2 Sheets--Sheet 1.

R. J. EDWARDS.

Machines for Coating Paper With Emery, Glass, &c.

No. 157,068. Patented Nov. 24, 1874.

Fig. 3

Fig. 5

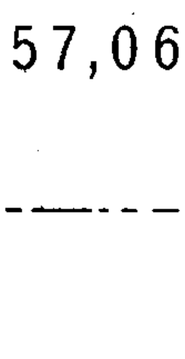


Fig. 4

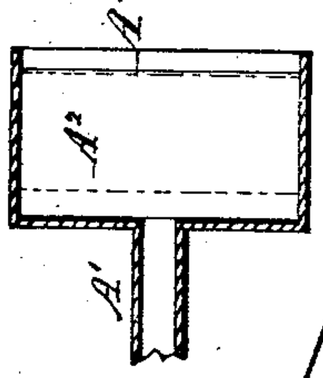
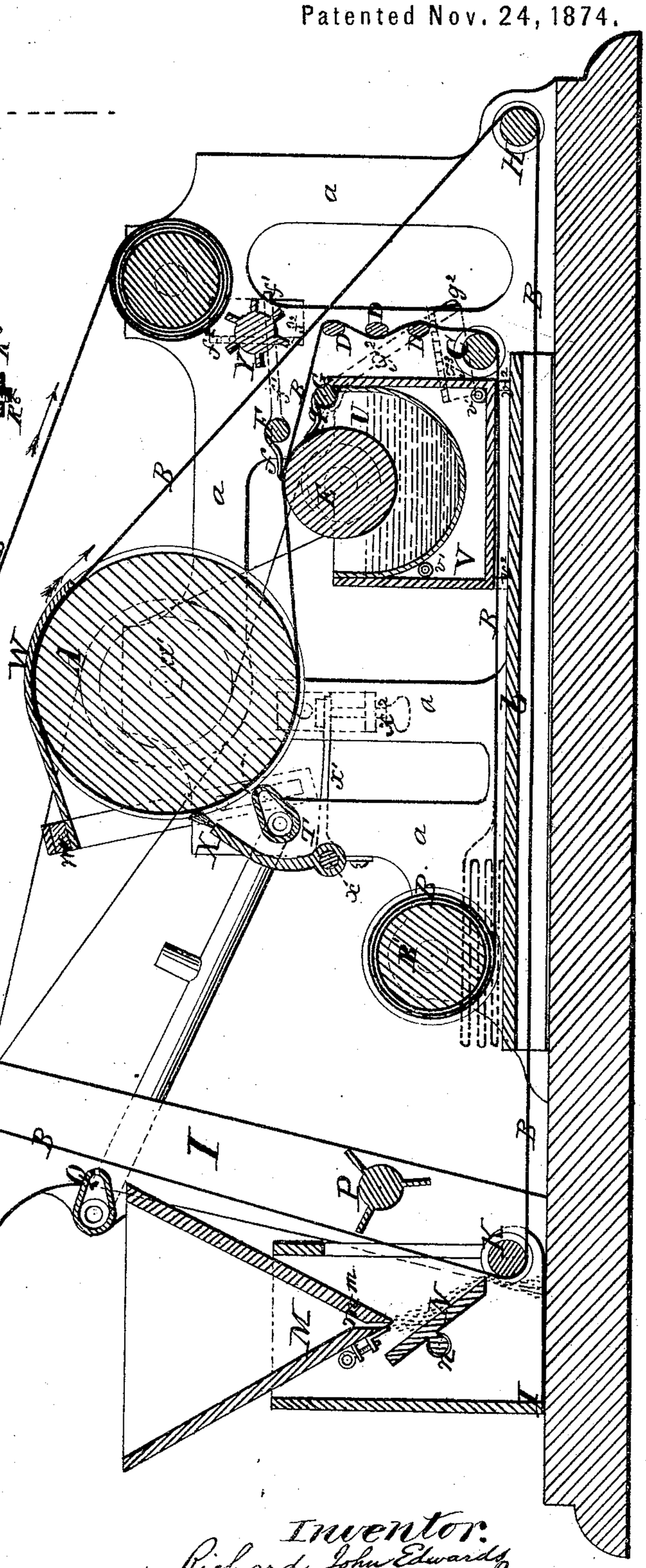


Fig. 1



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by his Attys Mason Fenwick & Lawrence

2 Sheets--Sheet 2.

R. J. EDWARDS.

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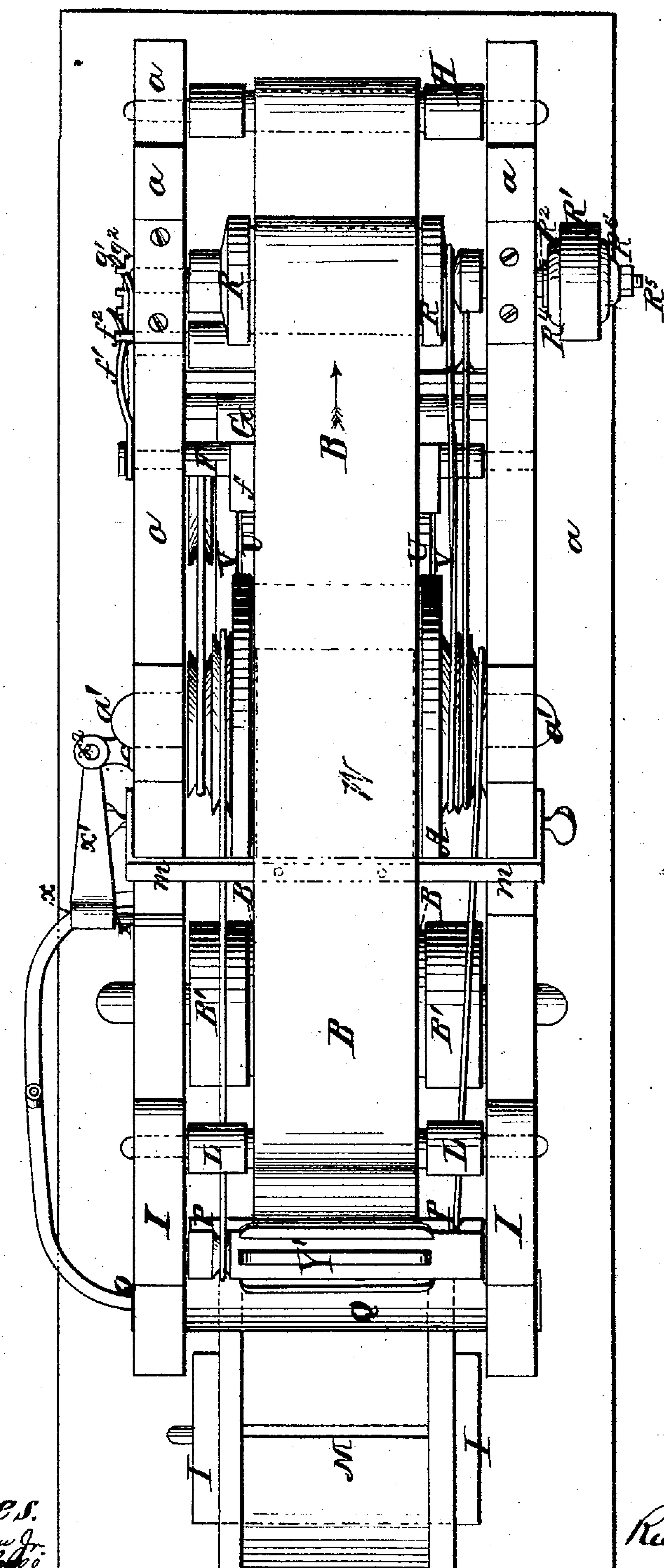
Fig. 2



Witnesses.
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J. N. Campbell.

Inventor.
Richard John Edwards
by his attys,
Mason Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

RICHARD JOHN EDWARDS, OF SHOREDITCH, ENGLAND.

IMPROVEMENT IN MACHINES FOR COATING PAPER WITH EMERY, GLASS, &c.

Specification forming part of Letters Patent No. **157,068**, dated November 24, 1874; application filed August 31, 1872.

To all whom it may concern:

Be it known that I, RICHARD JOHN EDWARDS, of Shoreditch, in the county of Middlesex, England, have invented a new and useful Improvement in Machines for Making Emery or Glass Cloth or Paper; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a vertical longitudinal section of the machine for manufacturing emery-cloth or emery-paper, or glass-cloth or glass-paper. Fig. 2 is a top view of the same. Fig. 3 is a longitudinal section of the self-releasing friction-roller upon which the finished cloth or paper is rolled. Figs. 4 and 5 are sections of a modified form of a steam-jet pipe which I use for melting the surface of the glue.

My invention relates to certain new and useful improvements in machines for coating paper or cloth in long lengths first with glue, and then with pounded or powdered glass, emery, and other abrasive powder, in such manner as to make the glue adhere more perfectly to the paper or cloth, and be more evenly spread thereon, while at the same time the abrasive material is affixed in a more perfect state of uniformity in regard to distribution and size of the grains, and whereby the said paper may be made more expeditiously than heretofore.

The first part of my invention consists in the combination of a glue-spreading machine and an emery-scattering machine, the said glue-spreading machine being constructed to do its work first, and the scattering-machine its work afterward, but the two machines performing their operations continuously, and both operated by the main cylinder-shaft, which is driven from the receiving-roller shaft, and each constructed independent of the other, and capable of being located at points remote from or close to the calender-roller, or so that the gluing and scattering apparatus may be placed near together or remote from each other by lengthening the belts, as occasion may require.

The second part of my invention consists of a rack of parallel horizontal rods, between which the paper or cloth is conducted to straighten it previous to the gluing.

The third part of my invention consists of a flexible adjustable pressure-strip, which forces the paper or cloth upon the glue-roller.

The fourth part of my invention consists of an adjustable brush, in combination with a remelting steam or hot-air blower, for giving the glue an even surface, which apparatus may be combined with a stationary sheet of flexible material bearing on the glued surface; or the brush may be substituted by the said sheet.

The fifth part of my invention consists in a hopper with a chute with adjustable inclination and two deflecting-rollers, over which rollers the paper or cloth is drawn in an oblique direction, while the abrasive material is applied by means of the momentum it receives from the inclination of the chute.

The sixth part of my invention consists of a revolving beater, for beating against the back of the passing paper or cloth, and thereby cleaning it of the looser grains of the abrasive material, while the more adherent grains are driven deeper into the soft glue by reaction.

The seventh part of my invention consists of a slotted or otherwise perforated steam-vessel, for throwing a sheet of steam or hot air against the paper or cloth which has been spread with glue and emery, whereby the surface of the glue is remelted, and caused to so surround the grains of the abrasive material as to fix them more permanently than an extra covering or coat of glue, according to the old method, can do.

The eighth part of my invention consists in an arrangement for driving the glue-rollers and the receiving-drum, by means of belts or cords, with a speed slightly exceeding that of the surface of the main cylinder, for the purpose of giving the paper or cloth a proper tension between the different stages of operation.

The last part of my invention consists of the application of fans or cold-air blowers at such places as adapt them best for the purpose of drying the glue.

In the drawings, *a* represents a frame, which

supports a raised platform, *b*, on which the paper or cloth B is placed, either in a coil, as shown by dotted lines, or wound upon a drum, B^1. The platform is constructed and arranged to permit the paper to pass back under it during the operation. C is the first roller, under which the paper or cloth is drawn; D D, a straightening-rack, consisting of a number of horizontal parallel bars fastened at their ends to the sides of the frame *a;* these, in any required number, may be provided and set at suitable distances apart. The form of the bars in cross-section should be elliptical or circular, so as not to cause chafing or undue stretching of the paper or cloth. E is the glue-roller, and F a bar with a flexible tongue, *f*, fastened to it. This bar turns in bearings of the frame *a*, and is made adjustable, so as to regulate the pressure of the tongue *f*, by a laterally-adjustable spring-arm, f^1, fastened to one of its journals and sprung into one or another of the notches of a stationary plate, f^2. The glue-roller E has bearings for its journals at the ends of a concave glue-tank, U, which is incased, except at top, by a chamber, V, which is heated by steam, supplied in pipes v^1 v^1, for the purpose of keeping the glue in the tank hot. The vessel V is supported above the platform *b* by legs v^2, which rest upon the side bars of frame *a*, so that the paper or cloth B may pass under it. G is a transverse strike-bar for freeing the glue-roller from any superfluous amount of glue before it meets with the paper or cloth B. This bar has a flexible strip, *g*, of rubber or leather, or other flexible material, attached to it, and is made adjustable by means of laterally-adjustable spring-arm g^2, which is sprung into one or the other of a series of notches of a plate, g^3, on the frame *a*, so that the strip of said doctor may be brought as near to the glue-roller E as described. Slots and screws may be adopted for adjusting this strike-board. A is the main cylinder, which is supported by journal-bearings a^1 on the frame *a*. T is a steam or hot-air blower for remelting the glue which has been put upon the paper or cloth; X, a brush for evenly spreading the remelted glue. Instead of this brush an adjustable cloth, W, may be used for evenly spreading the glue. The blower T may be simply a flattened perforated pipe, as in Fig. 2, but the best construction is that shown in Figs. 4 and 5, wherein a steam-pipe, A^1, with a flat mouthpiece, A^2, slotted or perforated by holes for the emission of steam or hot-air, is adopted. And this flattened mouth has a casing, A^3, of greater length than the part A^2, applied about it in the manner shown, in order that when it is desired to mix air with the issuing steam it can be done—the same being effected by the vacuum created between the tapered mouthpiece A^2 and casing A^3 by the suction of the steam as it escapes from the end of the part A^2. The steam-jet from the blower T may be directed on the brush, or on the glue which is on the passing paper at a point close to the brush X, as circumstances may demand. The brush X is fastened to a rock-shaft, *x*, which, by means of an adjustable arm, x^1, on one of its ends, the brush X can be adjusted to act with greater or less pressure upon the surface of the paper or cloth. The arm x^1 is adjusted by a screw, x^2; but it might be held to its work by a weight on the arm.

The same effect may be achieved by using a sheet of cloth or other flexible material, as at W, which, by its friction upon the surface of the glue, covers up all unevenness of the same. By fastening the sheet W to a frame or bar, *w*, which can be set higher or lower by means of slots and screws or rack-bars, the cloth can be adjusted so as to bear with more or less area upon the surface of the glue. The brush X and the cloth W, with their respective adjusting appliances, may be used together, or substituted for each other. H is a roller, over which the cloth B is passed down from the main cylinder A. K is a roller, fastened to the foot of the hopper-frame I, under which the cloth B passes in its passage under the platform, and to the emery or glass hopper. M is the emery or glass hopper, with an adjustable outlet, *m*, and a chute-board, N, as shown. The chute-board N is made adjustable in height and inclination by passing the end of the rock-shaft *n*, in which it is hung, through holes or slots in the side coverings of the frame I, and providing a suitable adjusting-arm and stop, or a clamp-nut on the outer end. L is a roller, upon which the paper or cloth *b* passes from the roller K. It is fastened by suitable means to the ceiling of the building, or it may be placed near the floor of the next story, so that the paper or cloth may be passed through an opening in the said ceiling and floor.

The position of the rollers K and L is such as to give the paper or cloth an inclined direction from the hopper-frame I, as shown in the drawing, to such an extent as is most favorable for the proper affixing of the abrasive material, which forces itself into the soft glue by the aid of the momentum it has acquired in its descent upon chute N. P is a revolving beater for shaking off the lighter parts of the so-affixed abrasive material, by making rapid blows against the back of the paper or cloth, and at the same time insuring by reaction the more firm embedment of the weightier parts of the said material into the glue surface of the paper or cloth. Q is a remelting steam or hot-air blower, for remelting the surface of the glue after the abrasive material has been applied to it. It is of the same construction as the blower T. By this contrivance for remelting the glue the abrasive material is allowed to sink firmer into the glue, and in fact becomes covered with a very thin film of glue. R is a roller, upon which the cloth is wound after it has passed over the roller L. In order that the cloth or paper may be wound

evenly and with a uniform tension upon the roller R, its driving-pulley R^1 runs loose upon the axle R^2, and is made to bear against the end of the hub R^4, or against a rubber gasket, R^3, bearing against said hub by means of a plate, R^6, which slides on a square of the axle, and is clamped by a nut, R^5. The pulley can be brought to bear against the hub or the gasket R^3 with any desired pressure by the nut R^5, and the roller R thus made to revolve with the pulley until the tension of the cloth or paper upon it becomes too great, and the pulley R^1 slips upon the plate R^6 without driving the roller. Rollers with pulleys of the same kind may be employed to carry the cloth or paper from place to place, as well as to wind it up when finished, as shown in the drawings.

The roller R may be supported by the frame *a*, or it may be placed in any part of the building where the cutting up of the paper or cloth and the packing of the same can be most conveniently done.

Between the cylinder A and the roller H a fan, Y, is stationed, to cool off the hot glue, and prevent it from running. For the same purpose the fan Y^1 is placed above the blower Q, and for the convenience of the operator the said fans are driven from the shaft-cylinder A by the well-known means of belts and pulleys.

The roller E is also driven from the calender-shaft by the above-named means, and the circumferential speed of the glue-roller is, by preference, made a little greater than that of the cylinder A, to assist the same in carrying the paper or cloth around it by friction, and to effect a better adhesion of the glue to the paper or cloth by rubbing it on. The speed of the roller R, which is geared by belt to the cylinder A, is in excess of the speed of the cylinder A, to secure the necessary tension to the paper or cloth.

The paper or cloth is drawn from the roller B′ or coil, shown by dotted lines, passed under the gluing apparatus through the rack-bars D, and between the pressure-bar F and the glue-roller E, where it receives its coat of glue, over the roller A, where, with the aid of the steam or hot-air blower T, it is partly remelted, and, by the brush X or the cloth W, brought to an even surface. From there the paper or cloth passes under the fan Y, which congeals the melted glue; thence over the roller H and under the platform *b*, over the roller K and past the chute-board N, where it receives the abrasive material, the flow of said material being regulated by a valve at the end of the hopper; thence upward in front of the beater P, where surplus light material is knocked off; thence past the blower Q, by which the glue is remelted, to allow the said material to fasten itself permanently; thence past the cooling-fan Y^1, over the roller L onto the receiving-roller R, or it may pass from the roller L to other rollers in another apartment or apartments, as illustrated by the dotted lines Y^3, for the purpose of being cut up.

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

1. The combination, in the machine described, of mechanism which supplies the glue to the surface of the paper, a heater which remelts the glue, a glue evener or spreader, the mechanism which supplies the emery or glass to the paper, and a beater which acts upon the back of the paper after it has been coated with glue and emery or glass, substantially as herein described.

2. The combination, in the machine described, of the following elements: Stretching or straightening rack-bars D D, glue-melting and supplying mechanism, a heater for remelting the glue, a glue spreader or evener, and emery or glass supplying mechanism, substantially as herein shown and described.

3. The adjustable bar F, having a flexible pressure-strip, *f*, in combination with the devices for adjusting the pressure of the strip, and with the glue-roller, substantially as described.

4. The glue evener or spreader X and the steam or hot-air blower T, in combination with the glue-spreading and emery-scattering machine, as and for the purpose herein described.

5. The emery-hopper M, with an adjustable chute, N, in combination with the rollers K and L, arranged as and for the purpose described.

6. A heater, T, for remelting the glue at a point between the glue-roller and emery or glass hopper, substantially as described.

7. A heater, Q, for remelting the glue upon the surface of the paper after the sand is upon it, substantially as described.

8. The glue-roller E and the receiving-drum R, in combination with the main cylinder A, the said roller, drum, and main cylinder having relatively different speeds, as and for the purpose set forth.

9. The fan Y, applied in the relation shown to the heater T, for cooling the glue and preventing it running too freely while the paper or cloth is passing to the emery or glass scattering mechanism, as set forth.

10. The fan Y^1, arranged in relation to the heater Q, which remelts the glue after the sand has been scattered upon it, for cooling the glue and preventing it running too freely, as set forth.

RICHARD JOHN EDWARDS.

Witnesses:
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