thicker than the stencil itself placed under it; but the present invention differs from such prior art practices by employing a thick body of absorbent felt, many times thicker than the stencil as shown in the drawing (Figs. 3 and 5), which absorbent mass itself acts as a reservoir or sponge into which the liquid ink may be injected in any way, either from a source within the cylinder or sector carrying the stencil, or from one exterior thereto (before the stencil sheet is put in position) as from a squirt can, or even by pouring it on to the spongy mass of felt.

In my co-pending application Ser. No. 572,480 filed November 2, 1931, I have shown how such a result can be obtained by another form of attachment comprising a type sector or platen roller which can be slipped into the addressing machine and there cooperate with the ink supplying apparatus already present in such addressing machine.

According to the present invention, however, I insert in the addressing machine mechanism a stencil covered sector or roller which contains its own ink supply, the regular ink supplying mechanism of the addressing machine having been first swung out of operative position, or removed altogether.

When the above described attachment is operated in conjunction with certain cooperating elements of the addressing machine apparatus, such revolving stencil prints the same legend on each postcard or letter sheet fed to it.

The best form of apparatus at present known to me embodying my said invention is illustrated as applied to a rotary hand operated addressing machine in the accompanying sheet of drawing in which

Fig. 1 is a diagrammatic side elevation of the

rotary stencil printing portion of the apparatus.

Fig. 2 is a front elevation of the same with parts broken away and others shown in section.

Fig. 3 is an axial section of the stencil carrying sector.

Fig. 4 is a cross section on line 4—4 of Fig. 3, and

Fig. 5 is a perspective detail showing one of the fibrous washers for holding and distributing the ink, mounted on the annular ink reservoir.

Throughout the drawing like reference characters indicate like parts. 1 represents the lower, pressure sector mounted on revoluble shaft 2 below the stencil track rails 9 and 99. Above and parallel to shaft 2 there extends a second revoluble shaft 3 carrying hand crank 4, said shaft and lower platen sector being rotated in unison but in opposite directions by gearing 5. On shaft 3 may be detachably mounted an ink carrying sector (not shown) for cooperation with a series of card stencils to be fed along the grooved guides 9 and 99 to cooperate with the ink impression mechanism to print a series of names and addresses, one on each of a series of postcards or envelopes, all in the manner described in my above noted co-pending application. After or before such address printing has been done, however, the ink-carrying, stencil-wrapped sector generally represented by the reference character 6 may be mounted on shaft 3 in place of the ordinary ink-carrying sector, and then, when crank 4 is revolved and a series of post cards or sheets (one of which is indicated at 7 in Fig. 1) are fed between sectors 1 and 6, the legend cut in such stencil wrapping will be printed on each one of such articles.

The sector 6 is a composite structure comprising means for detachably mounting it on the lever of the shaft 3 and compelling it to revolve therewith, means for supporting and fastening the flexible stencil sheet 8 which is wrapped around its curved face, and means for holding a considerable quantity of ink and distributing it evenly to all portions of the stencil sheet.

Referring to Figs. 3 and 4, the means for mounting sector 6 on shaft 3 there shown comprise the sleeve 11 having a notch 12 at one end to receive radial pin 13 which is set in shaft 3 to form a driving clutch or coupling adapted to cause said sleeve to rotate with said shaft, and a retaining latch pin 14 normally pressed by spring 15 through an opening in said sleeve and into engagement with annular groove 16 formed in the surface of shaft 3 near the free end thereof to serve as elastically yielding means for holding sector 6 on shaft 3. One end of sleeve 11 is shown expanded to form a recess 17 into which one end of the single journal bearing 30 for the overhung shaft 3 may project, and on the outer end of this expanded portion of the sleeve is cast or fastened one end plate 18 for the sector 6. The other end plate 19 is fastened to the other end of sleeve 11 by the screw plug 20 which passes through a circular opening in that plate and is threaded part way into the interior of the sleeve.

Before end plate 19 is put in position, however, a perforated cylinder 21 is slipped over sleeve 11, and around this cylinder are slipped a series of annular washers 22, 22, made of loosely felted, absorbent fiber, the outer outline of said washers conforming substantially to the outer outline of the end plates 18 and 19. Consequently, when a sufficient number of such felt washers 22 have been pressed together on said cylinder 21 and clamped between the end plates 18 and 19 a sector is produced having its outer, curved portions and surface formed of a uniformly dense, ink-absorbing mass capable of serving as an ink reservoir. If, therefore, these washers are impregnated with ink before or after they are placed in position, as above described, and a stencil sheet 8 is wrapped around the curved face of the sector so formed (as shown in Figs. 1 and 4) a complete printing unit is produced which, when rotated over a post card or sheet of paper in contact with said curved surface will print thereon any legend cut in such stencilled sheet. Preferably such stencil sheet is held in position by a clamping plate 10 screwed to end plates 18 and 19 and serving to clamp the end edges of the stencil sheet against longitudinally extending bars 23, 23, supported between said end plates, although any desired form of sheet stretching and clamping means might be used.

Ink may be stored in the stencil carrying sector 6 and supplied to the felt mass through perforations 24, 24, in the walls of cylinder 21. Ink can be introduced to this reservoir through the bore 25 of screw plug 20 which is normally closed by screw 26. Partition disk 27, screwed into the interior of sleeve 11, keeps the ink from running further into the said interior and escaping through the space in which shaft 3 is housed. Ink so introduced through bore 25 can therefore only escape through passages 28 to the interior of cylinder 21, and thence through perforations 24 to the mass of felt washers, thus properly saturating the latter and enabling them to produce and maintain an ink film on the inner face of sheet stencil 8. As a result, proper printing will be done on any post card or sheet pressed against the stencil at any time by the lower pressure platen 1 as the apparatus is operated by rotating hand crank 4. The parallel track rails 9 and 99 serve as the guides to direct the forward edge of the card or sheet being printed between the rotary printing members 1 and 6. The guide bars or track rails 9 and 99 lie in a plane parallel to that which forms a common tangent to the curved surfaces of the sector 6 and the platen 1 at their meeting point. Preferably they lie on the upper surface of such plane, so as to most accurately perform their function of guiding the card or sheet to be printed to the "bite" of the rotating sector and platen.

Among the advantages of the invention may be noted its smooth and noiseless operation, there being no reciprocating parts to snap and bang against one another. Also the use of rotary motion alone renders possible the higher speed of operation generally characteristic of all rotary apparatus free from reciprocating parts.

Various changes could be made in the details of construction shown and above described without departing from the principle of the invention so long as the relative arrangement of parts and general mode of operation above explained are preserved in substance. Another form of spring latch which would be wholly inside of sleeve 11 might be used in place of the parts 14, 15 here shown.

Other forms of supporting elements for the fibrous, or other absorbent ink-carrying body could be used in place of the sector shown and other absorbent masses of sufficient thickness might be substituted for the fibrous washers here shown. Also, the internal reservoir for holding a large reserve supply of liquid ink might be dispensed with. In such latter case, the ink may be deposited on the exterior surface of the ab-

sorbent material by any apparatus which will distribute it with sufficient uniformity, and then allowed to sink in. I have found that a relatively thick layer of felt, even if not formed out of annular washers as here shown, will hold enough liquid ink to print many hundreds of stenciled copies if such supply of ink is merely discharged on its surface from a squirt can and given time to soak in before the stencil is put in operative position. Consequently, the present invention is applicable both to other rotary duplicators now on the market, and to flat pad machines, such as shown in my co-pending application Ser. No. 697,407, filed November 10, 1933. In the latter case the series of card stencils there shown could of course be dispensed with, as well as the particular inking apparatus also there shown.

Having described my invention, I claim:

1. As an element of a printing apparatus, an ink carrying sector having a considerable portion of its surface cut away and a flexible sheet stencil stretched around the remaining and curved surface of said sector and clamped to it along the edges thereof, said curved sector surface being composed of a plurality of felt washers in contact one with another and capable of retaining a considerable quantity of ink.

2. A printing apparatus employing flexible stencils comprising, in combination, a revoluble sector shaped member provided with means located near the edges of its curved surface for holding the extremities of a flexible stencil sheet extending around such curved surface, a cooperating pressure platen revoluble on an axis parallel to that of said first mentioned member, means for revolving said member and platen in unison in opposite directions, means for conducting ink to the curved surface of said member; whereby a card or sheet to be printed may be fed between said member and platen whenever a space exists between them, so as to place it in position for any subsequent printing operation resulting from the subsequent rotation of said sector, and a pair of parallel straight bars adapted to guide the sheet or card to be printed, one of which bars extends across each pair of adjacent ends of said sector and platen and both of which lie in a plane parallel to that tangent to the curved surfaces of said sector and platen at their meeting points.

3. A combination such as defined in claim 2, the curved surface of said sector-shaped member being composed of an absorbent mass capable of retaining a considerable quantity of liquid ink in its interior and on said surface in contact with said sheet stencil.

4. A combination such as defined in claim 2, the curved surface of said sector-shaped member being composed of an absorbent mass capable of retaining a considerable quantity of liquid ink in its interior and on said surface in contact with said sheet stencil, and said member also containing a chamber adapted to be filled with liquid ink and in communication with said absorbent mass through a plurality of small openings in said chamber walls.

5. A combination such as defined in claim 2, said sector shaped member being provided with means for maintaining a film of ink between its curved surface and said stencil sheet at substantially all points of contact between the two.

6. In a printing apparatus the combination of a revoluble member having an arcuate surface concentric with its axis of revolution formed of a plurality of arcuate felt members located side by side and constituting a body many times thicker than the coated paper stencil to be stretched around it and adapted to receive and hold both on its surface and in its interior a considerable quantity of liquid ink, a flexible stencil stretched tightly over and around said curved surface, a revoluble platen member journaled so as to press against any stencil so carried by said first mentioned revoluble member along lines of contact substantially constituting elements of the cylindrical surfaces of both said members, and means for rotating said members in opposite directions; whereby, after substantially saturating said absorbent material with a liquid ink, placing the stencil sheet in operative position and rotating said revoluble members synchronously, the legend cut in the sheet will be reproduced in ink on any sheet sufficiently thin to be fed between said members while they are so revolving.

7. An apparatus such as defined in claim 6 combined with means for guiding such sheet to and between said revoluble members.

8. A combination such as defined in claim 6, in which said absorbent material is in the form of annular washers mounted on said first mentioned revoluble member.

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