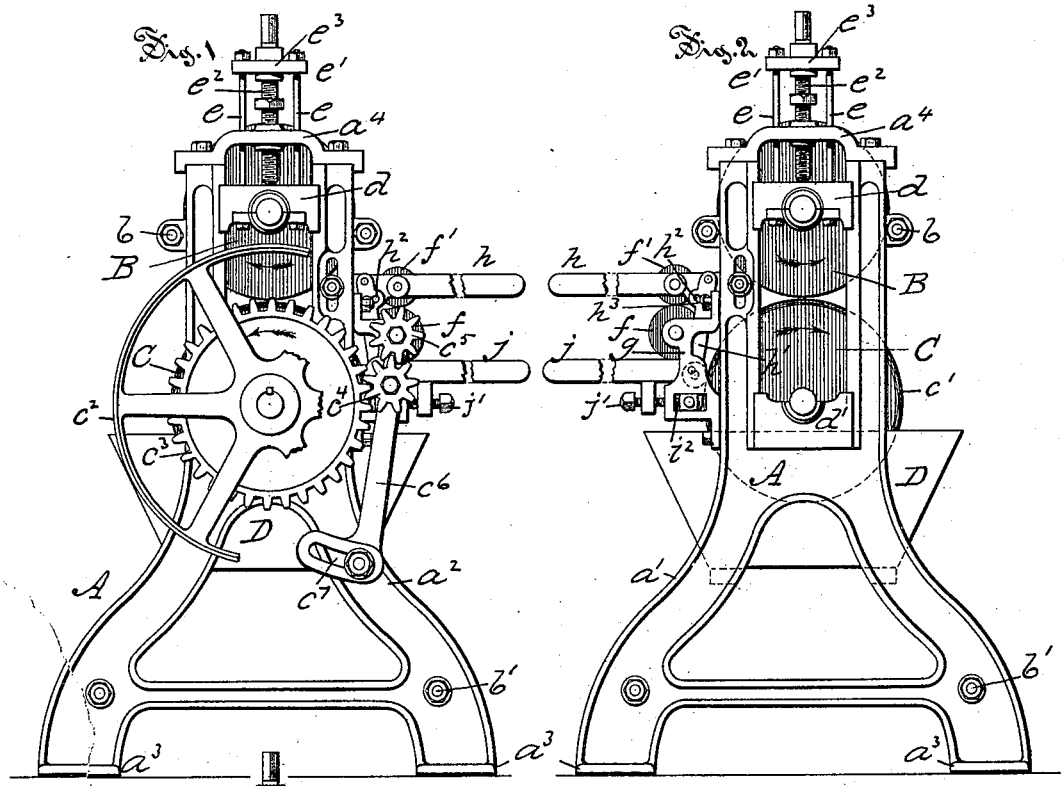
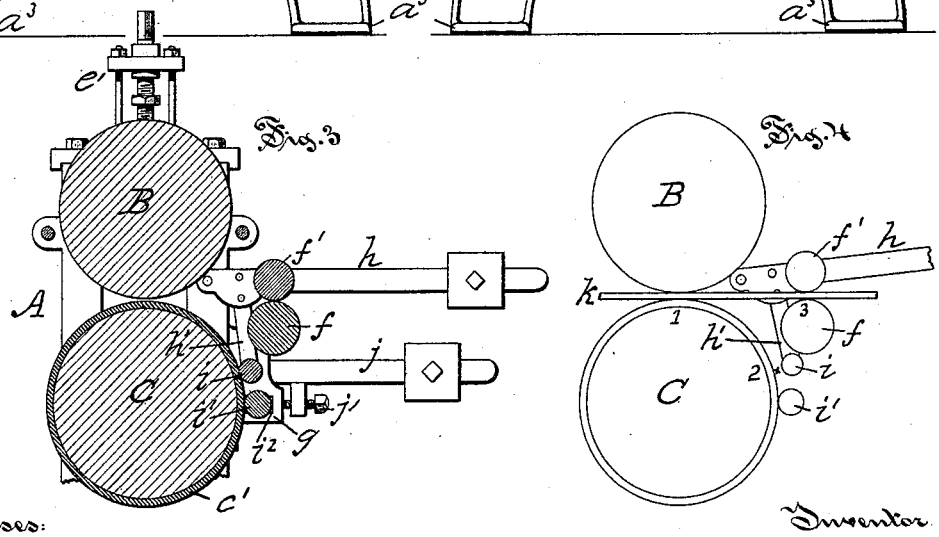
(No Model.) 3 Sheets—Sheet 1.

H. F. CASE.

MACHINE FOR SIZING AND COLORING PAPER AND OTHER FABRICS.

No. 346,894. Patented Aug. 10, 1886.





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(No Model.) 3 Sheets—Sheet 2.

H. F. CASE.

MACHINE FOR SIZING AND COLORING PAPER AND OTHER FABRICS.

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Fig. 5

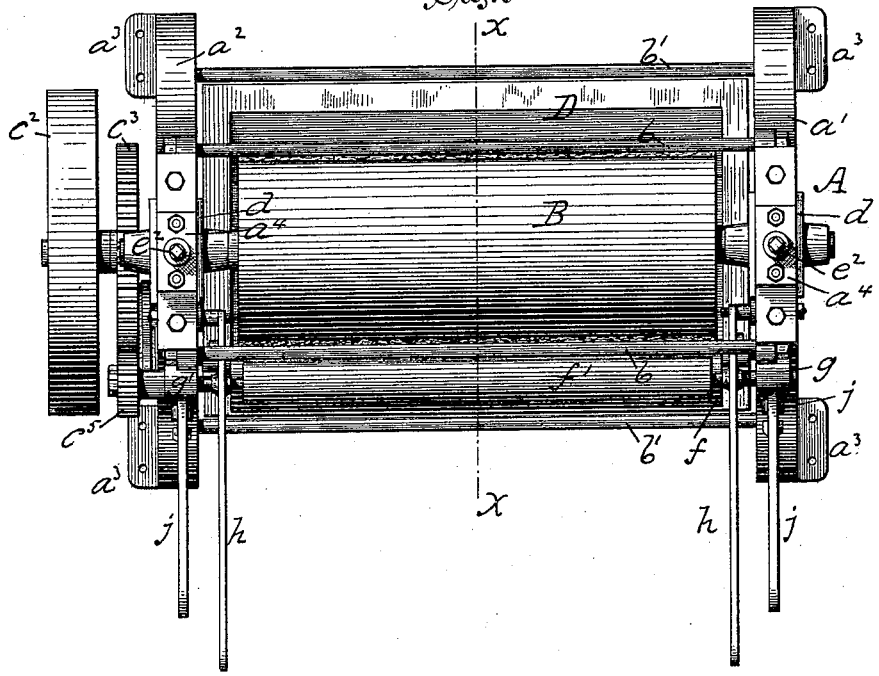
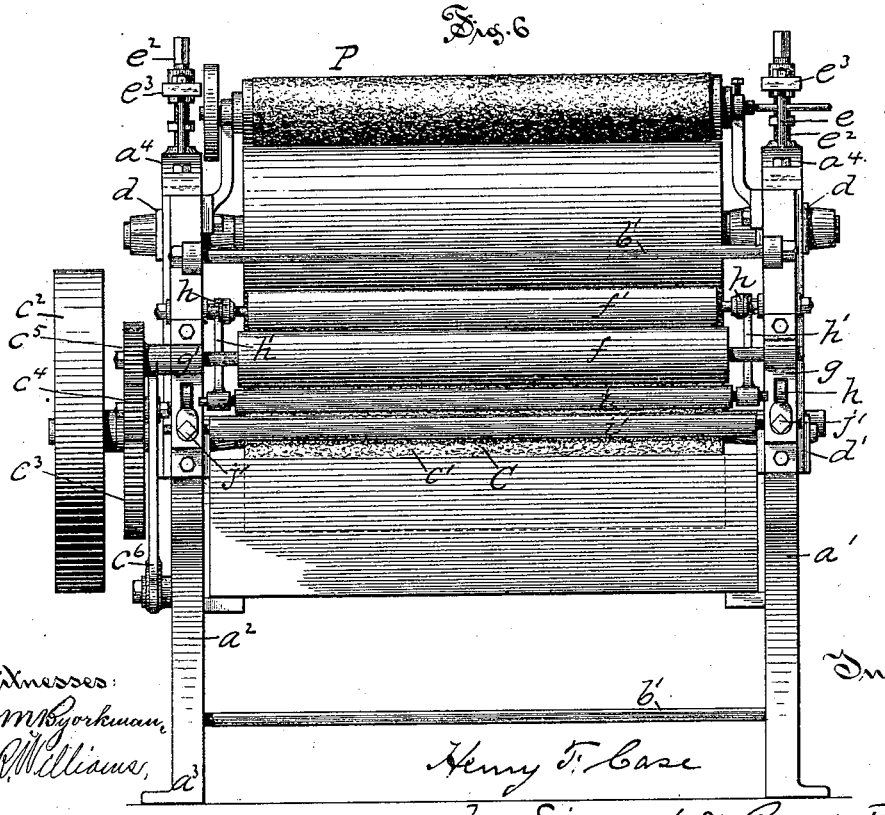


Fig. 6



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(No Model.) 3 Sheets—Sheet 3.

H. F. CASE.

MACHINE FOR SIZING AND COLORING PAPER AND OTHER FABRICS.

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Fig. 7

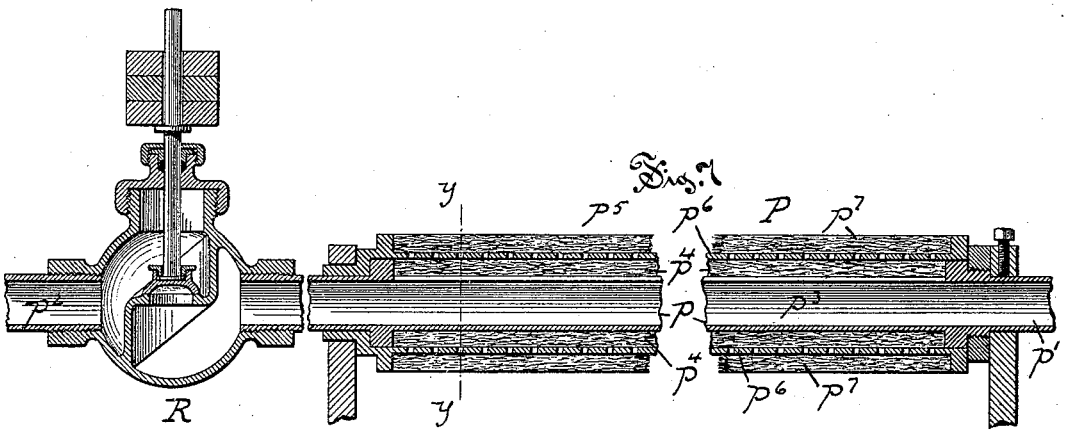


Fig. 8

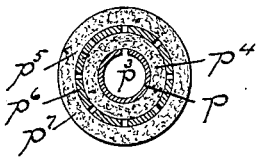
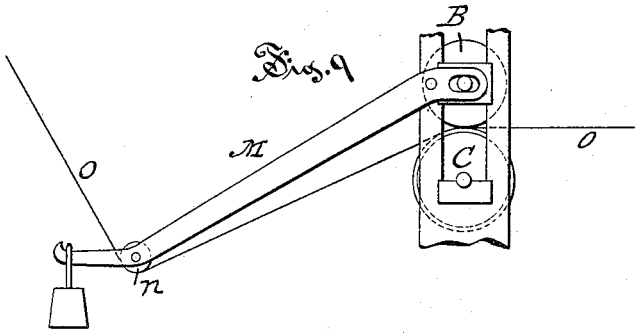


Fig. 9



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UNITED STATES PATENT OFFICE.

HENRY F. CASE, OF SOUTH MANCHESTER, CONNECTICUT.

MACHINE FOR SIZING AND COLORING PAPER AND OTHER FABRICS.

SPECIFICATION forming part of Letters Patent No. 346,894, dated August 10, 1886.

Application filed May 14, 1886. Serial No. 202,142. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. CASE, of South Manchester, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Sizing and Coloring Paper and other Fabrics, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My invention relates to the class of machines used in saturating or coating or otherwise treating the body or surface of a sheet or web of paper or textile fabric—such as cotton, linen, or the like—with a finishing, stiffening, waterproofing, coloring, or glazing substance in solution by means of a series of rollers.

The object of my invention is to provide a compact, simple, and comparatively inexpensive machine for the purpose of thus treating paper and other fabrics, and one that can be readily changed to adapt it to either sizing, coloring, or printing paper or other fabrics in thin sheets or web.

My invention consists in the combination of two or more main rollers, one or both of which serve as mediums for applying the solution to the sheet or web of fabric passing between them, the feed-rolls, one of which bears a fixed relation to one of the squeeze-rolls with reference to the main roller, the squeeze-rolls, and the tank or roll for applying the solution.

It further consists in the peculiar solution-feed roll in combination with the main rollers, feed and squeeze rolls, and in details of the several parts and their combination, as more particularly hereinafter described, and pointed out in the claims.

Referring to the drawings, Figure 1 is a view in end elevation of a machine embodying my invention, with parts broken away to show construction. Fig. 2 is a view in elevation of the opposite end of the machine. Fig. 3 is a view in vertical cross-section of the machine on plane denoted by line $x\ x$ of Fig. 5. Fig. 4 is a diagram view illustrating the operation of the device connecting the upper feed-roll and one of the squeeze-rolls. Fig. 5 is a top or plan view of the machine. Fig. 6 is a front view of the machine, showing the solution-feed roll not shown in the other views. Fig. 7 is a detail view in longitudinal central section of the solution-feed roll on enlarged scale. Fig. 8 is a detail cross-sectional view of the roll on plane denoted by the line $y\ y$ of Fig. 7. Fig. 9 is a diagram view illustrating the device used when a web of fabric is running through the machine.

In the accompanying drawings, the letter A denotes the frame of the machine, that is preferably of iron cast to shape, and consists of the side parts, $a'\ a^2$, joined by the tie-rods $b\ b'$, the lower ends of the sides broadening to form the feet a^3. The side parts are practically counterparts of each other, and the main rollers B C have their journals supported in bearing-blocks $d\ d'$, respectively, that are movable vertically in the frame, the ends of the blocks having lips that overlap the opposite edges of the opening in the frame and hold the blocks against lateral displacement. The upper blocks, d, that support the journals of the main roll B, are suspended by the rods e from the yoke e', and are vertically adjusted by means of the screw-rod e^2, that turns in a threaded socket in the cross-bar a^4 of the side parts and while rotating freely in the bar e^3, through which it passes, and is held against sliding movement therein by collars fast to the screw-rods on both sides of it. A tank, D, is supported below the lower roller, C, so that the latter may slip and move in any liquid or solution contained in the tank. On the front part of the frame are mounted the feed-rolls and the squeeze-rolls. The shaft or journal of the lower feed-roll, f, is borne at its opposite ends in the brackets $g\ g'$, that are secured to the front of the side parts of the frame, while the upper feed-roll, f', is supported by the levers h at opposite ends, the levers being pivoted to the side parts of the frame, so that this upper feed-roll will rest upon the lower in its normal position. Each of the levers h (there are two of them) is pivoted to the side part so as to move in a vertical plane, and it has an arm, h', pivoted to and extending downward from the lever, a slot, h^2, in the arm h' and a bolt and nut, h^3, serving to make the connection adjustable. In the lower end of the arms h' are formed the bearings for the opposite ends of the shaft or the journals of the upper squeeze-roll, i, the lever h and arm h' being so adjusted that the squeeze-roll i will be pressed forcibly against the surface of the main roller C by the weight h^4 on the outer end of the le-

vers before the feed-rolls will be in contact. The lower squeeze-roll, i', has its journals borne in a slot, i^2, in the bracket, the end of the adjusting-screw j' being thrust against the journal with a yielding pressure by a weight in the outer end of the lever j in a downward-projecting lug from which the screw j' is borne. The object of this peculiar construction and arrangement of the feed-roll and connected squeeze-roll is to prevent an undue amount of the solution being brought into contact with the paper or other material that is being treated in the machine. One or both of the main rollers (in this case the roller C) is provided with a jacket or cover, C', of absorbent material, as cloth or felt, and these main rollers are so adjusted that their peripheries are nearly in contact, it being of course necessary that the sheet or web of material should meet with some pressure in its passage between the rollers. The function of the squeeze-rolls $i\,i'$ is to leave on this absorbent jacket the necessary amount of the solution, and, except when the upper squeeze-roll, i, is in contact, there would be danger of the transfer of the solution to the top main roll or an accumulation of it between the rollers on the front side. It is to prevent this accumulation or transfer of the solution that the upper squeeze-roll, i, is held in contact with and operates in combination with the lower squeeze-roll, i', to express nearly or quite all of the solution from the cover except when the sheet of material k (see Figs. 3 and 4) is being passed through the machine. When this is taking place, the introduction of the edge of the sheet of material between the feed-rolls lifts the upper one, and in so doing withdraws the squeeze-roll i from the main roller C, thus leaving a quantity of the solution in the cover of the roll, which will be transferred to the under side of the material k as it passes between the main rollers. I prefer that these several parts shall be so arranged that the distance from the point 1, denoting the point of contact of the surface of the rollers B C, to the point of contact 2 of the squeeze-roll i with the main roller C, shall be equal to the distance from the point 1 to the point 3, where the surface of the feed-rolls are in contact. By this arrangement of the parts the front edge of the sheet of material as it passes between the main rollers is met by the appropriately-moistened cover c', and waste of material k or transfer of the solution to the upper roll prevented. The main rollers and feed-rolls are driven by means of a belt passing around the pulley C^2, that is fast to the shaft of the lower main roller, which shaft bears a cog-wheel, C^3, in mesh with the smaller cogs C^4 C^5, the latter being borne on the shaft of the feed-roll f. The cog-wheel C^4 is borne on a lever, C^6, the upper end of which is pivoted on the shaft of the feed-roll f, while its lower end has a slot, C^7, through which a bolt passes, so that, by means of a nut, the lever may be held with the cog-wheel C^4 in mesh with the cog-wheel C^3 or out of mesh with it. This arrangement of the parts will adapt the machine for operation upon sheets of material of varying thicknesses.

In the case of paper, sheets from extreme thinness to the greatest thickness of binders or press-board may be treated with a solution of sizing, coloring, waterproofing, or other material used to finish or specially prepare the paper. In case it is desired to thus treat paper or like material in the web, I find it convenient to make use of the device shown in the diagram view in Fig. 9 of the drawings. In this case the long levers M are pivoted one upon each side of the frame A, and project forward, the shorter arms of the levers taking under the journals of the top roller, B, and having also bearings in which the roller turns, while on the extreme front end of these levers is borne a guide-roll, n, under which the web is passed before it is grasped by the feed-rolls $f\,f'$. The outer end of these levers M is weighted, to counterbalance the weight of the main roller B, the tension of the web O being just sufficient to cause the rollers B C to turn in contact with the web and press upon it; but in case the web should break, the outer ends of these levers M will drop, and the upper roller, B, will be lifted out of contact with the lower roller.

Instead of putting solution in the tank D or in connection with this tank, I make use of a solution-feed roll, P. The roll is composed of a central tubular part, p, that is preferably of the same interior diameter as the inlet-pipe p' and the outlet-pipe p^2, and it has an outlet-opening in the wall of this central chamber, p^3, of the roll. On the outside of this central part, p, there is provided a cover or packing, p^4, of absorbent and porous material, as cloth or felt, and outside of this is the rotary body part p^5, that has a rigid shell, p^6, of tubular form fitting closely about the inside packing, and with its walls imperforate. This shell p^6 has an outside jacket or cover, p^7, of absorbent and porous material, as cloth, and through these several walls and covers any coloring, sizing, or other material in solution is forced under pressure, and the degree of this pressure is determined and controlled by the regulator-valve R on the outlet-pipe from the roll. The central body part of this feed-roll P is preferably fixed against rotation, and owing to the regularity of the pressure and provision for a constant circulation of the solution through the roll a uniform saturation of the absorbent covers results, the rotation of the outer body part aiding in the even distribution of the liquid without the deposit of any sediment. I have obtained good results in even coloring of thin paper by running it over this feed-roll P and without the intervention of the main or feed rolls, although for some kinds of work I prefer to use it in connection with these latter parts, and arranged on the frame, as shown in Fig. 6 of the drawings. By covering any part of the outer surface of this feed-roll P

with a cover that is impermeable in part, and by making the openings through this of some definite pattern, it may be reproduced in color on the fabric treated; or certain parts of the width of the sheets or web may be sized, colored, or similarly finished without affecting the rest of the surface.

I claim as my invention—

1. In combination with the main rollers, the feed-rolls and a solution-feed roll, the latter mounted with its periphery in contact with that of one of the main rollers and consisting of a non-rotary tubular center with an outlet in the upper side and a porous cover, and a rotary outside part with a perforated shell and a porous and absorbent cover, all substantially as described.

2. In combination with the main rollers, the feed-rolls and the squeeze-rolls, one of the latter being held forcibly against the surface of the main roller to which the solution of coloring or sizing material or the like is applied, and the other squeeze-roll being borne on an arm of a lever and held thereby in fixed relation to one of the feed-rolls that is borne on the lever, whereby an outward movement of this second squeeze-roll is obtained by the lifting of the upper feed-roll by the entrance between the feed-rolls of the material to be operated on, all substantially as described.

3. In combination, in a device of the within described class for applying material in solution by means of rollers, the feed-rolls, the squeeze-rolls and the tank or equivalent device for applying the solution to one of the main rollers, one of the squeeze-rolls being borne on an arm of the lever that bears one of the feed-rolls, whereby the thrusting apart of the feed-rolls causes the squeeze-roll to be withdrawn from the surface of the main roller bearing the solution, all substantially as described.

4. In a machine of the within-described class for coloring or similarly treating paper and other fabrics in sheets or web, the main rollers, the feed-rolls, and a solution-feed roll composed of a central non-rotary tube having a longitudinal slit through which the solution is forced, with a porous and absorbent packing between it and a rotary outside part having a perforated shell and a porous and absorbent covering, all substantially as described.

5. In combination with the main rollers of the within-described machine, the solution-feed roll consisting of a rotary outside part having a perforated inner wall and a covering of porous and absorbent material, as felt, and an inner part consisting of a tube fixed against rotation with a longitudinal outlet slot, the diameter of this inner tube being substantially the same as that of the inlet and outlet supply pipes, in combination with a pressure-valve in the outlet-pipe from the feed-roll, all substantially as described.

6. In a machine of the within-described class, in combination with the main rollers and the feed-rolls, a solution-feed roll having a tubular central part upon which the feed-roll turns and an opening for the outflow of solution through the wall of this central part, and inlet and outlet pipes of the same interior diameter as the central part of the feed-roll, and a pressure-regulating device in the outlet-pipe from the feed-roll, all substantially as described.

7. A solution-feed roll consisting of a non-rotary tubular central part having an opening for the outflow of the liquid through its wall, a porous and absorbent jacket or packing inclosing this central part, and a rotary outside part with a perforated shell and a porous and absorbent cover, all substantially as described.

8. A solution-feed roll consisting of a non-rotary tubular central part having an opening for the outflow of the liquid through its wall, a porous and absorbent jacket or packing inclosing this central part, and a rotary outside part with a perforated shell and a porous and absorbent cover, in combination with the inlet and outlet pipes, the latter having a pressure-regulating valve, all substantially as described.

9. A solution-feed roll, consisting of a non-rotary tubular central part having an opening for the outflow of the liquid through its wall, a porous and absorbent jacket or packing inclosing this central part, and a rotary outside part with a perforated shell and a porous and absorbent cover, in combination with the inlet and outlet pipes, the latter having a pressure-regulating valve and a pump or like device, whereby the solution is caused to flow into the central chamber of the roller under a pressure determined by the regulating-valve, all substantially as described.

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