(Specimens.)

2 Sheets—Sheet 1.

J. JORDAN.

MACHINE FOR COATING PAPER, &c.

No. 345,236. Patented July 6, 1886.

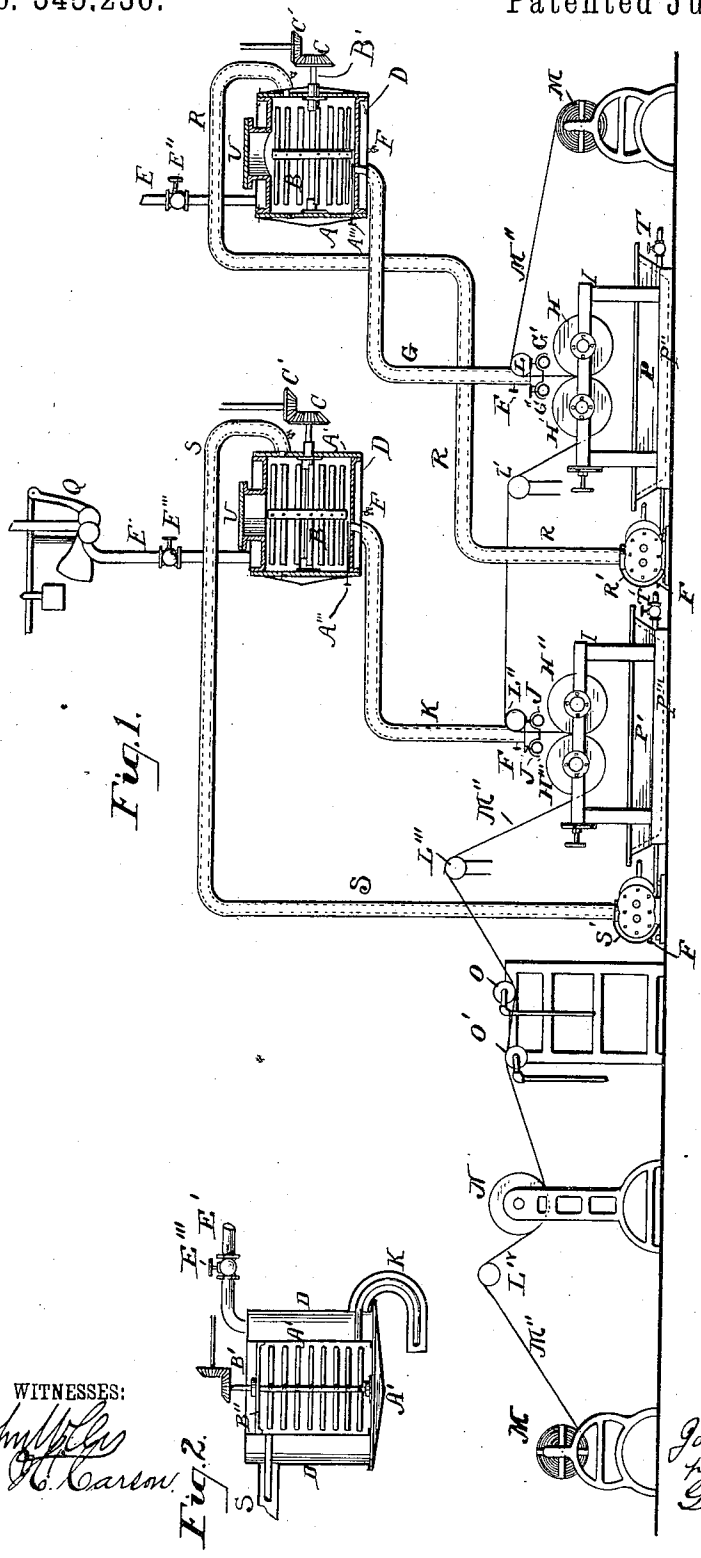


Fig. 1.

Fig. 2.

WITNESSES:

Wm. E. Carson

INVENTOR

Joseph Jordan

per

George E. Buckley

Atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

(Specimens.)

2 Sheets—Sheet 2.

J. JORDAN.

MACHINE FOR COATING PAPER, &c.

No. 345,236. Patented July 6, 1886.

Fig. 3.

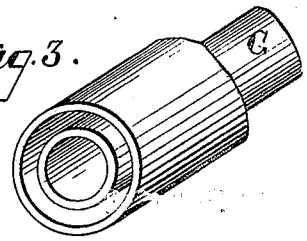


Fig. 4.

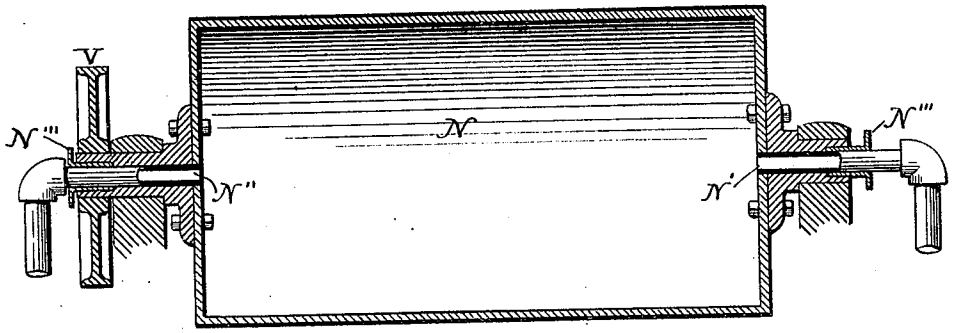


Fig. 5.

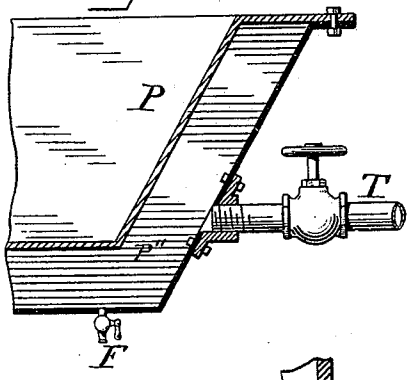


Fig. 6.

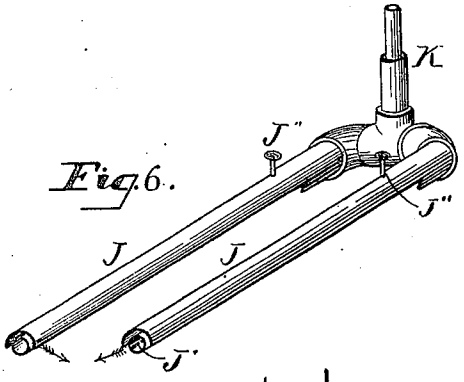
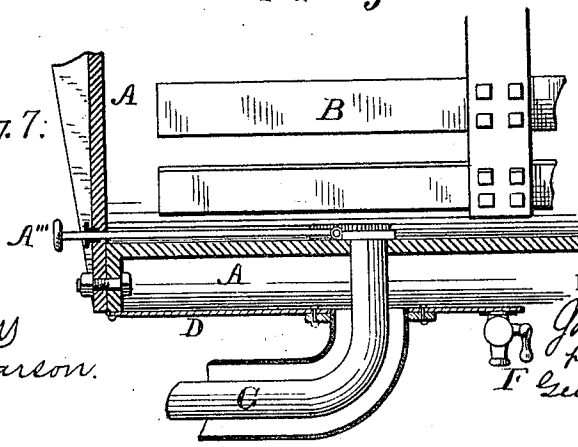


Fig. 7.



WITNESSES:

John D. Cox

Wm. H. Carson.

INVENTOR

Joseph Jordan

per

T. George E. Buckley

atty.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH JORDAN, OF BRIDGEPORT, PENNSYLVANIA.

MACHINE FOR COATING PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 345,236, dated July 6, 1886.

Application filed March 15, 1886. Serial No. 195,221. (Specimens.)

To all whom it may concern:

Be it known that I, JOSEPH JORDAN, a citizen of the United States, and a resident of Bridgeport, Montgomery county, Pennsylvania, have invented certain new and useful Improvements in Machines for Coating Paper or Textile Fabrics with Wax; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings making part hereof.

The nature of my invention will fully appear from the following specification and claims.

In the drawings, Sheet 1, Figure 1, is a longitudinal partly-vertical sectional view of my device and partly in elevation; Fig. 2, a detached view of one of my reservoirs in an upright position; Sheet 2, Fig. 3, a broken perspective view of one of my pipes for conducting the melted waxy composition, showing the enveloping steam-jacket; Fig. 4, a longitudinal sectional view of my revolving cooling-cylinder; Fig. 5, a broken vertical sectional view of one end of my steam-jacketed drip-tank; Fig. 6, a perspective view of my forked spray-pipes, also partially steam-jacketed; Fig. 7, an enlarged broken sectional view of one of my reservoirs with the agitators within, also showing the steam-jacket around the convex sides of the reservoir.

A is a reservoir containing oil and silicate of soda or other solution to saturate the paper with. This reservoir is cylindrical in form, set horizontally, the ends being flat.

B is a horizontal agitator composed of radiating arms set upon a central revolving shaft, B′, which passes through one end of the reservoir, and is turned by the beveled gear-wheels C C′. In Fig. 2, Sheet 1, this agitator is shown with the reservoir in a vertical position, the top of the latter being open, the upper end of shaft B′ being sustained by a cross-bar, B″, and its lower end set in a step or socket in the bottom of the reservior. A steam-jacket, D, surrounds this reservoir, forming a steam-space around the convex sides of the same.

E E′ are steam-pipes opening into the two reservoirs A A′, to supply the steam-jackets thereof with steam. They are provided with suitable stop-cocks, E″ E‴.

A′ is a reservoir constructed similarly to reservoir A, and is designed to contain the waxy composition with which the paper is to be coated.

G is a pipe from the lower part of reservoir A, to conduct the oil to the spraying-tubes G′ G″. The pipe G and all the pipes I employ to conduct the oil or melted waxy compound are provided exteriorly with larger enveloping-pipes, forming annular steam-spaces about the pipes to heat the oil or wax, and thus keep them soft and thin.

H H′ are two compressing hollow rolls, to squeeze out of the web being treated any excess of oil.

H″ H‴ are two similar rolls, to compress the web being treated and remove any superfluous waxy compound. These rolls are mounted on frames I I in ordinary journal-bearings.

J J are spraying-tubes, to spray the melted waxy compound on the web. The construction of these spraying-tubes G′ G″ and J J is illustrated in Fig. 5, Sheet 2, where it will be seen they are partially enveloped by steam-jackets, the lower part not being covered to permit the egress of the melted material through the lines of spraying-holes in the lower side of the inclosed pipe. These spraying-tubes J J are forked, as shown, both terminating in the pipe K.

L L′ L″ L‴ L^{iv} are carrying-rolls, over which the web which is being treated passes. All these carrying-rolls, excepting L, are coated with a non-adhesive rubber covering, whereby the paper is prevented from sticking to them. All the rolls and cylinders are made of metal.

M represents a roll of plain paper to be treated mounted on a reel, M′, the roll of paper, after treatment, finished.

M″ is the web of paper under treatment in course of passage through the machine.

N is a hollow cooling-cylinder, through the hollow journals of which a continuous current of cool water passes. The water enters through one end and passes out of the other. These journals are provided with suitable stuffing boxes to make close joints. This cylinder is covered with a non-adhesive rubber-surface coating.

O O′ are small heating-rolls, which are heated by jets of steam introduced through the journals. The interiors of these two rolls may be heated by leaving the heads open and burning gas in jets from openings in the hol-

low shaft, which passes through the cylinder in such case, the gas being introduced through the hollow journals. These two rollers turn in the direction of the traverse of the paper, but at slightly-greater speed than the paper is traveling, in order to create a friction and impart a polish to the surface of the paper. The web of paper passes from the roll M over carrying-roll L, thence down between rolls H H′, then under roll H′, over carrying-rolls L′ L″; then down between pressure-rolls H″ H‴, under roll H‴, over carrying-roll L‴, under heating-roll O, over heating-roll O′, under cooling-roll N, over carrying-roll L^{iv}, and it is then wound in a roll, M′, upon a suitable reel. All the rolls excepting the carrying-rolls are driven by belt and pulley. The carriers L L′ L″ L‴ L^{iv} are driven by the motion of the paper.

P P′ are drip-tanks to catch the drip as it falls from rolls H H′ and H″ H‴. These tanks are provided with steam-jackets P″ P‴, respectively, at the sides and bottom, to keep their contents heated. The large pipes which envelop and form steam-jackets around the smaller pipes containing the oil or waxy compound all empty into the steam-jackets surrounding the vessels, where they terminate, while the smaller inclosed pipes pass through the last-named steam-jackets into the interiors of the vessels which they enter.

A steam-damper, Q, is located upon each of the steam-pipes E and E′, though I have shown it in the drawings only upon the latter. These dampers are designed to regulate the pressure and keep it equable, whereby a steady and unvarying heat is maintained in all the steam-jackets.

R is a pipe passing from the rotary pump R′ to the reservoir A. It is also enveloped by a steam-jacket as well as the periphery of the pump. This pipe R conveys the oil from the pump R′ to the upper part of reservoir A, the oil flowing to the pump from the bottom of tank P, through a short pipe, as shown.

S is a pipe similar to pipe R, to convey the waxy compound from rotary pump S′ to the top of reservoir A′, the compound flowing from the drip-tank P′ to the pump S′, through a short pipe, as shown.

Each reservoir is provided with a slide-valve, A‴, (see Fig. 7,) which closes or opens the passage to the exit-pipes of the reservoir, whereby the supply of material to the paper-web may be controlled.

In Fig. 6, J′ indicates the perforations in the spraying-tubes, and J″ J″ cocks to regulate the feed of the material to each spraying-tube. The direction of the spray is downward and inward from each tube, as indicated by the arrows. In Fig. 7 is also shown the enveloping steam-jacket pipe in black lines surrounding pipe G.

F F in all the figures are small cocks to carry off the water resulting from the condensation of the steam.

T T, Figs. 1 and 5, are steam-pipes from a steam-boiler entering the steam-jackets of the drip-tanks.

U U are supply-holes, through which material for treating the paper may be fed to the reservoirs A and A′. I have shown them with covers. In the form of reservoir shown in Fig. 2, however, the top of the reservoir is left open.

Fig. 3 shows my hollow cooling-cylinder N and the pipe N′ through the journal at one end, where the water enters the cylinder, and pipe N″ through the journal at the other, where it flows out.

N‴ N‴, Fig. 4, are the stuffing-boxes.

I have not shown in the drawings the pulleys and bolts for driving the rolls and cylinders; but these devices are common, and will suggest themselves to the mind of any ordinary mechanic, together with their mode of application.

While cloth, calico, and other fabrics may be treated by my machine to give them a coating or sizing, I will confine myself in my description to the treatment of paper for this purpose.

The object of the special construction of my device shown in the drawings is to first saturate the paper with an oil to fill up its body, and then to coat the two surfaces with a waxy composition, which will render the paper non-adhesive and impervious to air or moisture.

One of the prime necessities in coating paper with a waxy compound is that the latter should be kept in a heated and therefore melted thin condition while being manipulated. I accomplish this by my system of surrounding every pipe and receptacle through which the composition is passing with a steam-jacket supplied, directly or indirectly, with steam from a steam-boiler. This wax I color, if desired, and scent before it goes into the machine while in a melted state. The oil and waxy compound which I prefer to use is that described in my Letters Patent of February 23, 1886; but my machine is adapted for sizing paper, calico, muslin, and other webbings or cloths with any of the preparations now in use for that purpose and well known in the arts.

V, Fig. 4, is a pulley to drive cooling-roll N.

I shall describe the operation of my device as though it were intended to first saturate paper with oil, and in a subsequent stage of the process coat it with wax upon both sides. If it is desired to coat it only with wax, dispensing with the oil, the reservoir A, pipes G and R, and rolls H H′ and their immediate connections can be dispensed with, and the web of paper can in such case be carried directly from the roll M to the rolls H″ H‴.

The general construction and operation of both sets of rolls and their attachments are about the same, and a description of one set will answer for the other. The web of paper is first drawn through the machine from roll M, in the manner shown in Fig. 1, until sufficient of it is wrapped around the end reel

for the latter to take hold of it to start the roll M′. The reservoir A is then filled with oil combined with silica, and the reservoir A′ with paraffine or other wax mixed with some coloring-matter and scent. The apparatus being now ready for operation, steam from the boiler is let into pipes E E′ and T T′, and the steam-jackets around the reservoirs, pipes, pumps, and tanks are thus quickly filled with steam, and their interiors are heated. This heat soon melts the wax in reservoir A′, which can be observed by the operator looking in at the top, which I leave open, as in Fig. 2, Sheet 1. Valve A‴ of reservoir A is then opened, and the oil and melted wax flow simultaneously down pipes G and K, respectively, to the sprayers. When the wax is sufficiently melted to flow, the operating machinery is started, and the rolls and agitators are revolved by means of the belting above referred to. The pulleys are so arranged respecting size that the rolls O O′ while revolving in the same direction as that of the traverse of the paper yet travel at a greater speed than the latter, whereby they have a frictional bearing on the paper and polish and finish its two surfaces. The paper is now passing through the machine, and the cocks J″ J″ of the two sets of sprayers are opened. As the paper passes between the sprayers G G′, it receives upon each surface a spray of mixed oil and silicate. It then passes down, and is compressed between the rolls H H′, whereby all superfluous oil is expressed from it, and the excess drips down into the tank P. The web then passes over the intermediate carrying-rolls and down between the two sprayers above the rolls H″ H‴, wherefrom its surfaces receive sprays of the melted waxy compound above referred to. It then passes between the two compressing-rolls H″ H‴, whence all excess of wax drips down into tank P′. The object of first soaking the paper in oil is to so charge its body with that liquid as to prevent it from absorbing or taking up an excessive quantity of wax. I thus economize in production, as wax is much more expensive than oil. The paper is also much more flexible when soaked with the oil and less liable to split or crack. The paper then passes over carrying-roll L‴ and under the heated roll O, from which its upper surface receives a finish and polish. It then passes over the heated roll O′, from which its under surface receives a similar finish and polish or gloss. The friction of these warm rolls has these results. The paper then reaches the cooling-cylinder N, which is full of a constantly-changing supply of cool water. The cool surface of this cylinder absorbs the heat from the soft waxy surface of the paper, cools the latter throughout, and "sets" the coating. The finished paper then passes on and is rolled up, as at M′. All the rolls, with the exception of the heated ones O O′, travel at the same rate of speed as the paper, and, in fact, excepting the carrying-rolls, are the agents in moving it. The oil and wax, respectively, in the drip-tanks is returned to the reservoirs by means of the pumps R′ and S′, through the intermediary of the steam-jacketed pipes R. As mentioned above, these steam-jackets prevent the contents of the pipes and other vessels from "setting" or thickening while circulating through the machine. By means of my pumps I maintain a continuous circulation of considerable of the materials which I employ in my operation. The height of the reservoirs above the sprayers results in driving the thin material through the spraying-holes under considerable pressure.

Melted waxes will very quickly set or harden when moved from point to point through tubes or pipes, unless by some means a considerable amount of heat is made to accompany them. I accomplish this by means of my above-described steam-jackets. As I have mentioned above, I control the degree of heat which is applied to my wax by means of the steam-damper, and so regulate the density of the wax or oil, for the density of these substances decreases in proportion to the increase of heat.

The steam-damper may be called a "steam-regulator," and I shall so name it in my claims.

The agitators in the reservoirs serve to make the consistency of their contents uniform throughout.

The drip-tanks may also be called "drip-receivers."

The rolls H H′ and H″ H‴ are set so as not to dip into the contents of tanks P or P′.

I am well aware that heated rigid pipes have heretofore been used in place of my two fast traveling rolls, O O′; but light paper was apt to be so dragged by these pipes as to be torn and broken, thus resulting in great loss and uncertainty as to results. My friction upon the surface of the paper is attained by a motion which assists it in its progress, and the speed of the rolls can be graduated by the size of the pulleys which drive them, whereby they can be made to travel at a speed only little greater than that of the traverse of the paper. I can also regulate these rolls to run at different speeds, whereby I can impart a finish upon one side of the paper different from that upon the other side.

I can color the oily compound, instead of the wax, and by this means remove, possibly, deleterious coloring-matter from the surface, as the wax will cover it, but by its transparency will still admit of its showing.

I heat the rolls H H′ and H″ H‴ with steam through their journals in substantially the same manner that the cylinder N is cooled with water. The heat of these rolls prevents the oil or wax from caking, clogging, or hardening while passing through them.

I am well aware of the device heretofore described in United States Letters Patent No. 305,424, of September 23, 1884, and I do not claim the same as my invention; but

What I claim as new is—

1. In a machine for sizing paper and other fabrics, the combination of reservoir A′, to contain the sizing, steam-jacketed pipe K, sprayers J J, connected with said pipe, compressing-rolls H″ H‴, mounted above a drip-tank, P′, pump S′, connected by a pipe with the interior of said drip-tank, and steam-jacketed pipe S, connecting said pump and the reservoir, substantially as and for the purpose described.

2. In a machine for sizing paper and other fabrics, the combination of reservoir A′, to contain the sizing, interior agitator, B, steam-jacketed pipe K, sprayers J J, connected with said pipe, compressing-rollers H″ H‴, mounted above a drip-tank, P′, pump S′, connected by a pipe with the interior of said drip-tank, and steam-jacketed pipe S, connecting said pump and the reservoir, substantially as and for the purpose described.

3. In a machine for sizing paper and other fabrics, the combination of the steam-jacketed reservoir A′, to contain the sizing, steam-pipe K, sprayers J J, connected with said pipe, compressing-rolls H″ H‴, mounted above a drip-tank, P′, pump S′, connected by a pipe with the interior of said drip-tank, and steam-jacketed pipe S, connecting said pump and the reservoir, substantially as and for the purpose described.

4. In a machine for sizing paper and other fabrics, the combination of reservoir A′, to contain the sizing, steam-jacketed pipe K, sprayers J J, connected with said pipe, compressing-rolls H″ H‴, mounted above a drip-tank, P′, steam-jacketed pump S′, connected by a pipe with the interior of said drip-tank, and steam-jacketed pipe S, connecting said pump and the reservoir, substantially as and for the purpose described.

5. In a machine for sizing paper and other fabrics, the combination of reservoir A′, to contain the sizing, pipe K, sprayer J, connected with said pipe, compressing-rolls H″ H‴, mounted above a drip-receiver, P′, pump S′, connected with the receiver, and pipe S, connecting the pump with the reservoir, whereby the drip of the sizing is pumped back to the reservoir to be reused, substantially as described.

6. In a machine for sizing paper and other fabrics, the combination of steam-jacketed reservoir A′, to contain the sizing, provided interiorly with an agitator, B, steam-jacketed pipe K, sprayer J, connected with said pipe, compressing-rolls H″ H‴, mounted above a drip-tank, P′, steam-jacketed pump S′, connected by a pipe with the interior of said drip-tank, and steam-jacketed pipe S, connecting said pump with the reservoir A′, all arranged and operating substantially as described.

7. In a machine for sizing paper and other fabrics, the combination of steam-jacketed reservoir A′, to contain the sizing, provided interiorly with an agitator, B, steam-jacketed pipe K, sprayer J, connected with said pipe, compressing-rolls H″ H‴, mounted above a drip-tank, P′, steam-jacketed pump S′, connected by a pipe with the interior of said steam-jacketed drip-tank, and steam-jacketed pipe S, connecting said pump with the reservoir A′, all arranged and operating substantially as described.

8. In a machine for sizing paper and other fabrics, the combination of a heated reservoir to contain the sizing, a steam-jacketed pipe to convey the sizing to the point of application to the paper, a heated drip-tank, P′, a pump, and steam-jacketed pipe to carry the sizing back to the reservoir, all arranged and operating substantially as described.

9. In a machine for sizing paper and other fabrics, the combination of a steam-jacketed reservoir to contain the sizing, a steam-jacketed pipe to convey the sizing to the point of application to the paper, a heated drip-tank, P′, a pump, and steam-jacketed pipe to carry the sizing back to the reservoir, all arranged and operating substantially as described.

10. In a machine for sizing paper and other fabrics, the combination of a heated reservoir to contain the sizing, interior agitator, B, a steam-jacketed pipe to convey the sizing to the point of application to the paper, a heated drip-tank, P′, a pump, and steam-jacketed pipe to carry the drip-sizing back to the reservoir, all arranged and operating substantially as described.

11. In a machine for sizing paper and other fabrics, the combination of the steam-jacketed reservoir A′, provided interiorly with an agitator, B, the steam-jacket being supplied with steam from pipe E′, upon which is located the steam-pressure regulator Q, by means of which an equable desired temperature may be maintained about the parts heated by the steam, steam-jacketed pipe K, passing from the reservoir to the sprayer J, compressing-rolls H″ H‴, drip-receiver P′, pump S′, connected with said receiver, and steam-jacketed pipe S, passing from the pump to the reservoir, whereby the drip may be returned to the reservoir for reuse, substantially as described.

12. In a machine for sizing paper and other fabrics, the combination of the steam-jacketed reservoir A′, provided interiorly with an agitator, B, the steam-jacket being supplied with steam from pipe E′, upon which is located the steam-pressure regulator Q, by means of which an equable desired temperature may be maintained about the parts heated by the steam, steam-jacketed pipe K, passing from the reservoir to the sprayer J, compressing-rolls H″ H‴, drip-receiver P′, steam-jacketed pump S′, connected with said receiver, and steam jacketed pipe S, passing from the pump to the reservoir, whereby the drip may be returned to the reservoir for reuse, substantially as described.

13. In a machine for sizing paper and other fabrics, the combination of the elevated reservoir A, to contain the sizing, pipe K′, to conduct the sizing from the reservoir to the sprayer J, compressing-rolls H″ H‴ beneath

said sprayer and drip-tank P′, the said rolls being set at an elevation above the point or plane which would bring them into contact with the contents of the said tank, all arranged and operating substantially as described.

14. In a machine for sizing paper, the combination of the carrying-rolls, substantially as shown, and fast-traveling heated rolls O O′, set to travel at a greater velocity than that of the traverse of the paper being treated, substantially as and for the purpose described.

15. In a machine for sizing paper, the combination of the carrying-rolls, substantially as shown, the hollow cooling-cylinder N, provided with pipes leading into its hollow journals, whereby a current of water may be passed continuously through it, and a final reel to receive and wind up the roll M′ of finished sized paper, substantially as described.

JOSEPH JORDAN.

Witnesses:
WM. H. CARSON,
GEORGE E. BUCKLEY.