

C. F. PEASE.
COATING MACHINE.
APPLICATION FILED JULY 19, 1912.

1,125,166.

Patented Jan. 19, 1915.

5 SHEETS—SHEET 1.

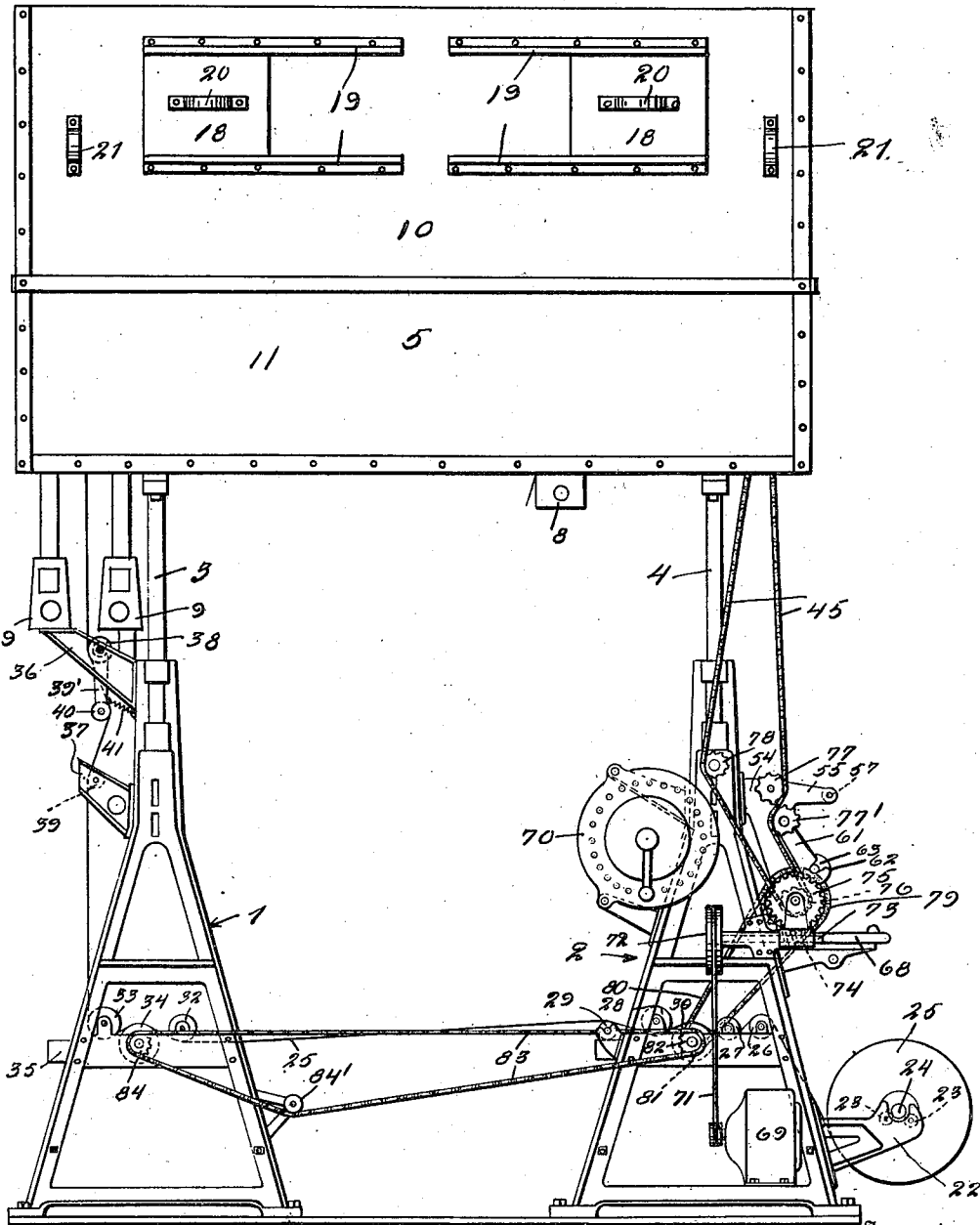


Fig. 1.

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Witnesses

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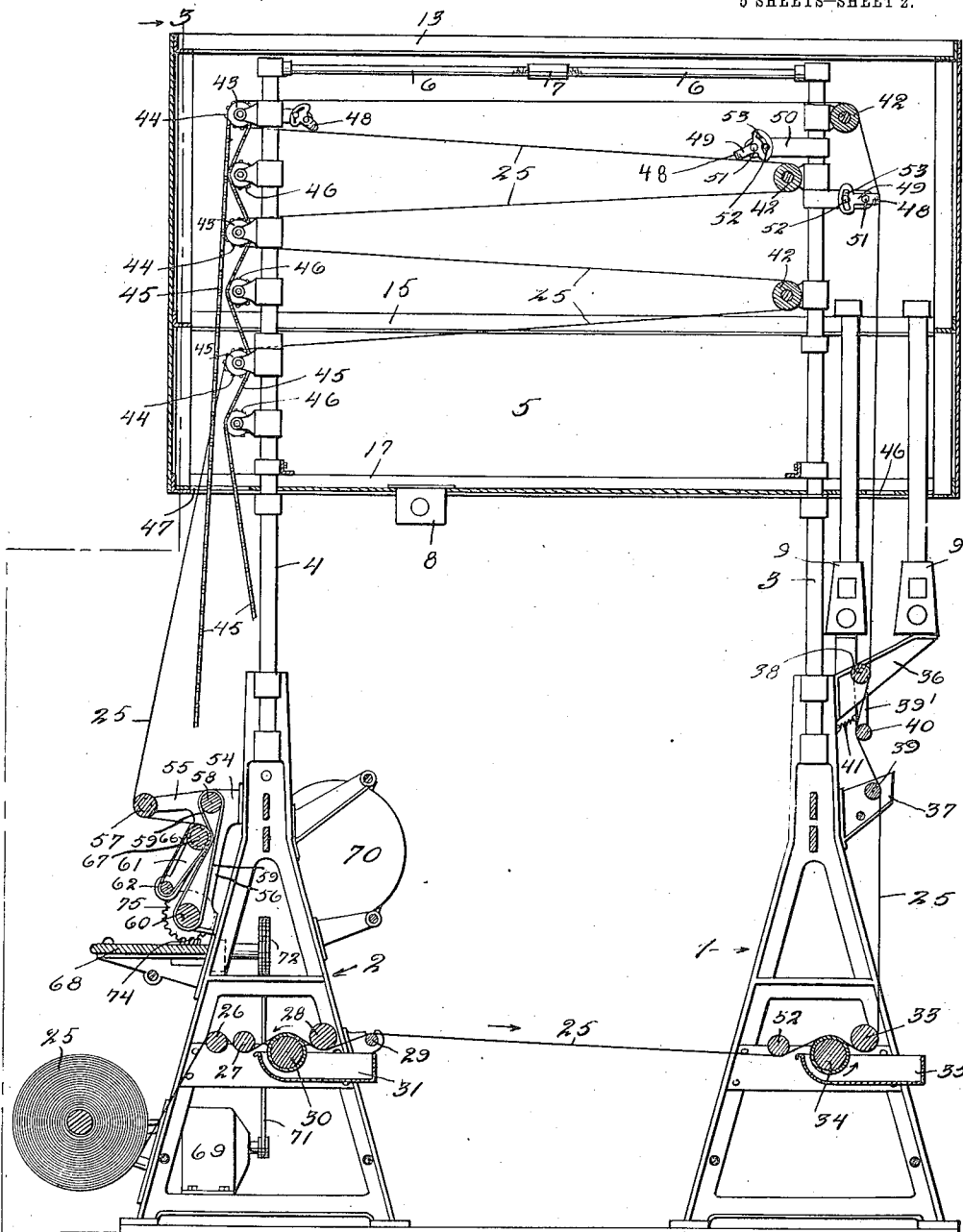


Fig. 2

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5 SHEETS-SHEET 3.

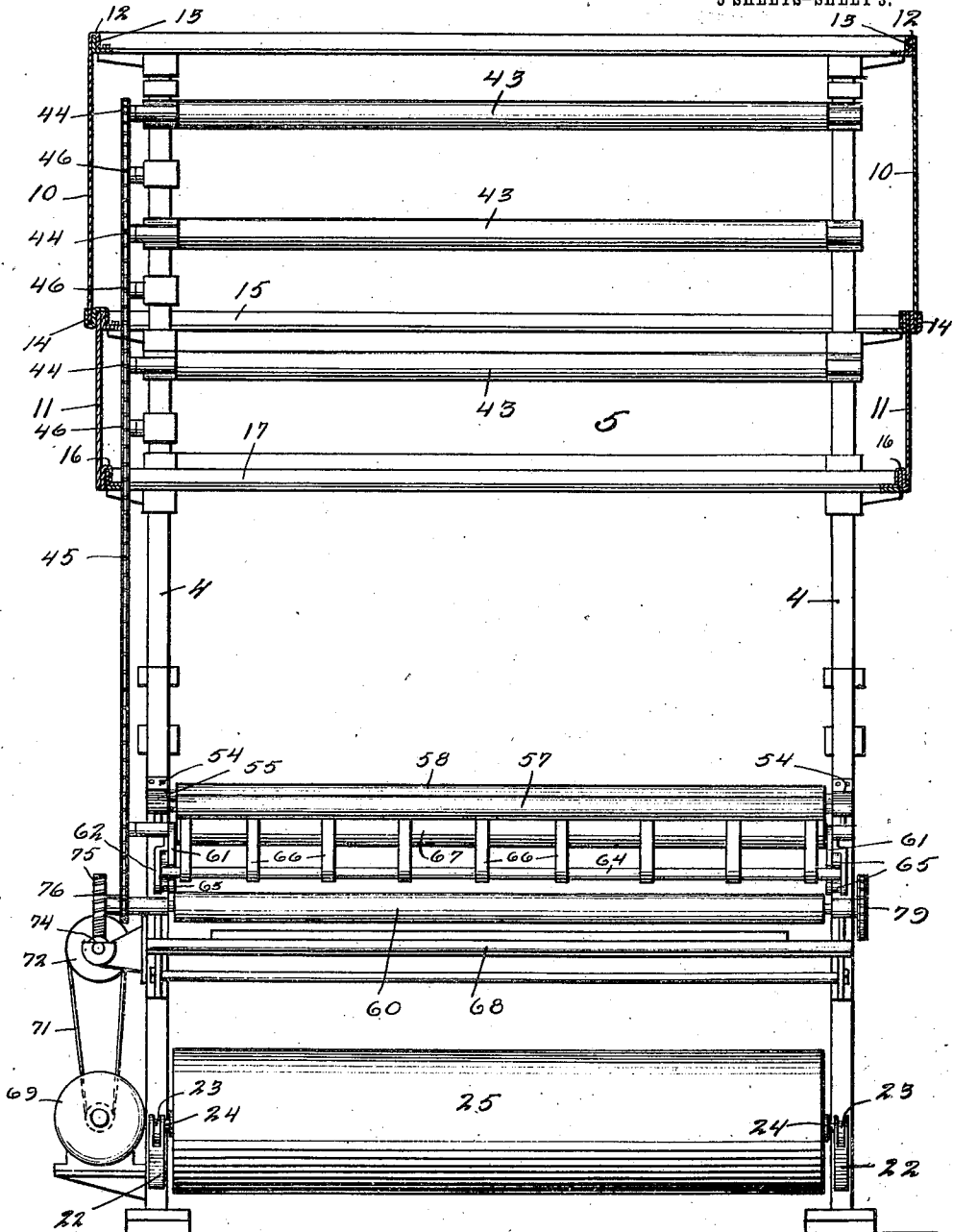


Fig. 3. C. F. Pease

Witnesses

Milton Jester
B. H. Schuman

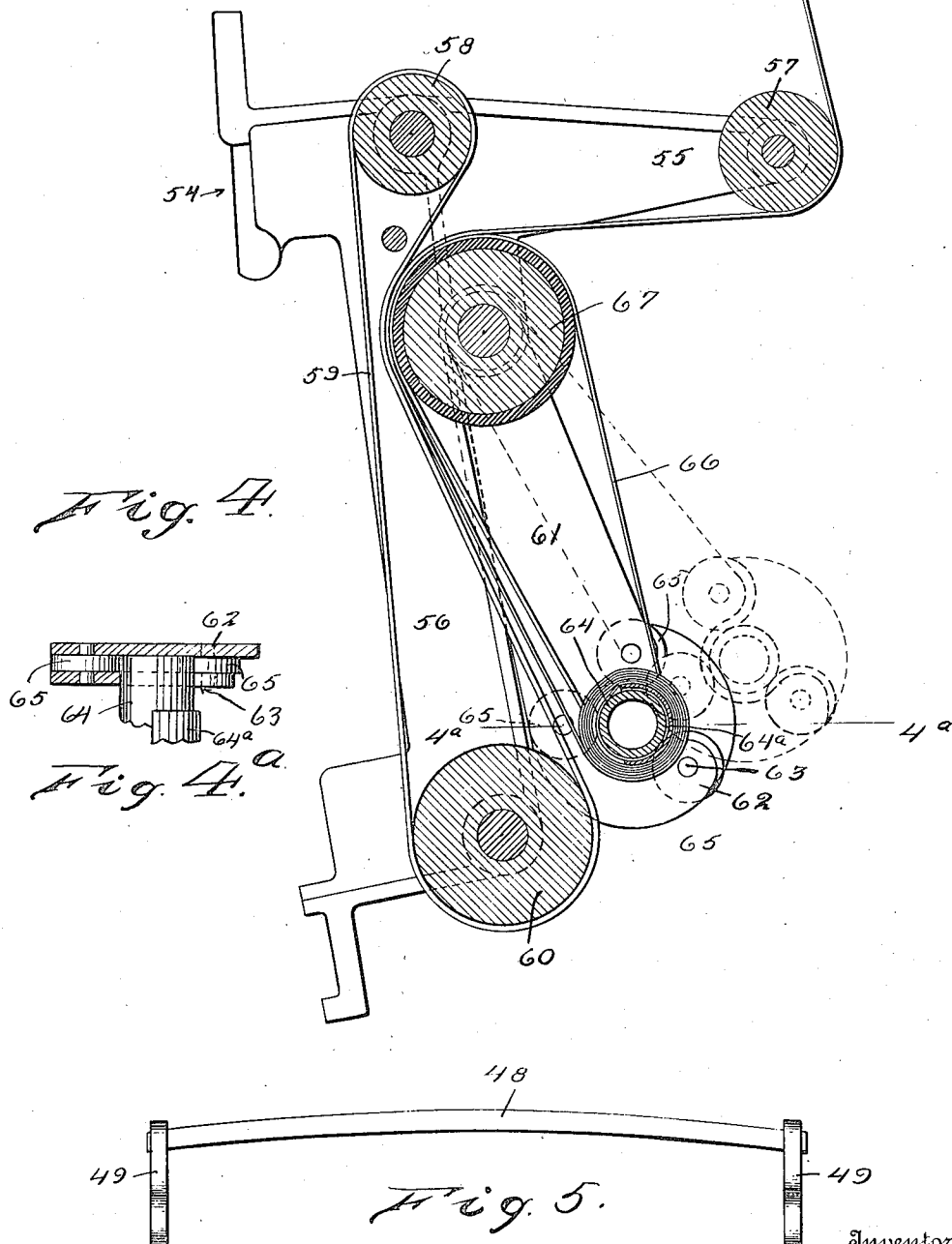
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5 SHEETS-SHEET 4.



Witnesses
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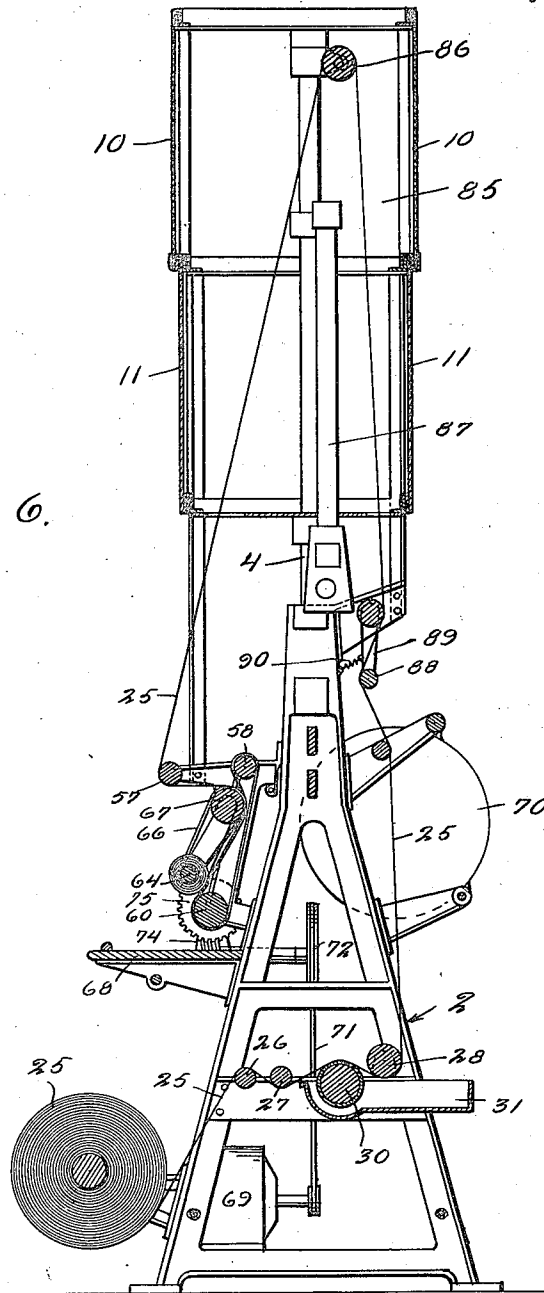
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5 SHEETS—SHEET 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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COATING-MACHINE.

1,125,166.

Specification of Letters Patent.

Patented Jan. 19, 1915.

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To all whom it may concern:

Be it known that I, CHARLES F. PEASE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Coating-Machines, of which the following as a specification.

The present invention relates to a machine to coat paper with a liquid chemical, in the manufacture of photographic paper, such as blue print or white print paper.

An important object of this invention is to provide a machine of the above mentioned character, which is adapted to coat the paper in a continuous and expeditious manner and subsequently thoroughly dry the same before it is wound up into rolls.

A further object of the invention is to provide novel means for preventing the damp coated paper from wrinkling or creasing while being passed through the machine.

A further object of the invention is to improve the construction of such machines in general, whereby they are rendered more simple, compact, durable, and efficient in fulfilling their function.

A further object of the invention is to provide means for heating the paper upon both sides as it enters the drier-casing.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a side view of the apparatus, Fig. 2 is a central vertical longitudinal sectional view through the same, Fig. 3 is a transverse vertical sectional view taken on line 3-3 of Fig. 2, Fig. 4 is an enlarged sectional view of the take up or winding means shown in Fig. 2, Fig. 4^a is a detail section taken on line 4^a-4^a of Fig. 4, Fig. 5 is a side view of the smoothing bar, and, Fig. 6 is a central vertical sectional view through a slightly different form of the invention.

In the drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention, the numerals 1 and 2 designate upstanding end frames, carrying vertical posts 3 and 4. These vertical posts support a horizontal drier-casing 5, extending into the same, as shown. The

upper ends of the posts 3 and 4 are connected by rods 6, provided with turn-buckles 7. The numerals 8 and 9 designate gas heaters of any well known or preferred type. It is to be understood that I may employ any suitable form of heating means for use in connection with the drier-casing 5. Each side of the casing 5 is normally closed by horizontally movable upper and lower doors 10 and 11. The upper door 10 is provided upon its upper longitudinal edge with an inverted U-shaped flange 12, which slidably engages a stationary rail or track 13. The lower longitudinal edge of the horizontal movable door 10 operates within a stationary track 14, which is S-shaped in cross-section. The track 14 is rigidly mounted upon a frame 15, as shown. The lower horizontally movable door 11 has its upper longitudinal edge operating within the track 14 and its lower longitudinal edge provided with a flange 16, which is U-shaped in cross-section and slidably engages a stationary track or frame 17, as shown. It is thus seen that access may be easily had to the interior of the casing 5 from both sides thereof by the proper manipulation of the doors 10 and 11. The upper horizontally movable doors 10 are provided with openings, which are normally closed by sliding doors 18, operating within tracks 19, which are fixed to the doors 10. The sliding doors 18 carry handles 20, so that said sliding doors may be easily moved. The doors 10 are also provided with handles 21, as shown. It is thus seen that by the proper manipulation of the sliding doors 18, a certain amount of access may be had to the interior of the casing 5 without moving the entire door or doors 10.

Rigidly mounted upon the outer portion of the end frame 2 and near the lower ends thereof, are stationary supporting brackets 22, having their outer ends forked and provided with bearing wheels 23, as shown, for rotatably supporting a core 24, upon which is wound a roll of paper 25, to be coated with a liquid chemical. Suitably mounted between the upstanding frames 2 are horizontal idle rolls 26, 27, 28 and a stationary scraper roll 29, as shown. The paper 25 is passed above the end roll 26 and the stationary scraper roll 29 and below the inner rolls 27 and 28. Disposed between the inner

idle rolls 27 and 28 is a coating roll 30, which engages the lower surface of the paper 25 and is rotated in a reverse direction to the travel of the paper, as indicated by the arrows. The coating roll 30 also operates within a receptacle 31, containing the liquid chemical to be applied to the lower surface of the paper 25. Suitably mounted between the frames 1 are idle rolls 32 and 33, between which is disposed a second coating roll 34, which is driven in a reverse direction to the travel of the paper as indicated by the arrows. The paper 25 is passed below the idle rolls 32 and 33 and above the coating roll 34. The coating roll 34 operates within a receptacle 35, containing the liquid chemical to be applied to the lower surface of the paper 25. Rigidly mounted upon the upper portions of the frames 1 are outwardly extending stationary brackets 36 and 37, carrying idle rolls 38 and 39, respectively, as shown. The brackets 36 also serve to support the gas burners 9, which are disposed near and upon opposite sides of the paper 25, to supply the maximum heat to said paper as it first enters the heating-chamber. Pivotally connected with the brackets 36 in any suitable manner, are depending arms 39', to the lower ends of which is rigidly connected a stationary scraper roll 40, which engages the outer or coated surface of the paper 25, to scrape off any excess of the liquid chemical. Retractable coil springs 41 serve to swing the stationary roll 40 into engagement with the paper, which engages the outer portions of the idle rolls 38 and 39.

Suitably mounted upon the vertical posts 3 is a vertical set of idle rolls 42, disposed within the drier-casing 5 and near one end thereof, as shown. Suitably mounted upon the posts 4 are vertical sets of positively driven rolls 43 disposed near the opposite end of the drier-casing and rotated by sprocket wheels 44. These sprocket wheels are all engaged by a sprocket chain 45, which also engages sprocket wheels 46, supported by the posts 4 and arranged below the rolls 43. The paper 25 extends upwardly into the drier-casing 5 through an opening 46, and is passed about the idle rolls 42 and the positively driven roll 43, as shown. By the arrangement of the sets of rolls near the ends of the drier-casing, I am able to construct said drier-casing comparatively short and pass a section of the paper through the same, which is several times larger than the drier-casing. It is obvious that the length of the paper thus passing through the drier-casing may be increased by increasing the number of rolls in the vertical sets of the same. It is thus seen that after the paper 25 has been coated with the liquid chemical, it is passed through the drier-casing 5, wherein it is dried, subse-

quently to which it is discharged therefrom through an opening 47.

I have found that the damp coated paper when first introduced into the drier-casing 5 and passed about the rolls therein, will ordinarily wrinkle or crease. To prevent this, I provide a suitable number of smoothing bars 48 (see Figs. 2 and 5) which are slightly curved longitudinally, as shown. These smoothing bars are rigidly connected at their ends with adjustable cranks 49, which are pivotally connected with brackets 50, as shown at 51. Clamping bolts 52 are provided, which operate within curved slots 53 formed through the cranks 49 and serve to rigidly lock these cranks in adjustment at different positions. These curved smoothing bars are arranged in the upper portion of the drier-casing 5 and engage only the uncoated surface of the damp paper. The paper by traveling over these curved smoothing bars is stretched transversely, that is, there is a tendency to pull the longitudinal edges of the paper away from each other, whereby the paper is held tight and kept smooth or prevented from being creased or wrinkled. After the paper has traveled for a certain distance within the drier-casing 5 and has become more or less dry, this tendency to crease or wrinkle is done away with and I have found by practice, that it is unnecessary to provide these smoothing bars in the lower portion of the drier-casing.

Rigidly mounted upon the upper portions of the end frames 2 are outwardly extending brackets 54, comprising upper horizontal and depending substantially vertical arms 55 and 56. Suitably mounted between the free ends of the horizontal arms 55 is an idle roll 57. Suitably mounted between the arms 55 near the inner ends thereof, is a driven roll 58, engaged by a suitable number of belts 59, extending downwardly to engage a positively driven roll 60, which is mounted between the lower ends of the vertical arms 56, as shown.

I provide a novel form of winding means, comprising a vertically swinging structure including depending arms 61, which are pivotally connected with the brackets 54 at their upper ends so that the lower ends of said arms are free to swing toward and away from the positively driven roll 60. The lower ends of the vertically swinging arms 61 are provided with enlarged heads 62, adapted to operate outwardly of the ends of the roll 60. These enlarged heads 62 are provided with pockets 63 for receiving a readily removable winding tube 64. As shown in Fig. 4, I provide a semi-cylindrical clamp 64, which is removable upon the winding tube 64 and serves to attach the free end of the paper to said tube. This clamp is shorter than the winding tube.

The heads 62 carry bearing-rollers 65, which engage the winding tube 64. The outer side of the pockets 63 are entirely open, as shown, whereby the winding tube 64 may be readily removed by an outward or upward movement. The winding tube 64 is driven by belts 66, which engage the end portions thereof outwardly of the clamps 64^a and the ends of a larger roll 67, which has engagement with the belts 59. It is seen that the winding tube 64 is rotated at a higher rate of speed than the larger roll 67. The paper 25 is passed outwardly about the roll 57, between the belts 59 and the roll 67 and then attached to the winding tube 64 by means of clamps 64^a. The feeding movement or advancement of the paper is effected by the positively driven rolls 44, rolls 60 and 67, and belts 59. The winding tube 64 is capable of being driven at a higher rate of speed than the roll 67, as above stated, whereby it has a tendency to wind up paper faster than it is advanced or fed. During the ordinary operation of the machine, the speed of rotation of the winding tube 64 is automatically reduced to correspond to that of the paper feeding means, by virtue of the fact that the belts 66 are adapted to slip upon the tube 64 when sufficient pull is exerted upon the paper, which might tend to tear it. Stops or the like (not shown) are preferably provided to limit the downward movement of the swinging arms 61, whereby the winding tube is retained spaced from the roll 60 and the roll of paper when first wound upon the winding tube is also held spaced from the roll 60. When, however, this roll of paper increases sufficiently in size, it engages the roll 60 and its belts 59, which aid in the rotation of the roll of paper. When the roll of paper which is being wound, is removed, the machine continues its operation, the paper is cut and the tube 64 removed. This tube is now removed from the roll of paper and returned to its normal position in the winding means and the free end of the paper is attached thereto. During the removal of the first roll of paper, the discharge of the paper continuing, there will be quite a lot of slack in the paper, which will be taken up during the continuous discharge of said paper, by virtue of the fact that the winding tube 64 is driven faster than the roll 67. It is obvious that at first this mechanical advantage is very slight, but as the size of the roll of paper being wound increases, said mechanical advantage also increases.

Disposed below the roll 60 is a horizontal table 68, as shown.

Rigidly connected in the lower portion of one end frame 2 is a motor 69, having electrical connection with and controlled by a rheostat 70, which is connected with the

upper portion of the end frame 2. This rheostat may be of any well known or preferred type. The motor 69 is employed to drive the different parts of the machine. This motor drives a belt 71, extending upwardly to engage a grooved pulley 72, rigidly connected with one end of a horizontal shaft 73. This horizontal shaft is provided with a worm 74, which engages a worm-wheel 75, rigidly connected with the roll 60 by being mounted upon the same shaft with said roll. The worm-wheel 75 drives a sprocket-wheel 76, which is engaged by the sprocket-chain 45. This sprocket-chain also engages sprocket-wheels 77 and 77' and an idle sprocket-wheel 78, as shown. The sprocket-wheels 77 and 77' are rigidly connected with the rolls 58 and 67, respectively, to positively drive the same.

Rigidly connected with the opposite end of the roll 60 is a sprocket-wheel 79, engaged by a sprocket-chain 80, which extends downwardly for engagement with a sprocket-wheel 81, which is rigidly connected with one end of the coating roll 30. Rigidly connected with the opposite end of this coating roll is a sprocket-wheel 82, engaged by a horizontal sprocket-chain 83, extending to the left to engage a sprocket-wheel 84, which is rigidly connected with the coating roll 34. It is thus seen that the coating rolls are driven together in the same direction, which is opposite to the direction of travel of the paper 25.

In Fig. 6 I have shown a slightly modified form of my invention, which is the single type machine as it only applies a single coating of the liquid chemical to the paper. This machine is just like the first form of the invention, except that the end frames 1 and elements carried thereby are dispensed with. The posts 4 support a drier-casing 85, similar to the drier-casing 5, except that it is made much shorter. The positively driven rolls 44 and associated elements employed in connection with the first form of the invention are dispensed with, and the paper 25 passes about a single roll 86, suitably mounted between the posts 4 within the drier-casing 85. The numeral 87 designates a gas heater of any well known or preferred type. Any other suitable heating means may be advantageously employed. The paper extends downwardly to be connected with the take up or winding means, which is the same as shown and described in connection with the first form of my invention. The same means are employed to coat the paper with the liquid chemical and such paper engages a stationary roll 88 carried by swinging arms 89, swung inwardly by retractile coil springs 90. The motor 69 is suitably geared with the roll 60, in the same manner as shown and described in connection with the first form of my inven-

tion. It is believed that no further description of this second form of the invention is necessary.

In the operation of the machine the paper is made to travel in the direction of the arrow, and the coating rolls 30 and 34 are driven in a reverse direction to the travel of the paper. These coating rolls are preferably formed of metal with their surfaces covered with rubber. The coating rolls operate within the receptacles 31 and 35 and supply the proper amount of the liquid chemical to one side only of the paper. The paper continues in its travel and passes into the upper end of the drier-casing 5. Within this casing the damp paper passes about the smoothing bars 48 and is held stretched transversely so that it cannot crease or wrinkle. After the paper has traveled into the lower portion of the drier-casing, it is comparatively dry and will not thereafter crease or wrinkle. The paper continues its travel and is properly wound upon the tube 64. The winding means operates particularly advantageously as it keeps the paper properly stretched while it is being wound. When the roll of paper is removed the machine continues in operation. The tube 64 is removed from the roll of paper and returned to its normal position in the winding means and connected with the free end of the discharging paper. The tube 64, by rotating to wind up the paper faster than it is being discharged or fed from the machine, soon takes up all the slack that occurred during the removal of the first roll of paper. When the roll of paper on the shaft 64 gets sufficiently large, it engages the roll 60 and its belt 59, which aid in rotating the same.

The operation of the form of the invention shown in Fig. 6 is so similar to that hereinabove stated in connection with the first form of the invention, that it is thought unnecessary to state such operation.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that certain changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In apparatus of the character described, the combination with a substantially closed heating shell provided near one end with a paper inlet opening, of positively driven means disposed within the substantially closed heating shell to effect the longitudinal travel of the paper within and through the heating shell, a heater extending into the heating shell in proximity to the paper inlet opening to supply the maximum amount of heat to the paper as the

same enters the shell, and a relatively stationary longitudinally curved smoothing element extending transversely of the shell and arranged therein in proximity to the heater with its convex surface adapted for slidable engagement with the paper.

2. In apparatus of the character described, the combination with a substantially closed heating shell provided with paper inlet and outlet openings, of positively driven means disposed within the substantially closed heating shell to effect the longitudinal travel of the paper within and through the heating shell, a heater extending into the heating shell in proximity to the paper inlet opening, a relatively stationary longitudinally curved smoothing element arranged within the heating shell and extending transversely of the paper with its convex surface adapted to slidably engage with the paper, and means arranged exteriorly of the heating shell to apply a liquid chemical to the paper.

3. In apparatus of the character described, the combination with a substantially closed heating shell, of means to heat the same, means to effect the longitudinal travel of paper within and through the heating shell, means to apply a chemical solution to the paper before entering the shell, a longitudinally curved rod extending transversely of the paper and having its convex surface slidably engaging the same, means to pivotally support the longitudinally curved rod whereby the same may be angularly adjusted so that its convex surface will laterally stretch the paper with different degrees of strength, and means to lock the longitudinally curved rod in adjustment at different angular positions.

4. In apparatus of the character described, the combination with a support, means mounted thereon to support longitudinally traveling paper, means to heat the paper while the same is traveling longitudinally, means to supply a chemical solution to the paper, and an angularly adjustable smoothing rod connected with the support and longitudinally curved with its convex surface adapted to engage with the paper to exert different degrees of lateral pull upon the paper depending upon the angular adjustment of the smoothing rod.

5. In apparatus of the character described, a substantially horizontal heating shell provided near one end with a paper inlet opening, means disposed within the heating shell to cause the paper to travel longitudinally back and forth within the same, means for applying a chemical solution to the paper before the same passes into the shell, a heater extending into the heating shell and disposed in proximity to the paper inlet opening, and a plurality of longitudinally curved relatively stationary

smoothing elements arranged within the heating shell and adapted to have their convex surfaces slidably engage portions of the paper at points spaced a substantial distance in advance of each other for subjecting the portions of the paper of different degrees of dryness to the lateral pulling action of the same.

6. In apparatus of the character described, the combination with an upstanding frame, of a heating shell mounted upon the upper portion thereof, a heater extending into the shell, a liquid holding receptacle mounted within the lower portion of the frame, a liquid applying roll operating within the liquid holding receptacle and engaging the paper traveling in one direction, paper guide rolls mounted within the lower portion of the frame near and upon opposite sides of the liquid applying roll, paper guide means mounted upon the side of the upstanding frame toward which the paper travels and near the upper end thereof for properly conducting the paper into the shell, a roll arranged within the upper portion of the shell to engage with the paper which passes thereover and extends downwardly through and beyond the shell to be arranged upon the opposite side of the upstanding frame with respect to the paper guide means, and winding means connected with such opposite side of the up-

standing frame to engage with the discharging end of the paper.

7. In apparatus of the character described, the combination with a substantially horizontal closed heating shell provided near its opposite ends with paper inlet and outlet openings, a plurality of substantially vertically arranged sets of rolls disposed within the heating shell near the opposite ends thereof and adapted to receive the paper about the same to hold it in approximately horizontal layers, means to positively drive one substantially vertical set of rolls to effect the proper travel of the paper, heating means arranged within the shell in proximity to the paper inlet opening, a plurality of longitudinally curved smoothing rods arranged within the heating shell and having their convex surfaces engaging the paper at points spaced a substantial distance in advance of each other to slidably engage portions of the paper having different degrees of dryness, means to supply a chemical solution to the paper, and separate means to angularly adjust each smoothing rod.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES F. PEASE.

Witnesses:

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THOMAS LORD.