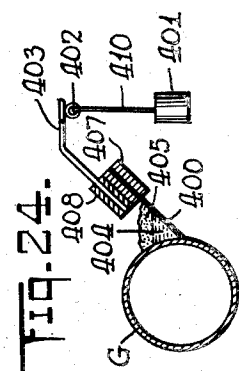


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8 Sheets-Sheet 1



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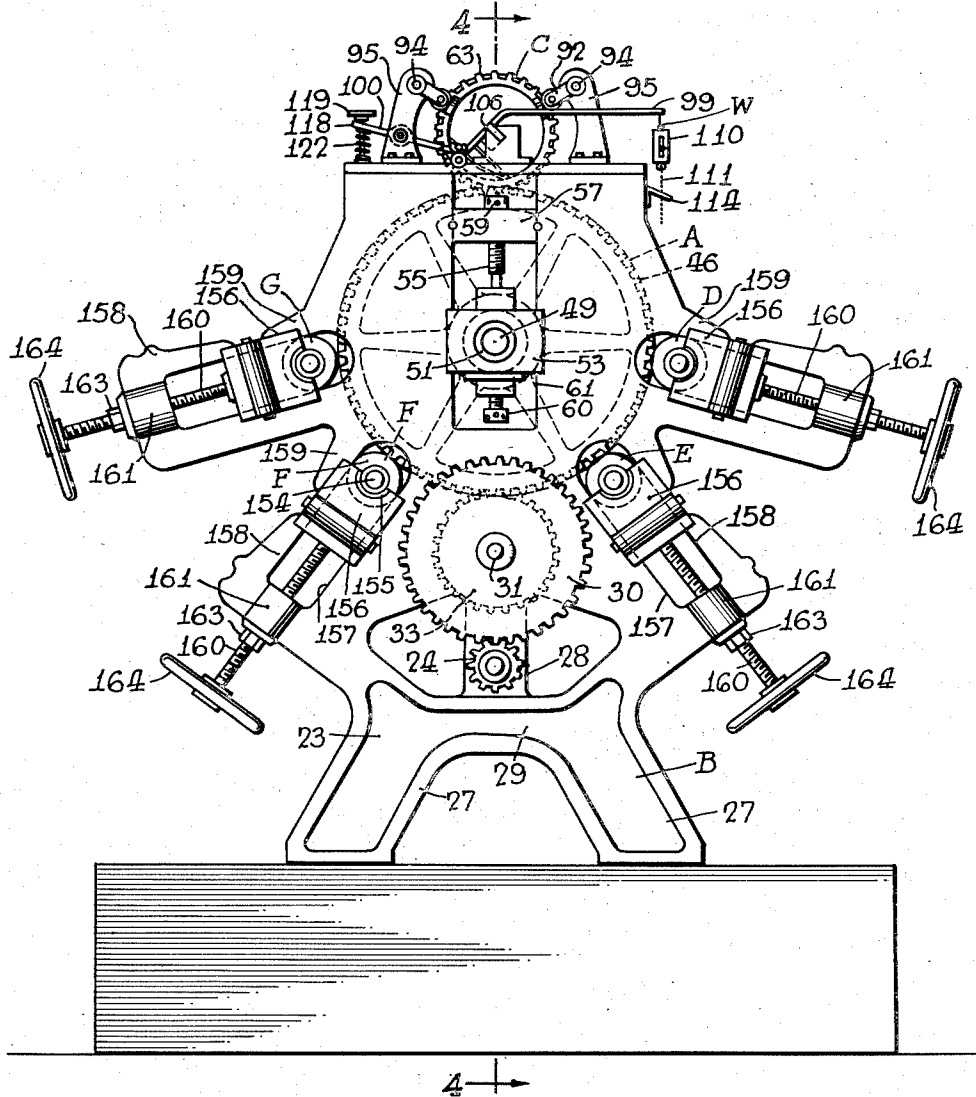
S. M. SCHWARTZ ET AL
STENCIL PRINTING APPARATUS

2,665,634

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8 Sheets-Sheet 2

FIG. 2.



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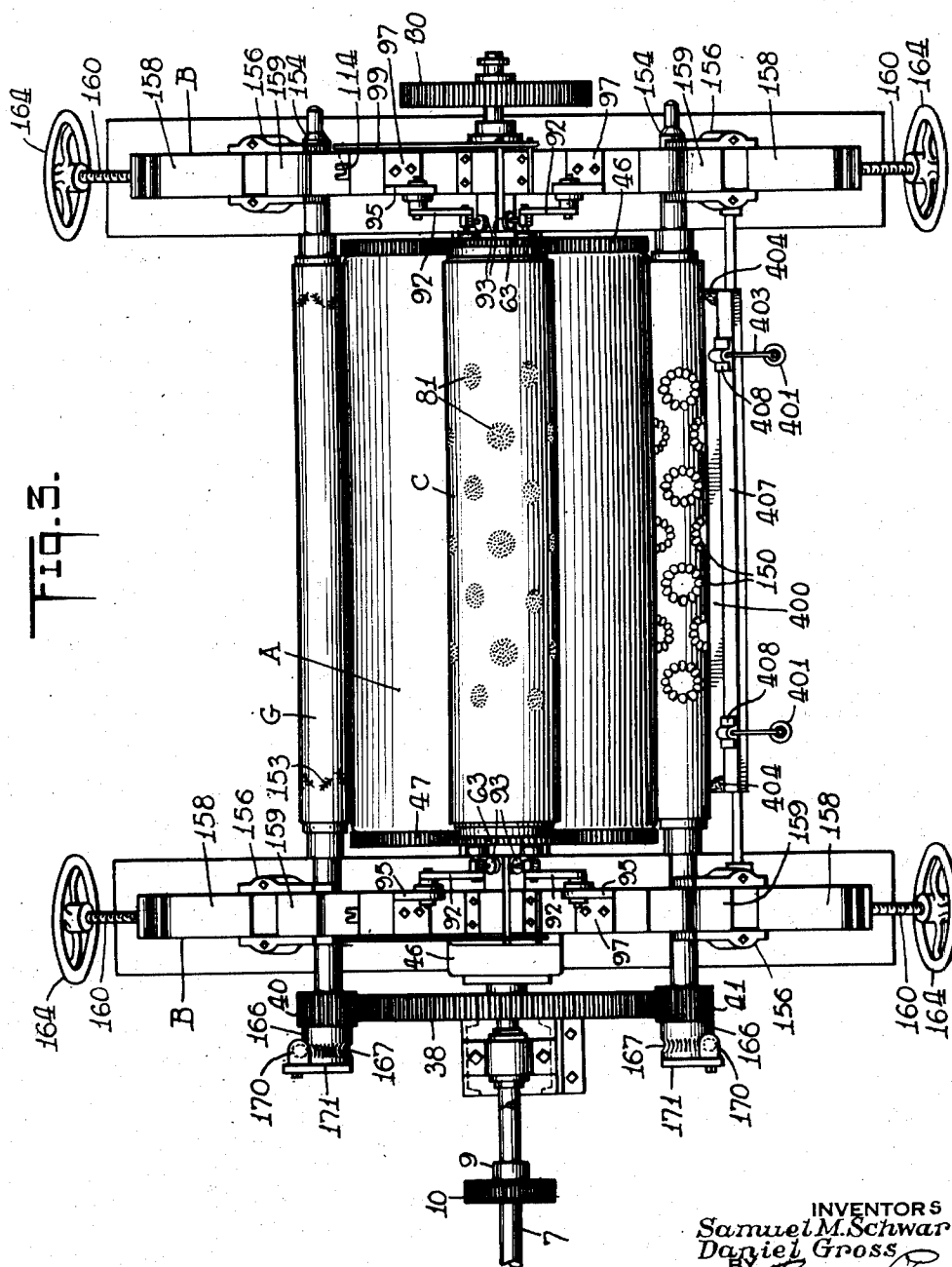
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S. M. SCHWARTZ ET AL
STENCIL PRINTING APPARATUS

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8 Sheets-Sheet 3



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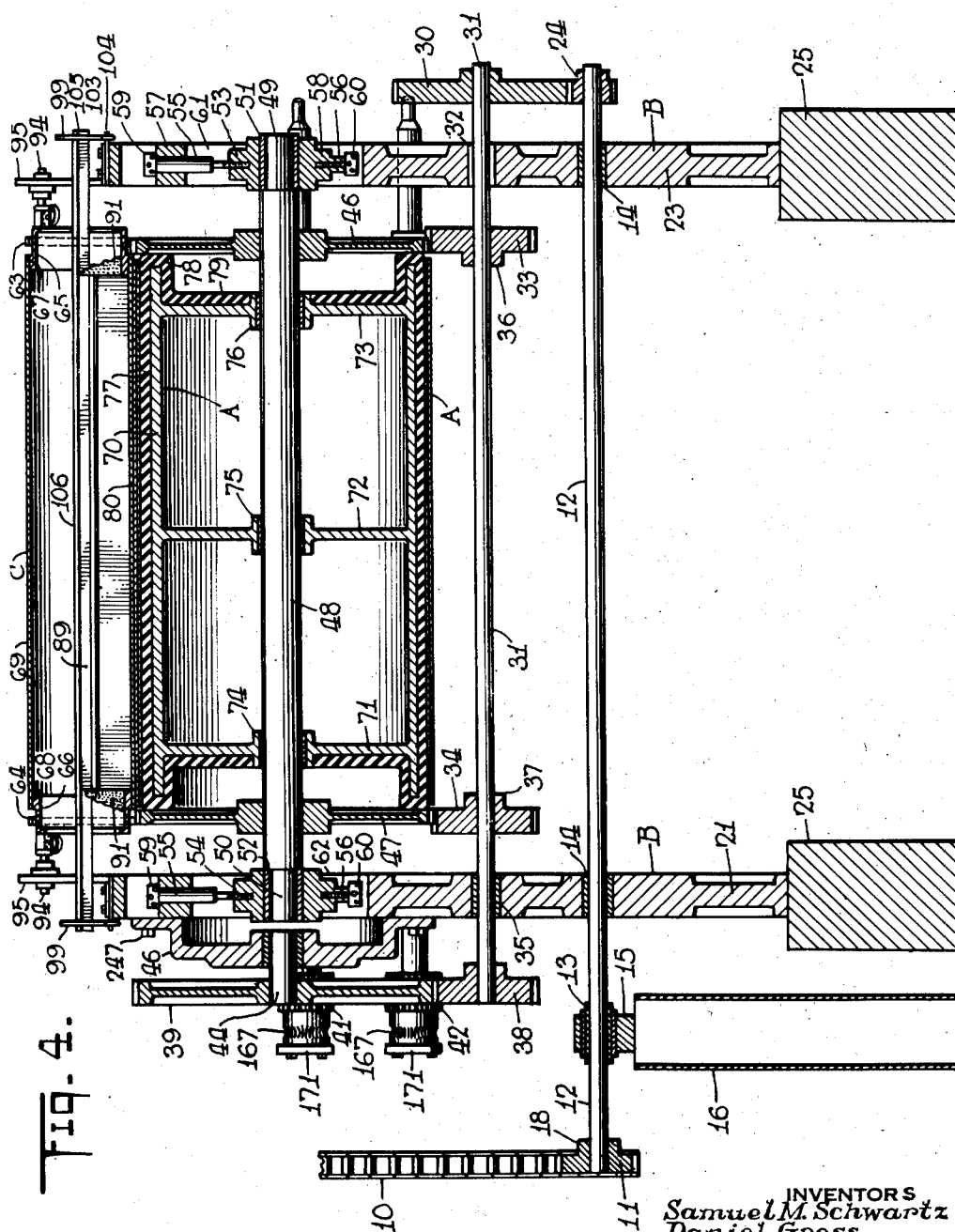
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STENCIL PRINTING APPARATUS

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3 Sheets-Sheet 4



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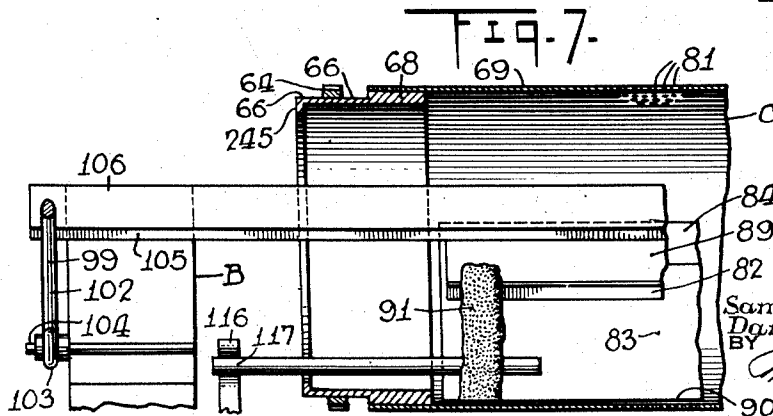
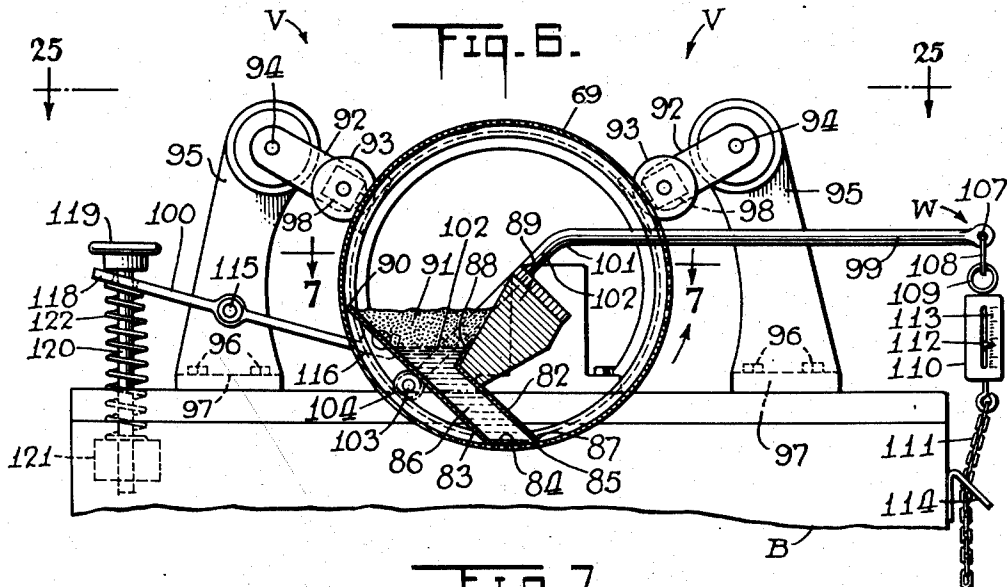
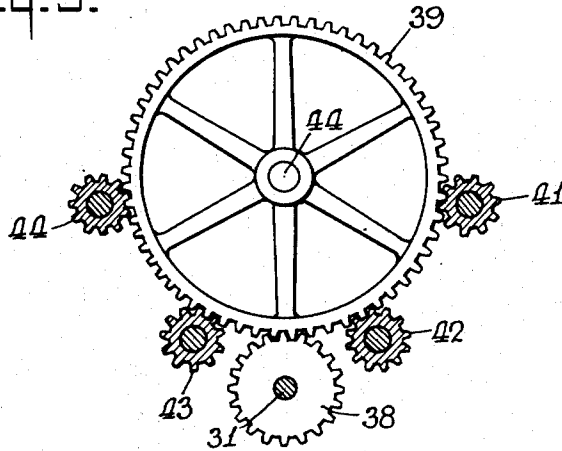
S. M. SCHWARTZ ET AL
STENCIL PRINTING APPARATUS

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FIG. 5.



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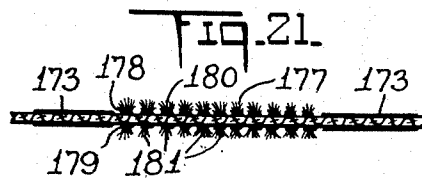
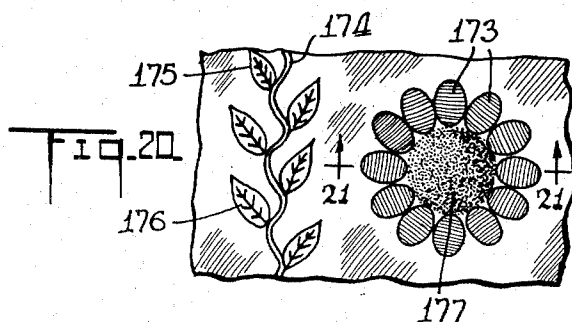
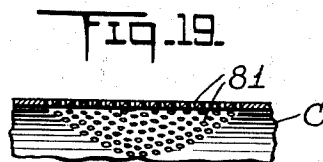
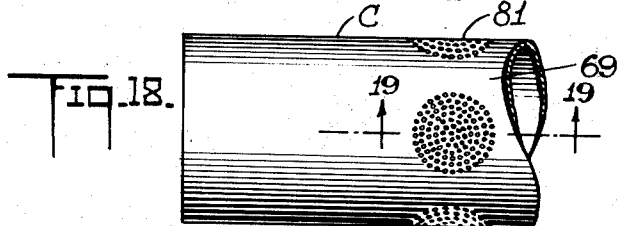
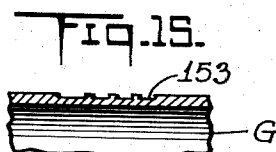
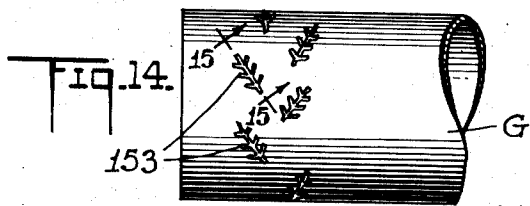
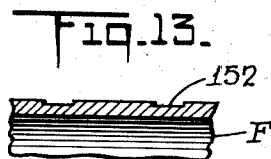
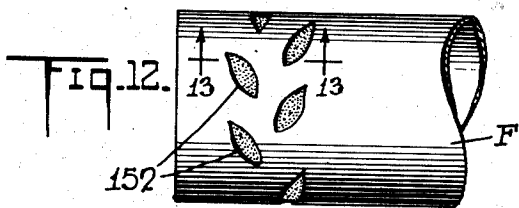
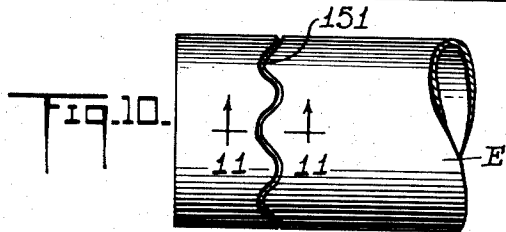
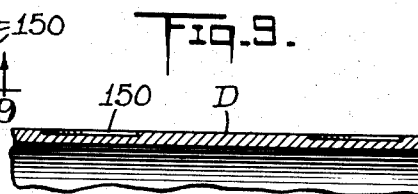
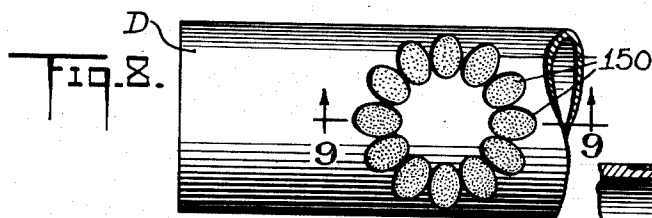
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STENCIL PRINTING APPARATUS

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8 Sheets-Sheet 6



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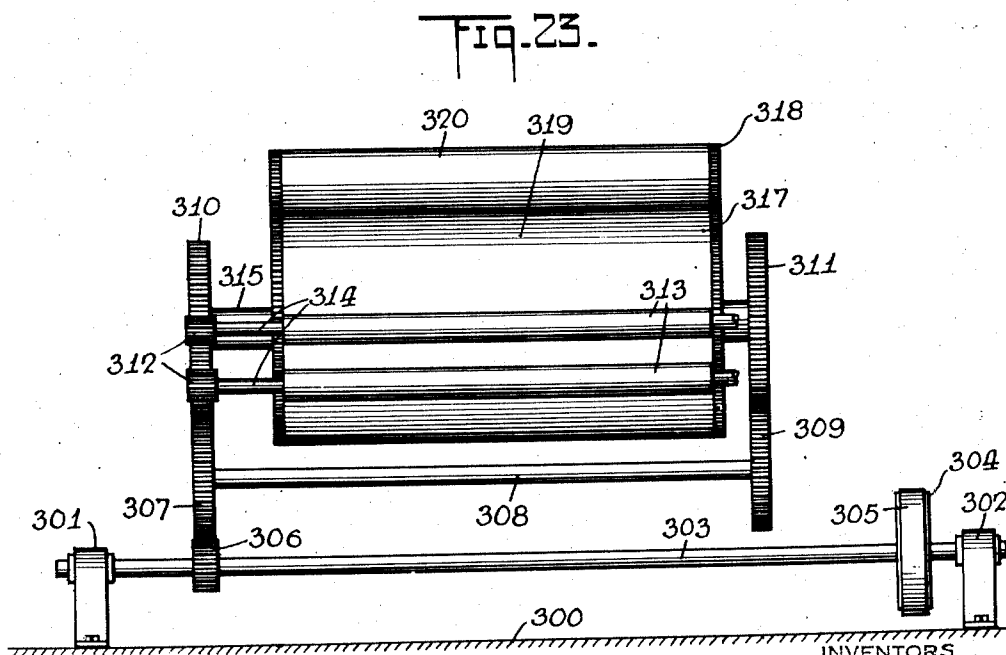
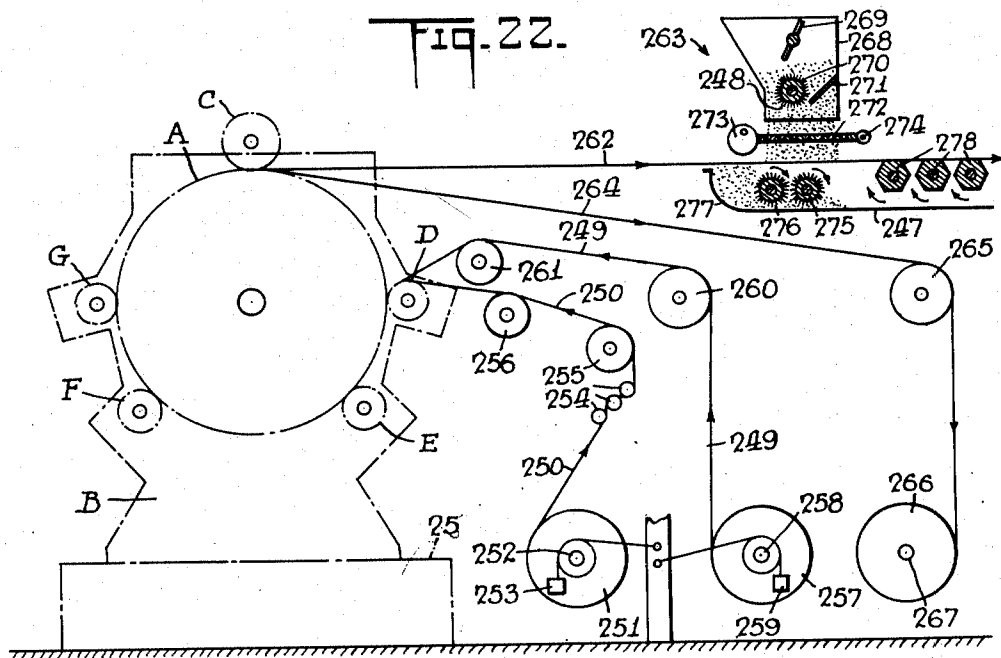
S. M. SCHWARTZ ET AL

2,665,634

STENCIL PRINTING APPARATUS

Filed March 10, 1947

8 Sheets-Sheet 7



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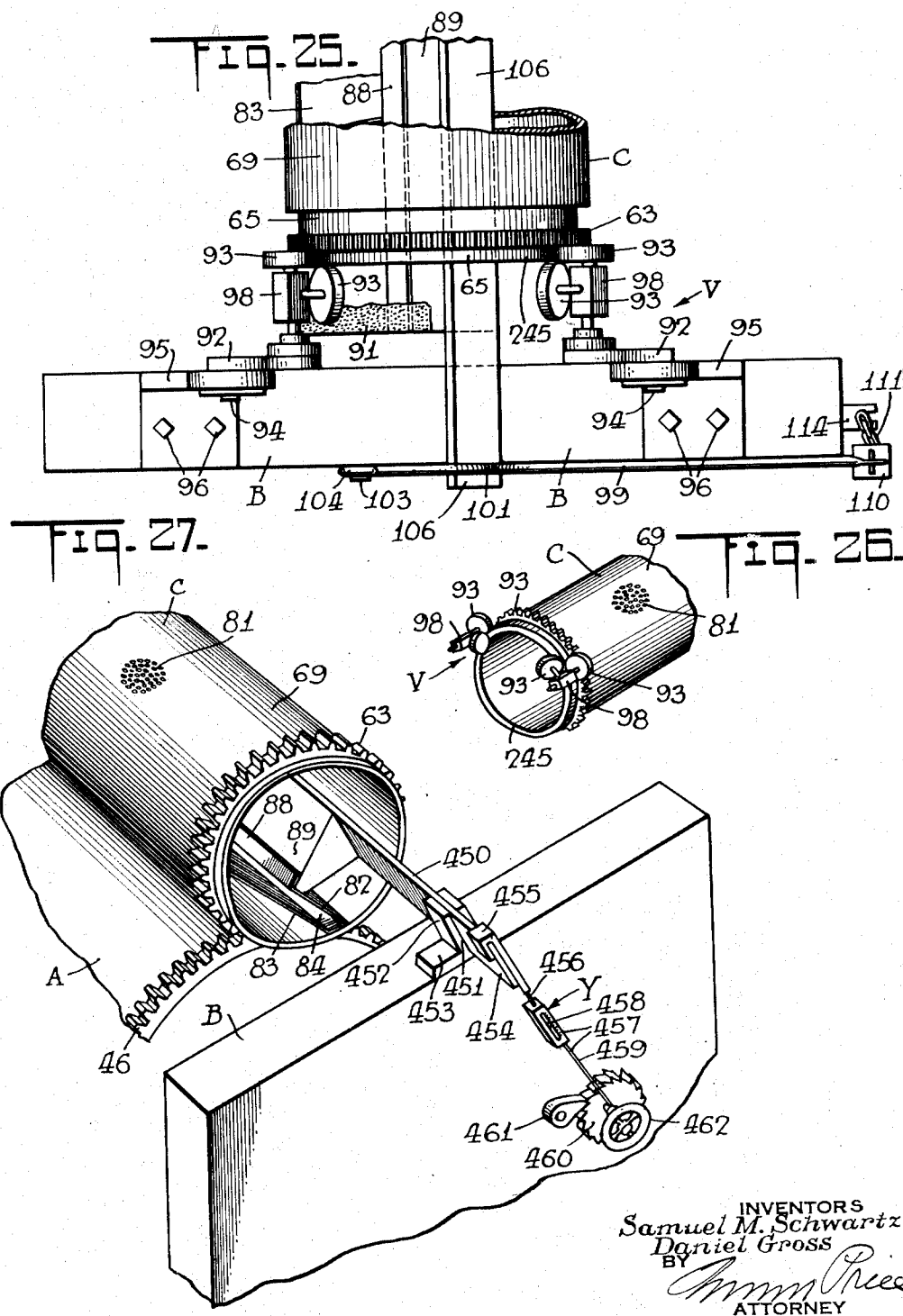
S. M. SCHWARTZ ET AL

2,665,634

STENCIL PRINTING APPARATUS

Filed March 10, 1947

8 Sheets-Sheet 8



UNITED STATES PATENT OFFICE

2,665,634

STENCIL PRINTING APPARATUS

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5 Claims. (Cl. 101—120)

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The present invention relates to a fabric decoration and it particularly relates to apparatus for printing and decorating textile sheets, plastic sheets and other sheet materials.

Although not limited thereto the present invention will be particularly described in its application to combined roller and flock printing of textile fabrics and particularly to novel means for accomplishing the same.

In combined roller and flock printing, considerable difficulty is encountered in assuring registry of the single or multi-colored roller or intaglio print with the flock print. Where chains are utilized to drive both the stencil rollers as well as the printing rollers, there is sufficient play so as to cause the printing to be out of registry.

It is therefore among the objects of the present invention to provide a novel method and means of combined roller and flock printing in which registry will be assured of the roller prints and the flock prints.

Another object is to provide an improved sheet material printing arrangement according to which artistic registered multi-colored and flock effects may be obtained upon a printed fabric.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects it has been found most satisfactory to provide a main roller for carrying the fabric or sheet material to be decorated. Around the periphery is located a plurality of printing and stencil rollers. These various rollers are driven through gear trains from a common source without intervening chain connections.

In one preferred form the main drive shaft is driven by a chain which in turn has a supplemental drive shaft C driving a stencil roller as well as a main gear which in turn drives a number of intaglio printing rolls. The drum itself which carries the fabric is driven by contact with the stencil roll as well as the printing rolls which apply one or more colored designs by intaglio to the fabric.

The invention also consists in certain new and original features of construction and combination of parts hereinafter set forth and claimed and as to its other objects, features and advantages, the mode of operation and manner of its organiza-

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tion, these, inter alia, may be better understood by referring to the following description considered in connection with the accompanying drawings forming parts thereof in which:

Fig. 1 is a front elevational view of the combined stencil and roller printing mechanism with one of the roller printing elements partly broken away;

Fig. 2 is an end elevational view taken from line 2—2 of Fig. 1;

Fig. 3 is a top plan view of the combined roller printing and stencil arrangement;

Fig. 4 is a vertical sectional view taken upon the line 4—4 of Fig. 2;

Fig. 5 is a vertical sectional view taken from the line 5—5 of Fig. 1;

Fig. 6 is a detailed, fragmentary vertical sectional view of the stencil roller upon an enlarged scale as compared to Figs. 1 to 4;

Fig. 7 is a transverse sectional view of the stencil cylinder upon the line 7—7 of Fig. 6;

Figs. 8 to 15 are respectively fragmentary end plan views and fragmentary sectional views of the four successive printing rollers, Figs. 9, 11, 13 and 15 being respectively fragmentary sectional views upon an enlarged scale taken upon the lines 9—9, 11—11, 13—13 and 15—15 of Figs. 8, 10, 12 and 14;

Figs. 18 and 19 are respectively a fragmentary end plan view and a transverse sectional view upon the line 19—19 of Fig. 18;

Fig. 20 is a fragmentary top plan view of the resultant fabric following the flock printing and multi-color intaglio printing;

Fig. 21 is a transverse sectional view upon the line 21—21 of Fig. 20 of the combined flock and intaglio printed fabric;

Fig. 22 is a side elevational view diagrammatically illustrating the location and combination of the combined stencil and roller printer device in a flock printing apparatus;

Fig. 23 is a front elevational view of an alternative combined printing and flocking arrangement, showing an alternative drive arrangement for the stencil and roller printing cylinders;

Fig. 24 is a detailed transverse sectional view upon the line 24—24 of Fig. 1 and upon an enlarged scale as compared to Fig. 1 showing the manner in which the printing paste or solution is supplied to the printing rollers;

Fig. 25 is a fragmentary top end view upon the line 25—25 of Fig. 6 upon an enlarged scale as compared to Fig. 6 showing the head arrangement with top and side rollers for holding the stencil cylinder or drum in position;

Fig. 26 is a fragmentary end perspective view of the aligning head and stencil roller of Fig. 25 upon a small scale as compared to Fig. 25; and

Fig. 27 is a fragmentary end perspective view of the stencil roller showing an alternative tensioning device for the doctor blade.

Referring to Figs. 1 to 4, and also Fig. 22 the printing mechanism includes a main carrier drum or cylinder A with a supporting structure B, the stencil cylinder C and the engraved printing rollers D, E, F and G.

The mechanism is driven from a motor or pulley (not shown) connected to the shaft 7. On the shaft 7 is the sprocket wheel 8 fixed on the shaft 7 by the collar 9. The wheel 8 drives the link belt 10 (see Fig. 4) which drives the sprocket wheel 11. The sprocket 11 has a collar 18 and a set screw 19 which fixes it to the shaft 12. The shaft 12 has bearings 13 and 14, the bearing 13 being mounted in the member 15 which is carried by the bolts 17 on the stand 16.

The shaft 12 (see Figs. 1 and 4) extends through the bearing 14 in the standard 21 of the supporting structure 22 and the bearing 14 is mounted in the other supporting structure 23. At the end of the shaft 12 is positioned the pinion 24.

The supporting structure B as shown in Figs. 1, 2 and 4 has the blocks 25 supporting the side frame members 21 and 23 having the legs 26 and 27. The bearing 14 is positioned in the block 28 extending upwardly from the bridge 29 of the side member 23 (see Fig. 2).

The pinion 24 as shown in Figs. 1, 2 and 4, meshes with and drives the gear 30 mounted on the shaft 31. The shaft 31 extends through the bearing 32 on the structure 23 and it carries the gears 33 and 34 by the collars 35 and 37. Then it extends through the structure 21 at 35 and at its end carries the gear 38.

The gear 38 meshes with and drives the idler gear 39 (see Fig. 5) which in turn meshes with and drives the gears 40, 41, 42 and 43. The idler gear 39 is mounted on the stud shaft 44 which has a bearing 45 in the bracket 46. The bracket 46 is bolted to the frame 21 at 247.

The gears 33 and 34 (see Fig. 4) mesh with the large wheel gears 46 and 47, which gears are fixed upon and turn with the shaft 48. The shaft 48 has reduced diameter and extensions 49 and 50 which have bearings 51 and 52 in the bearing mounts 53 and 54. The bearing mounts 53 and 54 may slide up and down in the guides 61 and 62 in the structures B and may be adjusted by the adjusting screws 55 and 56 which are threaded in the blocks 57 and 58 and which may be turned by tools inserted in the adjusting heads 59 and 60.

The gears 46 and 47 mesh with and drive the ring gears 63 and 64 which are mounted on the end extensions 65 and 66 of the tubular members 67 and 68 of the cylindrical stencil shell 69.

The cylindrical shell 70 is carried by the webs 71, 72 and 73 (see Fig. 4) which have bearings at 74, 75 and 76 on the shaft 48. The shell 70 is covered by a relatively thick layer 77 of rubber or a similar resilient material which extends over the ends of the shell 77 at 78 and over the sides of the webs 71 and 73. Wrapped around the outside of the shell 70 and on the rubber 77 is the double canvas cover 80. The fabric or sheet material to be decorated, that is both roller and flock printed is carried by the cloth-rubber covered rotating shell 70.

The construction of the adhesive applying sten-

cil cylinder C is best shown in Figs. 6 and 7. The shell 69 is provided with groups of perforations 81 arranged to form a design upon the sheet material to be decorated.

The adhesive material 86 which may consist of a resinous or plastic solution of a natural or synthetic material in an aqueous or organic solvent dispersion or solution is held between the blades 82 and 83 extending lengthwise of the cylinder 69. The lower edge of the blade 83 has a forwardly extending portion 84 leaving only the narrow gap 85 for the adhesive 86 to pass through the openings 81 and onto the sheet material therebelow.

The lower end 87 of the doctor blade 82 scrapes the inside of the cylinder 69 preventing any adhesive solution from passing. The upper end 88 of the blade 82 is bent over the member 89 while the upper end of the blade 83 extends to the inside face of the cylinder 69 at 90.

The space between the blades 82 and 83 adjacent the ends of the cylinder 69 is closed by the dams or closures 91. The rotating cylinder 69 is held down against the canvas facing 89 of the shell 70 by the arms 92 having the rollers 93 which arms are pivotally mounted at 94 on the brackets 95 mounted by the feet 97 and the bolts 96 on the top 97 of the structure members B. The rollers 93 ride on the reduced diameter portions 65 and 66 outside of the ring gears 63 and 64 and they are biased downwardly by the weights 98.

The blades 82 and 83 are held down by the arms 99 and 100. The arm 99 is bent downwardly at 101. The bent section 102 is pivotally mounted at 103 on the rod 104. The rod section 102 passes over the section 105 of the blade 106. The end of the rod 99 is provided with an eye 107 receiving the member 108 which carries the ring 109 attached to the scale 110.

The pressure may be regulated by pulling down upon the chain 111 until the pointer 112 reaches the appropriate graduation on the scale 113. The retainer member 114 will retain the chain 111 in any desired position.

The rod 100 is pivotally mounted at 115 on the bracket member 95. It is provided with a cup shaped receptacle 116 receiving the rod 117 at its inside end. At its outside end 118 it fits below the head 119 of the rod 120 which passes through the block 121. The spring 122 encircles the rod 120 and presses the rod 118 upwardly.

Referring to the engraved printing rollers D to G, these rollers are provided with diverse engravings or intaglio engravings 150, 151, 152 and 153 as best shown in Figs. 8 to 15. These rollers D to G carry printing ink of different color and deposit it upon the sheet textile or plastic material before it passes below the stencil roller C.

As shown best in Fig. 2 each roller D to G is provided with a trunnion 154 which is received in the half bearing member 155 in the sliding block 156. The block 156 slides in the guides 157, 158 and 159. The block 156 is pressed down by the screw 160 which is threaded through the collar 161 in the U-member 162 the arms of which form the guides 157 and 158. The lock nut 163 fixes the block 156 in position after the adjustment has been made by the hand wheel 164.

To assure registry of the engraved printing by the rollers D to G the shafts or trunnions 165 at the left side of the rollers D to G are provided with extensions 166. The extensions 166 have the ridged recesses 167 which engage the worm

member 168. The worm member 168 is carried by the bars 169 and 170 on the cross members 171. The head 172 may be turned by insertion of a pin thereto.

As shown in Fig. 22, the fabric 250 is taken off the roller 251 turning on the shaft 252 and tensioned by the weight or brake 253. The fabric 250 then passes over the tensioning rollers 254 and over the rollers 255 and 256 to the drum A.

The paper 249 passes from the roller 257 onto the shaft 258 where it is tensioned by the weight 259. Then it passes over the rollers 260 and 261 onto the drum A.

From the drum A the paper 264 passes over the roller 265 onto the paper take-up roller 266 turning on the shaft 267. The fabric 250 then passes at 262 to the flocking arrangement 263.

The flocking arrangement has the hopper 268 with the agitator 269 and the control brush 270 and baffle 271. The flock 248 then passes onto the screen 272 driven by the eccentric 273 on the pivot 274. The excess flock 248 passes to the pan 247 where it is picked up by the back flocking rollers 275 and 276 and thrown up against the rear of the fabric with assistance of the baffle 277. The beater elements 278 will beat the rear of the fabric assuring permanent attachment of the flock 248.

In Fig. 23, the floor 300 supports the pedestals 301 and 302 which carry the shaft 303. The shaft carries the pulley 304 which is driven by the belt 305. The gear 306 turns with the shaft 303 and drives the gear 307 and the shaft 308. The gears 307 and 309 mesh with and turn the gears 310 and 311 on the shaft 315. The rollers 313 are turned by the gears 312 meshing with the gears 310 and 311. The gears 318 and 328 on the stencil 320 and 317 and 327 on the drum 319 are in mesh and turn together.

Fig. 24 diagrammatically shows one manner of feeding printing paste or solution to the printing rollers D, E, F and G to which the invention is by no means restricted.

In Fig. 24 and also in Fig. 1 in which the device of Fig. 24 is shown in fragmentary form as applied to a printing roller G, the doctor blade 400 presses closely against the printing roller G. Between the doctor blade 400 and the printing roller G is placed the printing paste or solution 404 which is held in place by the dams 405. The doctor blade 400 extends into and is held in position by means of the blocks 407. The blocks 407 contact the blocks 408 carrying the outwardly extending arm 403. The arm 403 is provided with an eye 402 from which is suspended the rod 410 carrying the weight 401. If desired, a spring adjustment can be arranged as shown at W in Figs. 2 and 6 to control the pressure of the doctor blade 400 against the printing roller G.

In Fig. 27 is shown an alternative arrangement Y to replace the arrangement W of Figs. 2 and 6. In Fig. 27 the aluminum head 89 which carries the doctor blade 82 is in turn attached to the bar 450 which fits in the slot 451, in the receiver 452 mounted at 453 on the frame structure B. The end of the blade 454 is engaged by the hook member 455 which is connected at 456 to one element of the spring tensioning device 457. The spring tensioning device has a movable pointer 458 indicating the amount of tension applied to the doctor blade 82. The cable member 459 may be taken up by the ratchet 460 and the pawl 461. The ratchet 460 is turned by the hand wheel 462 to adjust the tension as indicated by the pointer 458.

In the operation, the main drive comes from the shaft 7 through the chain 10 to the main shaft 12 which extends entirely across the machine as best shown in Figs. 1 and 4.

The step-down or intermediate shaft 31 carrying the driving gears 33, 34 and 38 also extends in a reverse direction across the machine and simultaneously drives the main control gears 46, 47 and 39.

Although the gears 46 and 47 closely embrace the cylinder or drum A on the shaft 48, they turn with the shaft 48 and they are independent of the main carrier drum A alongside of which they are closely positioned.

The main gear 39 then drives the printing rollers D, E, F and G, while the side gears 46 and 47 drive the stencil roller C. These rollers C, D, E, F and G in turn drive the main drum A upon which the fabric is carried. This arrangement will give assurance of accurate register of the one or more color roller prints with the stencil and flock application.

In the alternative construction of Fig. 23 everything is coupled to the main drum 319 which drives the stencil roller 320 through the gears 318 and also drives the various printing rollers 313 through the main gears 310 and 311 and the pinions 312. Here again it will be noted that the main shaft 303, as well as the intermediate shaft 308, extend entirely across the machine.

The principal features of the present invention which enable successful combined roller and flock printing are as follows:

(a) The arrangement as shown in Fig. 4 in which the main drum A is closely embraced by the large gears 46 and 47 which drive the stencil cylinder C. The drum A is at the same time independently and freely rotatable on the shaft 48. The drum A is driven by the pressure of and contact with the stencil roller C as well as the printing rollers E, F and G;

(b) The alternative arrangement shown in Fig. 23, in which the stencil cylinder C and the printing rollers 313 and 320 are coupled to and driven through gearing by the main drum 319;

(c) The main and intermediate shafts 12 and 31 of Fig. 1 and the main and intermediate shafts 303 and 308 of Fig. 23 extending entirely across the machine, with the intermediate shafts 31 and 308 carrying the main driving gears 33, 34, 38, 307 and 309;

(d) The head arrangement V shown in small scale in Figs. 4 and 26, and in enlarged scale in Fig. 25 having side and top contact rollers 93 and a weight 98 correctly positioning the stencil roller C both vertically and laterally while it is being driven by the gears 46 and 47 through the gears 63 and 64. The head V is adjustable to take different size stencil rollers C because of the swinging arm 92. The rollers 93 ride continuously upon the stencil end portions 65 and 66 and intumed side portions 245, and

(e) The adjustable tensioning device W of Figs. 2 and 6 and the alternative construction Y of Fig. 27 for adjustably controlling the tension on the doctor blade 82.

As many changes could be made in the above mechanism method and means for producing a panne effect and many widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompany-

ing drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a hollow perforated sheet metal stencil cylinder for flock printing, two blades positioned within and longitudinally extending through said cylinder pressed closely into contact with the interior of said cylinder and forming a well within which the flock printing adhesive is received, one of said blades serving as a doctor blade and adjustable means to control the pressure of said doctor blade against the interior of said cylinder, said means including an aluminum head carrying said doctor blade, a bar attached to said aluminum head and extending beyond the ends of said cylinder, presser arms extending over and across the ends of said bars and adjustable resilient means to draw said presser arms downwardly, said adjustable resilient means including a graduated spring scale with a pointer to register tension, a cable connected to said spring scale and a ratchet and pawl controllably to adjust said scale attached to said cable.

2. In a hollow perforated sheet metal stencil cylinder for flock printing, said cylinder having reduced diameter end portions with inturned edge flanges and roller means having double roller axes which are at right angles to one another, to ride upon said end portions and inturned end flanges to hold said stencil cylinder in correct position during operation, said roller means including a weighted swinging member.

3. In a flocking machine having a frame and a perforated printing cylinder to apply an adhesive to a strip of fabric to be subsequently flocked, a hollow cylinder of thin sheet metal provided with a perforated design thereon, ring gears mounted on the ends of said cylinder and meshing with supporting actuating gears, said cylinder having cylindrical extensions beyond said ring gears and the ends of said extensions having inturned flanges, a plurality of double rollers having axes parallel to and perpendicular to the axis of the hollow cylinder, said rollers being pivotally mounted on said axes and one set of the rollers riding on the periphery of said extensions and the other rollers riding on said flanges, said rollers being provided with weights to press them against the extensions of said cylinder.

4. In a flocking machine having a frame and a perforated printing cylinder to apply an adhesive to a strip of fabric to be subsequently

flocked, a hollow cylinder of thin sheet metal provided with a perforated design thereon, ring gears mounted on the ends of said cylinder and meshing with supporting actuating pinions, said cylinder having vertically inclined blade members extending therethrough bearing against the inside of the cylinder and spaced from each other to form a space for a pool of adhesive between said blade members at the bottom of the cylinder and adjustable spring means to draw said blades down closely to contact the interior of said cylinder, one of said blades being provided with projections beyond the ends of the cylinder, guides on said frames beyond said cylinder to guide said projections, said adjustable spring means including a spring tensioning scale device and a ratchet to take up tension on said spring.

5. In a textile flock printing machine, a rotating hollow cylinder having ring gears mounted on the outside ends thereof, said cylinder having extending longitudinally therethrough at the lower part thereof two blades converging at the interior surface of the cylinder to form a pool of adhesive, rollers pressing down on the upper part of said cylinder, arms carrying said rollers pivotally mounted on said machine, said blades having extensions beyond said cylinder, arms cooperating with said blades to hold said blades down against the interior face of said cylinder, adjustable means to regulate the pressure of said blades against said cylinder, said cylinder having end extensions beyond said ring gears, rollers riding on the peripheries and ends of said extensions to hold said cylinder in correct positions, and a weighting member to weight said last mentioned rollers.

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