

(No Model.)

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MACHINE FOR SURFACE COATING PAPER.

No. 486,638.

Patented Nov. 22, 1892.

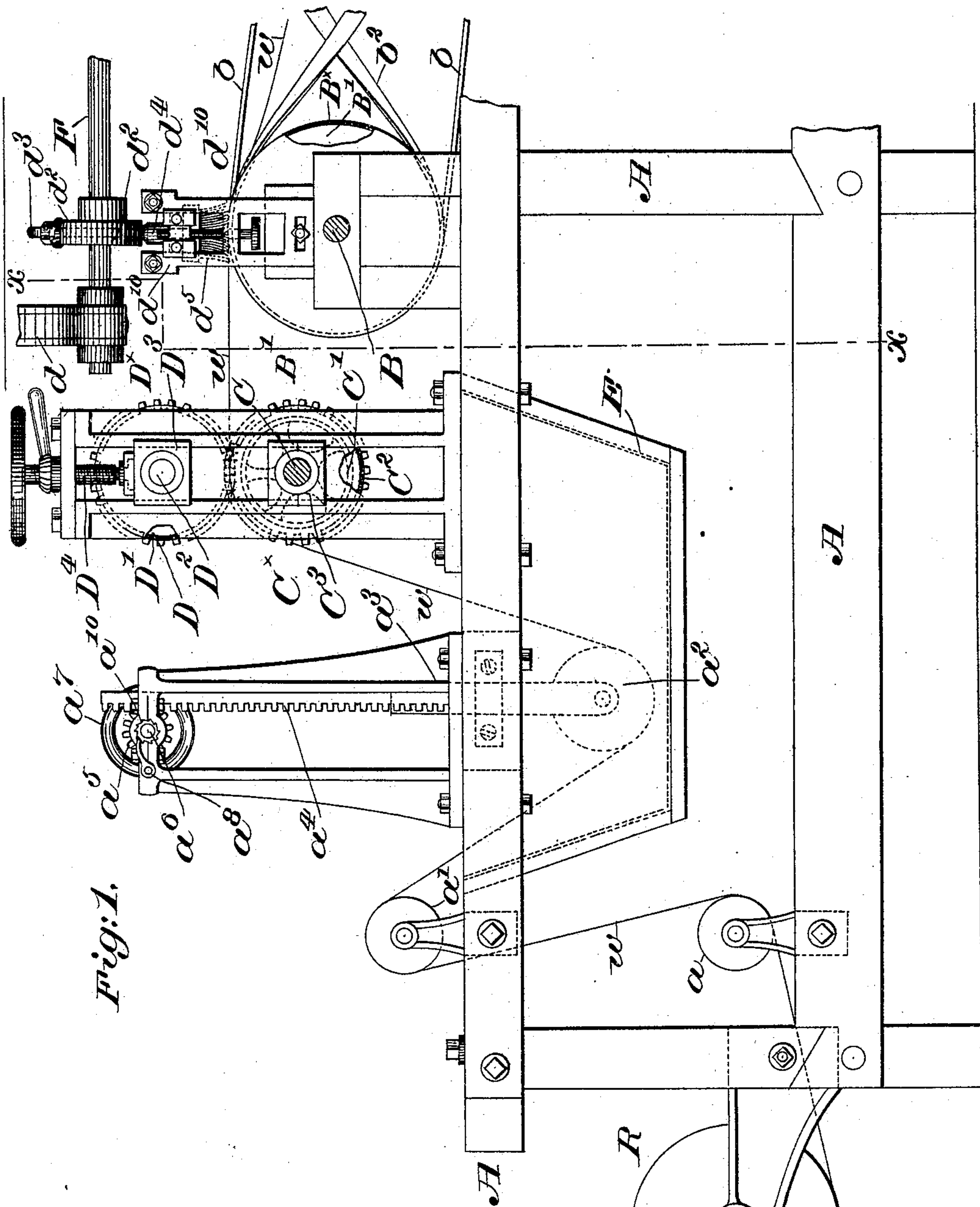


Fig. 1.

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Inventor:  
Charles M. Gage,  
by Crosby Gregory attys.

(No Model.)

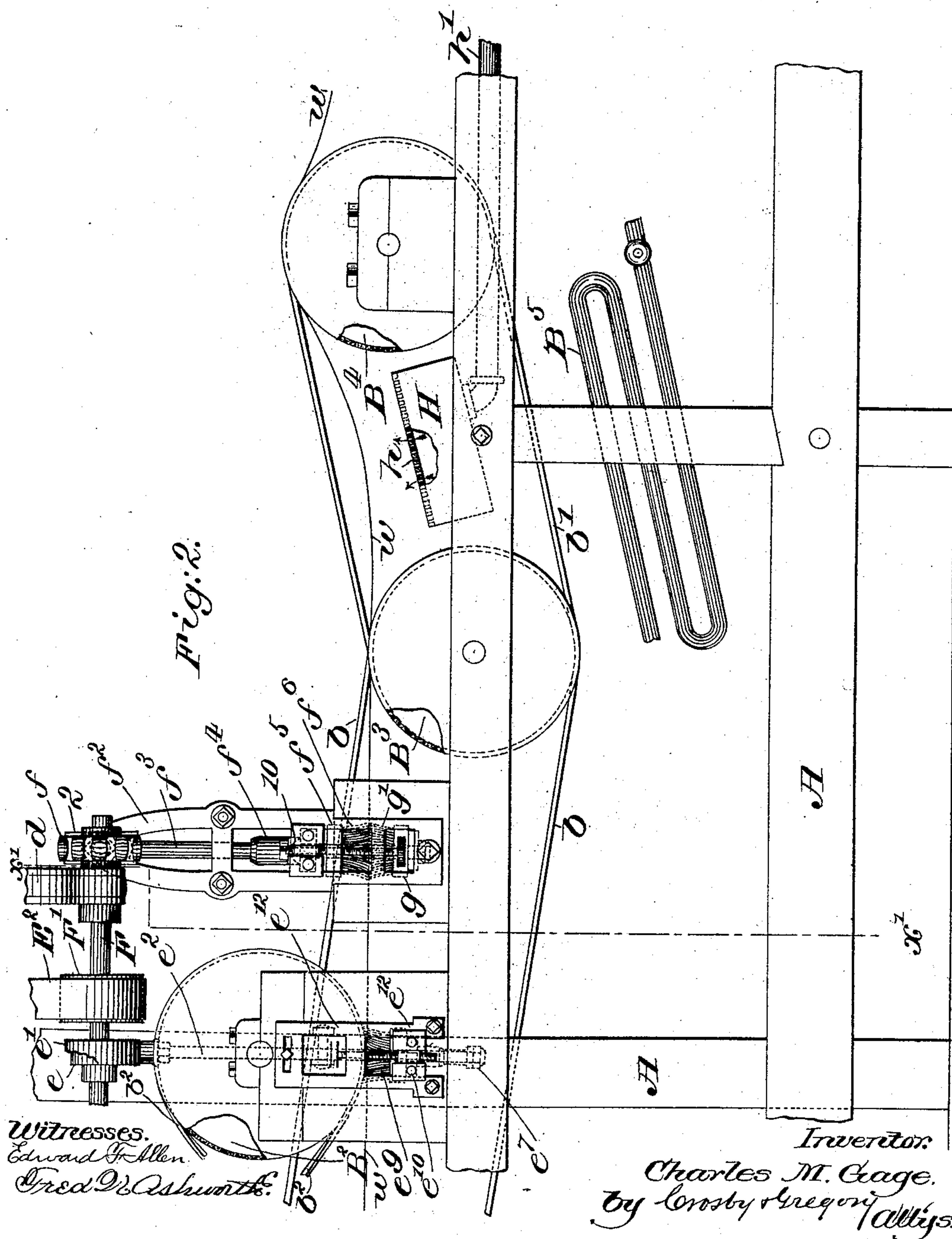
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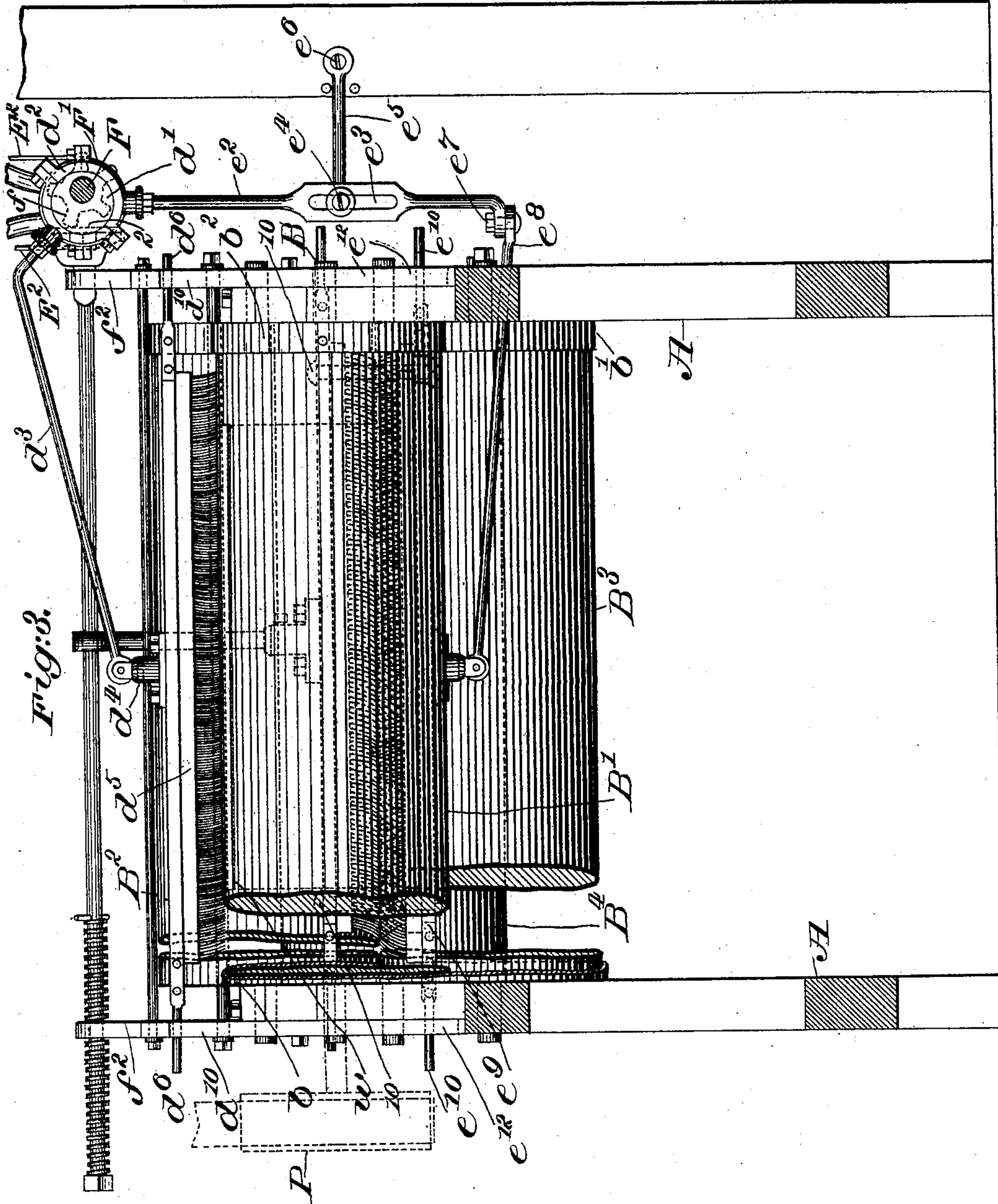
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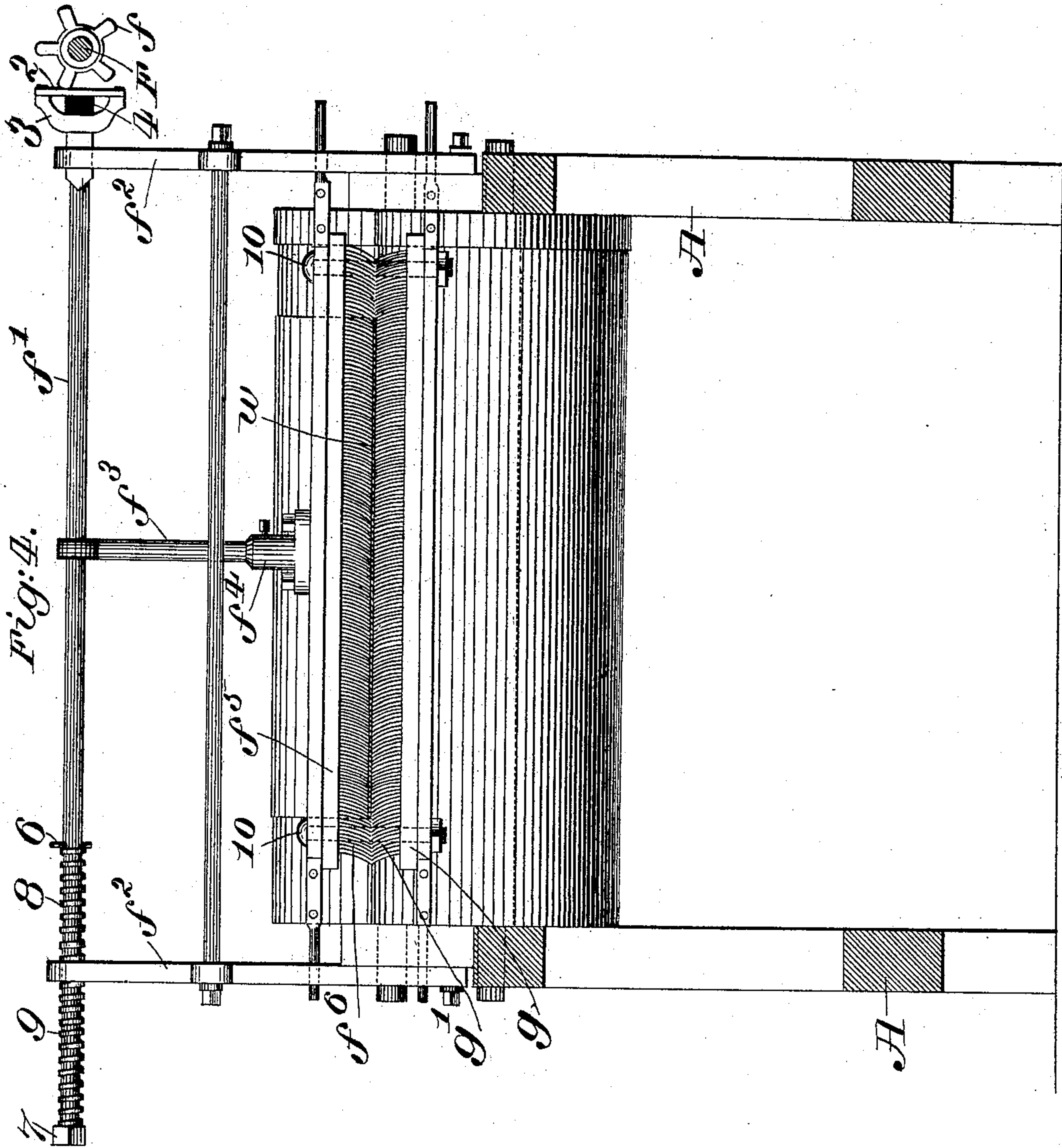
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# UNITED STATES PATENT OFFICE.

CHARLES M. GAGE, OF PEPPERELL, MASSACHUSETTS.

## MACHINE FOR SURFACE-COATING PAPER.

SPECIFICATION forming part of Letters Patent No. 486,638, dated November 22, 1892.

Application filed March 17, 1892. Serial No. 425,264. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES M. GAGE, of Pepperell, county of Middlesex, State of Massachusetts, have invented an Improvement in  
5 Machines for Surface-Coating Paper, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention has for its object the production of a novel machine by which to surface-coat on both sides paper used for various purposes, the paper being taken from a roll and coated and being in practice again wound  
15 upon a roll in readiness to be used.

My improved machine comprehends a tank or vessel to hold the surface-coating material, a pair of textile-covered rolls to control the quantity of surface-coating material left upon  
20 the web, and a series of rolls and brushes, the rolls aiding in feeding the paper, the brushes acting upon the opposite sides of the web to smooth the same. With these parts I may employ a drying apparatus of the class containing a series of pipes filled with a heating  
25 medium, preferably steam, and I may use a driver of the class wherein air is discharged or blown against the web.

Figures 1 and 2 of the drawings, taken together, show substantially one side of a machine embodying my invention, I having omitted from the machine the receiving-roll and the chief part of the web-drying mechanism, because the same are and may be of usual  
30 construction. Fig. 3 is a section of Fig. 1 in the irregular line  $x$ , looking to the right, some of the rolls being broken away to show the parts beyond; and Fig. 4 is a section to the right of the dotted line  $x'$ , Fig. 2.

40 The framework A, which may be of any suitable shape and construction to support the working parts, has in this present instance a shaft B, which in practice will be provided with any usual belt or driving pulleys P, which may  
45 be driven from any suitable source. The shaft C, also, in practice will have a suitable pulley upon it and will be driven from some suitable counter-shaft, said pulley being shown only by dotted lines, for in Fig. 1 the shaft C is cut off to show its bearings. The shaft C  
50 carries a suitable roll C', having a felt cover-

ing C<sup>2</sup>. Opposed to this roll is a roll D, having a felt-surfaced covering D', the shaft D<sup>2</sup> of the roll D being mounted in movable bearing-blocks D<sup>3</sup>, made adjustable by or through  
55 a suitable adjusting device D<sup>4</sup>, (shown as a screw,) the said screw in practice being loosely connected with a part of the bearing, a portion of the bearing entering an annular groove in the end of the screw, so that by rotating  
60 the screw the bearing D<sup>3</sup> may be moved toward and from the bearing C<sup>3</sup> for the roll C', thus permitting the web of paper  $w$  to have removed from it more or less of the coating material which is applied to the web of paper  
65 when passing through the box or vat E, containing the coating material. The shafts C and D<sup>2</sup>, carrying the rolls C' and D, are provided with gears C<sup>x</sup> D<sup>x</sup>, which mesh together, thus enabling the two rolls to be rotated in  
70 unison

The web of paper taken from the roll R, as at the left in Fig. 1, is led about suitable rolls  $a$   $a'$  and under an immersing-roll  $a^2$ , shown as having journals in a vertically-moving  
75 gate or frame  $a^3$ , provided with like racks  $a^4$ , one just within each of the machine sides and adapted to be engaged by two like gears  $a^5$  on a shaft  $a^6$ , having a suitable hand-wheel  $a^7$ . The shaft  $a^6$  may have a ratchet-wheel  $a^{10}$  fast  
80 on it, having co-operating with it a suitable detent or locking pawl  $a^8$  to thereby hold the immersing-roll in any position in the vat in which it may be adjusted by the operator. It will be obvious that the paper will be coated  
85 on both sides with the coating material. Beyond the rolls C' D the web of paper coated on both sides passes over a felt-covered roll B', fast on the shaft B, referred to, and the paper in the continuation of its travel is  
90 passed under a second felt-covered roll B<sup>2</sup>, then over other suitable rolls, as B<sup>3</sup> and B<sup>4</sup>, and on over any usual drying mechanism, as B<sup>5</sup>, and in practice to a suitable receiving-roll or to a paper-cutter, the receiving-roll or  
95 cutter being omitted, and only a part of the drying apparatus being shown, because not of this invention and in common use.

The roll B' at one end (let it be assumed its farther end in Fig. 1) has applied to it  
100 outside the edges of the felt covering an open belt  $b$ , which is extended about one end of



the roll  $B^3$  at its farther end viewing Fig. 2, and the end of the roll  $B^3$  at the front in Fig. 2 has, as herein represented, a belt  $b'$ , which is extended over the roller  $B^4$  to rotate it. The front end of the roll  $B'$  receives over it a cross-belt  $b^2$ , the latter being extended (see Fig. 2) over one end of the roll  $B^2$ .

Parallel to the length of the machine in suitable bearings I have mounted a shaft  $F$ , upon which is a pulley  $F'$ , driven by a suitable belt  $E^2$  from any suitable counter-shaft, supported in any usual or suitable hangers  $d$ . The shaft  $F$  has an eccentric  $d'$  embraced by an eccentric-strap  $d^2$  of a link  $d^3$ , jointed to a stand  $d^4$  of a sliding brush  $d^5$ , guide-rods  $d^6$  from the ends of the brush-back being guided in suitable fixed bearings in a stand  $d^{10}$ . The shaft  $F$  carries a second eccentric  $e$ , embraced by an eccentric-strap  $e'$  at the upper end of a rod  $e^2$ , slotted at  $e^3$ , and having its fulcrum on a projection  $e^4$  of an arm  $e^5$ , pivoted at  $e^6$ , the lower end of the said arms being jointed at  $e^7$  to a rod  $e^8$ , in turn jointed at its opposite end to the back of the brush  $e^9$ , the brush-back having at its end guide-pins  $e^{10}$ , guided in suitable stands  $e^{12}$ . The shaft  $F$  has also a cam-knocker  $f$ , which acts on a plate 2, secured to the head 3 of the sliding bar  $f'$ , free to slide in stands  $f^2 f^2$ , there being a spring 4 to back up the plate 2. The sliding bar  $f'$  has two projections 6 7, one each side of one of the stands  $f^2$ , and between the said projections and stand are spiral springs 8 9, which co-operate together and keep the plate 2 pressed against the cam-knocker, the spring 8 yielding to let the bar slide as the plate 2 is pushed by the cam-knocker. This slide-bar  $f'$  has fixed to it a rod  $f^3$ , which is suitably fixed at its lower end to a casting  $f^4$ , bolted to the brush-back  $f^5$ , carrying the brush  $f^6$ . The back  $f^5$  is connected by suitable bolts 10 (shown chiefly by dotted lines, Fig. 4) to a second back  $g$  of a brush  $g'$ , the backs  $f^5$  and  $g$  having suitable guide pins or rods extended from their outer ends through suitable bearings in the stands  $f^2$ .

The two backs  $f^5$  and  $g$  constitute a double brush, and in the space between the bristles  $f^6$  and  $g'$  is passed the web  $w$  of paper, the said sets of bristles acting one against the upper and the other against the lower side of the web and having a rapid reciprocating short-stroke movement.

Between the two rolls  $B^3 B^4$ , I have mounted a box or case  $H$ , having a perforated top  $h$ , and in communication by a pipe  $h'$  with a suitable fan, (not shown,) by which either warm or cold air may be blown upon the web  $w$  to aid in drying it.

The apparatus described will have co-operating with it a suitable drying apparatus  $B^5$ , (but partially shown,) its connecting of pipes adapted to receive steam.

The drying apparatus in practice will be extended beyond the roll  $B^4$  to continue the drying action of the web  $w$  until the same is

wound upon a roll or cut up by a cutter in any usual manner.

To enable the surface-coating material applied to both surfaces of the paper to be retained thereon in sufficient quantity, caused me very considerable trouble; but by experiment I ascertained that this might be done provided the rolls between which the web was first passed after leaving the tank and being immersed in the surface-coating material were covered with a soft textile body—such, for instance, as felt. Having discovered this, I then made one of the rolls, as  $D$ , adjustable toward and from the other, so as to regulate the amount of pressure put upon the coated web while passing between the rolls  $C'$  and  $D$ . The roll  $B'$ , also preferably coated with felt or equivalent material, and the rolls farther to the right of it in the drawings (see Fig. 2) act to feed the web through the machine or to draw the web through the tank, and for the best results the surface speed of the rolls  $C' D$ , gained by an independent driving-belt, is made to correspond substantially with the surface speed of the paper derived from the other rolls referred to, I preferring to drive the rolls  $C' D$  at such speed in order to prevent the wiping of the surface-coating material from the web of paper.

The paper to be surface-coated is led from a suitable roll through the liquid surface-coating material in the vat and is coated on both sides and the web of paper from the vat is passed between the first pair of felt-covered rolls, the peripheries of which may be brought more or less closely together by the screws  $D^4$ , the said felt-covered rolls having been found by me as less liable to remove the surface-coating material than a roll with any other surface known to me, the use of the felt to merely touch each coated face of the web of paper being a very important practical step of my invention. After leaving the felt-covered rolls referred to the web of paper is passed between a supporting-roll and a reciprocating brush, and thereafter under a third roll  $B^2$ , and between it and a brush  $e^9$ , which acts on the opposite face of the web of paper, and thence the web, partially polished on both sides, is shown as led between the bristles of a double brush  $f^6 g'$ , when it is acted upon at both sides and again further polished, and thence the polished web of paper, not yet fully dried, is led over or past drying apparatus of usual or suitable construction.

I am aware prior to my invention that paper has been moistened by a covered roll receiving its moisture by contact with the periphery of a roll, a part of which latter roll runs in a liquid in a box, as in United States Patent No. 32,759; but in my invention the covered rolls do not apply moisture to the warp of paper, but, on the contrary, the paper is wet by being immersed entirely before the paper comes in contact with the roll.



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

1. In a machine for surface-coating paper, a tank to contain surface-coating material and a device to immerse the paper in the material in the tank, combined with a pair of rolls having a felt covering, between which the web of paper, surface-coated upon both sides, passes on its way to the action of brushes, substantially as described.

2. In a machine for surface-coating paper, a tank to contain surface-coating material and a device to immerse the paper in the material in the tank, combined with a pair of rolls having a felt covering, between which the web of paper, surface-coated upon both sides, passes, and with a succeeding series of supporting-rolls and brushes adjacent to and also intermediate said supporting-rolls to act upon opposite sides of the web, substantially as described.

3. In a machine for surface-coating paper, a vat to contain the surface-coating material, a device to immerse the web in the surface-coating material in the vat, a pair of rolls, as C' D, covered with felt, succeeding rolls B'

B<sup>3</sup> B<sup>4</sup>, and a series of brushes, as d<sup>5</sup>, e<sup>9</sup>, g', and f<sup>6</sup>, the double brush g' f<sup>6</sup> acting upon both sides of the material, substantially as described.

4. In a machine for surface-coating paper, a vat to contain the material, a device to immerse the web in the surface-coating material in the vat, a pair of rolls, as C' D, covered with felt, succeeding rolls B' B<sup>3</sup> B<sup>4</sup>, a series of brushes to act upon opposite sides of the web, and a drying mechanism to operate substantially as described.

5. In a machine for surface-coating, a web of material, the rolls or supports B' B<sup>3</sup>, the shaft F, provided with eccentrics and with a cam-knocker, the series of brushes d<sup>5</sup> e<sup>9</sup> f<sup>6</sup> g', the link d<sup>3</sup>, the lever e<sup>2</sup>, the spring-controlled slide-rod f', having a head-plate 2, and connections between the link d<sup>3</sup>, the lever e<sup>2</sup>, and the rod f' respectively with the said brushes d<sup>5</sup> e<sup>9</sup> f<sup>6</sup>, to operate substantially as described.

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

CHARLES M. GAGE.

Witnesses:

ELMER E. DUNCKLEE,  
JOHN J. BARON.