Jan. 13, 1925.

1,522,653

J. SMOLEROFF

METHOD AND APPARATUS FOR FORMING DESIGNS ON FABRICS

Filed June 28, 1924 2 Sheets-Sheet 1

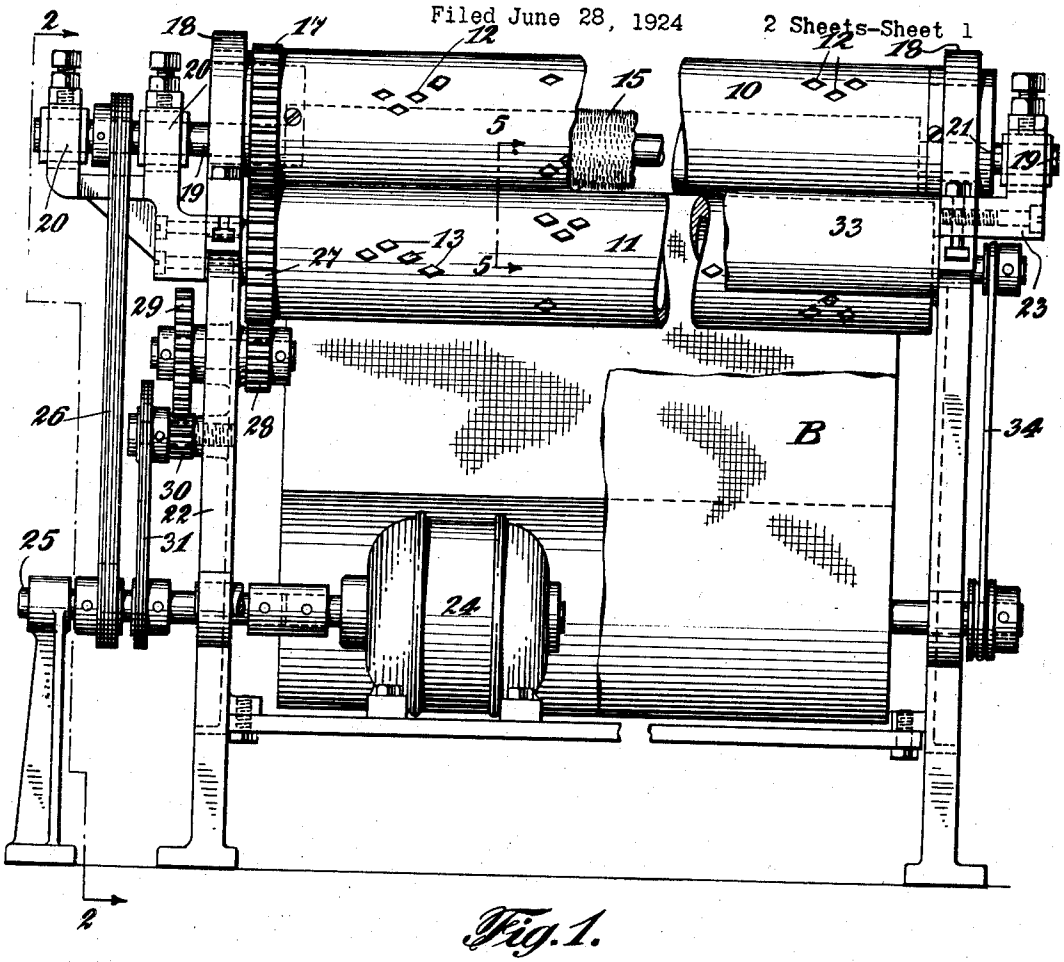


Fig. 1.



Fig. 6.

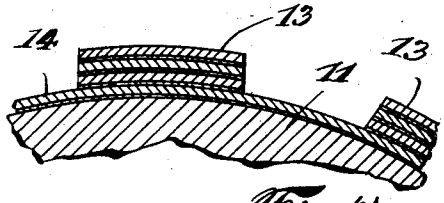


Fig. 7.

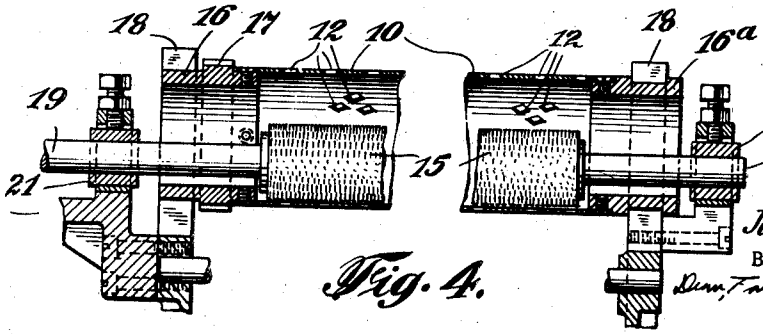


Fig. 4.

INVENTOR
Joseph Smoleroff
BY
Dunn, Fairbank, Albright & Hirsch
his ATTORNEY

Jan. 13, 1925. 1,522,653

J. SMOLEROFF

METHOD AND APPARATUS FOR FORMING DESIGNS ON FABRICS

Filed June 28, 1924 2 Sheets-Sheet 2

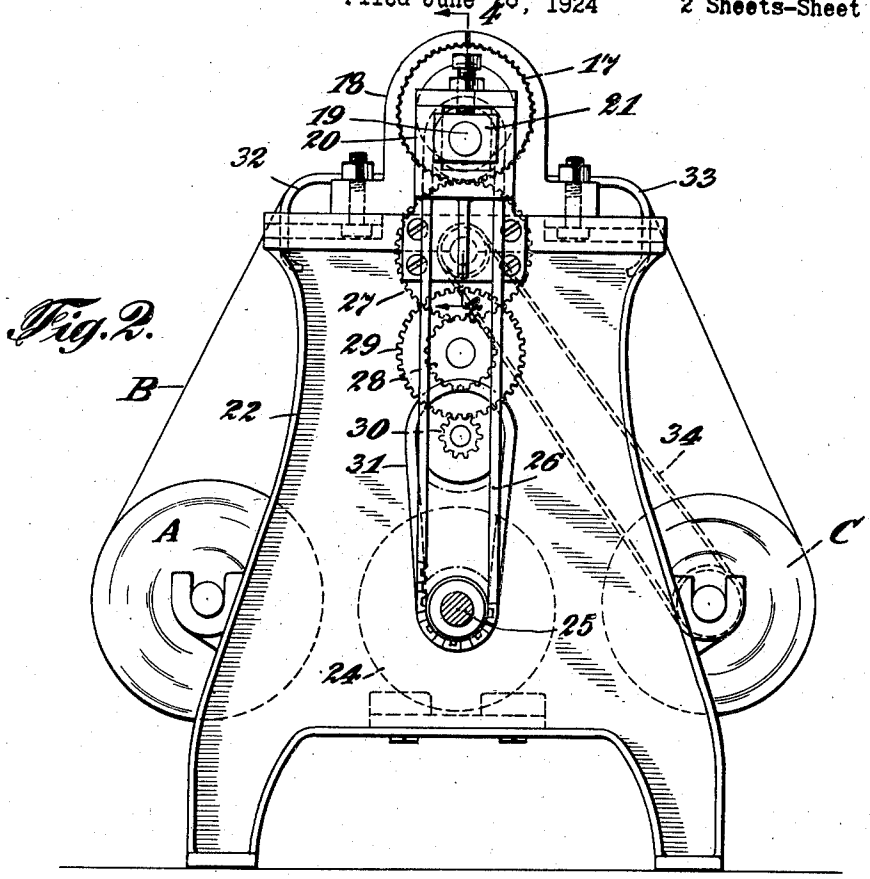


Fig. 2.

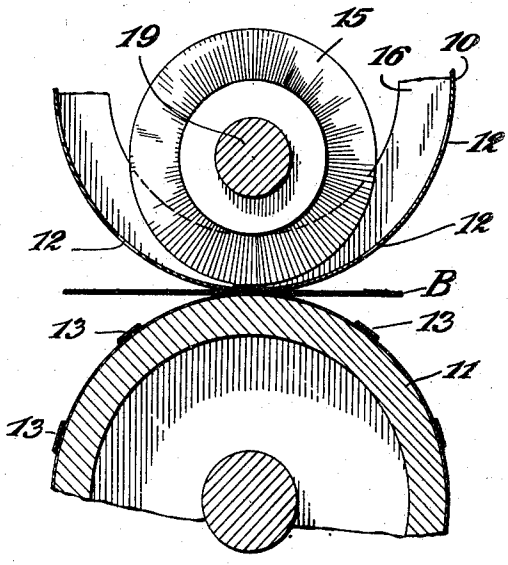


Fig. 5.

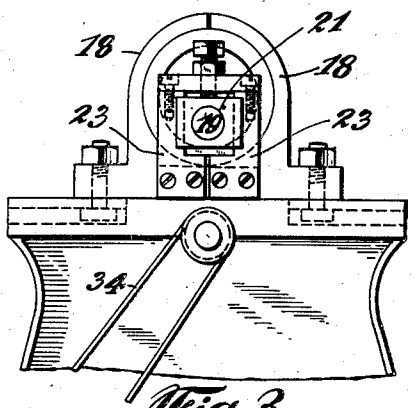


Fig. 3.

INVENTOR
Joseph Smoleroff
BY
Dean, Fairbank, Obrig & Finch
his ATTORNEY

Patented Jan. 13, 1925. 1,522,653

UNITED STATES PATENT OFFICE.

JOSEPH SMOLEROFF, OF NEW YORK, N. Y.

METHOD AND APPARATUS FOR FORMING DESIGNS ON FABRICS.

Application filed June 28, 1924. Serial No. 722,906.

To all whom it may concern:

Be it known that I, JOSEPH SMOLEROFF, a citizen of the United States, and resident of New York, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Methods and Apparatus for Forming Designs on Fabrics, of which the following is a specification.

This invention relates to the art of forming designs on fabrics by treating certain portions of the fabric and leaving other portions untreated so as to produce the desired effect.

In carrying out my invention I employ a stencil with the design cut therein so that portions of the surface of the fabric may be exposed through the apertures of the stencil. In connection with the stencil I employ a second member which will act upon only those portions of the fabric which are exposed through the said apertures. In order to secure high speed operation the stencil is preferably in the form of a hollow drum mounted for rotation and having rolling contact with the sheet material as the latter advances.

In order that such apparatus may be commercially practical and efficient in operation, it is important that the member which acts upon the portions of the fabric which are exposed through the apertures forming the design shall effectively and uniformly act upon all of such exposed portions and shall not subject the inner surface of the drum to such friction as will cause heat and wear. In order to secure this result I provide as one important feature of my invention a second rotating drum which will coact with the stencil drum to force portions of the fabric into or through the apertures in the stencil to such a distance that the surface of the fabric comes inside of the inner surface of the drum. Thus the fabric treating member within the stencil drum may rotate at any desired speed and may be of any desired character, whereby it will act on the fabric but will not act on the stencil. This is particularly important if the fabric treating member be in the form of a high speed rotary brush which raises the nap or roughens the surface of the cloth within the pattern of the design so as to form said design or if said fabric treating member be in the form of a polishing member which will smooth or polish the exposed portion of the fabric and thus form the design. The fabric treating member might also be in the form of a dye-carrying roller which would thus come in contact with the exposed portions of the fabric but would not engage with the inner surface of the stencil drum.

In carrying out my invention I utilize the stencil drum as a female member and provide a second drum or male member with the design thereon, but in the form of raised portions. Thus as the two drums rotate the raised portions of the male member force the fabric through the apertures of the female member to the required distance. By means of this arrangement all wear or friction on the inner surface of the stencil drum is eliminated and the stencil drum may be made of comparatively thin material so that the projections on the other drum may be comparatively low. The projections and apertures should be of such sizes that the fabric is not cut or pinched at the edges of the apertures, but at the same time the edges of the exposed portion of the fabric are sharp and well defined.

In practice it is necessary to use different stencil drums to produce different designs, and as another important feature of my invention I provide a simple and inexpensive method of forming the male die member to properly correspond with the apertures of the stencil. The male member may be in the form of a drum and upon its outer surface there may be wrapped a plurality of layers of paper glued together in succession to build up the drum to the desired increased thickness. By running this drum against the stencil drum the impression of the design may be transferred to the outer layer of paper on the other drum, and thereafter the desired number of layers of the paper may be cut away at all portions except those which register with the apertures of the stencil. In cutting away the paper the inner layer or layers are permitted to remain on the drum uncut so that the paper cover will hold in place and the projections will be in the form of multiple ply of paper on the inner paper layers. In cutting away the paper to leave the design in the form of projections, the projections may be made slightly smaller than the apertures of the drum, the amount being determined by the thickness of the fabric to be treated. The number of layers of paper which are cut away, in other

words, the height of each projection, will also depend upon the thickness of the fabric being treated.

As another feature of my invention the fabric treating member is mounted eccentrically in respect to the stencil drum so that the spacing between the drum and the fabric treating member will be at the minimum along the approximate line of tangency of the two drums, and the remainder of the outer surface of the fabric treating member will be spaced to a greater distance from the inner surface of the drum.

As a further feature of my invention I provide an improved means for supporting and rotating the hollow stencil drum and permitting of the removal and replacement of this drum without the removal of the fabric treating member disposed within said stencil drum.

In the accompanying drawings I have illustrated merely one form which my invention may assume, but it is obvious that various changes may be made in the details of construction within the scope of my invention as defined in the appended claims.

In these drawings:

Fig. 1 is a side elevation of an apparatus constructed in accordance with my invention, a portion of the apparatus being broken away.

Fig. 2 is an end view, a portion being in section, on the line 2—2 of Fig. 1.

Fig. 3 is an end view of the upper part of the opposite end of the apparatus.

Fig. 4 is a central longitudinal section on the line 4—4 of Fig. 2.

Fig. 5 is a transverse section through the drums and fabric treating member.

Fig. 6 is a sectional detail of a portion of the lower drum showing the layers of paper thereon, but greatly enlarged as to thickness, and

Fig. 7 is a view similar to Fig. 6, but with portions of the paper cut away to leave projections presenting the design.

In the apparatus illustrated there are provided a pair of drums 10 and 11 which are mounded for rotation about parallel axes and in closely juxtaposed position for the passage of the fabric or other sheet of material therebetween. One of the drums, for instance the upper drum 10, is formed of thin sheet metal with apertures 12 through the peripheral wall thereof, and of such positions, shapes and relationship as to form the required design. The drum acts as a stencil inasmuch as the fabric passing between the two drums is exposed through these apertures to the action of a fabric treating member within the drum.

As one important feature of my invention the other drum 11 is so formed as to force portions of the fabric into or through the apertures of the stencil drum, whereby the surface of the fabric is exposed for action within the drum and inside of the circular plane of the inner surface of the peripheral wall. In order to accomplish this result the drum 11 has formed thereon the same design as that on the drum 10, but the design is produced by projections 13 rather than apertures. These projections are of such size and location that they register with the apertures and are of a height dependent upon the thickness of the wall of the drum 10 and the thickness of the material being treated.

As one simple way of forming the projections 13 on the drum 11 I may wrap on the latter a plurality of sheets 14 of paper with intermediate layers of glue or adhesive to build up an outer jacket or coating of slightly greater thickness than the desired height of the projections. The two drums are then run together to impress on the outer paper layer the design formed by the apertures 12 of the drum 10. Certain of the outer layers of paper are then cut away on all portions of the lower drum which were not exposed through the apertures 12, so as to leave the projection 13, as shown in Fig. 7.

It will of course be evident that in Figs. 6 and 7 the thickness of the paper layers and the height of the projections are very greatly exaggerated to facilitate a clear understanding of the method of construction. It will be noted that the inner paper layer is not cut away, but serves to connect all of the projections and hold them in place on the drum.

Inside of the stencil drum 10 I provide a rotatable member 15 for acting upon the portion of the fabric exposed through the apertures. The character of this fabric treating member will vary in accordance with the desired method of treatment. For instance if the design is to be formed by producing a nap on portions of the fabric and leaving other portions without nap, then the member 15 may be in the form of a high speed rotary brush which will catch and loosen fibers of the exposed portion of the fabric, and thus roughen the surface or raise a nap. In the finished sheet there will be a very different light and shade effect on the portions having the nap as compared to those without this nap. Instead of roughing the surface I might in some cases use a fabric treating member which would serve to smooth the surface or remove nap. This might be in the form of a high speed rotary grinding or cutting member which would remove the nap of all portions exposed through the apertures 12. In some cases I might employ as the fabric treating member a dye roller which would color the exposed portions of the fabric and thus form the design.

As one important feature, the fabric treating member is of materially smaller diameter than the stencil drum and is eccentrically

mounted so that it is spaced from the upper surface but comes closely adjacent to the lower surface where the fabric is exposed for treatment.

In the machine illustarted the stencil drum 10 is provided with hollow bearing members 16—16ª at the ends thereof, one of said members, 16, having a gear 17 secured or formed thereon. The bearing members are mounted in a pair of two-piece bearings 18 which are so constructed that they may be opened up and the stencil drum removed. Preferably these bearings are so arranged that it is not necessary to remove the fabric treating member 15, and the drum is removed by an endwise sliding movement. As shown the brush or other fabric treating member 15 is carried by a shaft 19 which is mounted in a pair of bearings 20 at the drive end of the machine, and in a bearing 21 at the opposite end of the machine. The bearings 18 for the drum are divided along the vertical plane of the axis of the drum, and the two parts of each bearing are slidable horizontally toward and from each other to hold or release the bearing members 16, 16ª. At the drive end of the machine the bearings 20 for the shaft 19 are mounted on the end frame 22 so that they are not disturbed by opening the bearing 18 for the member 16. At the opposite end of the machine the bearing 21 for the shaft 19 is carried by a pair of brackets 23 which are separately secured to the two halves of the bearing 18. Thus upon separating the two members of the bearing 18 at this end of the machine, the bearing block 21 is liberated. Thus the stencil drum may be moved endwise out of the machine while leaving the brush 15 in place, and with its shaft supported at one end by the two spaced bearings 20.

For rotating the drum and the brush, power may be taken from any suitable source, as for instance the electric motor 24 which may have its shaft 25 directly connected to the shaft 19 through a pair or sprocket wheels and a silent chain 26. The lower drum 11 may be provided with a gear 27 meshing with the gear 17 of the upper drum, and also meshing with a pinion 28 on a stub shaft carrying a gear 29. This gear 29 may mesh with a pinion 30 on another stub shaft which also carries a larger sprocket for a silent chain 31 taking power from the motor shaft 25. Thus the brush will be rotated at very much higher speed than the two drums, and the latter will be rotated at the same speed. Any other suitable drive mechanism might be employed for giving to the rotating members the desired speed.

The same frame which carries the operating parts may also serve to carry the delivery and receiving spindles for the fabric being treated. As shown the frame at one side carries the roll A of fabric B which passes over a guide 32, thence between the two drums, then over a guide 33 to a receiving drum C. The latter may be rotated through a belt 34 from the shaft of the drum 11, but the drive would be such that there may be sufficient slippage to wind up the material without putting too high a tension thereon, and without causing a rate of travel of the material different from that of the surface speed of the drums 10 and 11. Obviously there will be greater slippage as the roll C increases in diameter.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of forming designs on a fabric, which consists in forcing portions of the fabric through apertures in a stencil, and brushing said portions to form a nap thereon.

2. In combination, a hollow stencil roller, a second roller having projections on the periphery thereof and corresponding to the apertures of the stencil whereby said projections force portions of a sheet into said apertures as the sheet is passed between the rollers in rotating meshing relationship, and means within the stencil roller for acting upon said portions of the sheet.

3. In combination, a hollow roller having apertures through the peripheral wall, a second roller having projections on the periphery thereof and corresponding in size and location to said apertures, means for rotating said rollers with the projections and apertures in meshing relationship whereby portions of a sheet passing between said rollers are forced into said apertures, and means within said first mentioned roller for acting upon said portions.

4. A construction as defined in claim 3, in which the last mentioned means is mounted out of contact with the inner surface of the roller.

5. A construction as defined in claim 3, in which the last mentioned means is mounted for high speed rotation.

6. A construction as defined in claim 3, in which the last mentioned means is eccentrically mounted within the first mentioned roller and is provided with means for rotating at a higher peripheral speed than the first mentioned roller.

7. In combination, a hollow stencil drum, a second drum having projections on the periphery thereof corresponding in size and location to the apertures of the stencil drum, means for rotating said drums with the projections and apertures in meshing relationship, a brush eccentrically mounted within the stencil drum, and means for rotating said drum at high speed in contact with portions of material forced through the ap-

ertures by said projections but out of contact with the inner surface of the stencil drum.

8 In combination, a hollow stencil drum, a rotatable fabric treating member within said drum, and eccentrically disposed in respect thereto, and bearing members for said drum permitting the endwise removal of the drum without removing the fabric treating member therein.

9. In combination, a hollow sheet metal stencil drum, a pair of hollow bearing members secured to opposite ends thereof, one of said bearing members being provided with a gear, and a pair of bearings for said bearing members, each formed of two sections, said sections being adjustable toward and from each other and meeting in the vertical plane of the axis of the drum.

10. In combination, a hollow sheet metal stencil drum, a pair of hollow bearing members secured to opposite ends thereof, one of said bearing members being provided with a gear, a pair of bearings for said bearing members, each formed of two sections, said sections being adjustable toward and from each other and meeting in the vertical plane of the axis of the drum, a rotary member within said drum, bearings at one end thereof and mounted independently of the bearings for the drum, and bearings at the other end of said member and including two sections carried by the corresponding section of the bearing of the drum at said end.

Signed at New York in the county of New York and State of New York, this 26th day of June A. D. 1924.

JOSEPH SMOLEROFF.