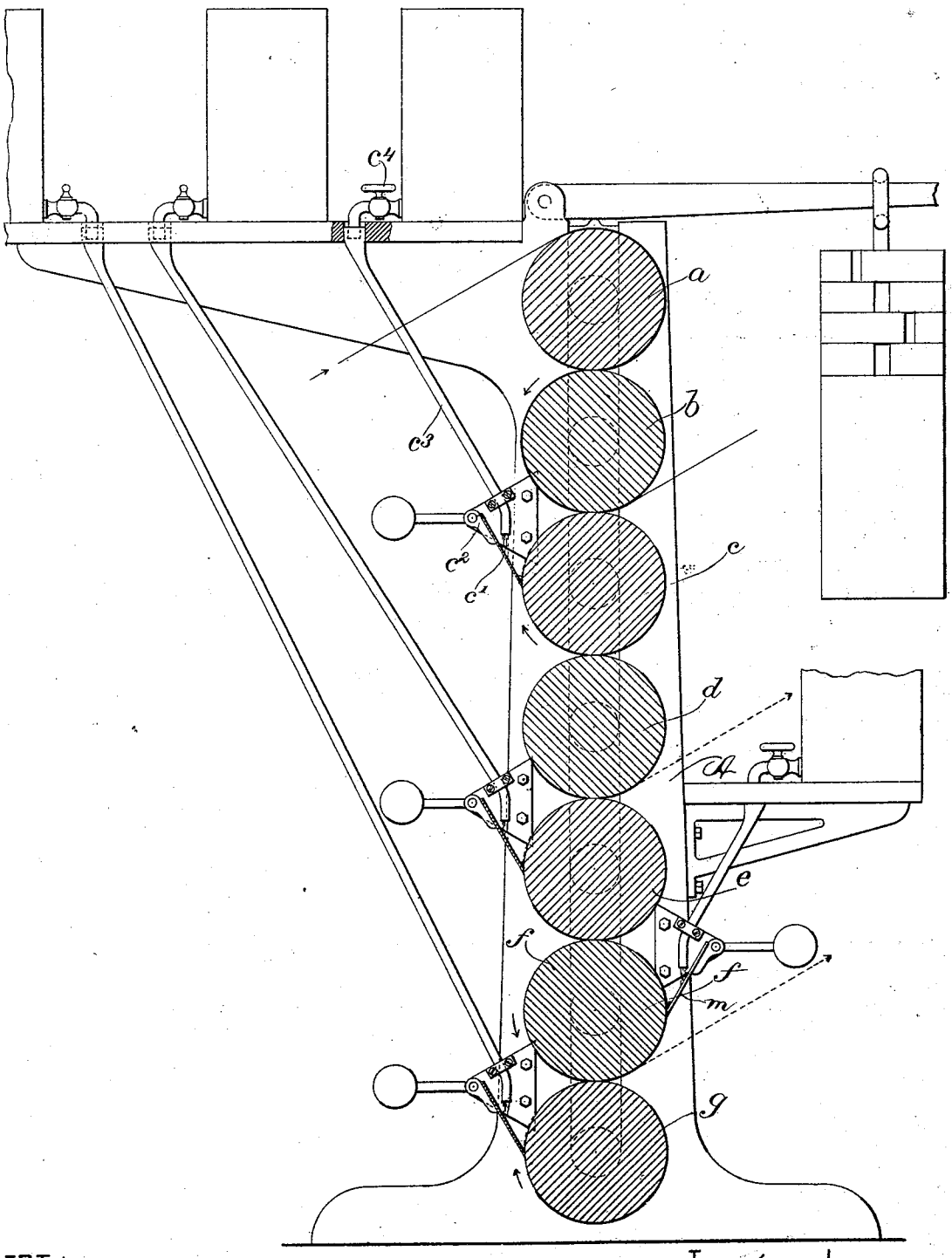
(No Model.)

W. A. HALL.

APPARATUS FOR APPLYING COLOR TO PAPER.

No. 505,982. Patented Oct. 3, 1893.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR APPLYING COLOR TO PAPER.

SPECIFICATION forming part of Letters Patent No. 505,982, dated October 3, 1893.

Application filed September 21, 1891. Serial No. 406,375. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. HALL, of Bellows Falls, county of Windham, State of Vermont, have invented an Improvement in Apparatus for Applying Color to Paper, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention has for its object to improve the construction of machines for applying color to paper.

In applying color to paper, the coloring matter is necessarily mixed with a fluid or solution in order that it may be properly applied to the paper, and while the coloring matter is often thoroughly dissolved by and diffused evenly through the menstruum, yet it has been found that many kinds of coloring matter are not dissolved but are simply held in suspension by the fluid with which they are mixed, and quickly settle to the bottom of the receptacle or color box in which they are contained.

In machines for applying color as commonly constructed the color is taken in a thin film from the surface of the color liquid in the receptacle, so that if the coloring matter settles to any extent to the bottom of the receptacle, it will be seen that the film or coloring fluid which is removed at the surface will not be as deep in color as that at the bottom of the receptacle or box.

The invention comprehends a novel form of color containing and distributing receptacle, whereby the color contained therein may be continuously agitated, and when fed to the paper may be taken from the bottom of the receptacle, thereby preventing settling, and hence preventing any variation in the shade, as well as insuring it being applied uniformly and evenly. This color-containing and distributing receptacle is composed of a stationary and a movable side wall, and is made by so arranging a plate or blade that it shall bear against the periphery of a rotating roll, the said plate and roll thereby presenting a V-shaped receptacle, of which the plate or blade forms a stationary side wall, and a portion of the periphery of the roll forms a movable side wall. The roll which forms the movable wall of the color-containing and distributing receptacle is the lowermost roll of a pair of rolls, and acts as a feeder for the color, raising the same in a thin film and delivering it in contact with the paper which comes down on the upper roll. The color meets the paper at the pinch or point of contact of the two rolls, and is thereby pressed into the paper with great uniformity, and all tendency of the paper to wrinkle is avoided. As the color is pressed into the paper, and as no more coloring matter is distributed than desired, "after" drying is unnecessary, and for this reason the device can be applied directly to the rolls of a calendering machine.

To apply several coats of color, and thereby vary the shade, color-containing and distributing receptacles may be arranged in connection with several pairs of rolls, and by making said rolls heavy, one coat will be thoroughly pressed or ironed into the paper before the next coat is applied. All of said pairs of rolls may be located adjacent each other.

The color receptacles may be arranged so as to deliver the color to the paper on each side if desired.

The drawing shows in vertical section a portion of a calendering machine provided with means for applying color to the paper, embodying this invention.

Referring to the drawing, A represents a suitable frame-work supporting a stack, or several pairs of rolls, herein represented as calender rolls, although so far as my present invention is concerned, one or more pairs may be employed as desired. The paper to be colored, and also as herein represented, to be calendered, passes over the roll *a*, thence down over the roll *b*, and out of the machine, or it may be continued down over the rolls *c*, *d*, and then out of the machine, or it may be still further continued down over the rolls *e*, *f*, and then out of the machine, as desired. A blade or plate *c'*, of brass or other suitable material, is fixed to a support c^2, and extends downwardly therefrom the lower edge of said plate or blade bearing against the periphery of the roll *c* at one side, thereby presenting in conjunction with the roll a V-shaped receptacle, of which the plate *c'* forms one side wall, and a portion of the periphery of the roll *c*, the other side wall. The ends of said

color-containing and distributing receptacle are preferably open, the color being delivered into the receptacle by a suitable pipe, as c^3, in such quantity as to spread laterally along the roll and toward the ends of the receptacle a distance equal to or slightly in excess of the width of the paper passed between the roll and its mating roll, the said color after it has spread a certain distance,—which may be varied as desired along the receptacle or roll,—being taken up by the roll as fast as it is delivered, thus preventing further spreading and rendering the use of ends for the receptacle unnecessary. In practice, however, a little grease may be and preferably is placed in ridges on the plate c' at such points as it is desired to stop the flow or spread of the color, for the latter will not flow over the grease, but will be stopped thereby, the distance between the ridges of grease being equal to or slightly in excess of the width of the paper being colored. If desired, another color-containing and distributing receptacle may be arranged in connection with the pair of rolls *d*, *e*, beneath the pair *b*, *c*; and if desired, still another color-containing and distributing receptacle may be arranged in connection with the pair of rolls *f*, *g*. In a color-containing and distributing receptacle of this kind formed by a downwardly inclined stationary side wall, contacting at its lowest edge with a movable side wall, the deepest part of the reservoir being at the point of junction of the two side walls, the color contained in the receptacle is continuously agitated, and as said roll *c* revolves in the direction of the arrow thereon, as shown, the color will be taken from the bottom of the receptacle, thereby preventing settling. The roll *c* takes up a thin film of color and delivers it to the paper, passing between the rolls *b*, *c*, at the pinch or point of contact, and as said rolls *b*, *c*, are made very heavy, the said color is pressed into the paper thoroughly, and thereby uniformly and evenly distributed. With this form of color-containing and distributing receptacle, but a small quantity of liquid is required, which is of great importance, as it can be changed with but little waste to change the color. If calender rolls are employed, the color will not only be pressed into the paper thoroughly, but will also be ironed into the paper, and as I have ascertained that I can so thoroughly press the color into the paper that "after" drying is unnecessary, it is evident that I may not only apply the color but calender at the same time, which is a great saving in the cost of handling the paper, as well as a great saving in room in the mill. The pipe c^3 will be supplied with a suitable valve as c^4, by which the quantity of color delivered may be regulated. The valve is adjusted so that the color is delivered to the receptacle in sufficient quantity to spread laterally along the receptacle and roll a distance equal to the width of the paper being colored, the quantity of color contained in the receptacle gradually diminishing as it spreads until the roll takes it up as fast as it spreads.

When several color-containing receptacles are employed in connection with several pairs of rolls, a separate pipe may be run to each receptacle, or they may be supplied with color in any other desirable way. When several pairs of rolls are employed, and hence several color-containing receptacles, the shade given to the paper will be heavier or darker each time the color is applied. If it is desired to apply the color to each side, a plate or blade is arranged on the opposite side of the stack, and in connection with the roll which presses down upon the paper. I have herein represented one such blade at *m*, which engages the roll *f*, and forms a color-containing receptacle.

I find that it is oftentimes desirable on several kinds of paper to apply a coat of water, or sizing, or adhesive material before the application of the color. It is necessary to iron this coating into the paper, so that it will be comparatively dry before the color is applied, and the apparatus herein described is particularly well adapted for this purpose, the liquid material, whatever it may be, being contained in the color or liquid containing receptacle. Hence I do not desire to limit my invention to the particular use to which the apparatus embodying my invention may be put.

I claim—

In an apparatus for applying color, sizing, &c. to paper, the herein described liquid containing and distributing receptacle consisting of a continuously and upwardly moving side wall, and a stationary side wall inclined downwardly toward and contacting at its lowest edge with the said upwardly moving wall to form therewith a V-shaped receptacle whereby the liquid at the bottom of the receptacle is acted upon by the moving wall and carried toward the surface of the liquid in the receptacle, thereby agitating the said liquid to prevent settling of the same, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. A. HALL.

Witnesses:
D. P. HIGGINS,
W. A. RUSSELL.