

June 26, 1934.

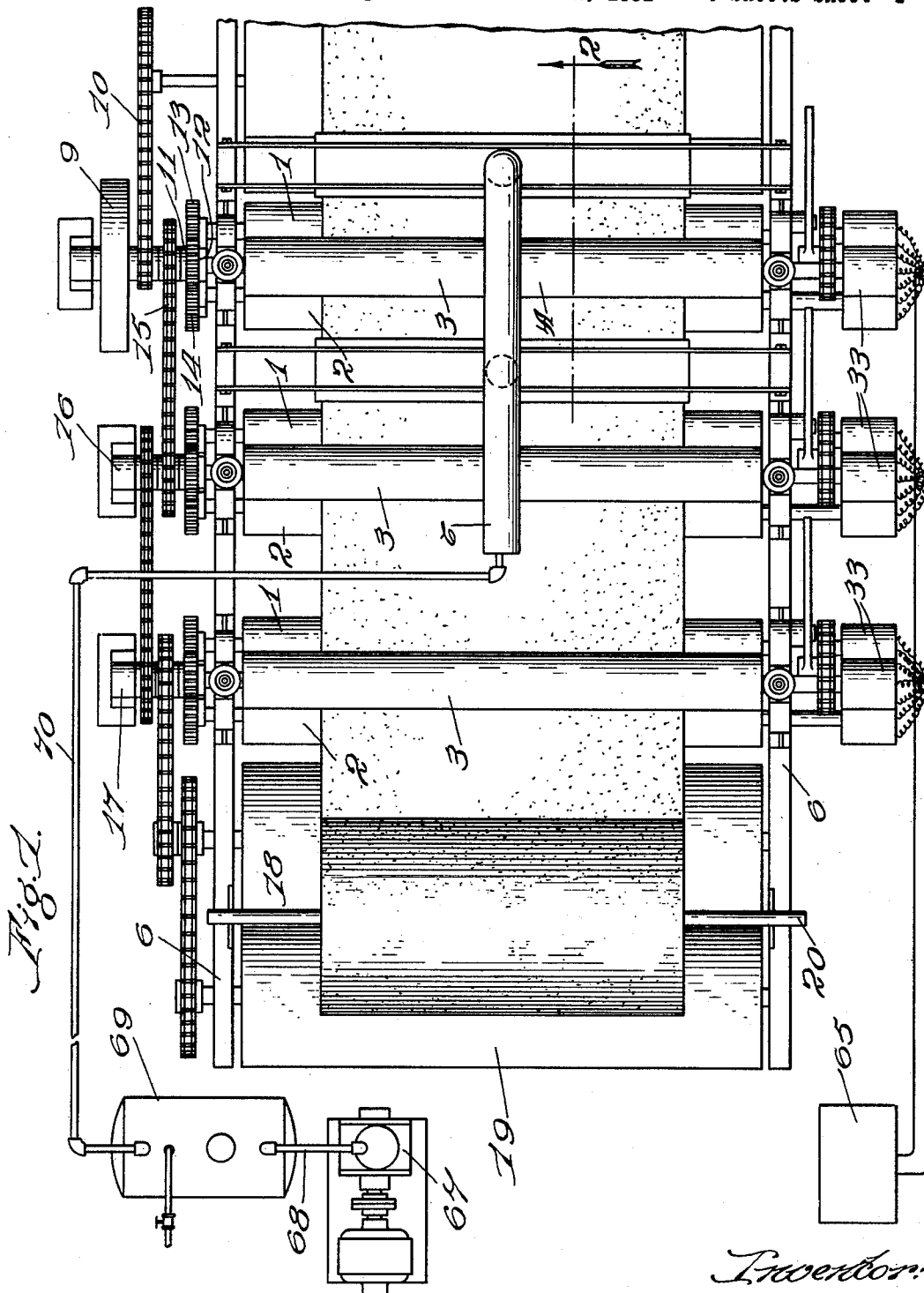
C. LOFMAN

1,964,668

BATT FORMING APPARATUS

Original Filed June 22, 1931

3 Sheets-Sheet 1



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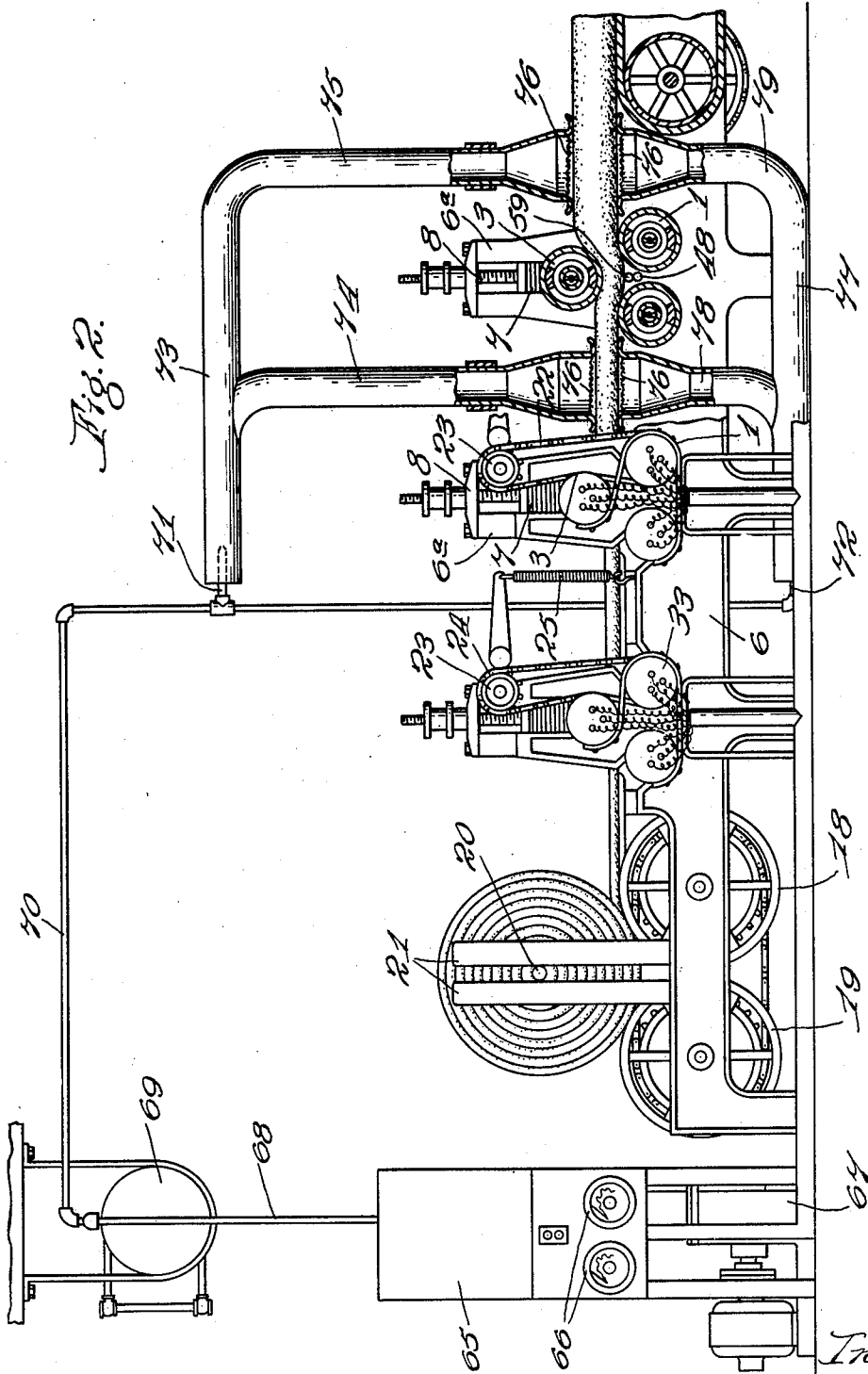
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3 Sheets-Sheet 2



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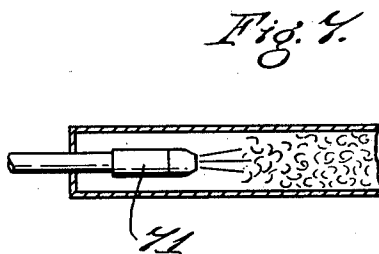
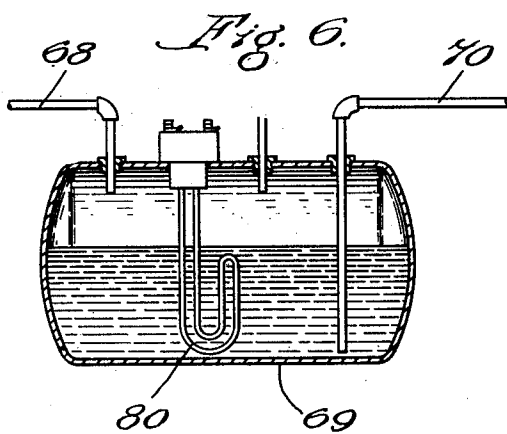
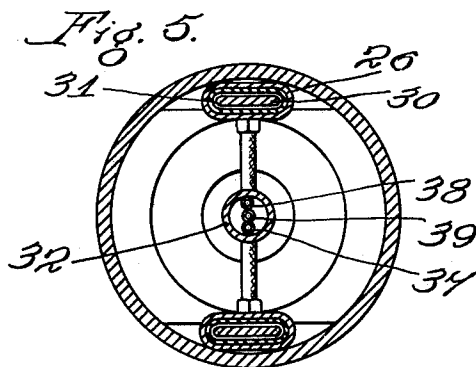
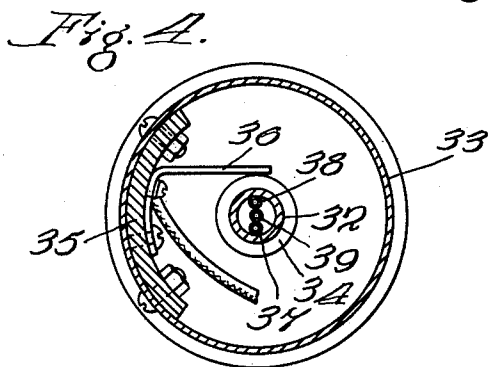
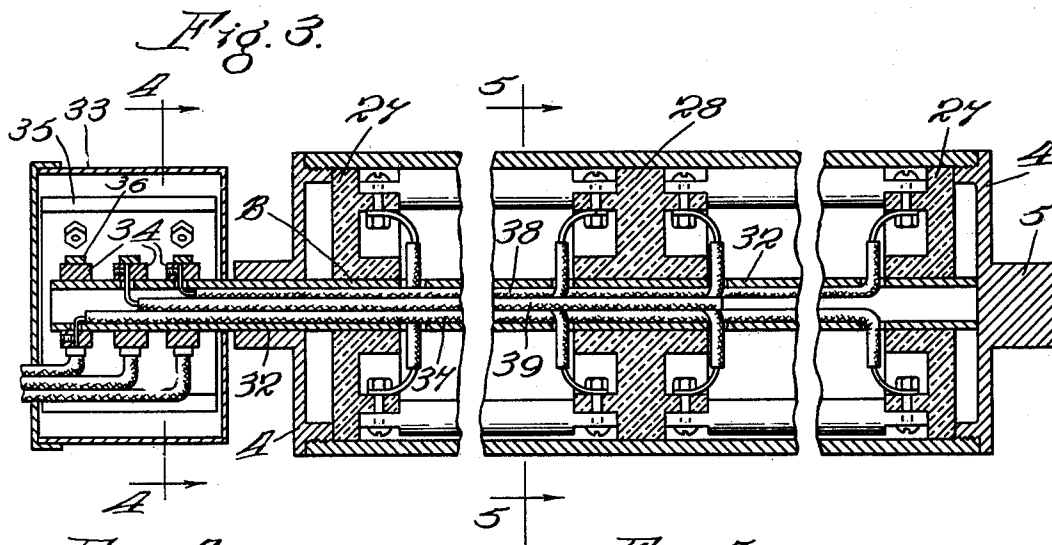
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BATT FORMING APPARATUS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,964,668

BATT FORMING APPARATUS

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Original application June 22, 1931, Serial No. 546,110. Divided and this application April 18, 1932, Serial No. 605,964

3 Claims. (Cl. 154—1)

This invention relates to a method of and apparatus for forming batts of fibrous material such as cotton and the like. This application is a division of my co-pending application Serial No. 546,110 for Batt forming method and apparatus issued as Patent No. 1,955,508.

One of the objects of the invention is to provide a method and apparatus for forming well-pressed and compact fibrous batting which will tend to retain its shape and compactness after the forming and compressing operation. Another object is to provide for treating the fibrous batt while in loose condition and before being passed through heated compression rollers and for treating again the compressed batt before passing it through other heated rollers. A further object is to treat both sides of a fibrous batting with suitable sizing material and passing the batting through heated compression rollers. Other objects and advantages will appear as the specification proceeds.

The invention is fully described in the following specification and shown in the accompanying drawings, in which—

Figure 1 is a plan view of apparatus showing one embodiment of my invention; Fig. 2, a side elevational view, a portion being shown in section and the section being taken at line 2 of Fig. 1; Fig. 3, a broken sectional view of one of the heated rollers and electrical connections therefor; Fig. 4, a vertical sectional view, the section being taken as indicated at line 4 of Fig. 3; Fig. 5, a sectional view, the section being taken as indicated at line 5 of Fig. 3; Fig. 6, a sectional view of a supply tank containing treating material to be applied to the batting; and Fig. 7, a detailed view of an atomizing nozzle employed.

In the illustration given, A represents the compression roller apparatus; B represents electrical heating means for the rollers; and C represents apparatus for applying sizing or other treating material to the fibrous batting.

The compression rollers may be of any suitable type and may be driven by any suitable means. In the illustration given, the rollers are arranged in groups of three, there being two bottom rollers 1 and 2, both of which are rotatably mounted and secured against vertical movement, and a top roller 3 which is guided so as to permit vertical movement and is provided with spring means for urging it in a downward direction. As shown more clearly in Figure 2, the bottom rollers 1 and 2 engage the lower surface of the fibrous batting web while the upper roller 3 engages the top surface of the batting.

Inasmuch as the compression rollers are of a well known type and are driven by well known apparatus, it will not be necessary to give a detailed description of the rollers or driving apparatus.

Broadly, the rollers are relatively large metal cylinders and are provided at their ends with plugs 4, which are equipped with trunnions 5. The trunnions are supported in a metal frame member 6, the trunnions supporting the upper roller 3 being guided in the slotted frame extensions 6a. A spring 7 is carried by the extension 6a and urges the roller 3 toward the lower rollers 1 and 2. The tension of spring 7 may be regulated by the adjusting screw 8.

Referring to Figure 1, gear and chain construction of a well known type is employed for driving the rollers 1 and 2. The pulley wheel 9 is driven by a belt connection with any suitable power shaft. A chain connection 10 is adapted to drive apparatus which delivers the batting web to the first group of rollers. The shaft 11 carries a pinion 12 which meshes with a pair of gears 13 and 14, which are fixedly connected to the trunnions 5 of lower rollers 1 and 2. Shaft 11 also carries a gear 15 which drives by means of a chain a similar gear on another shaft 16. Shaft 16 is provided with gear connections similar to those described with reference to shaft 11 for driving the lower rollers 1 and 2. Shaft 16 is similarly connected to a third shaft 17 which latter shaft drives the third group of lower rollers 1 and 2, through gear connections of the character already described. By means of chain and gear connections the two large rollers 18 and 19 are also driven by shaft 17. The two rollers 18 and 19 serve to roll the cotton batting about the shaft 20. As shown more clearly in Figure 2, the shaft 20 is guided by a pair of standards 21 so that the shaft 20 may rise as the roll of batting increases in diameter.

The upper rollers 3 are driven by chain connections on the opposite side of the frame 6. As shown more clearly in Figure 2, a chain 22 connects roller 1 to a gear 23 which is adjustably carried by the extension 6a. Chain 22 meshes with teeth carried by roller 3. As roller 1 rotates, the chain belt 22 moves against the gear on roller 3 and turns the roller, the chain drive permitting the roller 3 to move up or down. The gear 23 is mounted on the inner end of arm 24 which is pivotally secured to extension 6a. In order to maintain a tension upon chain 22, a spring 25, the lower end of which is secured to frame 6, and the upper end to the outer extrem-

ity of arm 24, draws the outer end of arm 24 downwardly and forces the inner end of arm 24 in an upward direction.

It will be understood that frame 6 comprises a pair of sides in which the above described rollers are mounted and also comprises a platen or bed supporting the cotton batting between the rollers. Any suitable type of frame may be employed.

The electrical heating apparatus and connections therefor may be of any suitable type. In the illustration given, electric resistance elements are supported in frames and connected so that the entire frame, with the elements secured thereto, may be withdrawn from the rollers.

As will be seen more clearly in Figures 3, 4 and 5, the electric resistance wires are carried in sheaths 26 which are supported by spiders 27. In the illustration given, end spiders 27 are employed to support the outer ends of the resistance elements while a central spider 28 is employed to support the inner ends of the elements, the elements being connected by bolts to the spiders. With this construction, the entire resistance element assembly can be removed from one of the tubes after the plug 4, which is threadedly connected to the end of the tube, is removed.

The resistance element may be of any desired type. As illustrated in Figure 4, the resistance wire 29 may be wound about a central insulating core 30, and a second insulating strip 31 may be wrapped around the resistance wire 29. The metal sheath 26 serves as a housing for the inner elements and also as a means for securing the elements to the spiders 27 and 28.

The spiders 27 and 28 are centrally apertured to receive a shaft 32 which also extends through the apertured trunnion 5. The spiders are rigidly secured to shaft 32. Shaft 32 is hollow and serves as a conduit for electrical wires. Suitable openings are made in the shaft 32 to permit the electric wires to be distributed to the desired terminal connections.

The free end of shaft 32 extends into an electrical connector box or unit 33. As illustrated in Figures 2 and 4, the connector units or boxes 33 are cylindrical in shape and one unit is supported adjacent the end of each of the rollers. Referring more particularly to Figures 3, 4 and 5, the end of shaft 32 which extends into box 33 is shown provided with metal rings 34 which are secured to the outer surface of shaft 32. The rings are connected to wires which extend into tube 32 and are distributed in the manner hereinafter described. As shown in Figure 4, fixed or stationary terminals are secured to box 33 at 35. From each of the fixed terminals a brush or spring connecting finger 36 leads to one of the rings 34 and makes sliding contact therewith. In this manner a continuous current is supplied from unit 33 to the rotating shaft 32.

The wiring within the shaft 32, may be as shown more clearly in Figure 3. The lower wire 37 and the upper wire 38 convey current to the outer terminals of the resistance elements. The returned current from the inner terminals of the resistance elements passes back through the central wire 39. Any suitable wiring arrangement may be employed, however.

The wires leading from the thermo-couples and from the connections with the resistance elements in units 33 may lead to a switch box 65, in which suitable controlling switches may be

used, and in which temperature recording thermometers 66 may be supported.

The fibrous batting passing between the heated rollers is preferably treated with a sizing or other desired material. The treating operation may take place before the fibrous material, such as cotton, reaches the first group of rollers. The cotton, being in a loose or fluffy condition, is readily penetrated by the sizing material and becomes thoroughly impregnated with it before reaching the rollers. A surface treatment may be applied to the cotton after it has passed through the first group of rollers. Some compression having taken place, the penetration of the treating liquid is not so great, but serves rather to glaze or finish the surfaces of the batt. It is preferred to treat both the top and bottom faces of the fibrous web.

Any suitable apparatus for accomplishing the treating operation may be employed. I prefer to use the apparatus illustrated in Figures 1, 2, 6 and 7.

In the illustration given therein, a motor driven compressor 67 supplies air through line 68 to tank 69 which is provided with a liquid inlet. An outlet pipe 70 leads from below the liquid level in the tank to atomizing nozzles 71 and 72. Nozzle 71 opens into a large conduit 73 which is divided into depending conduits 74 and 75. The lower ends of conduits 74 and 75 are flared and are provided at their mouths with screen sheets 76. The atomizing nozzle 72 opens into a conduit 77 which is similar to conduit 73, and which divides into upwardly turned conduits 78 and 79. The latter conduits have their upper ends flared, and are provided likewise with screens 76. The conduits 75 and 79 are adapted to treat the top and bottom portions of the fibrous web before it is fed to the rollers of the first group. Conduits 74 and 78 direct the treating material against the top and bottom faces of the web after it has passed between the first group of rollers. If desired, the treating material may be applied between other groups of rollers.

Any suitable treating material which may be applied to the fibrous batt to form a compact batt of good texture may be employed. For example, Dextrate or casein may be used. I have also found it satisfactory to use a composition composed of one-third ($\frac{1}{3}$) talc and two-thirds ($\frac{2}{3}$) starch, the mixture being boiled to a paste and then cooled. Any suitable diluent may then be added to adapt the composition for spraying. In order to maintain the treating material at a proper viscosity, I prefer to use in the tank 69 a heating element 80. This element is preferably an electric resistance element of a type well known and is automatically controlled to maintain the liquid at a constant temperature.

In the operation of the apparatus, the fibrous web, say of cotton, is delivered by well known apparatus to the first group of rollers 1, 2 and 3. Just before the loose web reaches the rollers, sizing material is applied to the top and bottom faces of the web through conduits 75 and 79. The sizing material is conveyed from tank 69 by means of the air pressure therein through pipe 70. The material is formed into a mist in conduits 73 and 77 by atomizing nozzles 71 and 72, and conveyed through conduits 75 and 79 to the cotton batting. In a similar way, the treating material is applied through conduits 74 and 78 to the top and bottom faces of the cotton after it has passed between the compression rollers of the first group. The rollers 1, 2 and 3 may be heated to any temperature adapted to iron out

a batting of good shape, compactness and texture. A temperature of about 230° F. has been employed with good results, although widely varied temperatures may also be found desirable. It has also been found that the temperatures of the rollers vary considerably with the particular treating material employed.

After the web has been given a second treatment through conduits 74 and 78, it may be passed through a second group of rollers and then through a third group of rollers. I have found it desirable to heat each of the rollers in the group although, if desired, the heating of one or two of the rollers, under certain circumstances, may be dispensed with. The temperature of the rollers may be maintained by automatic means, as described in my co-pending application Serial No. 546,110. When the temperature exceeds a predetermined temperature, one or more of the resistance elements are cut out of operation and the temperature is maintained by the remaining elements. Also, the temperature may be controlled more accurately by manipulation of separate switches 64 which control each of the resistance elements.

The cotton web is carried by the compression rollers in the three groups along the bed provided by frame 6 and is formed in a roll about shaft 20 which is vertically guided by the members 21. Rollers 18 and 19 turn the roll of cotton in a well known manner.

While I have shown three groups of rollers, each group comprising two lower rollers and a vertically adjustable upper roller, a single group may be employed if desired. Also, the position and type of rollers used may be modified without departing from the spirit of my invention.

If desired, the upper roller may be heated to a higher temperature than the lower rollers and

also, in order to increase the ironing effect, the upper roller may be operated at a higher speed. By changing the gear ratio, the upper roller can be caused to rotate more rapidly.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

I claim:

1. In apparatus of the character set forth, compression rollers adapted to compress a fibrous web between them, an atomizing nozzle, means for supplying a sizing liquid under pressure to said nozzle, and an enlarged conduit conveying the mist from said nozzle to the bottom of said web, said conduit being provided at its outlet with a screen adapted to support a portion of said fibrous web.

2. In apparatus of the character set forth, compression rollers adapted to compress a fibrous web between them, means for supplying a sizing material in mist form, and an enlarged conduit conveying said material to the bottom of said web, said conduit being provided at its outlet with a screen adapted to support a portion of said fibrous web.

3. In apparatus of the character set forth, means for forming a fibrous batting, means for treating both sides of the batting, said means including a conduit below the batting for conveying the treating material to the bottom of the batting, said conduit being provided at its outlet with a screen adapted to support a portion of said fibrous web, and compression rollers adapted to compress the batting between them.

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