Feb. 3, 1925. 1,525,180

P. W. GUMAER

COATING MACHINE

Filed May 27, 1924 3 Sheets-Sheet 1

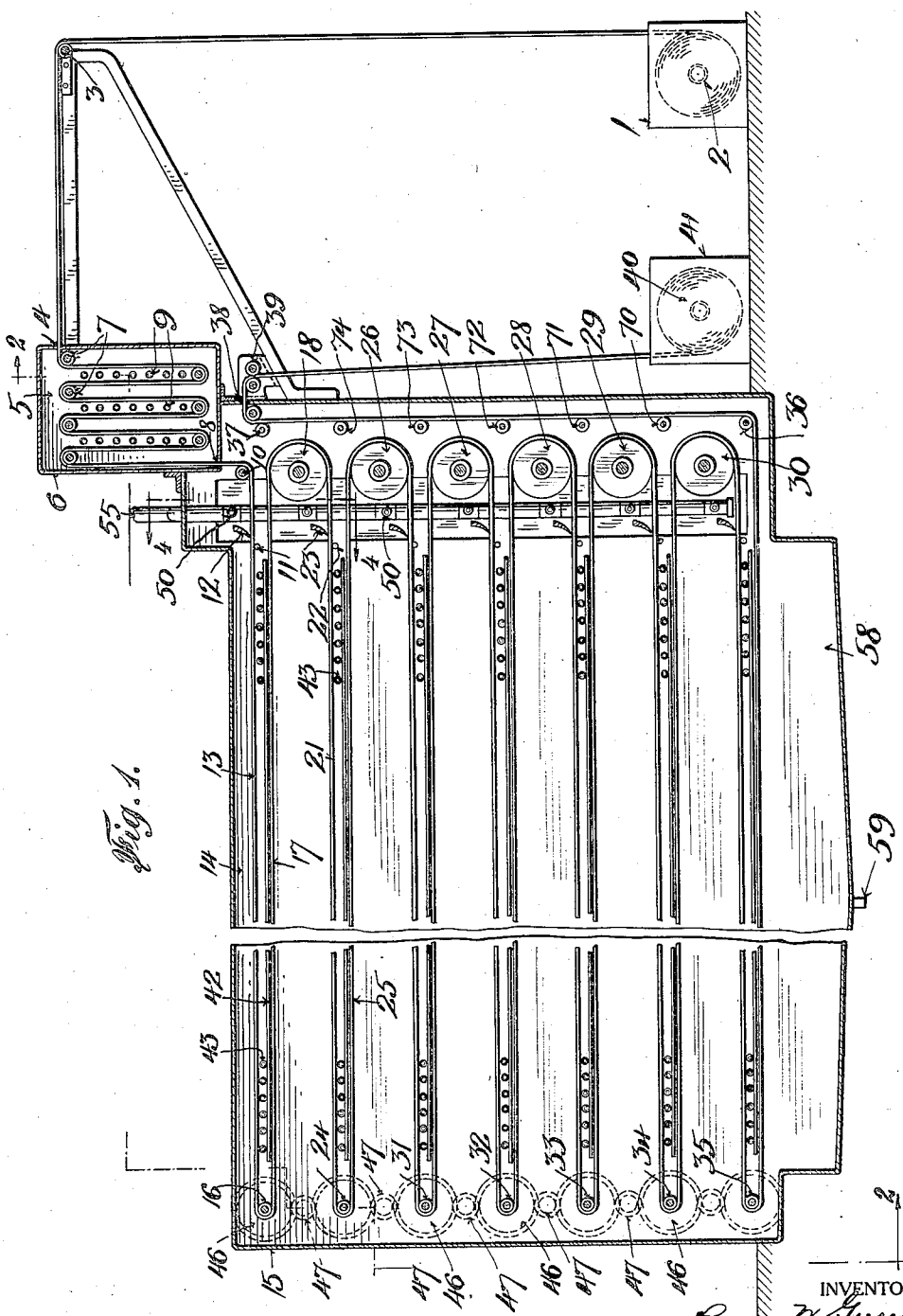


Fig. 1.

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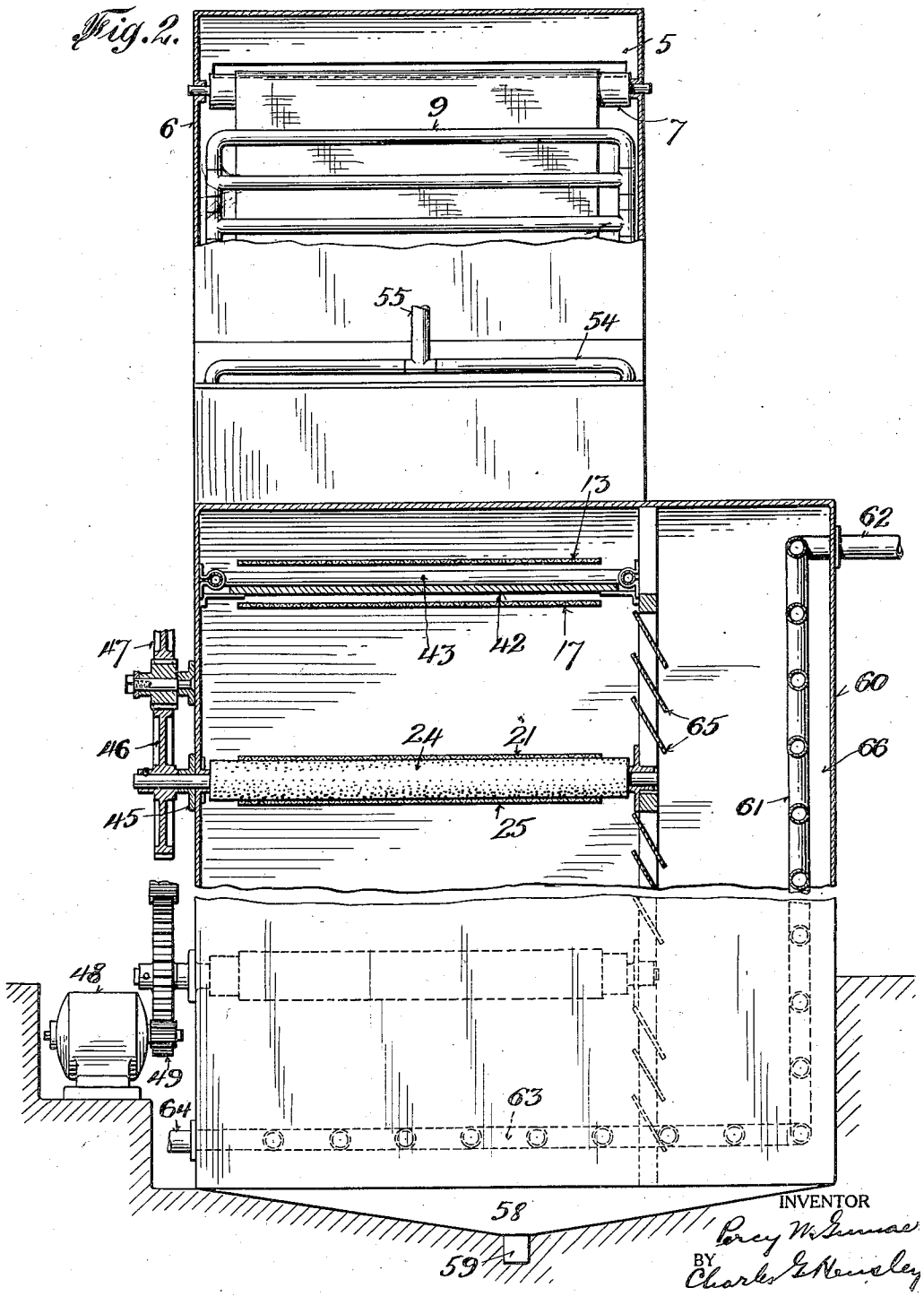
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COATING MACHINE

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Fig. 2.




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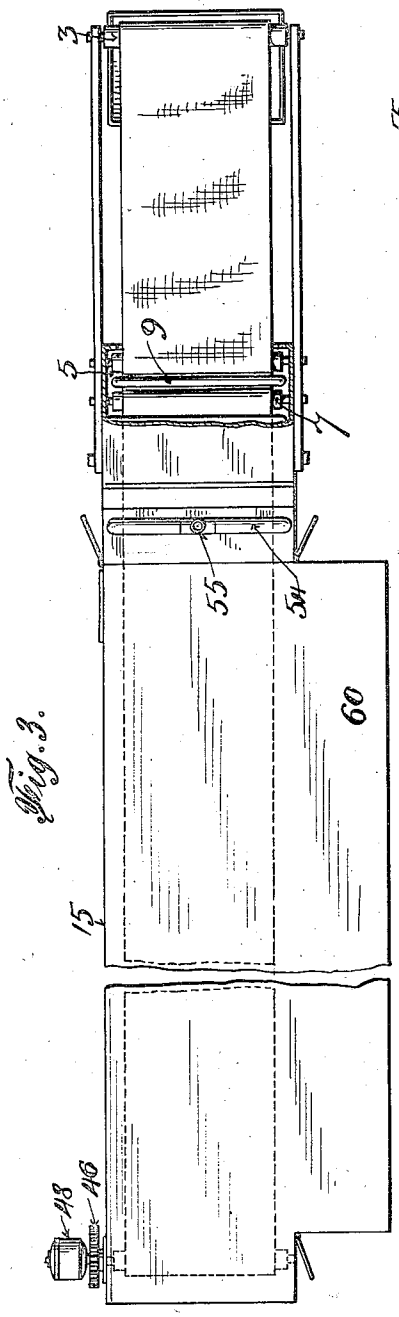



Fig. 3.

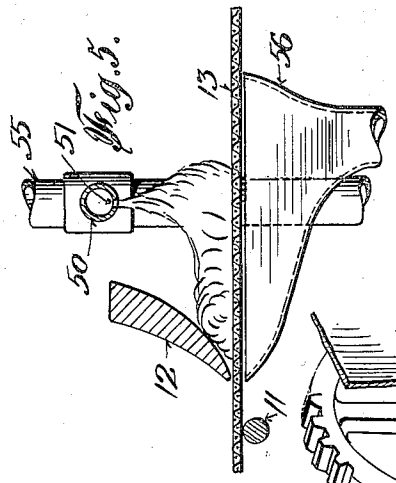



Fig. 5.

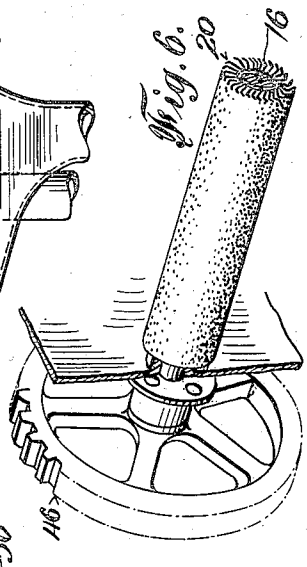



Fig. 6.

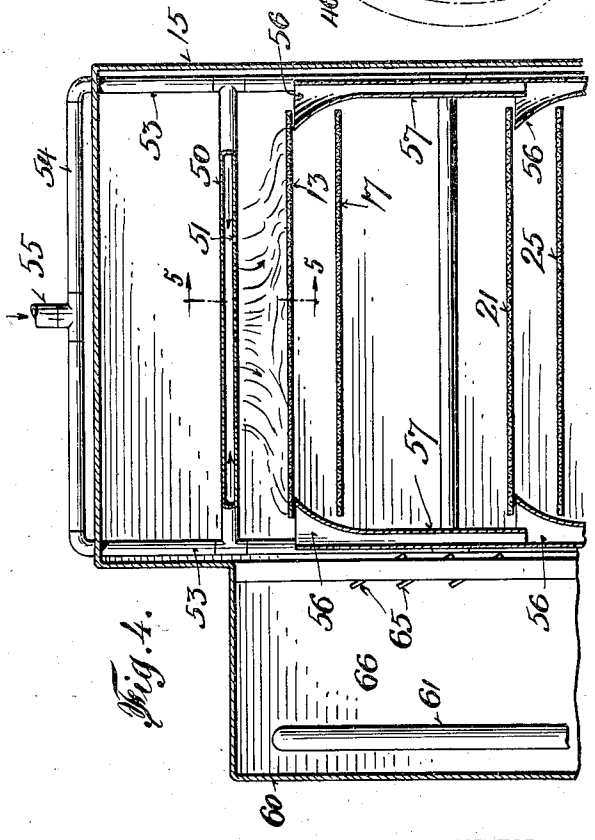



Fig. 4.

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Patented Feb. 3, 1925. 1,525,180

# UNITED STATES PATENT OFFICE.

PERCY W. GUMAER, OF WEST ENGLEWOOD, NEW JERSEY.

## COATING MACHINE.

Application filed May 27, 1924. Serial No. 716,085.

*To all whom it may concern:*

Be it known that I, PERCY W. GUMAER, a citizen of the United States, and a resident of West Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Coating Machines, of which the following is a specification.

My invention relates to machines for coating long lengths or strips of fabric and it may be used in coating fabric with rubber solutions or it may be used in applying coatings to fabrics in the process of making artificial leather; and in fact the invention is useful in various processes wherever a coating is to be applied to a fabric. One object of my invention is to provide a machine wherein a number of separate coatings may be applied to the same side of a strip of fabric in successive relation, and all in one continuous operation; and in the fullest embodiment of my invention all of the several coatings may be applied while the fabric is passing through one common chamber. One object of my invention is to provide a machine for applying successive coats to the fabric, wherein the mechanism of the machine is arranged in compact relation and wherein there will be sufficient time for each coat to dry before a succeeding coat is applied. Heretofore, in one method of making artificial leather the fabric has been run through a machine for applying a single coat and the machine contained a drying tower or chamber of considerable size to permit the coat on the fabric to be dried before the fabric was wound into a roll; and for each successive coat the fabric had to be run through the machine. This required considerable handling of the product and the process was slow. In the present machine I contemplate applying a number of successive coats to the fabric with the machine occupying no more space than the machines above referred to in general use and to apply the successive coats to the fabric at one passage of the fabric through the machine. The mechanism is so arranged that the several coats may be successively applied in a comparatively compact space and still there is sufficient length of travel for the fabric between the several points of coating to permit each coat to dry before a successive coat is applied. Another object of my invention is to provide means for saving and recovering a high percentage of the solvents evaporated from the coating material as it is dried. This latter feature embodies a very simple and efficient condensing apparatus which will serve to condense the vapors from the entire machine. Other features and advantages will be set forth in the following detail description of my invention.

In the drawings I have shown a machine embodying my invention and adapted for applying seven successive coatings to a fabric while being passed once through the machine and it will be apparent that the machine may be arranged for applying a greater or lesser number of coatings. In fact, a machine designed for a maximum application of seven coatings may be readily adapted for applying any lesser number of coatings as will be described hereinafter.

In the drawings forming part of this application,

Figure 1 is a longitudinal sectional view of a machine embodying my invention,

Figure 2 is a sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a plan view of the machine,

Figure 4 is a sectional view taken on the line 4—4 of Figure 1,

Figure 5 is a sectional view taken on the line 5—5 of Figure 4, and

Figure 6 is an enlarged detail view.

In the drawing I have shown a support 1 in which a roll 2 of fabric is placed and from which the fabric is taken for passage through the machine. The fabric passes from this roll first over a roller 3 arranged at a high elevation at one end of the machine, and it passes through a slot 4 into a preliminary heating chamber 5 formed within the box 6. Within this box the fabric passes in a tortuous path successively over the guide rollers 7 and from these it passes out of the chamber 5 through a slot 8 into the coating chamber. Within the preheating chamber I provide a series of coils of pipe 9 between the different runs of the fabric, and steam is circulated through these pipes in order to heat the fabric preparatory to the application of the coatings. When the fabric leaves the heating chamber it passes under a guide roller 10 and over the guide rod or roller 11 and there is a spreading knife or scraper 12 arranged over the top surface of the fabric and pressing against the latter between the roller 10 and the

roller 11 for the purpose of spreading the coating material in an even layer upon the top surface of the fabric as the latter moves along under the scraper. As the fabric passes from this first scraper it travels along a horizontal line forming an upper run 13 extending lengthwise of the coating chamber 14 formed by the shell 15 which encloses most of the mechanism of the machine. Toward the opposite end of the machine the fabric passes around a roller 16, the uncoated surface of the fabric engaging against this roller; and the fabric returns from the roller 16 toward the front of the machine forming a second or under run 17 lying just below the upper run 13. The roller body 16 is covered with carding cloth having wire teeth 20 corresponding to the carding cloth used in textile machinery. Toward the front of the machine the fabric then passes around an idle roller 18. This carding cloth of the roller 16 engages with the uncoated surface of the fabric and there is sufficient traction to propel the fabric. After passing around the roller 18 the fabric again travels in a horizontal run 21 toward the rear of the machine and between the roller 18 and a supporting pin or rod 22 the fabric passes under a second coating knife or scraper 23. The run 21 extends to the rear of the machine where the fabric passes around a second propelling roller 24 and it then travels forwardly to form the run 25 lying parallel and just below the run 21. In the manner just described, the fabric is carried successively in the same manner around the several rollers 26, 27, 28, 29, 30 and around the several propelling rollers 31, 32, 33, 34, 35 and after passing the last propelling roller the fabric travels around a guide roller 36 near the bottom of the machine and thence upwardly over a guide roller 37 and through a slot 38 in the wall of the casing, thence between the outside guide rollers 39 and it is wound into the form of a roll 40 on a receiving arbor in the holder 41. Between the adjacent horizontal runs of the fabric I place a metal plate 42 which serves as a support for the heating coils and across the upper surface of each of these tables I arrange coils of pipes 43 through which steam may be passed to apply heat close to the adjacent horizontal runs of the fabric. The rollers 18, 26, 27, 28, 29, and 30 are of sufficient diameter to space apart the several pairs of runs of fabric to provide space for the several spreading or coating devices. It will be noted that from the time the fabric receives its first coating at the scraper or knife 17 the coated surface does not contact with any part of the machine until it has traveled twice the length of the drying chamber 14 and returns to the forward guiding roller 18 and by the time the fabric has traveled this distance the solvent in the coating material will have been dried or set and it will have become sufficiently set to receive the second coating which is applied at the knife or scraper 44. There is preferably a heating table 42 and there is a set of coils 43 placed between each pair of longitudinal runs of the fabric, so that heat is applied for drying each coating after it has been applied by the coating knife, and the operations are the same for each successive coat of material applied to the fabric.

The shafts of the several propelling rollers are carried through suitable bearings 45 in the shell of the machine and on the outer ends of these shafts and exterior of the casing I provide a gear 46 and these several gears mesh with intermediate pinions 47 arranged between the several gears 46, and these several gears and pinions form a chain of gears all of which may be operated by means of a motor 48, shown in Figure 2, which has a gear 49 driving the lowermost gear 46 as shown in the drawing. By this system of gears all of the propelling rollers shown in Figure 1 are driven counterclockwise for the purpose of propelling the several runs of the fabric.

Adjacent or just in advance of each coating knife or scraper I provide a pipe 50 extending crosswise of the machine above the plane of the fabric and this pipe is provided with a number of apertures 51 through which the coating material in the form of liquid or paste will discharge upon the top surface of the fabric in advance of the spreading knife, so that as the fabric travels under this knife the latter will serve to spread the coating material upon the surface of the fabric in an even layer. There is a pipe 50 just in advance of each of the several coating knives and these several pipes are connected with vertically arranged feed pipes 53 at opposite sides of the machine, which vertical pipes are connected by the cross pipe 54 at the top to which a supply of coating material is fed from the pipe 55 leading from any source of supply. The coating material entering the pipe 55 feeds through the cross pipe 54 into both vertical pipes 53 and from these it passes into the several horizontal discharge pipes 50 so that some of the material is discharged by each of these horizontal pipes upon the top surface of the fabric in advance of a coating knife. In practice it is desirable to feed the coating material to the fabric faster than it is consumed so that some of the material forces off the side edges of the fabric and passes into the discharge funnels 56 arranged at the sides of the fabric opposite the several spreading knives. The material flowing into these funnels discharges through the vertically arranged pipes 57 which discharge one into the other, and the material is carried away from the

lowermost one to be returned to the original source of supply (not shown).

The casing 15 forms a complete enclosure for the entire coating mechanism to confine the vapors evolved from the coating material and the casing is provided with a sump 58 at the bottom in which the liquids resulting from the condensation of these vapors may collect and from which the condensate may be withdrawn through the pipe 59. The casing is formed with an extension 60 at one side of the coating chamber 14 and within or adjacent this extension I provide a suitable cooling device which may consist of a coil of pipe 61 adapted to receive a flow of cooling water through the connection 64 and preferably this cooling coil is extended horizontally across the bottom of the casing as shown at 63 and the cooling liquid is discharged through the upper connection 62. I have arranged a series of inclined baffle plates 65 at the side of the evaporated chamber for deflecting the vapors as they pass from the evaporating chamber into the cooling or condensing chamber 66 and also in order to prevent the direct radiation of heat from the heating coils 43 toward the cooling coils 61. When the machine is in operation there will be a continuous flow of cooling liquid, such as water, from any source of supply through the cooling coils 61.

The machine having been started by the threading of the fabric around the various rollers described above, the fabric will be propelled at different points by means of the power applied to the several propelling rollers 16, 24 etc. As the fabric passes the first spreading knife 12, it receives on the top surface the first coat of material and the fabric then travels along over the first heating table 42 and the first set of heating coils 43; thence around the first propelling roller 16 and back again directly under the first heating table, during which time the first coat applied to the fabric is dried and set by the evaporation of the solvents in the coating material. The fabric then passes around the first guide roller 18 and then under the second coating knife 12 where it receives a second coating applied directly over the first coating. This operation progresses until the fabric has received as many coatings as there are spreading devices, after which the fabric passes out of the coating chamber and is wound into the roll 40.

The cooling action of the coil 61 causes the vapors which pass from the evaporating chamber 14 between the baffle plates 65 to be cooled and condensed as rapidly as the vapors are evolved by the action of the heating coils 43 upon the solvents contained in the coatings and the condensed vapors in the form of liquid falls into the sump 58 at the bottom of the tank and it may be continuously or periodically removed through the pipe 59.

It will be apparent from the above that I have provided a coating machine in which a number of coats may be applied successively to a strip of fabric in a chamber of comparatively small dimensions compared with the number of separate chambers heretofore used in applying the same number of coatings to fabrics. It will also be apparent that the various coats are all applied while the fabric is moving once through the machine, thereby reducing the multiple coating to the simplest operation. Several elements in the present machine make it possible to apply the successive coats in the same vaporizing chamber and to keep this chamber down to relatively small dimensions. One of these is the fact that the coated surface of the fabric has a relatively long travel between each coating operation, the travel being approximately twice the length of the evaporating chamber. Another is the arrangement of the fabric in a plurality of closely related horizontal runs, and another is the fact that the vapors are condensed through the cooling system as rapidly as they are evolved by the heating of the coating material.

If it is desired to apply only six coats to the fabric, in a machine which is designed, as shown, for applying a maximum of seven coatings, then the fabric will not be threaded around the roller 30, nor the roller 35, but it will pass from the roller 34 forwardly and thence around the roller 70, instead of around the roller 36. In the same manner, the fabric may be led off from any row over the rollers 71, 72, 73, or 74.

Having described my invention, what I claim is:

1. A coating machine comprising a casing forming an evaporating chamber, means in said chamber for applying coating material to a strip of fabric, means for guiding and propelling a strip of fabric in said chamber whereby the fabric travels back and forth in a plurality of adjacent, substantially parallel runs, and means between said adjacent runs of fabric for heating the same.

2. A coating machine including a casing forming an evaporating chamber, a plurality of means in said chamber for successively applying coating material to a strip of fabric, means for guiding and propelling a strip of fabric in said chamber whereby the fabric travels back and forth in a plurality of horizontal, adjacent and substantially parallel runs following each of said coating means, and means between said adjacent runs of fabric for heating the same after it passes from each of said coating means.

3. A coating machine comprising a casing forming an evaporating chamber, means in said chamber for applying coating material to a strip of fabric, means for guiding and propelling a strip of fabric in said chamber whereby the fabric travels back and forth in a plurality of horizontal, adjacent and substantially parallel runs, and heating coils arranged between said runs of the fabric.

4. A coating machine comprising a casing forming an evaporating chamber, a plurality of means in said chamber for successively applying coating material to a strip of fabric, means for guiding and propelling a strip of fabric in said chamber whereby the fabric travels back and forth in a plurality of horizontal, adjacent, substantially parallel runs, and a heating coil arranged between the adjacent runs of the fabric.

5. A coating machine including a casing forming an evaporating chamber, a plurality of means adjacent one end of said chamber for successively applying coatings to the same side of a strip of fabric, and means for propelling the fabric in the said chamber whereby it is caused to travel back and forth in a plurality of adjacent, substantially parallel runs, and including a roller arranged near the opposite end of said chamber to the spreading device and engaging with the uncoated surface of the fabric, and means arranged between the said adjacent runs of the fabric for heating the fabric.

6. A coating machine comprising a casing forming an evaporating chamber, a plurality of means adjacent one end of said chamber for successively applying coatings to the same side of a strip of fabric, means for guiding and propelling a strip of fabric in said chamber whereby the fabric travels back and forth in a plurality of adjacent, substantially parallel runs, including a roller near the opposite end of said chamber to the applying means and engaging the uncoated surface of the fabric, and a roller forward of and intermediate the coating means and engaging the uncoated surface of the fabric, and means between the adjacent runs of the fabric for heating the latter.

7. A coating machine comprising a casing forming an evaporating chamber, a plurality of means adjacent one end of said chamber for successively applying coatings to the same side of a strip of fabric, means for guiding and propelling a strip of fabric in said chamber whereby the fabric travels back and forth in a plurality of adjacent, substantially parallel runs, including a roller of compressible material near the opposite end of said chamber to the applying means and engaging the uncoated surface of the fabric, and a roller forward of and intermediate the coating means and engaging the coated surface of the fabric, and means between the adjacent runs of the fabric for heating the latter.

8. A coating machine including a casing forming a preheating chamber, means for guiding a strip of fabric in a tortuous path through said preheating chamber, means for heating the fabric in said chamber, a casing forming an evaporating chamber for receiving the strip of fabric from said preheating chamber, means for applying successive coatings to the fabric while traveling in said evaporizing chamber, means for guiding the fabric in a plurality of adjacent, substantially parallel runs between the coating means, and means between said adjacent runs of the fabric for heating the latter in said evaporizing chamber.

9. A coating machine including a casing forming an evaporating chamber, a plurality of coating means in said chamber adjacent one end thereof, means for guiding and propelling the fabric in a plurality or adjacent, substantially horizontal runs between the coating means, means between the adjacent runs of the fabric for heating the latter, and means for guiding the fabric as it passes from the lowermost guiding means to cause it to pass upwardly and out of the upper portion of said casing.

10. A coating machine including a casing forming an evaporating chamber, a plurality of means adjacent one end of said chamber for successively applying coatings to the same side of a strip of fabric, means for guiding and propelling a strip of fabric in said chamber whereby the fabric travels back and forth in a plurality of adjacent, substantially parallel runs, including a roller near the opposite end of said chamber to the applying means, and engaging the uncoated surface of the fabric and a roller of larger diameter than said first roller, said latter roller being arranged forward of and intermediate the coating means and engaging the coated surface of the fabric, and means between the adjacent runs of the fabric for heating the latter.

11. A coating machine comprising a casing forming an evaporating chamber, means for applying a coating to a strip of fabric, means for guiding a strip of fabric in said evaporating chamber whereby the fabric travels back and forth in a plurality of adjacent, substantially parallel runs after leaving the coating means, means between the adjacent runs of the fabric for heating the latter, and means for condensing the vapors evolved from the coating material by the heating operation.

12. A coating machine comprising a casing forming an evaporating chamber, a plurality of means in said chamber for simul-

taneously applying coatings to a strip of fabric in successive order, means for guiding and propelling a strip of fabric in said chamber whereby it is caused to travel back and forth in a plurality of adjacent, substantially parallel runs following each coating device, means between the adjacent runs of the fabric for heating the latter and means for condensing the vapors evolved from the coating material by the heating operation.

13. A coating machine comprising a casing forming an evaporating chamber, a plurality of means in said chamber for simultaneously applying coatings to a strip of fabric in successive order, means for guiding and propelling a strip of fabric in said chamber whereby it is caused to travel back and forth in a plurality of adjacent, substantially parallel runs following each coating device, means between the adjacent runs of the fabric for heating the latter and means common to all of the said heating means for condensing the vapors evolved from the coatings.

14. A coating machine comprising a casing forming an evaporating chamber, means in said chamber for applying coating material to a strip of fabric, means for propelling and guiding a strip of fabric in said chamber whereby it is caused to travel back and forth in a plurality of adjacent, substantially parallel runs, heating means between the adjacent runs of the fabric for heating the latter, said casing having an extension at the side of said heating means to form a condensing chamber, and means in said condensing chamber for condensing the vapors evolved from the fabric coating.

15. A coating machine comprising a casing forming an evaporating chamber, a plurality of means in said chamber for successively applying coatings to a strip of fabric, means for guiding and propelling a strip of fabric whereby it is caused to travel back and forth in adjacent, substantially parallel runs following each coating means, means between the adjacent runs of fabric for heating the latter, said casing having an extension forming a condensing chamber at the side of the several heating means and cooling means in said condensing chamber for condensing the vapors evolved in said evaporating chamber.

16. A coating machine comprising a casing forming an evaporating chamber, a plurality of means in said chamber for successively applying coatings to a strip of fabric, means for guiding and propelling a strip of fabric whereby it is caused to travel back and forth in adjacent, substantially parallel runs following each coating means, means between the adjacent runs of fabric for heating the latter, said casing having an extension forming a condensing chamber at the side of the several heating means and cooling means arranged in said condensing chamber at the side of said heating means and at the bottom of said evaporating chamber, for condensing the vapors evolved in said evaporating chamber.

17. A coating machine comprising a casing forming an evaporating chamber, fabric coating means, means in said evaporating chamber for heating the coated fabric, cooling means at the side of said heating means for condensing the vapors evolved in the evaporating chamber, and baffles interposed between the said heating means and the said cooling means for preventing direct radiation between said heating and said cooling means.

18. A coating machine comprising a casing forming an evaporating chamber, and a condensing chamber at the side of the evaporating chamber, a plurality of means in the evaporating chamber for successively applying coatings to a strip of fabric, means for guiding a strip of fabric to cause it to travel back and forth in a plurality of adjacent, substantially parallel runs after each coating means, means between the adjacent runs of fabric for heating the latter, cooling means in said condensing chamber at the side of said evaporating chamber, and inclined baffle plates arranged between the heating means and the cooling means to prevent direct radiation of heat from the heating means to the cooling means and for directing the vapors downwardly from said evaporating chamber.

Signed at the city, county, and State of New York, this 19th day of May, 1924.

PERCY W. GUMAER.