No. 765,508. PATENTED JULY 19, 1904.

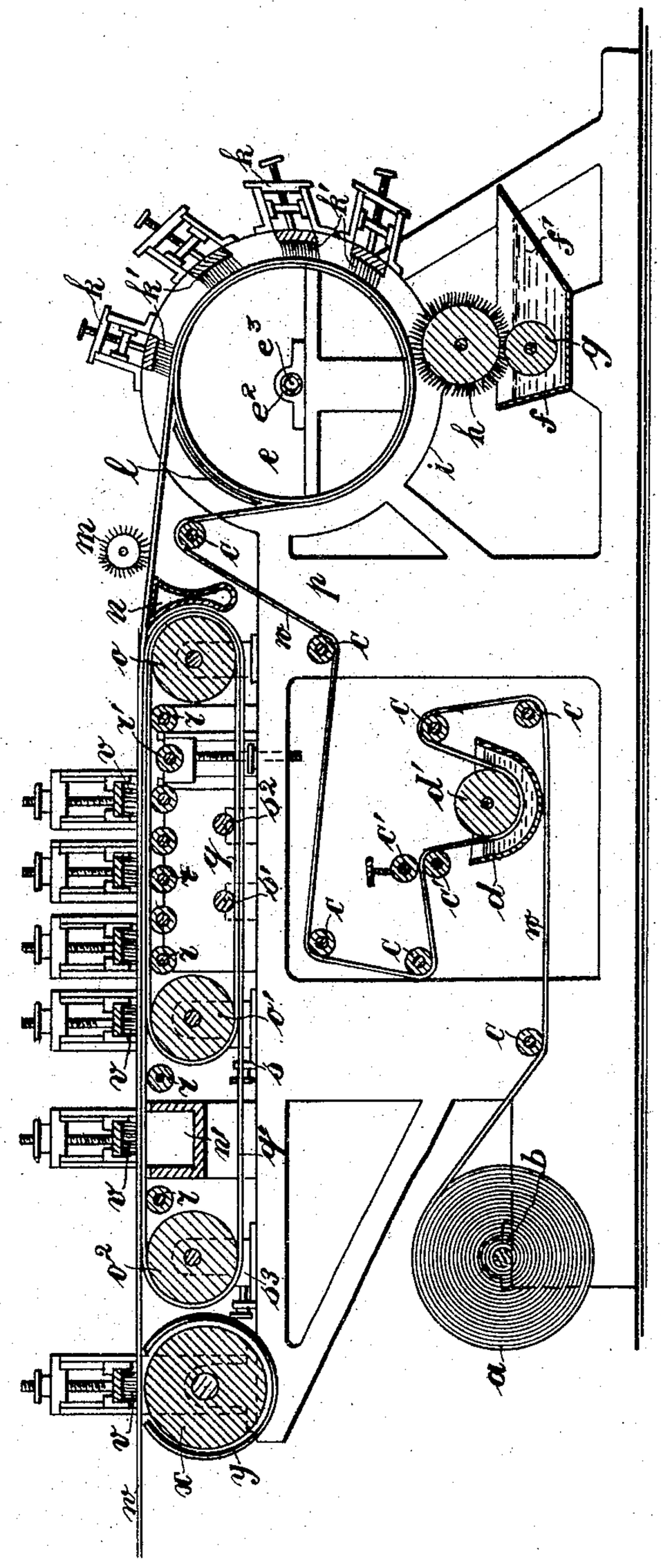
L. W. NOYES.

MACHINE FOR COATING PAPER OR LIKE MATERIALS.

APPLICATION FILED DEC. 19, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

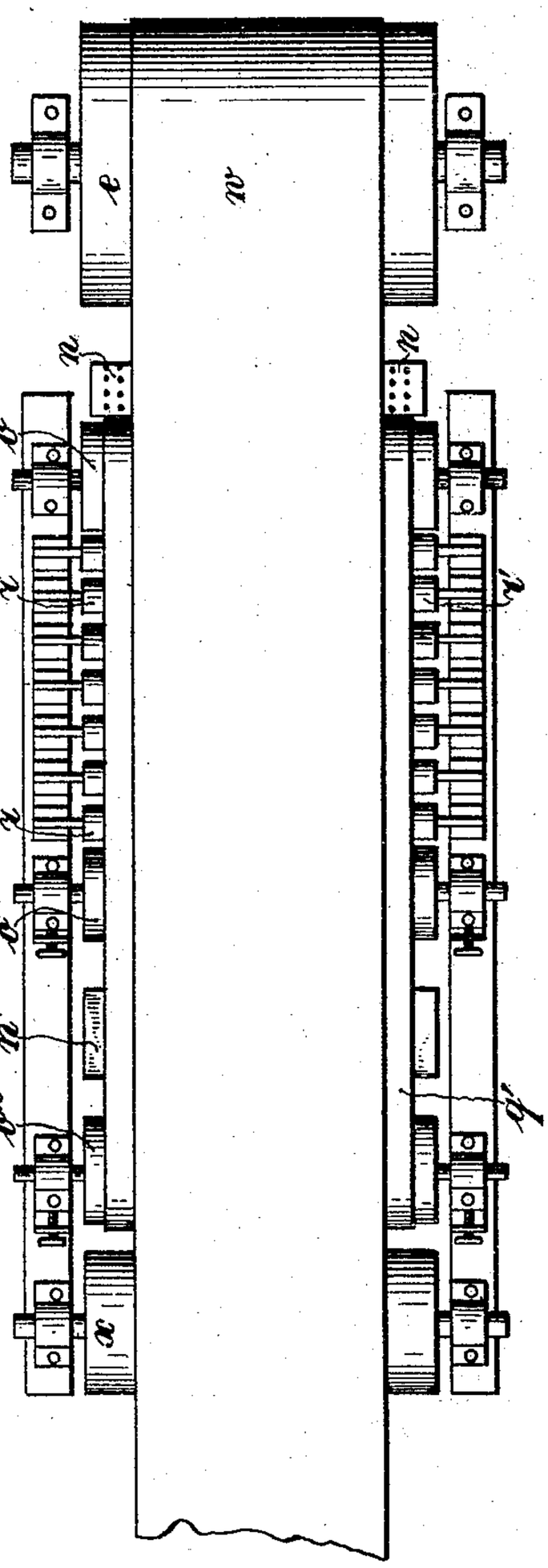
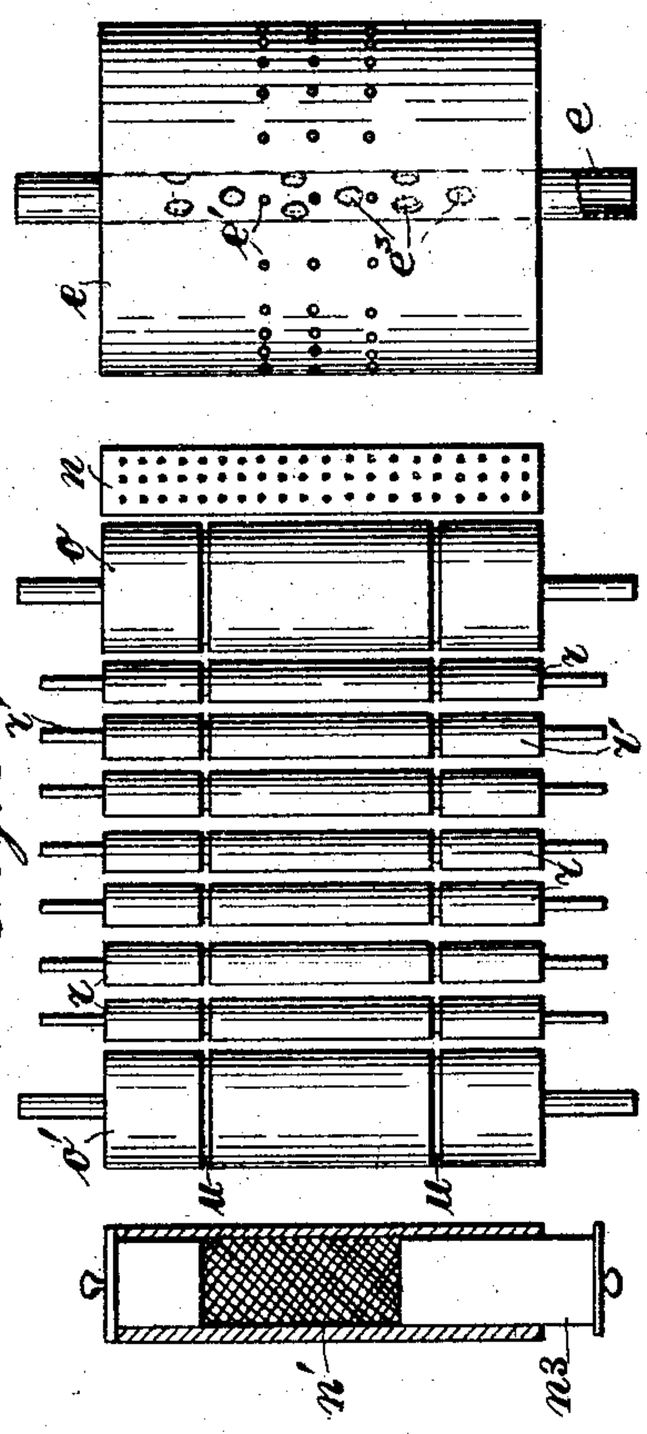


Fig. 3.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

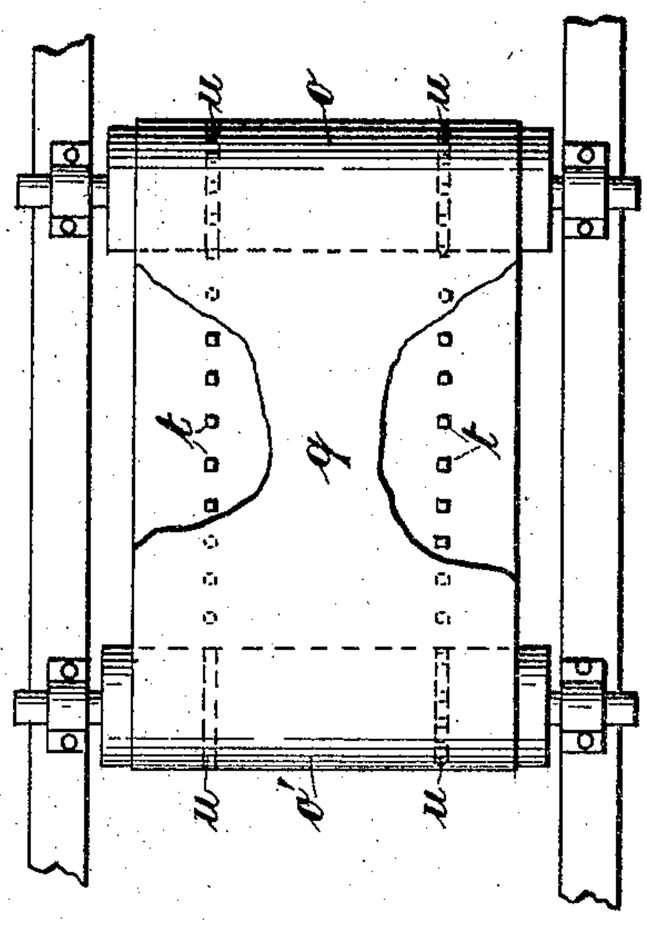


Fig. 7.

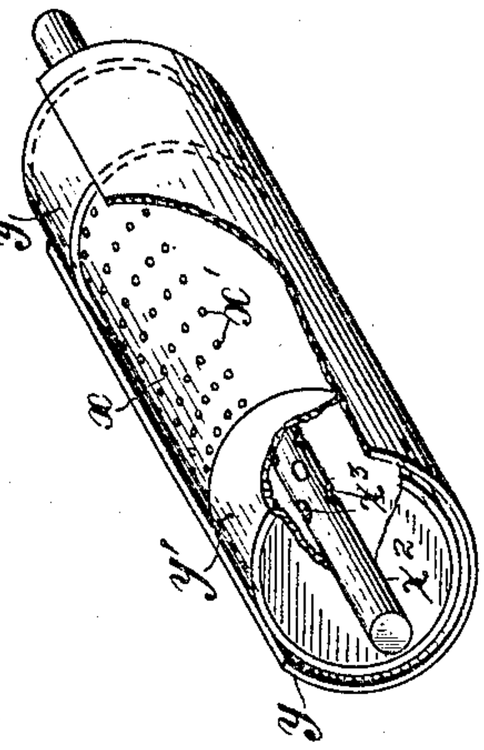


Fig. 4.

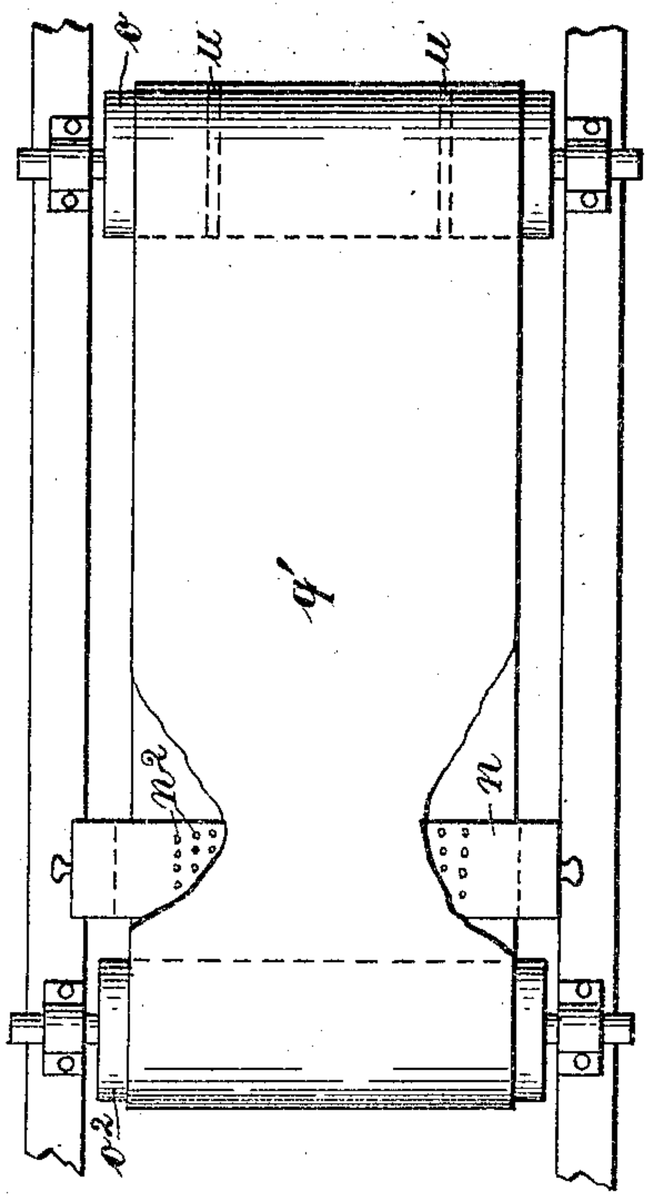
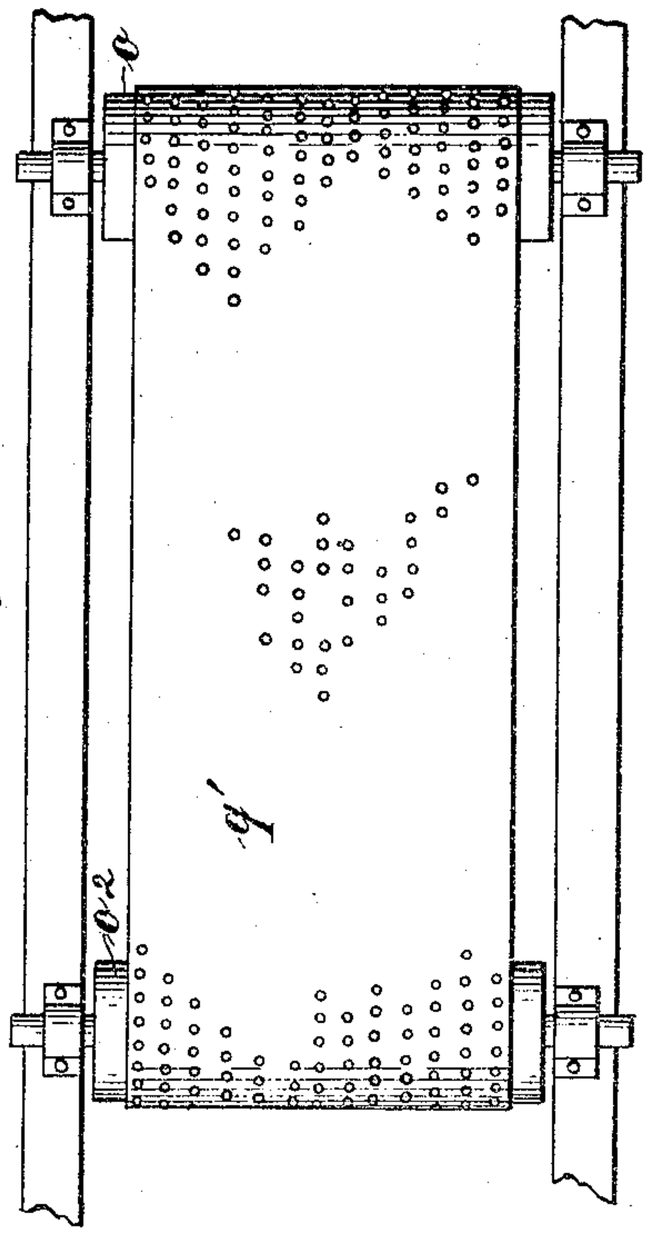


Fig. 5.



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No. 765,508. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

LEWIS W. NOYES, OF MECHANICSVILLE, NEW YORK.

MACHINE FOR COATING PAPER OR LIKE MATERIALS.

SPECIFICATION forming part of Letters Patent No. 765,508, dated July 19, 1904.

Application filed December 19, 1903. Serial No. 185,894. (No model.)

To all whom it may concern:

Be it known that I, LEWIS W. NOYES, a citizen of the United States of America, and a resident of Mechanicsville, in the county of Saratoga, State of New York, have invented certain new and useful Improvements in Machines for Coating Paper or Like Materials, of which the following is a specification.

This invention relates to improvements in machines for coating paper and like materials.

It is the special object of this invention to provide a paper-coating machine by means of which a more perfect paper is obtained. At the same time a larger quantity of paper may be run through the machine. Heretofore only from one hundred and fifty to one hundred and seventy-five feet of paper could be run through a paper-coating machine per minute under most favorable circumstances, while under same conditions I am enabled to run over three hundred feet of paper through my novel machine per minute and still get a better product. To attain this desirable result, I have provided devices which, during the operation of the machine, keep the paper perfectly flat and prevent the web from curling on the edges or from cockling.

My improved paper-coating machine comprises, essentially, a conveyer, for which I have filed application for Letters Patent of the United States on the 14th day of December, 1903, which application bears Serial No. 185,012.

The invention further consists in a sizing device, through which the web of paper passes before the coating material is applied, and in a rotatable and perforated suction-roll with brush attached thereto, as well as in the construction and application of details and the arrangement of various parts of the machine.

The novel paper-coating machine is illustrated in the accompanying drawings, in which—

Figure 1 represents in longitudinal vertical section a machine which embodies my invention. Fig. 2 is a top plan of same with the parts above the web removed. Fig. 3 illustrates in top plan a perforated drum, a number of rolls, and suction devices. Fig. 4 shows in top plan view a long endless apron, partly broken away. Fig. 5 illustrates in top plan view the long apron with perforations. Fig. 6 shows in top plan a short apron, partly broken away; and Fig. 7 illustrates in detail a rotatable suction-roll.

Similar characters of reference denote like parts in all the figures.

The machine is devised for use in manufacturing paper which is coated on one side only. If it is desired to coat the paper on both sides, then same is run through the machine twice. In this way a better quality of paper is produced than with machines which coat the paper on both sides simultaneously.

In Fig. 1 the web of paper *w* runs from the roll *a* on the reel *b* over a number of guiding-rolls *c*. A sizing device is provided between the roll of paper and the coating devices. This device *d* consists, simply, of a vessel holding the sizing material and a large roll *d'*, around which the web of paper runs while passing through the sizing solution. Above the sizing device *d* there are two rolls *c'*, between which the web passes and by means of which an excess of the sizing solution is pressed out. After leaving the rolls *c'* the web passes over some more guiding-rolls *c* and may then be subjected to the action of an air-blast which is not shown in the drawings. Now the web reaches a drum *e*, below which the coating devices are located. From the drum *e* the web passes through the conveyer and over the rotatable suction-roll on to the drying apparatus.

The drum *e* is hollow and has perforations *e'*. (See Fig. 3.) It is provided with a shaft e^2, which has perforations e^3 in its middle portion, which is located within the drum. The drum acts as a suction-roll which draws the web tightly down on its top surface. Below the drum there is a vessel *f*, containing the coating material *f'*. A hollow copper roll *g* is arranged within the vessel *f*, and above same a circular coating-brush is permanently mounted, so that it is in contact with the copper roll *g* and the web of paper. When the machine is in operation, the copper roll *g* carries the coating material up to the circular coating-brush, which in turn deposits the coating material on the web of paper. The drum *e* is surrounded by a shield *i*, forming an almost complete circle. Four brush-frames

k are secured in this shield. The brushes *k'* are adjustably mounted in these brush-frames, so that they may be brought down upon the coated surface of the paper in the proper position for acting effectively thereon. These brushes practically extend across the whole width of the drum.

The shield *i* around the drum *e* is interrupted on the side where the web of paper enters and leaves same. In order to prevent too much atmospheric air from being sucked through the drum, whereby power would be wasted, an arc-shaped device *l* is provided for covering said space as far as the perforations go. This device *l* may be made of wood or metal and is covered inside with felt. Near the drum *e* a dancing-brush *m* is located, which acts on the coated surface of the web. A suction-box is permanently secured near and below the dancing-brush. It has a relatively large top surface which is perforated and extends across the whole width of the machine, drawing the web tightly down. The side walls of this suction-box are curved in, and the inner curved side wall corresponds to the circumference of an adjoining roll *o*. A similar roll *o'* is provided at a certain distance, and a third roll o^2 is somewhat farther away. These three rolls are substantially mounted on suitable framework *p* and carry the endless aprons. A short apron of continuous material, which is preferably made of rubber, runs over the rolls *o o'*. A long endless and perforated apron *q'*, which may be made of perforated rubber or wire, runs over the rolls *o* o^2 and over said short apron *q*. These two aprons form a double or compound apron, which in combination with the other parts of the conveyer work very reliably.

Between the rolls *o o'* there are a number of small rolls *r*, which form a bed for the short apron *q*. These bed-rolls *r* are mounted within a suitable box and answer the same purposes as the old-fashioned bridge. The rolls *r* are all adjustable and may be raised or lowered on either side by any suitable means. As shown in Fig. 1 the short apron *q* passes around the rolls *o o'* and over the rolls *r*, which latter form a substantial bed for the short apron, and consequently for the long apron and the web. For the purpose of stretching the short apron a device *s* is provided near the roll *o'*. This device is of usual construction and works by means of a screw. The auxiliary stretching devices or set-ups *s' s²* are secured upon the frame *p*. They reach beyond the aprons and are adapted to assist in stretching same. Another stretching device s^3 is located near the roll o^2 for the purpose of assisting in stretching the long apron. One of the bed-rolls located beneath the short apron is mounted in adjustable bearings somewhat below the others, as shown in Figs. 1 and 2. This roll *r'* may be raised or lowered on either side during the operation of the machine for the purpose of adjusting slack edges. By means of this arrangement the web sags whereby any slack edges are adjusted. If, for instance, a slack edge is on the right side of the web, then the roll *r'* is somewhat lowered on the right side, but when a slack edge occurs on the left side of the web then the roll will be somewhat lowered on the left side.

In order to prevent any side play of the aprons, and consequently of the web moving over same, there is a guiding device provided partly on the lower surface of the short apron and partly on the various rolls over which said apron runs. The short apron has lugs *t* on its inner surface. Two rows of lugs *t* are illustrated in Fig. 6, which shows the short apron partly broken away. The rolls *o o'* and the bed-rolls *r*, as well as the lower roll *r'*, all have circular grooves *u*. The lugs *t* are so arranged on the short apron that they travel in these grooves *u* whereby a uniform and steady movement of the short apron is assured, and consequently of the long perforated apron and the web. This guiding device aids in rendering the machine capable of high speed. In Fig. 3 two rows of such grooves *u* are shown in all the rolls over which the short apron travels.

Between the rolls *o' o²* a supplemental suction-box *n'* is provided, which also extends across the entire width of the machine and has a perforated top surface. By drawing air out of the box *n'* the perforated apron and the web of paper will be sucked down on same. This facilitates the work of the brushes *v*, one of which is located directly above this suction-box and a number of others which are above the short apron. The brushes likewise extend across the whole width of the machine and are adjustably mounted, so that they may be raised or lowered, and thereby brought into the proper position for acting in the desired manner on the coated surface of the paper.

When the web of paper leaves the perforated apron *q'*, it passes a rotatable suction-roll *x* before entering the drying apparatus. This suction-roll has perforations *x'* in its center portion and is provided with a hollow shaft x^2, which has perforations x^3 in its middle portion. The roll is almost completely surrounded by a shield *y*, as shown in detail in Fig. 7. The shield *y* prevents the atmospheric air from being sucked uselessly through the roll. As shown in Fig. 1, it is only open at the top where the web of paper passes. Above the open part on the roll *x* a brush *v* is adjustably mounted the same as the other brushes *v* above described. In addition thereto the suction-roll *x* is run at a slightly higher speed than the rest of the machine, whereby a steady draft is exerted on the entire web of paper which runs through the machine.

When a web of paper of smaller diameter

than the perforated portions of the suction devices is conveyed through the machine, then it is desirable to cover the end portions of said suction devices. This is done for the purpose of preventing atmospheric air from being uselessly drawn through the machine. The suction-boxes which are stationarily mounted may simply be covered up on the perforated side ends. The suction-drum *e* preferably is perforated in its center portion only, and as a rule does not require any device for closing off part of the perforations. The supplemental suction-box may be provided with slides n^3, which close off part of the perforations, as shown in Fig. 3. The suction-roll *x*, which is surrounded by a shield may have part of its perforations closed off by applying to its side ends flexible metal sheets *y'*, which may be covered with felt. (See Fig. 7.) These sheets may be introduced by removing the brush *v* above this roll.

By means of my improved machine the web of paper or fabric is conveyed through same in a quick and reliable manner, producing at the same time a better quality of paper by virtue of the novel system of suction devices.

It occurs frequently that a roll of paper is unevenly calendered. When such a roll is run through a coating-machine, it will not lie flat on the bed, and consequently when it passes under the brushes the action of the latter on such uneven paper produces streaks in the coated surface. The object of these suction devices is to suck down or flatten the web, so as to avoid the production of imperfect paper.

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

1. A machine for coating paper and like materials consisting essentially of a reel, a number of web-guiding rolls, a device for applying a weak sizing solution, a perforated drum mounted on hollow bearings, reciprocating brushes adjustably mounted thereon, a coating device below said drum, a dancing brush near the drum, a conveyer comprising a compound apron, a supplemental suction-box, and a perforated suction-roll mounted on hollow bearings having a shield surrounding it except on its top portion where the web passes, and a brush above said open portion.

2. In a paper-coating machine, a system of suction devices consisting of a perforated drum over which the web passes after being coated, a suction-box stationarily mounted in front of the conveyer, a supplemental suction-box stationarily mounted behind the conveyer, a rotatable suction-roll adapted to be revolved at a slightly higher speed than the rest of the machine, having a shield surrounding it except on its top portion where the web passes, a brush above said open portion, and means for conveying the web through the machine.

3. In a paper-coating machine, a suction-box stationarily mounted in front of the conveyer, a supplemental suction-box stationarily mounted behind the conveyer, and a rotatable suction-roll mounted on hollow bearings and adapted to be run at a slightly higher speed than the rest of the machine, a shield thereon surrounding it except on its top portion where the web passes, a brush adjustably mounted above said open portion, and means for conveying the web through the machine.

4. In a paper-coating machine, a perforated drum around which the coated web runs, a suction-box stationarily mounted between the conveyer and the drum having a relatively large perforated top surface, a perforated suction-roll mounted on hollow bearings and adapted to be run at a slightly higher speed than the rest of the machine, a shield on said roll surrounding it except on its top portion where the web passes, a brush above same, and means for conveying the web through the machine.

5. In a paper-coating machine, a suction-roll mounted on hollow bearings and adapted to be run at a slightly higher rate of speed than the rest of the machine, perforations on its center portion, a shield surrounding it except at the top where the web passes and metal sheets or slides adapted to be applied to its side ends, a brush above said open top portion of the roll, and means for conveying the web through the machine.

6. In a paper-coating machine, a reel for the roll of paper, guiding-rolls, a sizing device, a coating device, a conveyer, and a suction-roll adapted to be run at a slightly higher rate of speed than the rest of the machine, a shield thereon surrounding it except at the top portion where the web passes, and a brush above said top portion.

7. In a paper-coating machine, a reel for the roll of paper, guiding-rolls, a sizing device, a perforated drum, having reciprocating brushes thereon and an arc-shaped device on the perforations not covered by the web, a coating device below the drum, a conveyer comprising a double apron and brushes, a supplemental suction-box, and a suction-roll with shield and brush at the other end of the conveyer.

8. In a paper-coating machine, a reel for the roll of paper, guiding-rolls, a sizing device, a perforated drum with reciprocating brushes and an arc-shaped cover thereon, a coating device below said drum, a dancing brush acting on the web when it leaves the drum, a suction-box near and below said dancing brush, a conveyer comprising a double apron with brushes, a supplemental suction-box with brush, and a suction-roll with shield and brush at the other end of the conveyer.

Signed at New York, N. Y., this 12th day of December, 1903.

LEWIS W. NOYES.

Witnesses:

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