W. A. ZICKERMAN.

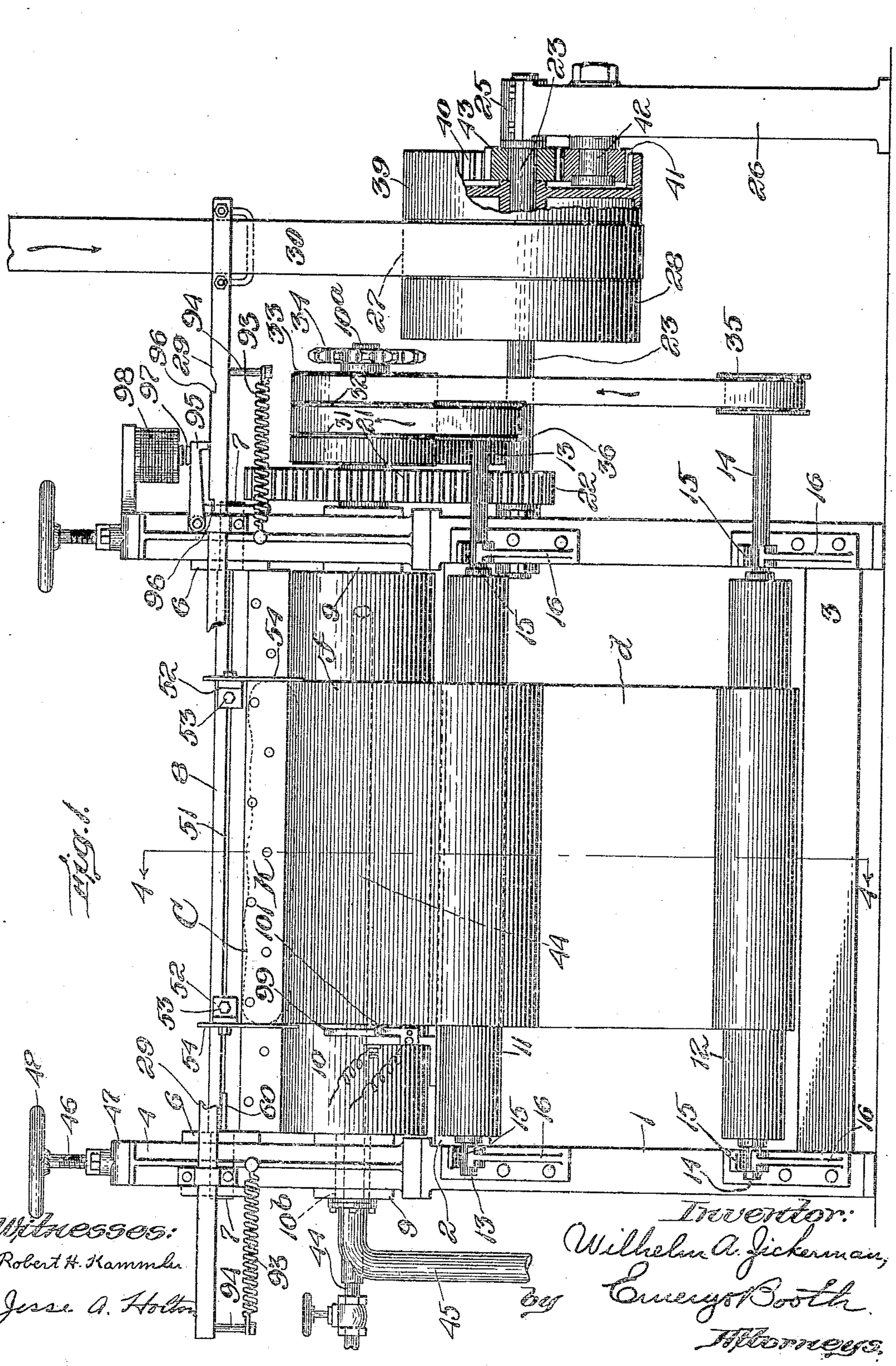
COATING MACHINE.

APPLICATION FILED MAR. 12, 1907.

953,570.

Patented Mar. 29, 1910.

4 SHEETS—SHEET 1.



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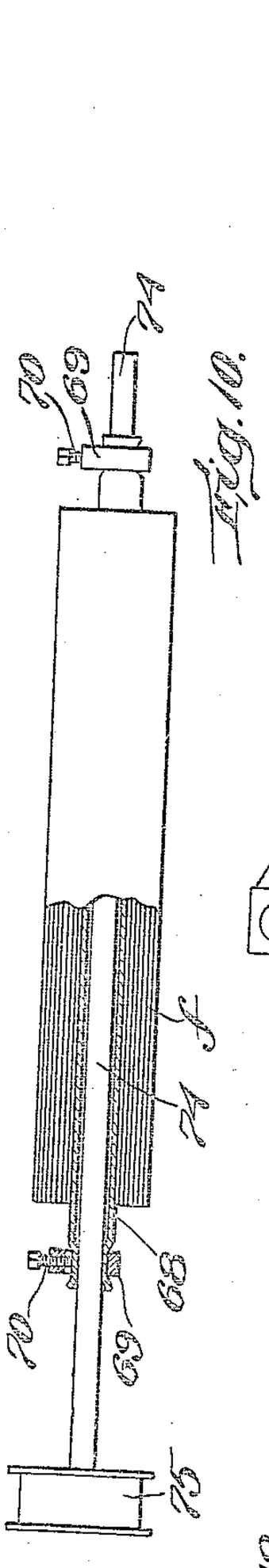

Fig. 10.

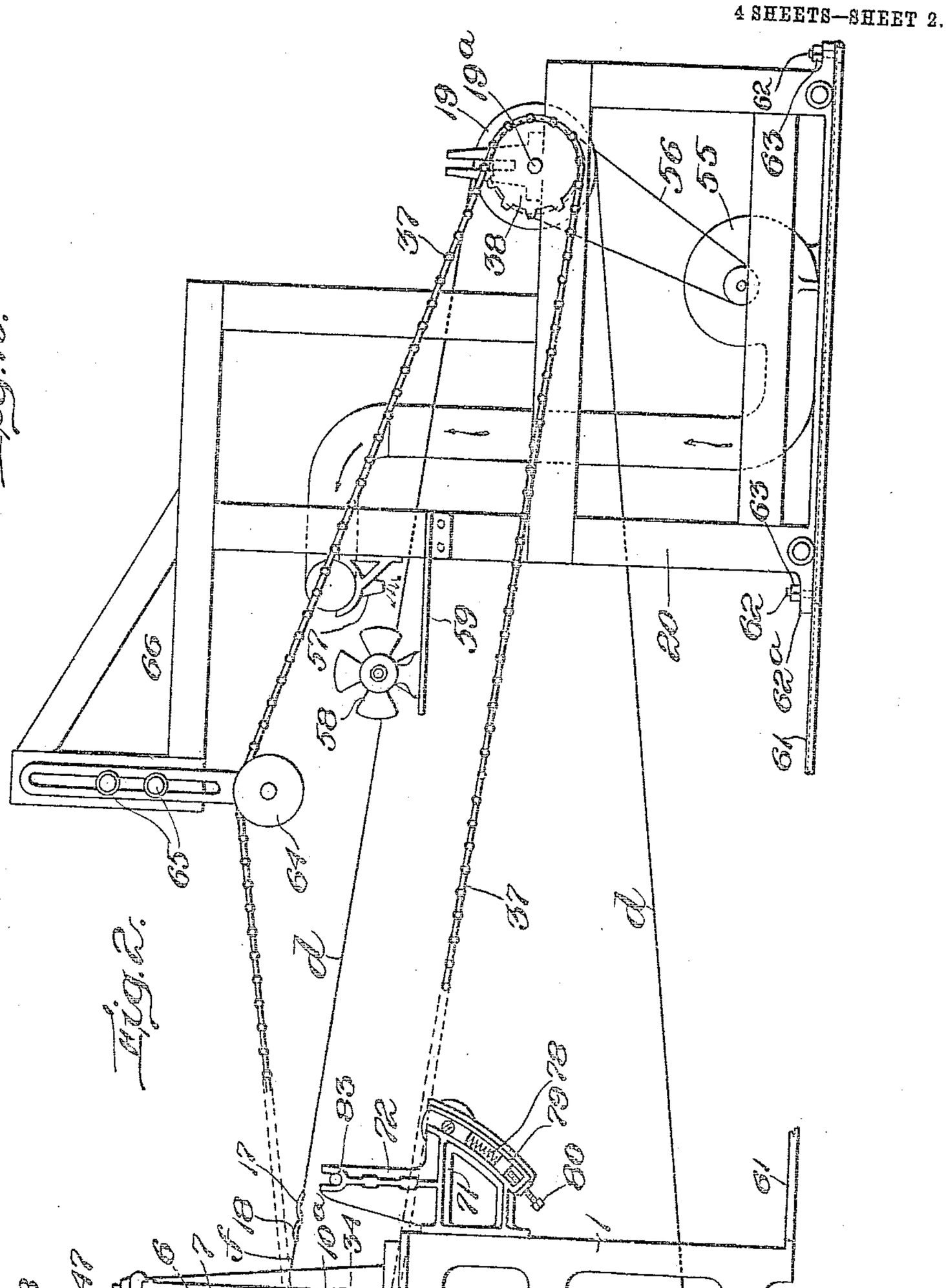

Fig. 9.

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4 SHEETS—SHEET 3.

Fig. 4.

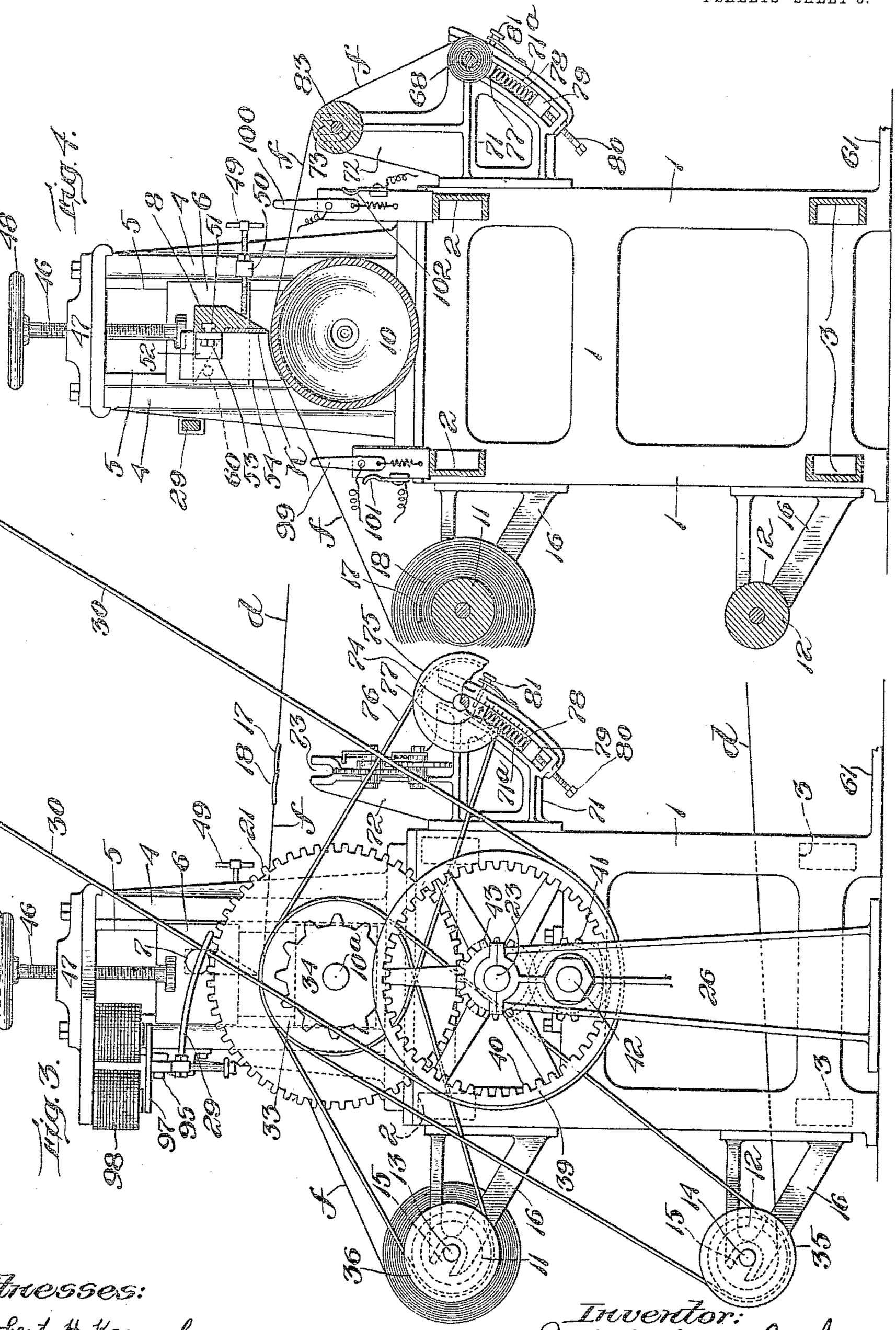

Fig. 3.

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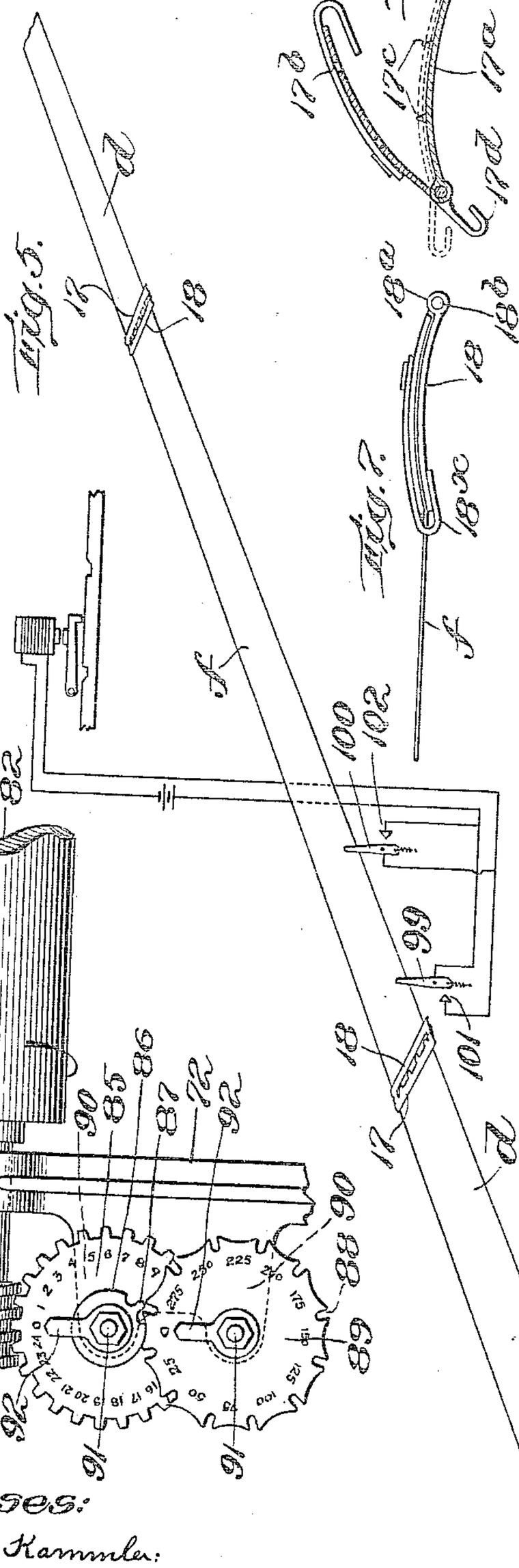
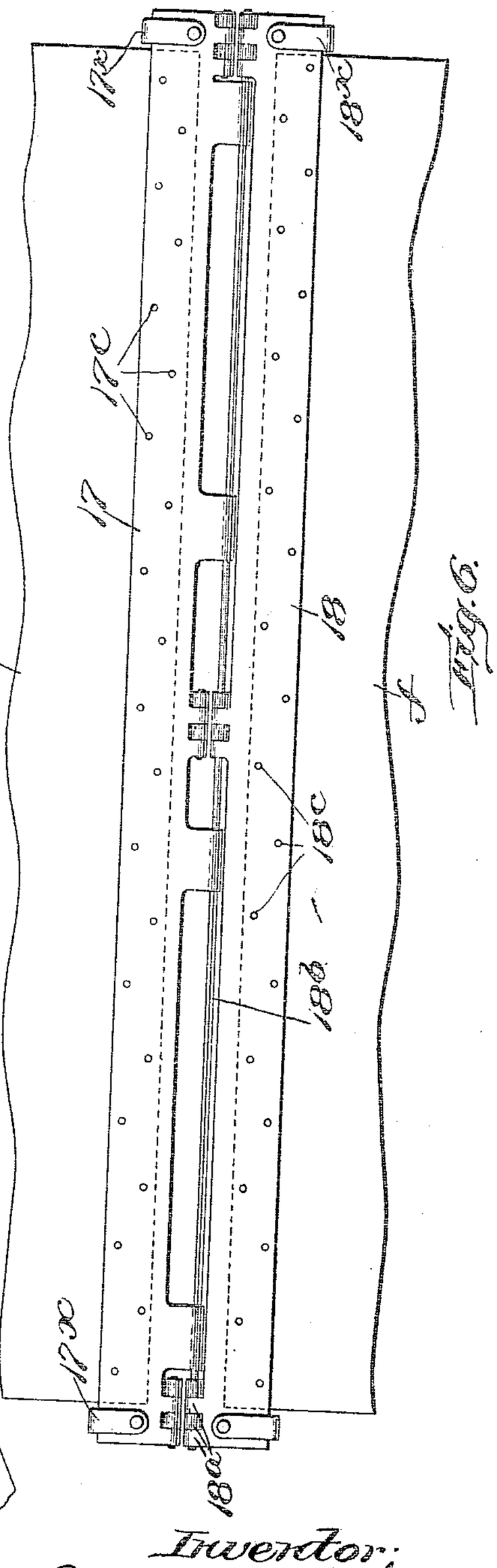
4 SHEETS—SHEET 4.





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UNITED STATES PATENT OFFICE.

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COATING-MACHINE.

953,570. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed March 12, 1907. Serial No. 362,039.

To all whom it may concern:

Be it known that I, WILHELM A. ZICKERMAN, citizen of the United States, residing at 8 Berwick Park, Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Coating-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention relates to coating machines and more particularly, though not exclusively, to those known to the trade as spreading machines employed for applying coating solutions or compounds, for example, rubber compositions to fabrics or other material.

My invention aims, generally, to improve machines of this type and to that end comprises novel features of construction and arrangement, that will be best understood and appreciated from the following description and accompanying drawings of a machine embodying one form of my invention and selected for purposes of illustration, its scope being more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a front elevation, with parts broken away, of a spreading machine selected for purposes of illustration and embodying one form of my invention; Fig. 2, an elevation of the right side thereof; Fig. 3, a similar view of the head or main frame of the machine on a somewhat larger scale; Fig. 4, a vertical and longitudinal section on the line 4—4, Fig. 1; Fig. 5, a perspective detail, showing the manner of using clasp or clamping devices for removably attaching the fabric ends to the winding rolls or dummies; Fig. 6, a plan of a detail, showing the connected dummy clamps, to which reference will be made; Fig. 7, an end elevation of one of said clamps and the attached fabric or dummy; Fig. 8, a vertical transverse section of the other, adapted for connection therewith; Fig. 9, a detail, showing the yard counting device employed for measuring the number of yards coated; and, Fig. 10, an elevation in partial section of the auxiliary winding or quill shaft and of the paper quill or shell on which the fabric is finally wound after the coating operation has been concluded, and on which the fabric is weighed.

In the particular embodiment of my invention, herein selected for illustration, referring first to Figs. 1 and 2, I have shown my invention as applied to a machine for applying or spreading water-proofing or insulating material, for example, rubber composition, to the surface of a fabric, though obviously my invention is not limited to such use. As here shown (Fig. 2) the machine is provided with main and auxiliary frames on which the operative parts are suitably mounted, the main frame or head, in the present instance, comprising the vertical sides 1, suitably connected by upper and lower horizontal tie or cross plates 2 and 3 (Figs. 1 and 4) to form a rigid structure. The heads of these side frames 1 are each provided with a pair of uprights 4 having at their inner sides vertical ribs 5 (Figs. 3 and 4) extending inwardly to form guides for a grooved block 6, vertically and slidably mounted thereon. Each of these blocks has a bearing for the adjacent trunnioned end 7 (Fig. 2) of a spreading knife carrier 8 (Fig. 4) to the front face of which a spreading-knife K is vertically secured, said knife operating to spread the coating compound evenly over the surface of the fabric, as the latter is fed over the main guide roller 10 immediately below it. Also mounted between said ribs or guides 5 and immediately below said blocks 6, are suitable bearing blocks 9 for the journals of the main guide roller 10, which, as stated, coöperates with said knife K, during the coating operation and supports the fabric in coating position.

In the present embodiment of my invention, the rubber coating compound or composition employed is first suitably heated and treated to render it plastic or pliable and of dough-like consistency and is then formed into a roll-like mass and spread across the roller supported fabric in front of said spreading and leveling knife K, which forces the gummy composition into the interstices of the fabric and which is adjustably mounted to secure a desired thickness of coating composition in spreading it over the surface of said fabric.

To provide suitable means for carrying or feeding the fabric, I preferably employ upper and lower conveyer or winding rolls 11 and 12, respectively, (Figs. 2–4), removably and respectively secured to roller shafts 13 and 14, journaled at their ends in inclined and open ended bearing slots 15 formed in

the front ends of horizontal brackets 16 which are suitably secured to the front of said side frames 1. The ends of the material or fabric to be coated are removably secured to these winding rolls by any suitable means, preferably by means of attaching clasps or clamps 17 and 18, hereinafter described, and what are termed dummies *d* (Figs. 2 and 5), secured to said rolls, said fabric running between these rolls and over the main guide or coating roller 10 and a second guide roller 19, journaled in an adjustable auxiliary frame 20, termed a horse, at the rear of the machine.

The dummies *d* are pieces of fabric or cloth secured at one end in any suitable manner to the periphery of the rolls 11 or 12, and at their opposite ends to the opposite ends of the fabric by means of said clamps 17 and 18. These dummies are preferably long enough to reach from one winding roll to the other over said guide rollers, so that the whole upper surface of the fabric, including its end portions, may be coated. This, obviously, would not be the case if the fabric were directly attached to the winding rolls, since an end portion thereof would then be in rear of the guide roller 10 (Fig. 2) and attached to the lower roll 12 and consequently would not be fed past the spreading knife in starting the machine. The fabric being thus attached to the rolls 11 and 12, which may be termed the delivery and receiving rolls, is wound on the upper roll 11 previously to coating, its rear or leading end being connected to the dummy *d* of the lower roll by means of the clamping devices 17 and 18, said dummy passing beneath the spreading knife K, over the roller 10, around the guide roller 19 at the rear of the machine, and thence forwardly to said lower winding roll 12. In the coating operation, the rolls 11 and 12 and said guide rolls 10 and 19 are simultaneously rotated in the same direction, to cause the fabric to be unwound from the upper or delivery roll 11, fed rearward over the surface of the roller 10, past the spreading knife, around said guide roller 19, and finally wound up on the lower or receiving roller 12. Any suitable means may be employed for driving these rolls and rollers, but I preferably employ the driving mechanism herein shown, wherein the roller shaft 10^a extends through the right side frame 1, to receive a large gear wheel 21 (Figs. 1 and 3), meshed with a driving pinion 22, fast on a drive shaft 23. This shaft is journaled at its left end (Fig. 1) in a bracket bearing 24 (Fig. 2), of the right side frame 1, and at its outer right end in a suitable bearing 25, provided at the head of a standard 26 (Fig. 1) at the right side of the machine. In the present instance this shaft is provided with three pulleys, the middle one 27 and the outer pulley 39 being loose or idle, the former being constantly rotated through a suitable belted connection with a convenient, preferably overhead, source of power. The inner pulley 28, (Fig. 1) is fast on said shaft and is employed for rotating said rolls and roller 19 for feeding the fabric during the coating operation, a suitable belt shifter 29, slidably mounted on said brackets 4, convenient to the operator, being provided for shifting the driving belt 30 from the idle pulley 27 to said driving pulley 28.

That the winding rolls 11 and 12 and the rear guide roller 19 may be rotated simultaneously with the main guide roller 10 any suitable means may be employed, but in the present instance, the shaft 10^a of said roller 10, exterior to the large gear wheel 21, is preferably provided with fast pulleys 31, 32 and 33 (Fig. 1), its outer end receiving a sprocket wheel 34. The outer pulley 33 is belted to a pulley 35 on the right end of the lower roll shaft 14, the intermediate pulley 32, to a similar pulley 36 on the shaft 13 of the upper winding roll 11, and the sprocket wheel 34 is geared by a sprocket chain 37 (Fig. 2) with a similar sprocket wheel 38 on the right end of the shaft 19^a of the rear guide roller 19. By this arrangement rotation of the gear wheel 21 and its shaft rotates the guide roller 10, said rolls 11 and 12 and the roller 19, causing the unwinding of the fabric from the delivery roll 11 and winding it up on the receiving roll 12, the guide rollers coöperating in feeding it from one to the other beneath and past the spreading knife K. The outer pulley 39 on the drive shaft 23 is a reversing pulley, to which the belt is shifted after a coat has been applied to the fabric and which operates to run the fabric back or rewind it upon the delivery roll 11 preparatory to the application of an additional coat. The hub of this pulley is loosely journaled on its supporting shaft 23 and its rim is interiorly provided with gear teeth 40 (Figs. 1 and 3), in mesh with a gear pinion 41 suitably journaled on a bearing stud 42 secured to the standard 26. This pinion is in mesh with a pinion 43, fast on said shaft 23 and interiorly concentric with said pulley 39, the rotation of the latter, effected by shifting the belt 30 thereto, rotating the pinions 41 and 43 and said drive shaft 23 in the opposite direction and at approximately twice the speed relative to that produced by the pulley 28. This construction results in a saving of time and labor with a consequent reduction in the cost of manufacture, for prior to my invention it has been customary to remove the fabric-carrying rolls from the machine, turn them end for end, and interchange their positions, the size and weight of the rolls employed, or to express it differently, the length of fabric that could be

coated, having been limited necessarily to the weights the operatives could handle. My invention does away with all this, so that rolls of any weight or fabrics of most any desired length may be expeditiously coated and with minimum cost and economy of labor. Prior to my invention, furthermore, the rubber compound or composition employed with spreading machines of this type has been rendered plastic by dissolving it in naphtha or similar solvents to reduce it to a dough-like consistency, a mass of such compound being spread across the fabric in front of a spreading knife, which, in the operation of the machine, spreads said compound over the surface of the fabric as the latter is fed between it and the guide roller below it. These machines have the rear guide roller 19 mounted at considerable distance in rear of the head of the machine and on a stationary frame, thus providing for a long reach or run of said fabric between the carrying rolls, in order that the naphtha solvent may be evaporated from the solution or composition, leaving the dry residuum as a coating on the fabric and which will not stick to the uncoated face thereof as it is wound on the lower roll. Because of the explosive character of these solvents, especially naphtha, and the danger attending their use in any form, the guide roller below the knife has hitherto always been of rubber, or rubber faced, to prevent metallic contact with the spreading knife and the possible production of sparks to ignite or explode the naphtha. By my invention I avoid these objections by providing a machine employing a rubber composition prepared by subjecting it to the influence of heat of a given temperature and by treatment by special machinery, no naphtha or like solvent being used in preparing it. The composition being brought to a heated dough-like consistency and plastic, is then placed upon and spread across the fabric, as shown at C (Fig. 1) and in front of the knife as hitherto, but maintained at a given temperature, to maintain the composition in its plastic state. To this end, the roller 10 is preferably made hollow and of metal, preferably of polished steel, and it is maintained at the desired temperature by heating the same. While any suitable heating means may be employed for this purpose, I have found that the most advantageous results are secured by using steam, which is conducted to one end of the roller by a valve controlled steam pipe 44 (Fig. 1), which passes through the left bearing block 9 and a hollow trunnion 10^b at the left end of said roller. This pipe extends within the roller and is open at its right end to permit the steam to enter and subject it to a uniform temperature. Surrounding this pipe and forming a support therefor is a steam outlet or escape pipe 45, also passing through the left bearing block 9 and having a lateral opening to receive the inlet pipe 44.

The heated compound, being deposited in front of the knife K, as shown at C (Fig. 1), the latter spreads it over the fabric and forces it into the interstices of the fabric to cause permanent adherence of the coating thereto, so that subsequent peeling up from the fabric is prevented when it is used, the thickness of the coating being regulated by vertical adjustment of the slide blocks 6 (Fig. 1) in their guideways. This adjustment is effected, in the present instance (see Figs. 2–4), by means of two adjusting screws 46 rotatably secured at their lower ends in said blocks 6, and threaded through cross-plates 47 connecting the heads of the uprights 4, hand wheels 48 being provided for conveniently rotating said screws to elevate or depress the trunnioned knife carrier and its knife, thus to regulate its distance from the coöperating surface of said roller 10, and hence the thickness of coating. The knife is also mounted for adjustment transversely to its length for varying its position relative to the adjacent polished surface of the coöperating roller 10, this adjustment being provided by suitable horizontal adjusting screws 49 mounted in lugs 50 at the inner sides of the rear uprights 4, said screws engaging by their ends the rear inclined face of the knife carrier, and by which the knife may be moved forward or back, as desired.

For gaging the sides of the fabric and centering it relative to the knife in the coating operation, I preferably provide the knife carrier 8 with a horizontal T-shaped groove 51 (Fig. 4), in which are slidably and adjustably secured the side gages 52 (Fig. 1), the latter being provided with set screws or bolts 53, to retain them in adjusted position, and with gage plates 54 to engage the sides of the fabric, the adjustment adapting the same for use with fabrics of different widths. These gages also act as guides for positioning the fabric on the roller 11 during the winding operation and may be employed for varying the width of the coat of coating composition relative to the fabric.

After the compound is spread over the fabric by the action of the knife K, it is essential that its temperature be reduced so that it will not stick to the uncoated surface of the fabric when wound upon the lower winding or receiving roll 12. This is but partially provided for by the short run of the fabric between the rolls 11 and 12, and to quicken the cooling of the fabric coat during the run, I also provide suitable cooling means which may be of any desired type. In the present embodiment of my invention I employ a blower conventionally represented at 55, mounted upon the base and between the sides of the auxiliary frame and movable

with it. This blower is belted, as at 56, to rotate with the guide roller shaft 19ª and has a suitably supported mouth or nozzle 57 arranged above and in juxtaposition to the coated surface of the fabric so as to cause the jet of cold air therefrom to effectively cool or dry the composition. To coöperate with this blower, I also employ one or more electric fans 58, mounted on brackets 59, on the frame 20 and operating to blow a current of air over the coated surface. By this arrangement the compound is rapidly cooled, which also permits a still shorter run of the fabric enabling the horse 20 and its roller 19 to be moved nearer to the main guide roller 10 or the head of the machine, providing a more compact machine, taking up but little room and thereby economizing the floor space.

In operation, the leading end of the fabric to be coated being connected by the clamps 17 and 18 to the adjacent end of the dummy *d* of the receiving roll is moved to bring the connected portions to the rear of the spreading knife, when, the composition being spread across the fabric and the knife adjusted and positioned, the machine is started by shifting the belt on to the driving pulley 28 to rotate its shaft 23. This shaft being thus rotated, rotates its pinion 22 and the large gear wheel 21 thereby transmitting rotation to the main guide roller 10 and, through the pulleys 32 and 33 and sprocket wheel 34, to the winding rolls 11 and 12 and guide roller 19, thus causing the feeding of the fabric beneath the heated coating compound and against and past the spreading knife K, which forces said compound into the interstices of the fabric and spreads it over the upper surfaces thereof, thereby greatly improving the adhesion and preventing the subsequent peeling up of the coating from the fabric when it is used.

When the whole length of the fabric has been coated and as the clasps or clamps connectetd to the dummy move off the periphery of delivery roll 11, the machine is automatically stopped by shifting the belt to the idle pulley 27. The coating compound is then removed from the upper surface of the fabric, the knife edge swung forward by swinging its carrier 4 in the same direction to a preferably horizontal position, where it may be supported by a pin 60 (Fig. 4), placed under the inclined rear face of the carrier 8, said pin being removably held in a socket in the side of one of the front uprights 4.

Instead of removing the rolls from the machine and shifting them end over end, as hitherto practiced, I shift the belt 30 on to the reversing pulley 39, causing the fabric to be fed forward at a high rate of speed and rewound upon the upper winding or delivery roll 11 until the rear end thereof is again in position to receive additional coats, if such is desired. In that case the pin 60 is removed, the knife readjusted to its spreading position, the coating composition applied, and the belt 30 again shifted to the driving pulley, to cause the coating operation to be repeated and the machine automatically stopped as described.

It being advantageous in using different coating compounds to vary the length or run of the material or fabric to be coated, the auxiliary frame 20 is adjustably mounted upon plates or tracks 61, extending rearwardly from said side frames 1, and which are provided with longitudinal grooves to slidably receive the headed ends of screw bolts 62 (Fig. 2), apertured through lugs 62ª on said auxiliary frame 20, the threaded ends of said bolts receiving nuts 63 that may be set up to clamp or secure said frame and its guide roller 19 in desired adjustment relative to the main guide roller 10. In order that the sprocket chain may be adjusted for the adjusted position of the frame 20, the sprocket links are made removable. I also provide an idle sprocket gear wheel 64, vertically adjustable, as by the slot and screw arrangement shown at 65 (Fig. 2), on an overhanging support 66 provided at the head of the auxiliary frame, the vertical movement of said wheel varying the effective length of the chain between said frames without interfering with its movement. This arrangement of the main and auxiliary frames efficiently provides for convenient and relative adjustment of the frames toward and from one another and without necessarily changing the number of links in the sprocket chain.

I will next describe the clasps or clamps 17 and 18 (see Figs. 6–8) which are employed for connecting the fabrics *f* to the roll dummies *d* in the manner illustrated in Fig. 5. Referring to Fig. 8, the clamp 17 therein shown, comprises a pair of hinged jaw members 17ª, 17ᵇ, of rectangular shape and provided with inwardly projecting prongs or points 17ᶜ, adapted to engage or pierce the end of the fabric inserted between said jaw members as the latter are closed upon said end, pivoted retaining latches 17ˣ being provided at the ends of said clamp for holding or locking its members in clamping position. The clamp 17 is also provided with laterally extending hooks 17ᵈ by which it is attached to the clamp 18 now to be described. This clamp 18 is generally similar in construction to the clamp 17, having prongs 18ᶜ and latches 18ˣ, except that the hinge lugs 18ª between its members (Figs. 6 and 7) is provided with a rod 18ᵇ connecting the same, which the hook members 17ᵇ of said clamp 17 engage, in attaching the clamps together. As these clamps with the dummies and connected fabric are

adapted to be wound up upon the winding rolls, they are preferably made curvilinear in cross section corresponding to the curvature of the roll or rolls upon which they are to be wound or unwound. By the provision of these clamps, the usual practice of pasting and stitching the adjacent overlapping edges of the dummies and fabric together is done away with, the clamps permitting the instantaneous attachment or removal of the fabric.

At the conclusion of the coating operation, and the fabric wound upon the receiving roll 12, the front end of the fabric is disconnected from the clamps and the connected dummy of the delivery roll 11, and the latter is removed from its supporting shaft 13. A quill or shell of paper 68 is then slid on the said shaft in place of the roller 11, its opposite ends being secured thereto in any suitable manner, as, for example, by means of the rings 69 and clamping screws 70 (Fig. 10). The fabric end is then wound around the quill to bind upon itself and the machine reversed to wind the fabric upon the quill. The leading end of the fabric is then released from the clamps, connecting it with the dummy of the lower roll 12, when the roll of fabric and said paper shell and supporting shaft may be removed from the machine, the roll and shell removed from said shaft 13. The coated roll is thus conveniently prepared for shipment or for cutting it longitudinally into rolls of less width. I prefer, however, to provide an auxiliary shaft for the final winding of the fabric, as illustrated in Fig. 2, 71, representing suitable brackets secured to the rear of the side frames 1, and provided with uprights 72, having bearing slots 73 open at their upper ends. Said brackets are also provided with a groove 71^a, (Figs. 2, 3 and 4) preferably curvilinear and concentric with the shaft 10^a in which are mounted slidable bearing blocks 77. In these blocks are loosely journaled the ends of the auxiliary winding shaft 74 which has a pulley 75, at its right end connected by a belt 76 (Figs. 1 and 3) to the inner pulley 31, on the roller shaft 10^a to which reference has already been made, the belt 76 of this pulley being shipped, when it is desired to rotate the auxiliary shaft 74, to wind up the coated fabric thereon, after the coated fabric has its rear end attached thereto. This shaft receives the hollow cylinder or tube of paper commonly termed a shell 68 (Fig. 10) described, which is secured to said shaft by means of the clamping rings 69 and set screws 70. The bearing blocks 77 slidable in the curvilinear slots 71 are removably maintained in elevated position by coil springs 78 interposed between the same and blocks 79 adjustably seated in the bottom of said slots, said blocks being moved to desired or predetermined position by means of adjusting bolts or screws 80. If desired the bearing blocks 77 may be temporarily locked in elevated position, any suitable means being employed for this purpose, 81 (Figs. 3 and 4) in the present instance, representing spring controlled latch pins, which engage suitable sockets or notches in the adjacent face of said blocks 77. When these pins are drawn back out of latching position the blocks 77, which normally slide with little friction, tend to slide down in said slots but are limited by engagement with said springs and effect compression of the latter. As the amount of compression and the position of the shaft 74 relative to said slots obviously depend upon the total weight of the coated roll, this construction constitutes a suitable means for determining the total weight of the roll, or the weight of the fabric, or simply the weight of the coating applied thereto. As here shown, one of the blocks 77 has an index, and the adjacent side of the bearing slot 71 suitably calibrated scale graduations, so that the weight of the fabric or the coating may be determined. It being, furthermore, desirable to determine the amount or weight of coating material thereon per yard, thereby to determine the thickness or thinness of the coating and also to determine the total number of yards coated, suitable yard counting mechanism is provided. Any suitable measuring means may be provided for this purpose, as here shown, however, (see Figs. 3 and 9) I provide an auxiliary guide roller 82 having its shaft 83 removably journaled in the open ended bearing slots 73 of the bracket uprights 72, the fabric passing over said roller in being wound up on the paper shell 68. Exteriorly, as best shown in Fig. 9, this shaft 83 is provided with a worm 84 in mesh with the teeth of a worm wheel 85 formed or connected with a one toothed disk 86, the single tooth 87 of which engages one of the notches 88 in the edge of a counting wheel 89 at each complete rotation of said disk and worm wheel 85. In the particular construction herein selected for the purposes of illustration only, the rotation of said gear wheel 85 through the space occupied by one tooth measures the advance of a yard of fabric over the roller 82 and a complete rotation measures 25 yards, corresponding to the 25 teeth of said wheel. A complete rotation of the wheel 85 obviously produces rotation of the lower wheel 89 through the space of one tooth, the notches of said wheel each representing a measurement of 25 yards. Each of these wheels is suitably journaled upon laterally extending lugs 90 of said upright 72, by means of suitable studs 91, which exteriorly are provided with index pointers 92 that enable the number of yards measured to be determined, the faces of the gear

wheels being provided with graduations, here shown as numerals, that represent the measuring movement of the teeth or notches of said wheels.

Mention has been briefly made of the fact that the machine is stopped automatically at the conclusion of the coating operation and also at the conclusion of the rewinding operation, while any suitable means may be employed for this purpose, in the present instance I preferably provide suitable mechanism for shifting the belt shifter, so as to move the belt from either the direct feeding pulley 28 or the reversing pulley 39 to its intermediate position on the idle pulley 27. As here shown, this result is attained by providing the belt shifter with springs 93, Fig. 1, interposed between the belt shifter 29 and the vertical uprights 4, said springs normally acting to maintain the belt shifter and the belt governed thereby in inoperative position, that is, with the belt 30 running loosely on the idle pulley 27. To retain said belt shifter in its outer or inner position when moved by hand to shift the belt to the reversing pulley 39 or the feeding pulley 28, as may be desired, the left upright 4 is provided with a pivoted latch 95, (Fig. 1), adapted to engage suitable notches 96 formed in the upper face of the belt shifter and when in engagement with either of them acting to hold the belt shifter in operative position relative to one or the other of said operating pulleys. This pivoted latch member is provided at its upper face with an armature plate 97 (see Fig. 3) immediately above which is an electromagnet 98, the coils of which are in electrical circuit with a suitable source of electric power, conventionally illustrated in Fig. 5, and with spring controlled switch arms 99 and 100 respectively. The former of these switch arms is positioned in front of the guide roller 10 and at the left side of the movable fabric (Figs. 1 and 4), so that it may be thrown or swung to the right Fig. 5, as its free end is engaged by the clamping devices 18, 17, as the latter move rearwardly from off the delivery roll 11. As this switch lever 99 is swung to the right, its lower arm strikes a spring contact member or brush 101 and closes the electrical circuit through the battery and electromagnet. The circuit being thus closed, the armature 97 is elevated and with it the latching end of said latch 95, lifting the latter out of engagement with the notch of the belt shifter, in which it may, for the time being, be in engagement. The lifting of the latch releases the belt shifter which is returned by its springs to normal inoperative position, thus shifting the belt to the idle pulley and stopping the machine. The other switch arm 100 (see Fig. 4) is similarly mounted in rear of said main guide roller 10 having its contact member 102 in rear thereof in position and adapted to be operated by the clamping devices 17, 18, of the dummy *d* of the lower receiving roll 12, as said devices are moved forwardly, upon the upper run thereof, at the conclusion of the rewinding of the fabric upon the delivery roll. In operation the forward movement of the clamping devices brings them into engagement with the upstanding switch lever 100 to swing it also forwardly to bring its lower arm in electrical contact with the spring contact member 102 and thereby close the circuit to operate the electromagnet and latch in the manner described to permit the belt shifter under the action of this spring 93 to slide inwardly and shift the belt from the reversing pulley 39 to the idler, 27, thus to stop the machine.

In starting the machine the belt shifter is moved inwardly for feeding the fabric for coating and outwardly for reversing the direction of the movement and for rewinding it upon the delivery roll at the conclusion of the coating operation, the notches of the belt shifter being placed in proper position relative to the latch to maintain the belt upon the desired pulley and until released by said latch through the operation of the conveyer means.

By my invention I have provided a simple and novel machine for effectively applying a coating compound to the surface of a fabric or other material, said machine requiring but little floor space relative to machines of this type hitherto constructed and which may be operated very rapidly to secure the best results, the winding and unwinding of the fabric upon the winding rolls, either during the coating stages, or finally, being effected automatically, and which, so far as I am aware and believe, is new in the art, as is also the combination with means for automatically carrying, cooling, measuring and weighing the length of material that has been coated.

While in the particular embodiment of my invention, herein selected for purposes of description and illustration, I have shown my invention as applied to a spreading machine for applying a particular coating compound or composition to fabric, obviously my invention is not limited to the particular compound employed, nor to the application thereof to fabrics, but contemplates the use of any compound or solution for coating any desired or suitable material. My invention, furthermore, is not limited to the specific details of construction and arrangement, the same being capable of modification within wide limits without departing from the spirit and scope thereof.

Claims.

1. In a machine of the type described, the combination of a pair of rolls on which the material to be coated is adapted to be wound

and unwound, a guide roller over which said material is fed in passing from one to the other of said rolls, means for heating said guide roller to maintain the coating composition, applied to the surface of said material upon said roller, in a pliable or plastic state, a spreading knife to coöperate with said roller to spread a coat of said composition over the surface of said material as the latter is fed beneath and past said knife, and means for automatically and simultaneously rotating said rolls to feed said material.

2. In a machine of the type described, the combination of a pair of rolls on which the material to be coated is adapted to be wound and unwound, a guide roller over which said material is fed in passing from one to the other of said rolls, means for heating said guide roller to maintain the coating composition, applied to the surface of said material upon said roller, in a pliable or plastic state, a spreading knife to coöperate with said roller to spread a coat of said composition over the surface of said material as the latter is fed past the knife, with means for automatically and simultaneously rotating said rolls to feed said material and means for reversing the direction of their rotation.

3. In a machine of the type described, the combination of a pair of rolls on which the material to be coated is adapted to be wound and unwound, a guide roller over which said material is fed passing from one to the other of said rolls, means for heating said guide roller to maintain the coating composition, applied to the surface of said material upon said rolls in a pliable or plastic state, a spreading knife to coöperate with said roller to spread a coat of said composition over the surface of said material as the latter is fed past said knife, and means for automatically and simultaneously rotating said rolls to feed said material, said guide roll being hollow to permit it to be heated interiorly.

4. In a machine of the type described, a supporting frame provided with upper and lower winding rolls, means connected with the periphery of said rolls for clamping and holding the ends of the material to be coated thereto, thereby to cause the latter to run between said rolls as the latter are rotated, an auxiliary frame in rear of said supporting frame having guiding means over which said material runs in passing from one roll to the other, means for automatically and simultaneously rotating said rolls to feed said fabric over the said rolls and for reversing the direction of rotation, and means for applying coating compound to the surface of the material during the feeding movement thereof.

5. In a machine of the type described, a main frame, comprising a head provided with delivery and receiving rolls on which the material to be coated is wound, means for rotating the same, an auxiliary frame mounted in rear of said head having a guiding roller over which said material is fed in passing from one roll to the other, means intermediate said rolls and roller and adjacent said head for applying and spreading a coating of heated compound to the surface of said material, and means for cooling the coated surface thereof as it runs from the delivery to the receiving roller.

6. In a machine of the type described, a main frame, comprising a main frame or head provided with delivery and receiving rolls on which the material to be coated is wound, an auxiliary frame mounted in rear of said head having a guiding roller over which said material is fed in passing from one roll to the other, means for rotating said rolls and roller and for reversing the direction of their rotation to cause such material to be rewound upon the delivery roll, means intermediate the delivery roll and said guiding roller for applying and spreading a coating of heated compound to the surface of said material, and means for cooling the coated surface thereof as it runs from said coating means to the receiving roller.

7. In a machine of the type described, a main frame, comprising a head provided with a pair of rolls on which the material to be coated is adapted to be wound, means for rotating said rolls to feed said material, an auxiliary frame mounted in rear of said head having a guiding roller over which said material is fed in passing from one roll to the other, means for positively driving said roller, means for spreading a coating of heated compound to the surface of said material, and means for cooling the coated surface thereof prior to its winding upon said receiving roller, said cooling means comprising a fan operatively connected with the driving means of said machine.

8. In a coating machine, the combination of fabric feeding and coating means, with means operated by the feeding movement of said fabric for measuring the same.

9. In a coating machine, the combination of means comprising a rotary heated roller and a coöperating spreading knife for applying a hot coat of coating composition to the surface of the material to be coated, with means for rotating and heating said roller, and means operated thereby for cooling the same.

10. In a coating machine, the combination of means for applying a hot coat of coating composition to the surface of the material to be coated, with means for cooling the same, and means for winding the material on a paper shell or quill.

11. In a machine of the type described, the combination of a material-carrying

winding roll, a receiving paper shell or quill on which said material is adapted to be wound, a rotary shaft to receive said shell and means for securing the latter thereto and means for simultaneously rotating them to transfer the coated fabric to and winding it on said paper shell.

12. In a machine of the type described, the combination of a pair of winding rolls, each provided with a clamping device for removably attaching the ends of the material to be coated thereto, said device including a pair of jaws adapted to grasp the end of said material and retain it between them and latching members for locking said jaws in clamping relation.

13. In a machine of the type described, the combination of a pair of winding rolls, each provided with a clamping device for removably attaching the ends of the material to be coated thereto, said device including a pair of hinged jaws connected adjacent the hinged portion thereof with said roller and adapted to grasp the end of said material and retain it between them, and means for locking the same in clamping position, said jaws having inwardly extending projections to engage and hold said material.

14. In a machine of the type described, the combination of a pair of winding rolls, each provided with a clamping device for removably attaching the material to be coated thereto, coating means, and means actuated by said clamping devices for automatically and respectively reversing or stopping the machine.

15. In a machine of the type described, the combination of coating means for applying coating composition to the material to be operated upon, conveying means including clamping devices for removably attaching said material thereto and for feeding the material to and from said coating means, and means for operating said conveying means including an idle pulley, an operating pulley, a belt, and connected mechanism, said belt being adapted to be shifted from one to the other of said pulleys, and means operated by said conveying means for automatically shifting the belt at a predetermined time in the cycle of operation of said machine.

16. In a machine of the type described, a main frame provided with delivery and receiving rolls for the material to be coated, a guide roller over which said material is fed in passing from one to the other of said rolls, a coöperating spreading knife adapted to apply coating material to the surface of said material as it passes over said guide roller, an auxiliary frame having a guide roller over which the loop of said material runs, and means for adjusting said auxiliary frame and its guide roller toward and from said main frame to lengthen or shorten the run of said material.

17. In a machine of the type described, a main frame provided with delivery and receiving rolls for the material to be coated, a guide roller over which said material is fed in passing from one to the other of said rolls, a coöperating spreading knife adapted to apply coating material to the surface of said material as it passes over said guide roller, an auxiliary frame having a guide roller over which the loop of said material runs, and means for adjusting said auxiliary frame and its guide roller toward and from said main frame to lengthen or shorten the run of said material, and power means for producing simultaneous rotation of said rolls and rollers.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILHELM A. ZICKERMAN.

Witnesses:

GEO. W. KENYON,

HATTIE A. DELLIT.