

No. 767,684.

PATENTED AUG. 16, 1904.

C. L. BURDICK.
PATTERN PRINTING MACHINERY.

APPLICATION FILED JULY 8, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

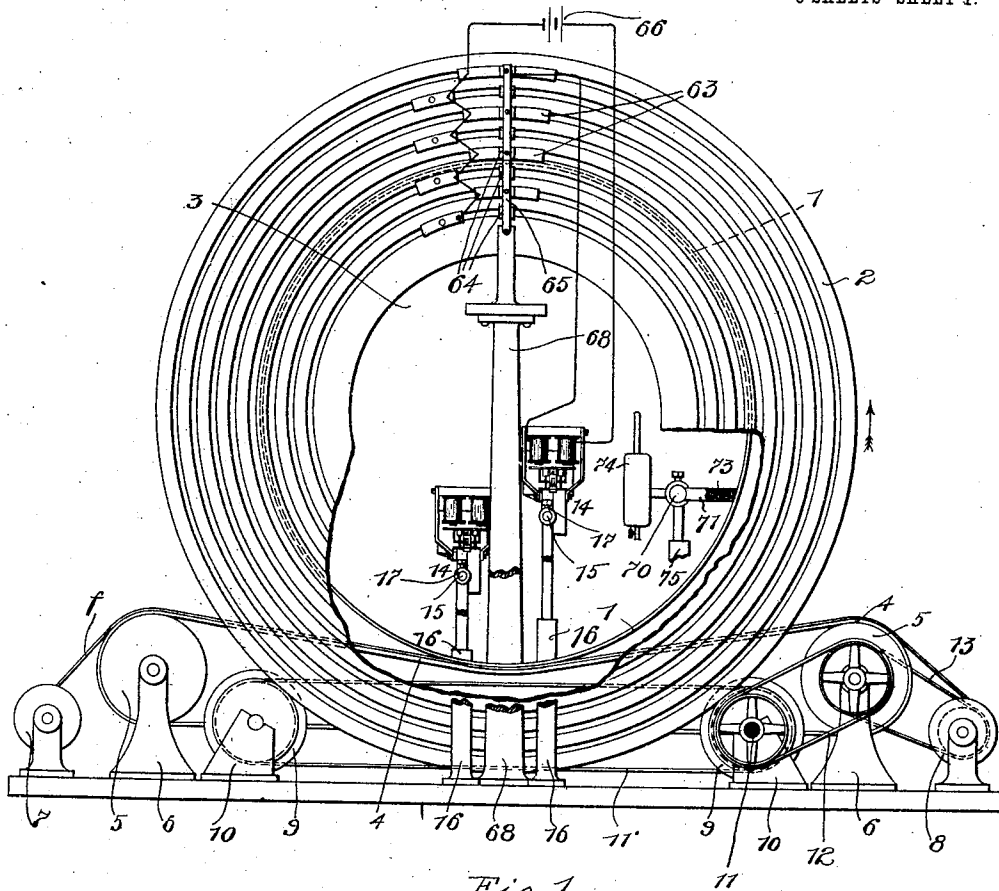


Fig. 1

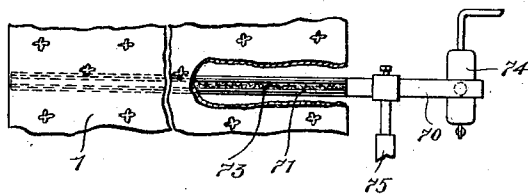


Fig. 6

Witnesses
Leonard W. Novander.
Charles J. Schmidt.

Inventor
Charles L. Burdick
By Charles A. Brown
Attorney

No. 767,684.

PATENTED AUG. 16, 1904.

C. L. BURDICK.
PATTERN PRINTING MACHINERY.

APPLICATION FILED JULY 8, 1903.

NO MODEL.

3 SHEETS—SHEET 2.

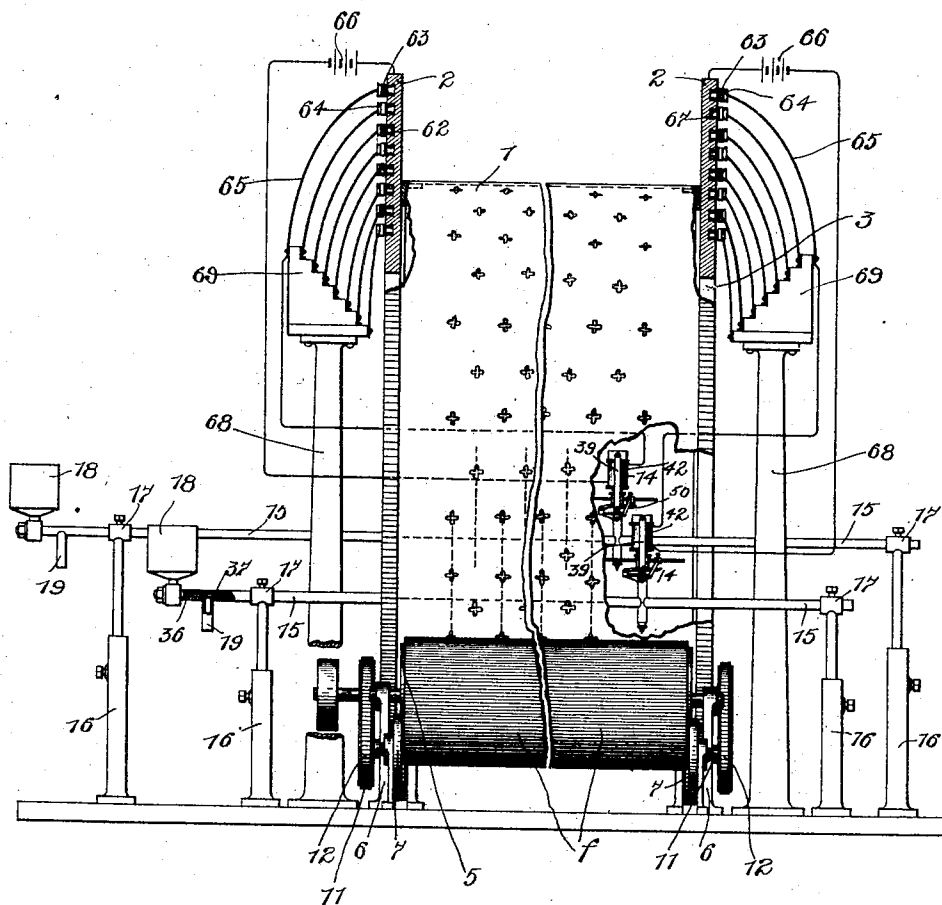


Fig. 2

Witnesses
Leonard W. Novander.
Charles J. Schmitt.

Inventor
Charles L. Burdick
By Charles A. Brown
Attorney

No. 767,684.

PATENTED AUG. 16, 1904.

C. L. BURDICK.
PATTERN PRINTING MACHINERY.

APPLICATION FILED JULY 8, 1903.

NO MODEL.

3 SHEETS—SHEET 3.

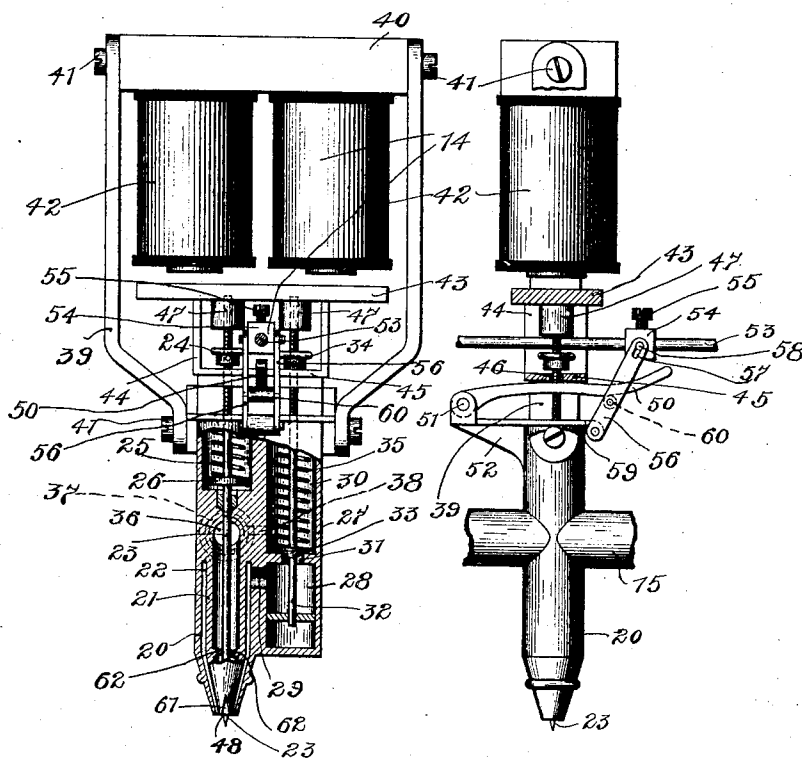


Fig. 3

Fig. 4

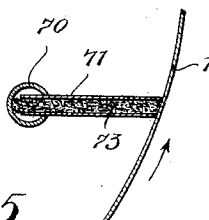


Fig. 5

Witnesses.

Leonard W. Novander.
Charles J. Schmidt

Inventor
Charles L. Burdick

By Charles A. Brown
Attorney

UNITED STATES PATENT OFFICE.

CHARLES LAWRENCE BURDICK, OF LONDON, ENGLAND.

PATTERN-PRINTING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 767,684, dated August 16, 1904.

Application filed July 8, 1903. Serial No. 164,631. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LAWRENCE BURDICK, a citizen of the United States, residing at London, in the county of Middlesex, England, have invented a certain new and useful Improvement in Pattern-Printing Machinery, (Case No. 2,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to pattern-printing machinery, and particularly machinery designed to repeatedly print patterns upon fabrics such as wall-paper, cloth, or the like; and the object of my invention is to provide improved and more efficient construction and operation for the essential parts of such machines.

The improved machine of my invention is substantially of a like construction as the machine described in my copending application, Serial No. 97,960, filed March 12, 1902; and the invention has for its particular ends improved means for electromagnetically operating the sprayers, improved means for accomplishing a better and more even distribution of the coloring-matter upon the fabric, and more efficient and economical means for removing surplus coloring-matter from the stencil.

The machine consists, primarily, of a stencil in the shape of a drum mounted between end plates or disks having a hollow central portion of slightly less diameter than the diameter of the stencil-drum. The sprayers are suitably mounted within said drum to apply coloring-matter through the openings of the stencil to the fabric, which is passed between the exterior of the stencil and an endless belt, as described in the copending application above referred to. The drum is driven by the combined efforts of this endless belt and supporting-wheels mounted below the disks to engage the lower edge thereof, these wheels being driven in unison with the endless belt.

I provide novel means for electromagnetically and automatically operating the sprayers at determined intervals suitable to the pattern employed, and to this end I associate with the valve-spindles of the sprayers an armature actuated by electromagnet-coils included in electric circuits. Contact-pieces are mounted upon the outside of the disks to be engaged by con-

tact-fingers to close circuits through said electromagnets to operate the valve-spindles. Provision is also made to operate these valve-spindles manually by means of hand-levers, and the valves may be set to allow a certain amount of coloring-matter to be discharged, the electromagnets on closure of the circuits therethrough causing increased opening of the valves to allow increased coloring-matter to be discharged, or the electromagnetic means may be employed to open the valves from a closed position.

Heretofore nozzles of sprayers have been designed to emit circular sprays, and where several of such sprayers were disposed side by side the effect of the sprays upon each other tended to flatten them, so that the contour of the coloring-matter discharged upon the fabric was elliptical, the long axes of these ellipses extending in the direction of travel of the stencil. This manner of applying the coloring-matter caused the tint to be dark at the central portions of the elliptic discharges and lighter toward the edges thereof, the effect as a whole upon the fabric being regions of darker and lighter tints, it being very difficult to obtain a uniform tint. To overcome this difficulty, I so construct the nozzles of the sprayers that the spray emitted thereby is of elliptical contour in a direction transverse to the direction of travel of the stencil. The effect of the sprays upon each other where the sprayers are in horizontal alinement is thus counteracted. I also prefer to use two or more horizontal rows of sprayers, the brushes being disposed in alternate series, the lack of coloring-matter on the fabric between the sprayers of the first row being thus compensated for by the alternately-disposed sprayers in the succeeding rows, whereby a uniform tint is obtained. In devices of this class in the prior art there has been considerable waste of coloring-matter which adhered to the stencil and which was not utilized for printing purposes, this surplus coloring-matter having heretofore been absorbed—as, for instance, by means of a roll of absorbent material—or the surplus coloring-matter has been dried on the stencil by means of hot air or like means. This manner of drying the surplus coloring-matter not only caused considerable waste, but the dried

coloring-matter thus accumulated on the stencil interfered with the proper operation thereof. I therefore provide means for entirely removing from the stencil all superfluous or surplus coloring-matter by means of an improved suction device. This device consists of a pipe connected with an exhausting source, and a tube, which may be of flexible material, extends from this pipe across the entire length of the stencil. The interior of this tube may be filled with absorbent material, such as felt, the end of this material projecting from the end of the tube in contact with the interior of the stencil. All surplus coloring-matter coming under the tube or in contact with this absorbent material is carried into the suction-pipe to be deposited in a receiving-chamber, the coloring-matter thus gathered being again utilized, and thus waste thereof is entirely prevented.

My invention will be more clearly understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is an end view of the machine. Fig. 3 is a detail view of an electromagnetically-operated air-brush. Fig. 4 is a side view of Fig. 3. Fig. 5 is a section view of the suction device. Fig. 6 is a front view of the suction device.

Like reference characters indicate like parts of the machine throughout the figures.

A stencil-drum 1 is mounted between the end disks or rings 2 2, said disks having central openings 3 3 of a diameter less than the diameter of the stencil-drum. An endless belt 4 passes over belt-wheels 5 5, mounted in pedestals 6 6, so that a portion of the under surface of the stencil-drum is engaged by said belt. A feed-drum 7, carrying the fabric *f* to be printed, is disposed with respect to said endless belt so that the fabric may pass over the top of the endless belt and between said belt and the under side of the stencil-drum to be gathered by an intake-drum 8, disposed at the other side of the machine. Supporting-wheels 9 9, mounted in standards 10 10, are disposed to engage the lower edge of the disks 2 2 and serve, in conjunction with the endless belt, to cause rotation of the drum. A shaft 11, carrying one of said supporting-wheels, may be driven from some suitable source, and a belt 11' may connect the wheels supporting each disk. A belt 12 may be driven from shaft 11 to drive the endless belt 4, and another belt 13 may drive the intake-drum 8, as best shown in Fig. 1. The fabric *f* to be printed thus passes below the stencil to be repeatedly printed with a suitable pattern.

Electromagnetically-operated sprayers 14 14 are mounted upon feed-pipes 15 15, these pipes being placed one back of the other and extending through the interior of the drum parallel to the axis, and the sprayers are mounted thereon to be alternately disposed.

The sprayers are adapted for vertical adjustment by means of telescoping standards 16 16 and for angular adjustment by means of rotatable connections of the pipes with the bearings 17 17 at the upper ends of said telescoping standards. Reservoirs 18 18 contain the coloring-matter to be supplied to the sprayers. The pipes 15 15 are provided with two tubular chambers or bores, the coloring-matter preferably passing through the inner tube to the sprayer, and compressed air, which may be admitted through pipes 19 19, preferably passes through the outer tube to the sprayer.

Figs. 3 and 4 show a detail construction of the electromagnetically-operated sprayers, each nozzle of the sprayers comprising an exterior casing 20, having its lower end pointed and apertured, and an interior casing 21, arranged within the casing 20, a chamber 22 being disposed between the two casings. For controlling the aperture of the inner casing 21 a spindle 23 is provided, which is adapted to extend into the aperture at the point of the casing 21 to control the outflow of coloring-matter and to extend upwardly and out of the upper end of the casing, the upper end thereof being threaded and provided with a nut 24. A spring 25 is arranged about the upper portion of said spindle, being confined between the upper wall of the casing 20 and a disk 26 on the spindle 23, the tendency of said spring being to cause said spindle to close the aperture from which the coloring-matter is to flow. Adjacent to the casing 20 is a casing 27, having a chamber 28 communicating with the chamber 22 through a port or passage-way 29. A chamber 30 is disposed above chamber 28, a port-opening 31 connecting the two chambers. A spindle 32, carrying a seat-valve 33, is arranged within the chambers and extends through the upper wall of casing 27, the upper end of the spindle being threaded and supplied with a nut 34. A spring 35 is interposed between the seat-valve 33 and the upper wall of the casing 27, said spring tending to retain said valve in its seat to close the opening 31. The coloring-matter flows from the reservoir through the inner bore 36 of the pipes 15 and into the interior of the casing 21. The compressed air coming through the outer bore 37 of the pipes 15 passes through a passage-way 38 and to chamber 30.

A Y-shaped frame 39, carrying a yoke-piece 40 between its upper ends, is secured to the top of the sprayer by means of screws 41 41, and electromagnetic coils 42 42 extend downwardly from the yoke-piece 40. The armature 43 for the electromagnet is provided with a U-shaped frame 44, extending downwardly therefrom, the lower member 45 of said U-shaped frame being provided with apertures 46 46, through which the sprayer-spindles may freely pass, the upper ends of these spindles being screwed into lugs 47 47, secured to the under side of the armature. The adjusting-nuts

24 and 34 engage the threaded ends of the spindles between said lugs and the lower member 45 of the U-shaped frame and can be so adjusted that upon attraction of the armature the coloring-matter outlet 48 and the compressed-air valve 33 may be opened from a closed position, or they may be so adjusted that these valves are opened a distance, attraction of the armature causing increased opening, whereby increased coloring-matter and increased air are allowed to flow. The valves may also be manually adjusted by means of a hand-lever 50, pivoted at 51 to an extension 52 at the upper part of the sprayers. A stationary rod 53 is slidably engaged by a block 54, which may be secured to said rod in any position by a set-screw 55. Link-pieces 56 56 are provided at their upper end with slots 57 57, engaging pivots 58 58, secured to the block 54, the lower end of said links being pivotally connected to projections 59 59 at the upper end of the sprayers. A rod 60 bridges between the link-pieces and is engaged by the hand-lever 50. Thus upon longitudinal adjustment of the block 54 along the rod 53 the end of the hand-lever is either raised or lowered to cause resulting opening or closure of the valves.

The spray emitted from a sprayer as thus far described will be circular, and where several such sprayers are placed side by side the effect of the sprays upon each other is to flatten the sprays. Such sprays cause the coloring-matter to be deposited much more thickly in the center than along the edges of the regions covered by each spray, and consequently the tint is very uneven and by no means uniform. I therefore construct the points of the sprayers so that the spray emitted is elongated in a direction transverse to the direction of travel of the stencil, the spray thereby covering more breadth, the tendency being to counteract the mutual effect of the different sprays. I obtain this elongated spray by cutting slots or grooves 61 61 upon the outside and on opposite sides of the tip of the casing 21. As the compressed air now flows from the end of the sprayer these slots produce a cross-current, which carries with it the coloring-matter to form the elongated or elliptical spray. In order to have the spray emitted perfectly elliptical, it is necessary that the spindle which controls the color-flow be centrally located with respect to the outflow-aperture, and I provide guiding-lugs 62 62, extending from the inner wall of casing 21, to form a guideway for the lower part of the spindle. Although this form of spray overcomes to a great degree the defects of the circular sprays, there is still difficulty encountered in producing a tint which will be absolutely uniform. I therefore arrange the sprayers alternately in a series of rows. By this alternate arrangement of the sprayers the regions between ad-

jacent sprays which have not received enough coloring-matter receive the greater part of the coloring-matter deposited by the alternately-disposed sprayer in a succeeding row, the deposits of the sprayers thus overlapping and forming as uniform a tint as it is possible to obtain.

To automatically cause inclusion in circuit of electromagnets controlling one or more of the sprayers, I provide contact-plates 63 63, contact-fingers 64 64, and contact-springs 65 65, adapted to be included in circuit with said electromagnets and with a source of power 66 66. As a support for the contact-plates 63 63 I provide concentric grooves upon the outside of the drum-disks, the contact-plates being separably and movably held in said grooves by means of the spreading action of leaf-springs 67 67, secured to the contact-plates, which may thus be moved to any position in any of the grooves. Pedestals 68 68 support mounting-blocks 69 69, to which the contact-springs 65 65 are secured and are insulated therefrom and from each other. Usually a closed circuit contains all the sprayers in one horizontal line, the source of power, the corresponding circuit contact-spring, contact-finger, and contact-plate, the armatures of the electromagnets thus being raised to open the valves of the sprayers a length of time depending upon the length of the contact-plate included in circuit. Any arrangement of sprayers may, however, be included in the same circuit at any time.

To remove from the stencil any surplus coloring-matter left thereon after the active section of the stencil has passed beyond the sprayers, I extend a pipe 70 horizontally across the interior of the drum, which pipe is connected to some exhaust-engine. (Not shown.) A flat tube 71 extends along the entire length of the pipe and projects from the interior of said pipe, the free end 72 thereof being close to the inner surface of the stencil. This tube preferably has rubber sides to enable it to follow the shape of the stencil. The interior of the tube may be filled with some absorbent material 73, such as felt, and as the surplus coloring-matter is carried under the tube or into contact with this felt at the end of the tube the suction will carry the coloring-matter into the pipe 70 to be delivered to a receptacle 74, interposed between the pipe 70 and the exhaust-engine, from which receptacle the coloring-matter may be withdrawn, to be again utilized for printing purposes. The pipe 70 may be adjustably supported from a telescoping pedestal 75.

Having thus described my invention, I do not wish to be limited to the precise construction outlined, but I wish to secure by Letters Patent—

1. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact

with the material to be printed, means for applying coloring-matter to the stencil, and automatic means for controlling the amount of application of the coloring-matter, substantially as described.

2. In a machine of the class described, the combination with a continuous stencil in the shape of a drum, of means for advancing the stencil in contact with the material to be printed, means for applying coloring-matter to the interior of the stencil, and automatic means for controlling the amount of application of the coloring-matter, substantially as described.

3. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, sprayers for applying coloring-matter to the stencil, and automatic means for controlling the amount of coloring-matter issuing from said sprayers, substantially as described.

4. In a machine of the class described, the combination with a continuous stencil in the form of a drum, of means for advancing the stencil in contact with the material to be printed, sprayers for applying coloring-matter to the interior of the stencil, and automatic means for controlling the amount of coloring-matter issuing from said sprayers, substantially as described.

5. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, means for applying coloring-matter to the stencil, and electromagnetic means for controlling the amount of application of the coloring-matter, substantially as described.

6. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, sprayers for applying coloring-matter to the stencil, electromagnetic means for controlling the amount of flow of coloring-matter from said sprayers, and automatic means for controlling the operation of said electromagnetic means, substantially as described.

7. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, sprayers for applying coloring-matter to the stencil, electromagnets for controlling the amount of flow of coloring-matter from said sprayers, and automatic means for controlling electric circuits including said electromagnets, substantially as described.

8. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, a plurality of sprayers for applying coloring-matter to the stencil, an electromagnet for each of said sprayers

for controlling the amount of flow of coloring-matter, electrical circuits containing one or more of said electromagnets, and automatic means for controlling the continuity of said circuits, substantially as described.

9. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, sprayers for applying coloring-matter to the stencil, an electromagnet for each one of said sprayers for operating the valves thereof to control the amount of flow of coloring-matter, electric circuits including one or more of said electromagnets, contact-plates and contact-fingers included in said circuits, and automatic means for bringing said plates in contact with said fingers, substantially as described.

10. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, a plurality of sprayers for applying coloring-matter to the stencil, an electromagnet for each of said sprayers for operating the valves thereof to control the amount of flow of coloring-matter, electric circuits including one or more of said electromagnets, and automatic means for repeatedly interrupting said circuits whereby the valves of said sprayers are repeatedly opened and closed, substantially as described.

11. In a machine of the class described, the combination with a continuous stencil in the form of a drum, of annular end plates for said drum, means for advancing the stencil in contact with the material to be printed, a plurality of sprayers for applying coloring-matter to the interior of the stencil, an electromagnet for each of said sprayers for operating the valves thereof, electrical circuits containing one or more of said electromagnets, stationary contact-fingers included in said circuits, and contact-plates disposed upon the outside of said end plates, said contact-plates upon rotation of said end plates being engaged by said contact-fingers to repeatedly open and close said circuits whereby the electromagnets are operated to repeatedly change the position of said valves, substantially as described.

12. In a machine of the class described, the combination with a continuous stencil in the form of a drum, of annular end plates for said drum, means for advancing the stencil in contact with the material to be printed, sprayers adapted to apply coloring-matter to the interior of the stencil, an electromagnet for each of said sprayers for controlling the valves thereof, electric circuits each including one or more of said electromagnets, concentric grooves disposed upon one face of said end plates, contact-plates movably and separably supported in said concentric grooves, a stationary contact-finger included in each of said circuits, and a source of current for said circuits, said end plates upon rotation thereof

carrying said contact-plates into contact with contact-fingers whereby said circuits are repeatedly opened and closed thereby causing said electromagnets to repeatedly increase or
5 decrease the valve-openings of said sprayers, substantially as described.

13. In a machine of the class described, the combination with a continuous stencil in the shape of a drum, of means for advancing the
10 stencil in contact with the material to be printed, means for applying coloring-matter to the stencil, and electromagnetic means for controlling the amount of application of the coloring-matter, substantially as described.

14. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact
15 with the material to be printed, sprayers for applying coloring-matter to the stencil, electromagnets for controlling the amount of flow of coloring-matter from said air-sprayers,
20 electrical circuits including said electromagnets, and automatic means for controlling the time of closure of said circuits whereby to control the time of application of the coloring-
25 matter, substantially as described.

15. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact
30 with the material to be printed, a plurality of sprayers for applying coloring-matter to said stencil, and a plurality of supply-pipes for said sprayers, said brushes being alternately mounted upon said supply-pipes whereby said
35 coloring-matter is evenly distributed over the material, substantially as described.

16. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact
40 with the material to be printed, sprayers for applying coloring-matter to said material, and a plurality of supply-pipes for said sprayers disposed in horizontal rows, said sprayers being
45 mounted upon said supply-pipes to be alternately disposed whereby said coloring-matter is evenly deposited upon the material, substantially as described.

17. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact
50 with the material to be printed, means for applying coloring-matter to the stencil, and suction means for removing surplus coloring-matter from said stencil, substantially as described.
55

18. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact
60 with the material to be printed, means for applying coloring-matter to the stencil, a flexible tube engaging said stencil, and means for exhausting the air from said tube whereby surplus coloring-matter on said stencil is
65 drawn into said tube, substantially as described.

19. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, means for applying coloring-matter to the stencil, a flexible
70 tube extending transversely across said stencil one open end thereof engaging said stencil, and suction means associated with the other open end of said tube whereby surplus coloring-matter on said stencil is withdrawn
75 into said tube, substantially as described.

20. In a machine of the class described, the combination with a continuous stencil, of means for advancing the stencil in contact with the material to be printed, means for
80 applying coloring-matter to the stencil, a pipe extending transversely across said stencil, a short flat tube extending from said pipe to said stencil, absorbent material within said tube extending from the end of said tube in
85 contact with said stencil, means for causing suction through said pipe whereby superfluous coloring-matter is drawn from the stencil through said tube and into said pipe, and a receptacle interposed in said pipe for receiving the superfluous coloring-matter, sub-
90 stantially as described.

21. In a machine of the class described, the combination with a traveling stencil, of means for maintaining in contact with said stencil
95 the material to be printed, stationary sprayers for applying coloring-matter to said material, and means for causing the breadth of the spray emitted by said sprayers to be increased in a direction transverse to the direction
100 of travel of the stencil, substantially as described.

22. In a machine of the class described, the combination with a traveling stencil, of means for maintaining the material to be printed
105 in contact with said stencil, sprayers disposed in horizontal rows for applying coloring-matter to said material, and means for increasing the breadth of the spray emitted by said sprayers in a direction transverse to the direction
110 of travel of said stencil, substantially as described.

23. In a machine of the class described, the combination with a traveling stencil, of means for maintaining in contact with said stencil
115 material to be printed, sprayers disposed in horizontal succeeding rows for applying coloring-matter to the material, and means for causing each of said sprayers to emit a spray having a greater breadth in a direction trans-
120 verse to the direction of travel of the stencil, said sprayers being alternately disposed whereby a uniform distribution of coloring-matter is obtained, substantially as described.

In witness whereof I hereunto subscribe my
125 name this 22d day of June, A. D. 1903.

CHARLES LAWRENCE BURDICK.

Witnesses:

H. D. JAMESON,
F. D. RAND.