Dec. 19, 1922. 1,439,183

J. A. MARTIN.

PAPER WAXING MACHINE.

FILED OCT. 2, 1919.

6 SHEETS-SHEET 1

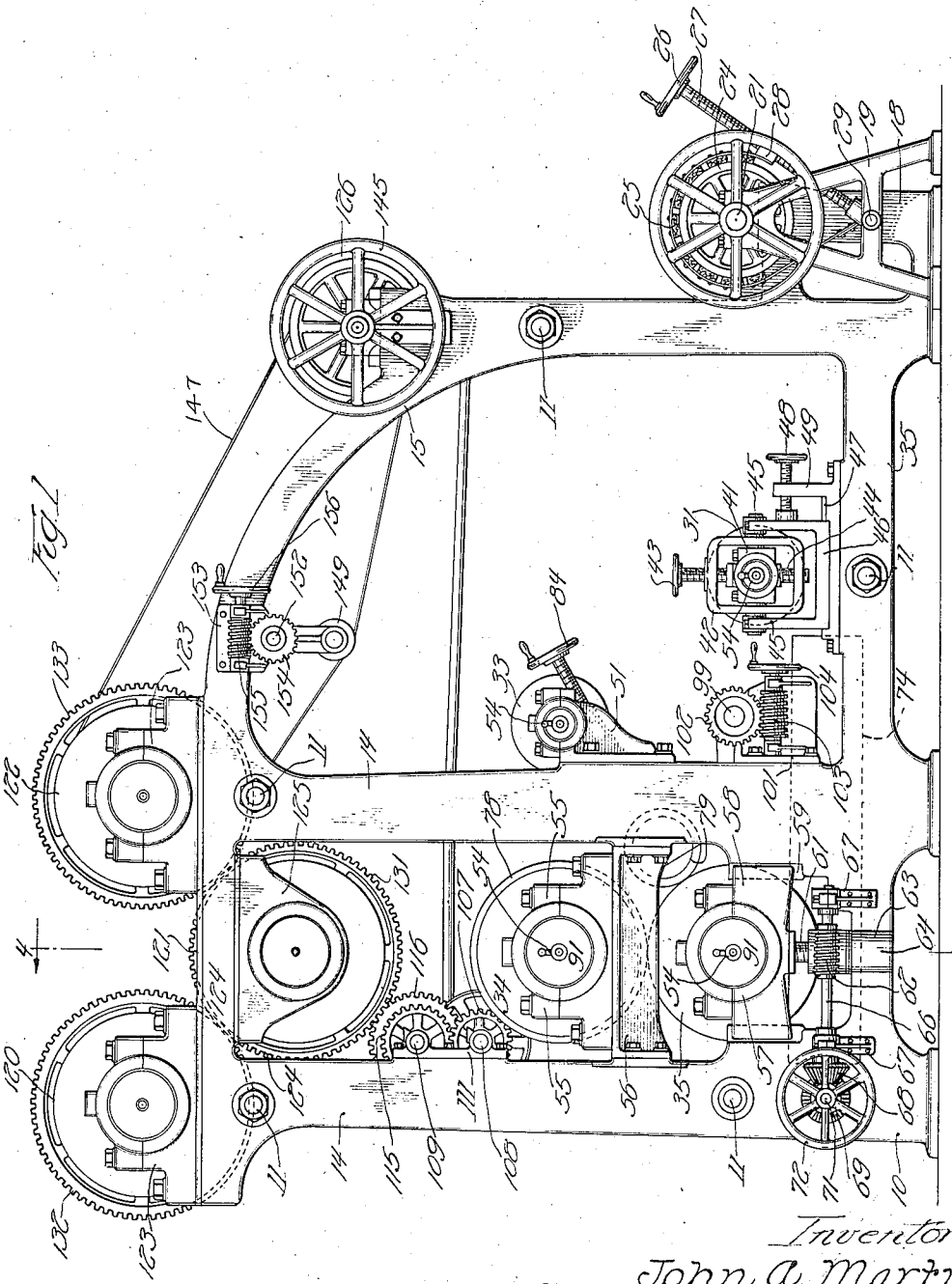


Fig. 1.

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6 SHEETS-SHEET 2

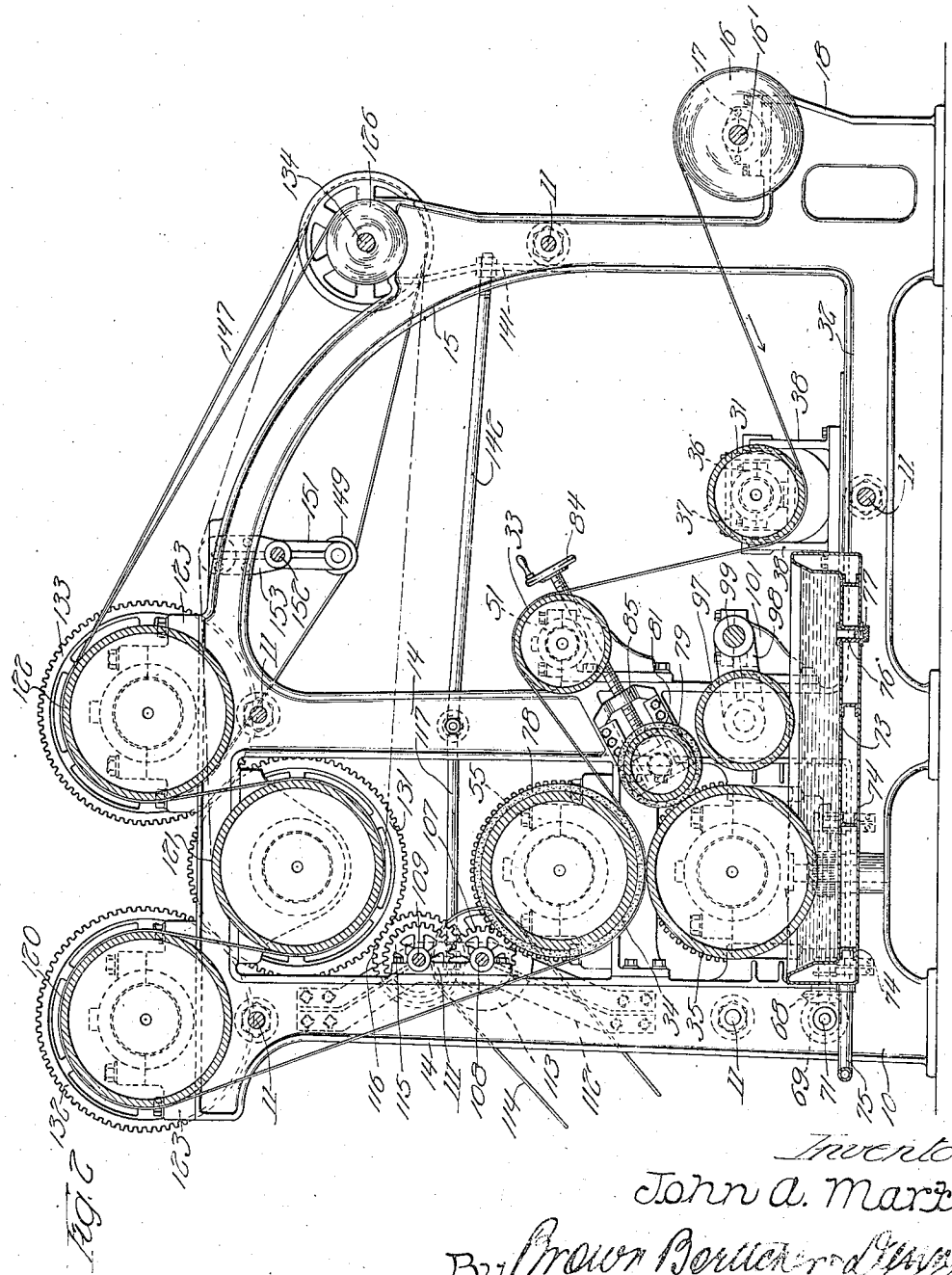


Fig. 2.

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6 SHEETS-SHEET 3

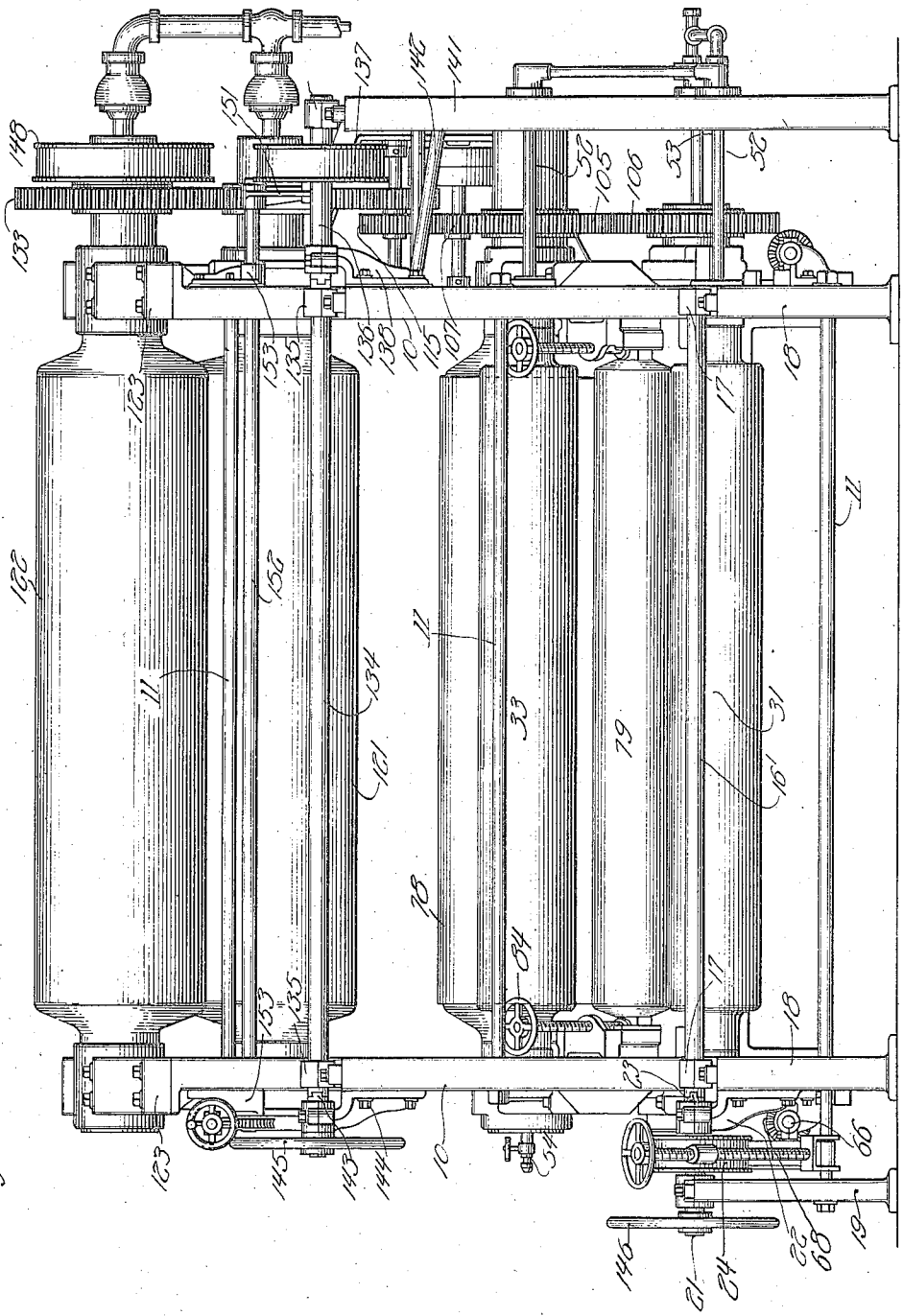


Fig. 3

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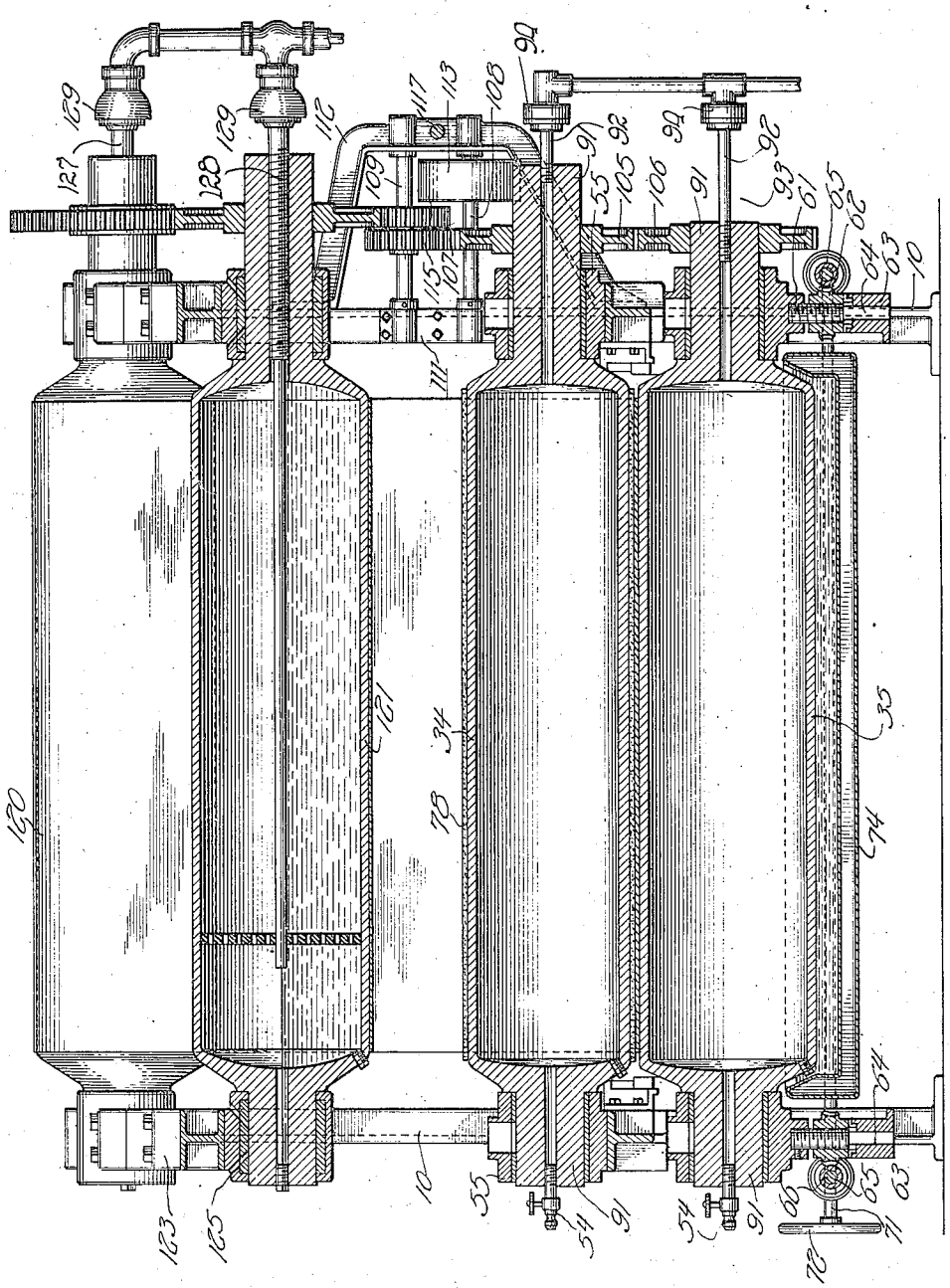


Fig. 4

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Fig. 5

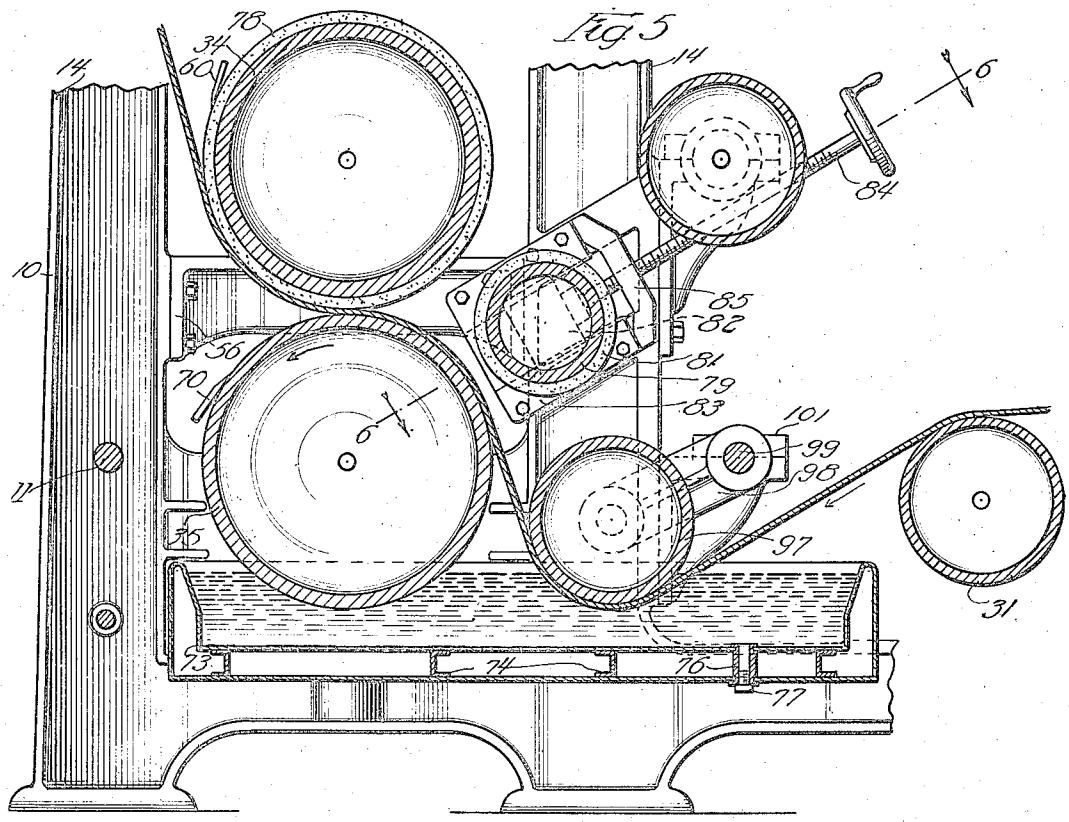
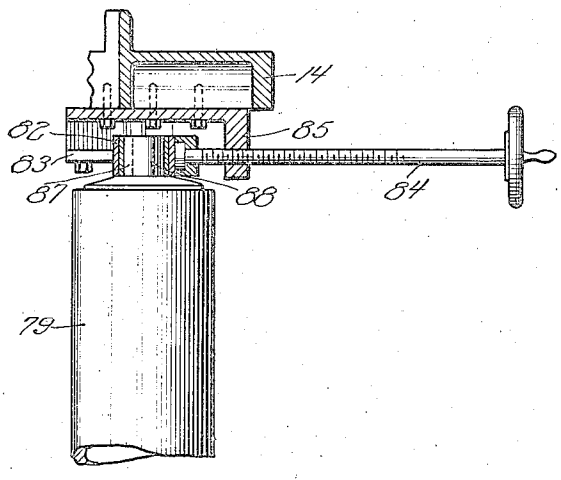


Fig. 6



Inventor.

John A. Martin

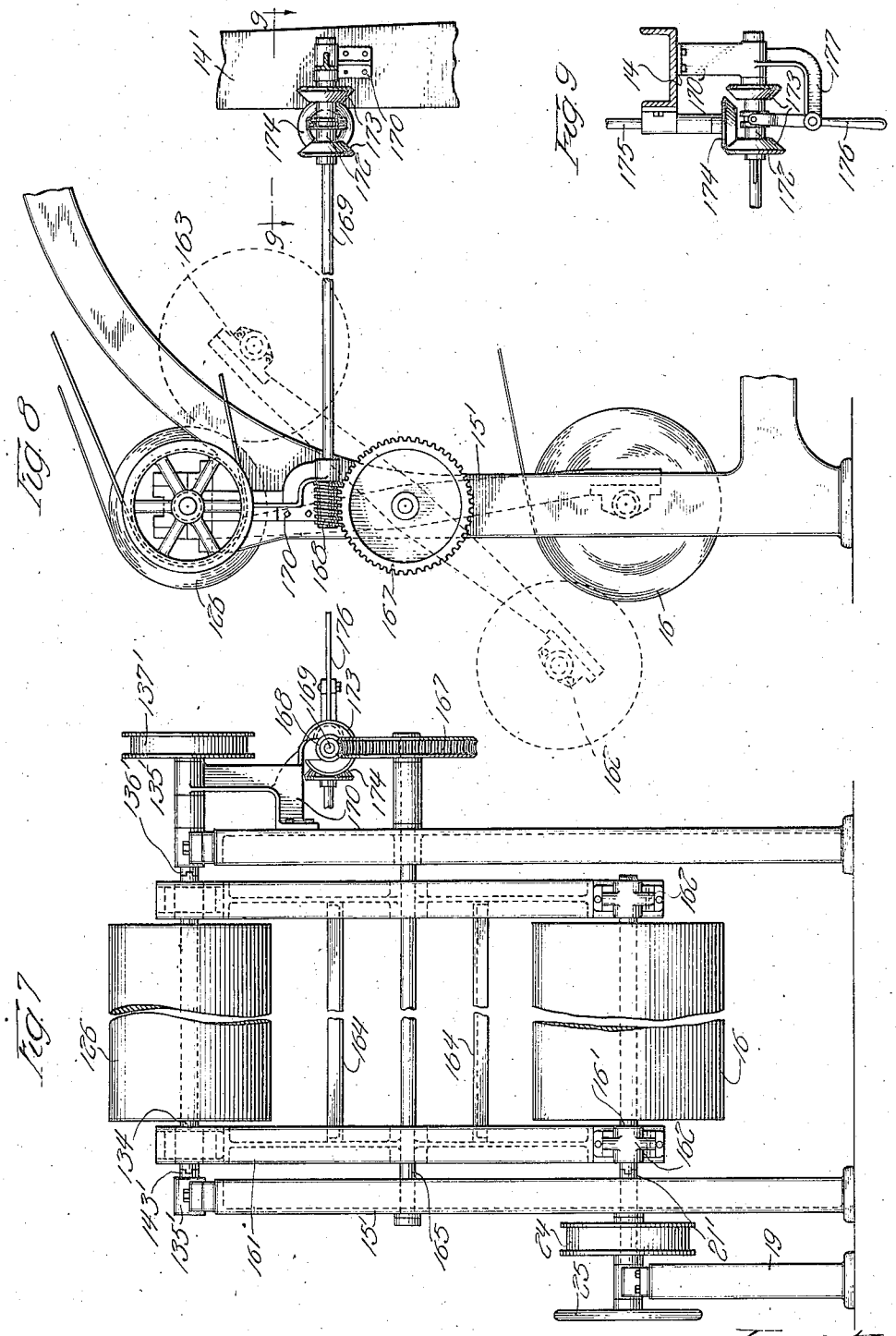
By Brown Bortener & Ellis

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Dec. 19, 1922. 1,439,183

J. A. MARTIN.
PAPER WAXING MACHINE.
FILED OCT. 2. 1919.

6 SHEETS-SHEET 6



Inventor
John A. Martin
By Brown, Boettcher, Dienner & Wise

Patented Dec. 19, 1922. 1,439,183

UNITED STATES PATENT OFFICE.

JOHN A. MARTIN, OF RHINELANDER, WISCONSIN, ASSIGNOR TO ASHLAND MACHINE & PAPER COMPANY, OF ASHLAND, WISCONSIN, A CORPORATION OF WISCONSIN.

PAPER-WAXING MACHINE.

Application filed October 2, 1919. Serial No. 327,986.

To all whom it may concern:

Be it known that I, JOHN A. MARTIN, a citizen of the United States, residing at Rhinelander, in the county of Oneida and State of Wisconsin, have invented a certain new and useful Improvement in Paper-Waxing Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to paper waxing machines.

The present invention has particular reference to a machine for waxing roll paper, or any other form of continuous web paper. It is to be understood, however, that the invention may also be embodied in machines for applying either wax, glue or any other liquid to paper, textiles or the like. Waxed paper has come into extensive use for wrapping, covering and decorative utilities; more particularly, however, for bread, candy and meat wrapping, or for wrapping oily or greasy commodities of all kinds, or where sanitation and protection of the wrapped article is desired. In manufacturing waxed paper for either of these uses, it is the customary practice to first wax the paper in the form of a continuous rolled web as above mentioned, and to then cut the waxed paper into the desired form and size.

The primary object of the invention is to provide a machine capable of efficiently waxing the paper at a higher rate of speed than has heretofore been practicable, whereby a greatly increased output is obtained over prior methods and machines. This object is attained by numerous factors contributing to the rapidity of the operation, including the pre-heating of the web, and the relatively large size of the waxing rolls and the cooling rolls, which, by reason of their larger circumferential dimensions, have longer intervals of contact with the web, even at the increased speed of the latter.

Another object of the invention is to provide a machine in which the paper can be waxed either on one side or on both sides with the same rapidity and efficiency. The waring rolls and the immersion tank are so related to the run of the web that the change of operation incident in changing from the waxing of one side of the web to the waxing of both sides, or vice versa, can be effected with facility, and without necessitating the re-arrangement or replacing of any parts in the machine.

Another object is to provide improved means for compensating for certain irregularities frequently encountered in the paper web, such as the two margins of the web being of unequal thickness. The provision of this compensating means insudes that the web, even in such condition, will have a uniform pull at all points and will track evenly over the rolls.

Another object is to provide improved roll supporting means to facilitate the placing and removing of the feeding and receiving paper rolls. I do not intend to limit this feature of my invention solely to paper waxing machines, as the same has equal utility with calendering machines, or with similar continuous web machines employing feeding and receiving rolls.

Another object is to provide a machine in which the new web can be easily and quickly threaded thru the machine, and with minimum waste of paper. In making frequent changes of paper this constitutes a big saving in time and paper.

Another object is to provide an improved and simplified construction of waxing machine characterized by compactness of structure, and accessibility and facility of operation of the various regulating adjustments and controls. By reason of the comparatively short length of the machine and the close, convenient grouping of the various adjustments and controls on one side of the machine, the same can be operated handily by only one operator, instead of requiring two as with most prior machines.

Other objects will be apparent from the following detailed description taken in con-

nection with the accompanying drawings, in which I have illustrated a preferred embodiment of my invention.

In the drawings:

Figure 1 is a front elevational view of the machine;

Figure 2 is a vertical, longitudinal sectional view thru the approximate center of the machine;

Figure 3 is an end elevational view of the right hand end of the machine as viewed in Figure 1;

Figure 4 is a vertical transverse sectional view taken on the plane of the line 4—4 of Figure 1 and looking in the direction indicated by the arrows;

Figure 5 is an enlarged sectional view of the waxing rolls and related parts of the waxing mechanism showing the web threaded therethru for waxing upon both sides;

Figure 6 is a detail section taken on the plane of the line 6—6 of Figure 5;

Figure 7 is an elevational view of an improved construction of pivoted roll supporting frame for supporting the parent and receiving paper rolls;

Figure 8 is a different view of the same; and

Figure 9 is a detail view of the transmission or drive mechanism for operating the roll supporting frame.

Referring particularly to Figures 1, 2 and 3, the frame of the machine is made up of the front and rear frame members 10—10, which are joined by a plurality of horizontal tie rods 11. The several waxing and cooling rolls having bearing support on the front and rear bearing members 10, have shouldered bearings (Figure 3) which assist in maintaining the proper spacing between the frame members. Both frame members are substantially identical, and at one end are formed with two upright standards 14—14 for supporting the waxing and cooling rolls, and at the other end are formed with an arched upright 15 for supporting the parent and receiving paper rolls.

In describing the operating parts of the machine, I shall in general follow the run of the paper web so that the functional relation of the different parts of the machine to the entire operating cycle will be more apparent.

The parent roll of paper 16 is wound upon a central shaft 16′ which is adapted to be removably supported at its ends in hinged bearings 17. These hinged bearings are mounted on the forwardly projecting frame extensions 18, which are of appropriate height to enable the paper roll 16 to be wheeled into position for mounting in the hinged bearings 17 on a truck. In front of the machine, and spaced slightly therefrom, is provided a pedestal bearing 19 in which is pivoted a short stub shaft 21. Referring to Figure 3, the other end of this tub shaft has bearing support in a bearing bracket 22 which is bolted to the side of the frame extension 18. The end of the stub shaft 21 is adapted to be releasably coupled to the end of the roll shaft 16′, preferably by a tongue and groove coupling as indicated at 23. Mounted on the stub shaft 21 between the pedestal bearing 19 and the bracket bearing 22 is a brake drum 24 which is partly encircled by a frictional brake band 25. The brake band 25 is intended to impose a frictional retardation on the unwinding of the paper roll 16 so as to obviate overrunning of the roll and back-lash of the web. Adjustment of the brake band is afforded by an adjusting hand wheel 26 which operates thru the shank 27 and the threaded nut 28 to increase or decrease the tension on the free end of the brake band. The other end of the brake band is pivoted to the pivot pin 29 of the adjusting screw 27.

From the parent roll 16 the web is extended back into the machine where it is passed under a compensating roll 31, which is mounted on the horizontal frame rails 32. From the compensating roll 31 the web is passed up and over a guide roll 33 and thence down between the two large waxing rolls 34 and 35, as I shall presently describe.

The compensating roll 31 has a novel adjusting or compensating function, for compensating for irregularities in the run of the web. It frequently happens that one margin of the web will be slightly thicker than the other margin, particularly in relatively wide paper, and as a consequence, the web is not wound with an even tension across the parent roll. As a result, one margin of the web sustains all the pulling tension in passing thru the rolls, while the other margin is relatively loose on the rolls and has insufficient tension to keep it taut and in proper condition for waxing. This improper distribution of the pulling tension is liable to tear the web, and furthermore, the loose margin of the web is very susceptible to wrinkling in passing thru the rolls, particularly the waxing rolls, so that an ineffective application of the wax along this margin results. To compensate for this condition, I have arranged the roll 31 so that it can be adjusted angularly relative to the normal run of the web to increase or decrease the length of run along either margin of the web between the parent roll 16 and the waxing rolls 34 and 35. The roll 31 is preferably made adjustable in two dimensions relative to the run of the web so that adjustment of considerable latitude can be had either when the web is passed up under the roll as previously described, or when the web is passed across the top of the roll for immersion in

the wax immersion tank (Figure 5), which latter path I shall describe in connection with the waxing operation.

Referring again to Figure 2, the far end of the compensating roll 31 is journaled in a split bearing 36 which is pivoted in a swivel bearing frame 37 for movement about a vertical axis. The swivel bearing frame 37 is in turn pivoted between upright bearing standards 38 for movement about a horizontal axis. This end of the compensating roll 31 consequently has universal pivotal support whereby the transverse position of this compensating roll may be angularly adjusted either horizontally or vertically relative to the run of the web.

Referring to Figure 1, the other end of the compensating roll 31 has pivotal support in a split bearing 41, which is arranged for vertical reciprocal adjustment in a swiveled bearing frame 42. A handscrew 43 threads down thru the top of the swiveled bearing frame 42 and has suitable rotatable connection with the top of the bearing 41. The lower end of the bearing 41 is guided by a pin 44 which is guided in a hole in the bottom of the swiveled bearing frame 42. The bearing frame 42 is swiveled in horizontally aligned hubs 45 which project up from a shiftable slide member 46 adapted for sliding motion on the horizontal guideways 47. An adjusting handscrew 48 is provided for horizontally shifting the slide member 46, this hand screw threading thru an upright stationary standard 49 and having rotatable connection with the slide member 46. It will be aparent that the compensating action of the roll 31 is simply that of relatively increasing or decreasing the length of the run along either edge of the web between its point of feed from the parent roll 16 and the point of applying the wax at the waxing mechanism so as to maintain a uniform pulling tension across the width of the web and to avoid the formation of wrinkles in one edge thereof in the event of the web being thicker along one margin than along the other.

When the paper is to be waxed only upon one side the web is extended under the compensating roll 31 and up over the guide roll 33 as previously described, and as indicated in Figure 2. This intermediate guide roll 33 is of substantially the same size as the compensating roll 31 and is pivoted in bearing brackets 51 which are bolted to the upright frame standards 14 of the machine. Both rolls 31 and 33 consist of hollow metallic cylinders, closed at both ends, and provided with connections 52 at one end (Figure 3) for feeding a heating fluid preferably steam into the rolls. The steam may be circulated through the rolls, if desired, but I find it preferable to merely feed the steam into the rolls and allow it to condense therein. The condensation is drained from each roll in any suitable manner, such as through a suitable vent plug. The steam pipes 52 have suitable rotatable connection in rotatable coupling heads 53 which communicate with the steam supply pipes. At the opposite ends, the rolls 31 and 33 are provided with cocks 54 to blow off the air in admitting steam to the rolls.

The particular purpose of heating the rolls 31 and 33 is to pre-heat the paper web prior to applying the wax thereto. This feature of pre-heating the web is an important factor in increasing the rapidity and efficiency of the present machine. The pre-heated condition of the web facilitates the impregnation of the heated wax into the fibre of the paper; and obviates the tendency of the wax to instantly chill upon contact with the paper, whereby the application and distribution of the wax is more rapid and effective. As a result, the web can be run thru the machine at a considerably faster rate, and the application of the wax to the paper is more efficiently made and is more uniformly distributed. The pre-heated condition of the web also serves to prevent chilling of the upper waxing or squeeze roll 34, the surface of which should be maintained at sufficient temperature to insure of the wax being in a fluid condition at the instant of squeezing between the rolls 34 and 35.

From the intermediate guide rolls 33 the web is passed down directly between the waxing rolls 34 and 35. I have previously referred to the upper roll 34 as "waxing" roll, but to differentiate this roll from the lower roll 35, which is more properly a waxing roll, I shall refer to it as a "compression" or "squeeze" roll. These latter rolls are of comparatively large diameter, and are supported in vertical alignment between the frame standards 14. The upper roll 34 is pivoted at each end in large pillow blocks 55 which are mounted on bracket members 56 which span the two frame standards 14. The lower waxing roll 35 is adapted for vertical adjustment to vary the degree of compression between the squeeze roll 34 and the waxing roll 35 for receiving different weights of paper and for compressing the wax into the fibre of the paper to a greater or less degree. To this end, the waxing roll 35 is pivoted in reciprocable bearings 57, having lateral guide extensions 58, which are slotted to engage over vertical guides 59 on the frame standard 14. The bearings 57 are supported on screws 61 which thread through small worm wheels 62, mounted on hubs of bosses 63 projecting from the frame. As shown in Figure 4, the lower ends of the screws 61 have reduced guide stems 64 extending down through the bosses 63 to guide the screws and hold the worm wheels in place. Meshing with the worm wheels 62 are the adjust-

ing worms 65 which are mounted on short horizontal shafts 66 on each side of the machine-frame. The shafts 66 are mounted at each end in bearing brackets 67, and at one end of each shaft is secured a bevel gear 68, which meshes with a bevel gear 69 on the operating shaft 71. This operating shaft is extended through the front and rear frame members 10, and at the front of the machine is provided with an operating wheel 72, by the operation of which both ends of the waxing roll are raised or lowered in an obvious manner.

The waxing roll 35 dips into a receptacle or immersion tank 73, which contains the melted wax, paraffin or other material used in coating the web. This wax receptacle consists of a double walled vessel of open tray formation, which is suitably supported between the front and rear frame members 10, with its front and rear sides closely embracing the ends of the waxing roll 35. The tank is preferably constructed of sheet metal and has the bottom thereof reenforced for supporting the metal wax, by the insertion of spaced sections of channel bar 74 between the two walls of the tank. Steam or some other heating fluid is supplied to the tank through the pipes 75, and is circulated between the double walls of the tank to melt the wax and maintain it approximately at the predetermined desired temperature. A discharge bung 76, closed by a plug 77, is provided in the bottom of the receptacle for draining the wax when desired.

It will be apparent that as the waxing roll 35 rotates in a counter-clockwise direction the metallic periphery of the roll will pick up the liquid wax in a thin film and convey it up to the point of intersection of the waxing and squeeze rolls where the liquid wax will be brought into contact with the underside of the paper web. The paper web will be coated and impregnated with this wax to a degree depending upon the intimacy of contact between the rolls 34 and 35, and the quantity of wax conveyed to the web on the lower roll 35. The amount of wax which the paper is allowed to absorb can be readily controlled by increasing or decreasing the degree of compression between these rolls. The upper squeeze roll 34 is preferably provided with a coating or layer of medium hard rubber 78 for placing the paper web under a resilient compression and for avoiding the harsh metal to metal contact of the rolls with the web.

To regulate the quantity of wax which the periphery of the waxing roll 35 brings up into contact with the paper web, there is provided an adjustable wiping roll 79 which is adapted for approximate contact with the waxing roll 35 for removing the surplus wax from the periphery thereof. This wiping roll preferably consists of a hollow metallic cylinder covered with a layer of fabric or rubber 81, similar to the layer 78, for resilient contact with the waxing roll 35. As more clearly shown in Figures 5 and 6, the wiping roll 79 is pivoted in shiftable bearing blocks 82, which are guided for shiftable movement in diagonal guideways 83 mounted on the adjacent frame standards 14. An adjusting hand screw 84 threads thru a bridge member 85 at each end of the roll, and has rotatable connection in each of the bearing blocks 82. By adjusting the hand screws 84 the intimacy of contact between the wiping roll and the waxing roll can be nicely varied to obtain practically any desired rate of feeding of the wax to the paper. When a very thin superficial coating of wax is desired, the wiping roll is, of course, pressed down rather firmly against the waxing roll, to prevent all but a very thin film of wax to reach the web. The contact of the wiper roll with the waxing roll can be nicely adjusted to regulate the amount of wax applied to the web, and the contact between the squeeze and the waxing roll can be nicely adjusted to either superficially coat or entirely impregnate the web as desired. One or both of the journals 87 of the wiper roll 79 is bored out as indicated at 88 (Figure 6) and has communication with the interior of the roll so that steam may be injected from a hose nozzle or the like at the beginning of the run to impart a preliminary heat to the roll before contact with the wax. The wiper roll 79 can be positively driven from the waxing rolls thru the medium of chains or gears, if desired.

The two rolls 34 and 35 each consist of a hollow metallic cylinder having its ends closed, the cylinder 34 being slightly smaller than the cylinder 35 to allow for the added thickness of the rubber covering 78. Both rolls are internally heated by feeding steam to the rolls, the same as with the rolls 31 and 33. The journal ends 73 of both rolls 34 and 35 are bored out as indicated in Figure 4 for communication with the hollow interior of the rolls. Threading into these axial holes in the journals are the steam admission pipes 92 which have communication with the steam supply pipe 93 thru the rotatable coupling heads 94. Vent plugs 95 are provided in the ends of the rolls to drain the condensation at the end of the day's run. The journals at the front ends of the rolls 34 and 35 are provided with cocks 54 similarly to the rolls 31 and 33 to blow off the air trapped in the rolls upon starting of the machine. The heating of the waxing roll 35 prevents chilling of the thin film of wax on the periphery of the roll in its travel from the tank 73 to its point of contact with the paper. The heating of the squeeze roll 34 assists in maintaining the wax in a liquid condition until after the squeezing opera-

tion is completed and the wax is uniformly distributed over the web. Both waxing and squeeze rolls are provided with stripping plates or "doctors" 60 and 70 for stripping the "tail" end of the web from the rolls in threading the web thru the machine.

In the foregoing description I have referred only to those parts directly concerned in the operation of waxing only one side of the paper. I shall now describe the secondary waxing roll and its relation to the operation of waxing both sides of the paper.

Referring to Figure 5, it will be noted that this secondary waxing roll 97 is mounted in juxtaposition to the large waxing roll 35 and in position for dipping into the wax immersion tank 73. This secondary waxing roll, or immersion roll, as it might otherwise be termed, is supported at its ends in swinging arms 98. The arms 98 are carried on a horizontal operating shaft 99 which is supported in bracket bearings 101 bolted to the frame standards 14. At the front of the machine the shaft 99 is provided with a worm wheel 102 which meshes with an operating worm 103 pivoted in the front bearing bracket 101. The worm 103 is rotated by a hand wheel 104, and it will be apparent that by the operation of this hand wheel the immersion roll 97 can be elevated out of the immersion tank 73, as illustrated in Figure 2, or can be dipped into the same to any desired depth, as indicated in Figure 5. For waxing the web upon both sides, the web is extended across the top of the compensating roll 31 and thence down under the immersion roll 97 for immersion in the tank 73, before being led between the waxing and squeeze rolls 35 and 34. When the web is threaded thru the rolls in this relation, the wiper roll 79 is, of course, retracted from contact with the waxing roll 35, as illustrated in Figure 5. The amount of wax picked up by the web can be regulated to a certain extent by the depth of the immersion of the web in the wax through the adjustment of the roll 97. The surplus wax is rejected according to the degree of compression between the rolls 34 and 35.

The two waxing rolls 34 and 35 are both power driven so that they rotate independently of peripheral contact therebetween, and as a consequence there is no tendency to drag on the web and tear it. In the preferred embodiment the two rolls are positively geared together by gears 105 and 106 mounted on the journals 91 at the rear end of the machine. I also contemplate driving the two rolls together thru a system of belts, preferably after the rolls have been ground down to the point where the original gears become inefficient and noisy. The belt drive would be from a belt pulley on the projecting journal 91 of the upper roll to a counter shaft, and from there back to a pulley on the lower journal 91. The drive of the two rolls is thru a gear 107, which meshes with the gear 105 on the upper roll 34. This gear 107 is mounted on one of a pair of spaced countershafts, 108 and 109, which project horizontally from the side of the machine as clearly shown in Figure 4. The inner ends of these countershafts are journaled in a double bearing bracket 111, which is bolted to the frame standard 14. The outer ends of the countershafts are journaled in a yoke-shaped bearing frame 112 which extends outwardly from the side of the machine, the ends of which are bolted to the frame standard 14. On the lower countershaft 108 is mounted a driving pulley 113 over which is trained a driving belt 114 extending from any suitable source of power. The gear 107 on this lower countershaft also meshes with a gear 115 on the upper countershaft 109, which gear drives the upper cooling rolls thru the gear 116, as I shall presently describe. The yoke-shaped bearing frame 112 is braced by the horizontal tie rod 117, the end of which is bolted to the other frame standard 14.

From between the two waxing rolls 34 and 35 the run of the web is up and around a series of three cooling rolls 120, 121 and 122 at the top of the machine. The two upper rolls 120 and 122 are pivoted at each end in pillow blocks 123, which are mounted on the upper horizontal channel rail 124 of the frame. The central cooling roll 121 is mounted in pillow blocks 125, which are slung from the rail 124 between the frame standards 14. The web is threaded around the cooling rolls 120, 121 and 122 in the order named, and is thence led to the receiving roll 126, at the other end of the machine. The three cooling rolls are all internally cooled by the circulation of a cooling medium such as water or brine therethru. As illustrated in Figure 4, the journals at the rear ends of the rolls are bored out to receive concentric admission and discharge pipes 127 and 128 for circulating the cooling medium thru the rolls. Similarly to the steam pipes 92 and 93, these admission and discharge pipes have suitable rotatable connection in a rotatable coupling head 129 which communicates with the main supply and discharge pipes for the cooling medium. The three cooling rolls are geared together and are all positively driven by the gear 116 on the upper counter shaft 109. This gear 116 meshes with the relatively large gear 131, for driving the central cooling roll 121, and this latter gear in turn meshes with the two gears 132 and 133 for driving the two upper cooling rolls 120 and 122. Disposing the central cooling roll below the plane of the two lateral cooling rolls increases the extent of circumferential contact of the web with the cooling rolls.

The receiving roll of paper 126 is wound upon a central shaft 134 which, as shown in Figure 3, is removably supported in hinged bearings 135 mounted on the arched uprights 15. The rear end of the shaft 134 is adapted to have releasable coupling with a short stub shaft 136 on which is mounted the driving pulley 137. One end of the stub shaft 136 is mounted in a bracket bearing 138, which is bolted to the side of the frame member 10, and the other end is mounted in a bearing 139, which is supported on an independent frame standard 141, spaced from the rear of the machine. A tie rod 142 connects the standard 141 with the frame standard 14 and serves to brace the standard 141. At its front end, the receiving roll shaft 134 has a similar releasable coupling with a short stub shaft 143, which is pivoted in the bearing bracket 144. A hand wheel 145 on the stub shaft 143 affords means for manually turning the receiving roll shaft when drawing the beginning of the new web thru the machine, or for winding up the tail end of a completed web. Similarly, the stub shaft 21 is provided with an operating hand wheel 146 for providing convenient means for manually turning the parent roll shaft 16′ to facilitate threading the web thru the machine and the like.

In the winding of the ordinary form of paper roll, the receiving roll shaft 134 is driven by a belt 147 which encircles the pulley 137 and is extended up and around a pulley 148 on the rear journal end of the cooling roll 122. It is essential that this driving belt have a certain amount of slippage to compensate for the increasing peripheral velocity of the roll as it grows larger. For adjusting the tension of this belt to obtain the proper amount of slippage, there is provided an adjustable idler pulley 149, which is carried on a swinging arm 151 at the rear of the machine. This arm is carried on an adjusting shaft 152 which extends forwardly to the front of the machine, and which is journaled in bearing brackets 153. The shaft 152 is extended forward to permit of adjustment of the idler pulley from a convenient point at the front of the machine. On the end of the shaft is mounted a worm wheel 154 which meshes with a worm 155, having bearing support in the front bracket 153. It will be apparent that by manipulating the hand wheel 156 any degree of tension can be imposed upon the belt 147, and that thru the irreversible action of the worm 155 the idler pulley will remain in any adjusted position.

It is frequently desirable to wind the receiving roll 126 in the opposite direction so that the single waxed surface of the web will be on the inside. In this event a longer driving belt is substituted and is trained over a driving pulley 157 on the central cooling roll 121, as denoted in dotted lines in Figure 2. The idler pulley 129 can be revolved thru a complete circle on the arm 151, and consequently can also be utilized to regulate the tension on this latter driving belt, as indicated by its dotted line position.

The receiving roll is removed at the end of the run by unhinging the bearings 135 and simply lifting the roll out of engagement with the stub shafts 136 and 143. This usually necessitates an overhead crane or loading platform, however, and to facilitate the operation of removing the completely wound receiving roll and placing a new pad roll in the machine, I have devised an improved construction of swinging roll supporting frame whereby the removal and replacing of these rolls can be effected from the floor level. Referring to Figures 7, 8 and 9, in which is illustrated this improved roll supporting frame, it will be noted that between the end frame standard 15′ is pivoted a frame structure 160 on which are carried the parent and receiving rolls 16 and 126. This pivoted frame structure comprises the two side members 161 which are provided at their ends with oppositely facing hinge bearings 162 and 163, for receiving the shafts of the parent and receiving rolls. The two side frame members 161 are joined by the intermediate angle sections 164. The frame as an entirety is rigidly mounted on the central shaft 165, which has bearing support in the front and rear frame members of the machine. Adapted for coupling with the parent roll shaft 16′ is the usua stub shaft 21′ on which is mounted the braking drum 24 and hand wheel 25, and also a stub shaft 165 in the rear frame member of the machine. The ends of these stub shafts are preferably slotted to have releasable coupling engagement with the tongued ends of the shaft 16′, as in the previous embodiment. The receiving roll shaft 134, similarly, is adapted for coupling connection with the usual stub shafts 136′ and 143′, the former of which is driven by a belt pulley 137′.

On the rear end of the pivotal shaft 165 is mounted a worm wheel 167 which meshes with a power driven worm 168. This worm is mounted on a shaft 169, which is extended back along the rear of the machine and is supported in the bracket bearings 170. Adjacent one of the frame standards 14 the shaft 169 is provided with a sleeve 172, which is keyed against rotation on said shaft. This sleeve is provided with two facing friction wheels 173, of conical formation, which are adapted to be brought into frictional engagement with the conical friction driven wheel 174 on the transversely extending drive shaft 175. The shifting of the sleeve 172 with its friction wheels 173 is effected by an operating lever 176

which is pivoted to a bracket arm 177, and which has its end forked for engagement between spaced collars on the sleeve 172. It will be apparent that by shifting the lever 176 to bring one or the other of the friction wheels 173 into operative engagement with the driving wheel 174, the worm 168 can be rotated in either direction to swing the roll supporting frame 160 up or down for removing and replacing the paper rolls 16 and 126. The irreversible action of the worm 168 constitutes an effective brake for preventing the supporting frame from lowering too rapidly under the heavy weight of the receiving roll 126.

A notable feature of the present machine is the comparatively short length of the machine and the compact assemblage of the different operating parts whereby this short length is made possible. It should be observed that by placing both the parent and receiving paper rolls at one end of the machine and passing the web back upon itself, in traveling between these rolls, considerable reduction in the overall length of the machine is attained. Disposing both paper rolls at one end of the machine permits of the use of the swinging roll supporting frame, and results in one roll counterbalancing the other in the operation of this frame. The relatively short length of the machine places the several controls within convenient reach of the operator, so that the one operator can, without any difficulty, adjust the tension on the web by manipulation of the brake 25, adjust the compensating roll 31 for web of non-uniform thickness, adjust the depth of immersion of the web by the manipulation of the immersion roll, adjust the degree of compression between the squeeze roll and waxing roll, and adjust the tension imposed on the driving belt thru the idler pulley, all of which can be accomplished from the front of the machine without distracting the attention of the operator from the other operations.

Although I have shown and described a particular embodiment of the invention, it will be understood that I contemplate changes in form and arrangement of parts as circumstances suggest, or necessity requires, without departing from the scope of the invention as defined in the appended claims.

I claim:

1. In a paper waxing machine, the combination of a wax immersion tank, a relatively large waxing roll dipping into said immersion tank, a superposed squeeze roll of substantially the same size as said waxing roll, means for creating a waxing pressure between said rolls sufficient for impregnation of the wax in the paper, an immersion roll, means for adjusting said immersion roll to varying depths in said immersion tank, a parent roll, the web of paper being extended from said parent roll to the point of contact between said waxing and squeeze rolls for applying wax to only one side of said web, means for guiding the web from said parent roll to said waxing and squeeze rolls, said latter means comprising a relatively large preheating roll for preheating the web prior to the waxing thereof, a plurality of relatively large cooling rolls substantially above said squeeze roll for cooling the run of web after the waxing thereof, means for driving said waxing roll, said squeeze roll and said cooling rolls, said waxing roll and said squeeze roll being positively geared together for rotation at a common peripheral speed.

2. In a paper waxing machine, the combination of a wax immersion tank, a relatively large waxing roll partially immersed in said tank, a superposed squeeze roll of substantially the same size as said waxing roll, an immersion roll adapted for guiding the web of paper through said immersion tank, a first preheating roll over which the web is drawn to said immersion roll, and a second preheating roll over which the web is drawn when being fed directly to said waxing and squeeze rolls.

3. In a paper waxing machine, the combination of a wax immersion tank, a waxing roll partially immersed in said tank, a squeeze roll cooperating therewith, an immersion roll adapted to guide the web into said immersion tank, means for guiding the web either to said immersion roll for immersion in said tank, or directly between said waxing and squeeze rolls for waxing on only one side thereof, wiping means adapted to bear upon or closely approach said waxing roll to remove the surplus wax therefrom when said web is only waxed on one side thereof, and means for retracting said wiping means out of contact with said waxing roll when said web is drawn through said immersion tank.

4. In a paper waxing machine, the combination of a wax immersion tank, a waxing roll dipping in said tank, a squeeze roll cooperating with said waxing roll for squeezing the web of paper therebetween, an immersion roll for guiding the web into said immersion tank, a first preheating roll, arranged whereby said web is drawn into contact with said preheating roll and thence to said immersion roll for immersion in said tank, a second pre-heating roll arranged whereby said web is drawn into contact therewith and thence between said waxing and squeeze rolls when said web is to be waxed only upon one side, a wiping roll adapted to approach or bear against said waxing roll for removing the surplus wax therefrom when said web is being waxed upon one side thereof, and means for re-

tracting said wiping roll from operative association with said waxing roll when said web is being waxed upon both sides thereof.

5. In a paper waxing machine, the combination of a wax immersion tank, a waxing roll dipping in said immersion tank, a squeeze roll cooperating with said waxing roll, an immersion roll adapted to be immersed in said tank, a pair of pivoted arms supporting the ends of said immersion roll, adjusting means for swinging said arms for varying the depth of said immersion roll in said tank, a first preheating roll, means for adjusting said first preheating roll, a second preheating roll, a wiping roll for wiping the surplus wax from said waxing roll, bearing members for supporting the axis of said wiping roll, and screw means for adjusting the position of said bearing members for changing the relative position between said wiping roll and said waxing roll.

6. The combination of waxing mechanism comprising a receptacle for heated wax, a waxing roll receiving wax from said receptacle, an immersion roll in said receptacle, means for guiding the web either to said immersion roll for immersion in said receptacle, or directly to said waxing roll for waxing only one side thereof, preheating means for preheating the web prior to admission to said waxing mechanism, and cooling means for cooling said web after the completion of the waxing operation.

7. In a paper waxing machine, the combination of waxing mechanism comprising a wax immersion tank, a waxing roll receiving wax from said immersion tank, a squeeze roll cooperating with said waxing roll, a second waxing roll arranged for dipping in said immersion tank, said rolls adapted to receive a web threaded in different paths through said rolls, a preheating roll for preheating the web prior to admission to said waxing mechanism, and a plurality of cooling rolls adapted to receive said web from said waxing mechanism.

8. In a paper waxing machine, the combination of waxing mechanism comprising a tank for containing heated wax, a waxing roll receiving wax from said tank, a squeeze roll co-operating with said waxing roll, said waxing mechanism receiving the web from a parent roll, an adjusting roll for adjusting the run of the web between said parent roll and said waxing mechanism, a guide roll for guiding said web to said waxing mechanism, and means for heating said adjusting roll and said guide roll.

9. In a paper waxing machine, the combination of a supporting frame, a pair of supporting standards at one end of said frame, a parent roll and a receiving roll supported by said standards, said receiving roll being mounted above said parent roll, a wax immersion tank at the other end of said frame, a relatively large waxing roll dipping in said tank, a squeeze roll of substantially the same size bearing against said waxing roll, means for creating a relatively high pressure between the peripheries of said rolls for impregnating the wax in the paper, said latter rolls being supported one above the other between pairs of supporting standards at said other end of the supporting frame, and a plurality of cooling rolls supported on said pairs of standards above said waxing roll and said squeeze roll, the run of the web being from said parent roll across the machine and between the waxing and squeezing rolls, thence up around said cooling roll, and thence back across the machine to said receiving roll.

10. In a paper waxing machine, the combination of a supporting frame, a wax immersion tank carried by said frame, a waxing roll dipping in said immersion tank, a squeeze roll disposed above said waxing roll, gearing for driving said squeeze roll from the source of power, stationary bearings on said supporting frame for supporting said squeeze roll, said squeeze roll having a yieldable surface adapted to be compressed against said waxing roll, a pair of gears positively connecting said rolls together in a common drive, bearings slidable in said supporting frame for said waxing roll, a vertical adjusting screw at each end of said frame for supporting said shiftable bearings, a worm wheel having threaded engagement with each of said adjusting screws, worms meshing with said worm wheel, and operating means for simultaneously actuating both of said worms.

11. In a paper waxing machine, the combination of a supporting frame, means for supporting the parent roll of paper at one end of said frame, a wax immersion tank, a waxing roll receiving wax from said tank, a squeeze roll having a resilient covering disposed above said waxing roll, stationary bearings mounted on said frame for supporting said squeeze roll, bearings vertically shiftable in said frame for supporting said waxing roll, screw means for raising or lowering said shiftable bearings, and means for relatively increasing the run of the web along either margin thereof between said parent roll and said waxing and squeeze rolls.

12. In a paper waxing machine, the combination of waxing mechanism, means for supporting a parent roll of paper, the web from said parent roll being extended to said waxing mechanism, and means for relatively increasing the length of run of said web along either margin thereof between said parent roll and said waxing mechanism.

13. In a paper waxing machine, the combination of a receptacle for containing heated wax, a waxing roll receiving wax from said

receptacle, a squeeze roll co-operating with said waxing roll, means for supporting a parent roll of paper, said paper adapted to be fed from said parent roll to said waxing and squeeze rolls, and means for compensating for irregularity in the run of the web, said compensating means being operable to relatively increase or decrease the length of run along either margin of said web between said parent roll and said waxing and squeeze rolls.

14. In a paper waxing machine, the combination of a receptacle for containing heated wax, a waxing roll receiving wax from said receptacle, a squeeze roll co-operating with said waxing roll, bearing means for supporting a roll of paper for feeding to said waxing and squeeze rolls, and an adjustment roll engaging with the run of the web between said feeding roll and said waxing and squeeze rolls, said adjustment roll being operable to relatively increase or decrease the length of run along either margin of said web.

15. In a paper waxing machine, the combination of a wax immersion tank, a waxing roll dipping in said tank, a squeeze roll co-operating with said waxing roll, a parent roll for feeding paper between said waxing and squeeze rolls, a compensating roll engaging with the run of the web between said parent roll and said waxing and squeeze rolls for compensating for irregularities in the thickness of the web, and means for angularly shifting one end of said compensating roll relative to the other end for increasing the length of run of said web along either margin thereof.

16. In a paper waxing machine, the combination of a supporting frame, a parent roll mounted on one end of said supporting frame, waxing mechanism supported on the other end of said frame, said waxing mechanism comprising a wax immersion tank, a waxing roll dipping in said tank, a squeeze roll co-operating with said waxing roll, a second waxing roll dipping in said tank, said rolls adapted to receive the web from said parent roll, said web adapted to be threaded directly between said first waxing roll and said squeeze roll for waxing one side thereof, and adapted to be threaded around said second waxing roll, and thence between said first waxing roll and said squeeze roll for waxing both sides thereof, a plurality of cooling rolls supported on said frame adjacent said waxing mechanism, a receiving roll supported on said frame adjacent said parent roll for receiving the web from said cooling rolls, a compensating roll supported on said frame and engaging with the run of the web between said parent roll and said waxing mechanism, a universal pivotal mounting for one end of said roll, and screw means for vertically or horizontally shifting the other end of said roll angularly relatively to said pivoted end.

17. In a paper waxing machine, a wax immersion tank, a waxing roll dipping in said tank, a squeeze roll for operating with said waxing roll, a second waxing roll adapted to be dipped into said tank, said rolls adapted to receive a web threaded in different paths thru said rolls, a pair of pivoted supporting arms for supporting the ends of said second waxing roll, and irreversibly acting screw means operating said supporting arms for raising or lowering said second waxing roll into or out of said immersion tank.

18. In a paper waxing machine, the combination of a supporting frame, a receptacle for containing heated wax, a waxing roll receiving wax from said receptacle, a squeeze roll disposed above said waxing roll and co-operating therewith, bearings for said rolls supported by said frame, said bearings being adjustable to adjust the compression between said rolls, and a pair of intermeshing gears at the ends of said waxing and squeeze rolls for mutually driving said rolls at the same peripheral speed independently of peripheral contact with the paper web, said pair of gears remaining in mesh independently of adjustment of said bearings.

19. In a paper waxing machine, the combination of a waxing mechanism, a plurality of cooling rolls for receiving the web from said waxing mechanism, a receiving roll for receiving the web from said cooling rolls, a pair of oppositely rotating belt pulleys, said receiving roll adapted to have belted connection with either of said pulleys, and an adjustable idler pulley for governing the tension of said belt, said idler pulley being adapted for engagement with either of said belts.

20. In a paper waxing machine, the combination of a waxing mechanism, a plurality of cooling rolls for receiving the web from said waxing mechanism, gears connecting the rolls of said waxing mechanism with said cooling rolls in a positive drive, a receiving roll for receiving the web from said cooling rolls, oppositely rotating belt pulleys on the shafts of two of said cooling rolls, said receiving roll adapted to have belted connection with either of said pulleys, the belted connection with one of said pulleys having non-parallel relation to the belted connection with the other of said pulleys, an adjustable idler pulley for governing the tension of said belts, said idler pulley shiftable for engagement with either of said belts, and irreversible gear means for controlling the tension adjustment applied to said idler pulley.

21. In a paper waxing machine, the combination of a main supporting structure, waxing mechanism at substantially one end

of said supporting structure, said waxing mechanism comprising a wax immersion tank, a waxing roll dipping in said tank, a squeeze roll co-operating with said waxing roll, means for guiding the run of web directly between said waxing and squeeze rolls or first through said wax immersion tank and thence between said rolls, a plurality of cooling rolls supported on said supporting structure above said waxing and squeeze rolls, a roll supporting frame pivoted at the other end of said main supporting structure, said roll supporting frame comprising means for supporting the feeding and receiving paper rolls at opposite ends of said frame, said means permitting ready removal or substitution of said rolls, a pivot shaft intermediate the ends of said supporting frame for pivotally supporting said frame on said main supporting structure, means for revolving said pivot shaft to revolve said roll supporting frame, means for driving said waxing and squeeze rolls and said cooling rolls, power transmission means extending between said latter means and the axis of said receiving paper roll on said roll supporting frame, said power transmission means being disconnectable to permit rotation of said roll supporting frame, and frictional retarding means for retarding the rotation of said feeding paper roll.

22. In a paper waxing machine, the combination of a supporting frame, a parent roll, supported on said frame, means for frictionally retarding the rotation of said parent roll adjustment means for said frictional means, a compensating roll mounted on said frame for compensating for abnormal conditions in the web, adjustment means for said compensating roll, a waxing roll supported on said frame for waxing the web, adjustment means for said waxing roll, the several adjustment means for said frictional means, for said compensating roll, and for said waxing roll, being all operable from one side of the supporting frame.

23. In a paper waxing machine, the combination of a supporting frame, a parent roll of paper, means for frictionally retarding the rotation of said parent roll, adjustment means for said frictional means, a compensating roll on said frame for compensating for variations in the thickness of the web, adjustment means for said compensating roll, a pair of waxing rolls for waxing the web, adjustment means for adjusting the contact between said waxing rolls, a receiving paper roll supported on said frame, a belt for driving said roll, adjustment means for adjusting the tension of said belt, said several adjustment means being all operable from one side of said supporting frame.

24. In a paper waxing machine, the combination of a supporting frame, a paper feeding roll at one end of said frame, paper waxing mechanism at the other end of said frame, said paper waxing mechanism comprising a pair of contacting waxing rolls, means for supplying a heating medium to said waxing rolls, a plurality of cooling rolls mounted above said waxing mechanism, admission and discharge conduits entering one end of said cooling rolls for circulating a cooling medium therethru, gears interconnecting said waxing rolls and said cooling rolls, and a paper receiving roll mounted on the other end of said frame above said feeding roll.

In witness whereof I hereunto subscribe my name this 27 day of Sept., 1919.

JOHN A. MARTIN.