S. COHN.

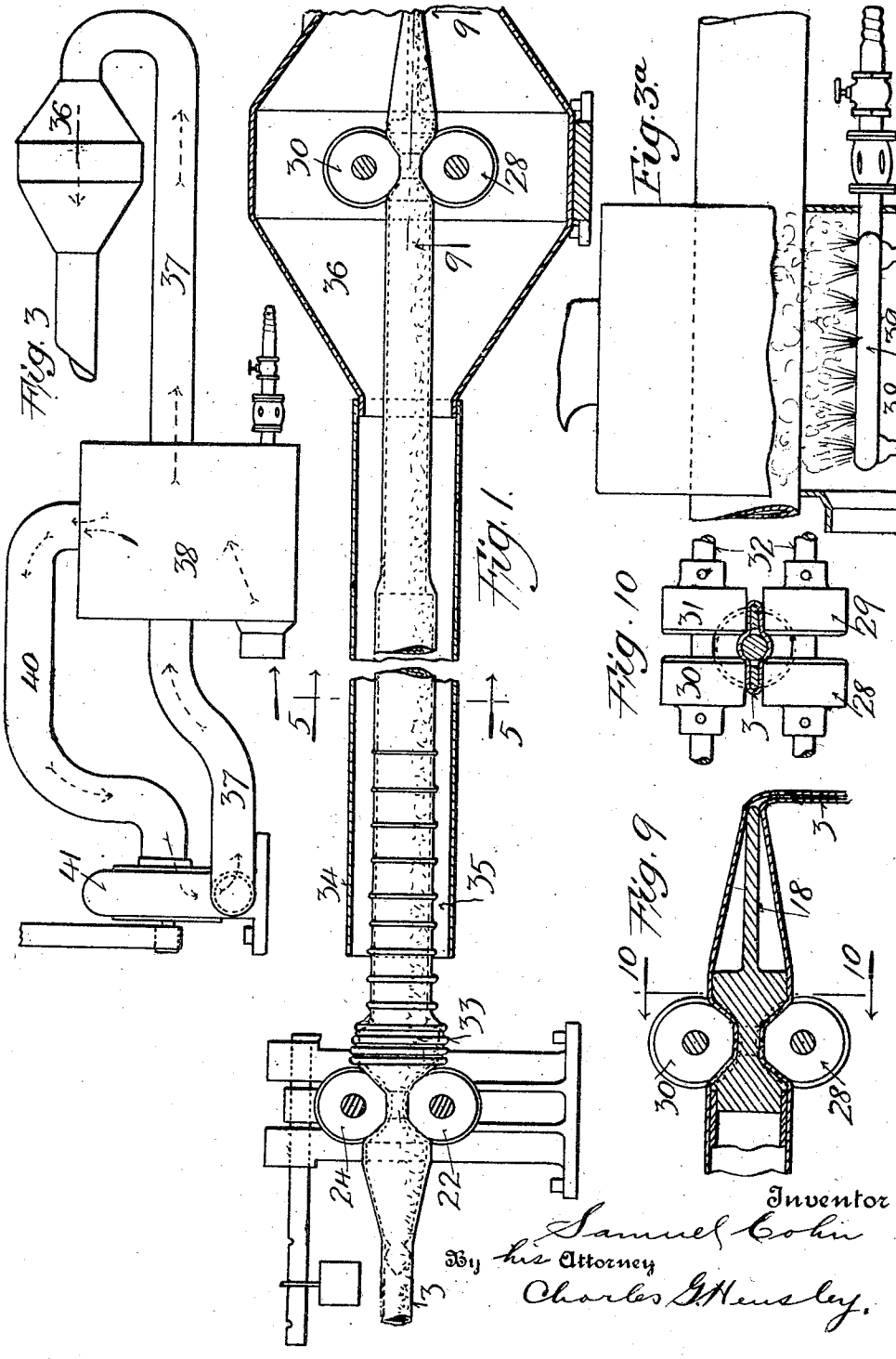
MACHINE FOR STRETCHING AND DRYING TUBULAR FABRICS.

APPLICATION FILED AUG. 1, 1917.

**1,313,468.**

**Patented Aug. 19, 1919.**

3 SHEETS—SHEET 1.




Inventor
Samuel Cohn
By his Attorney
Charles G. Hensley.

S. COHN.

MACHINE FOR STRETCHING AND DRYING TUBULAR FABRICS.

APPLICATION FILED AUG. 1, 1917.

**1,313,468.**

Patented Aug. 19, 1919.

3 SHEETS—SHEET 2.

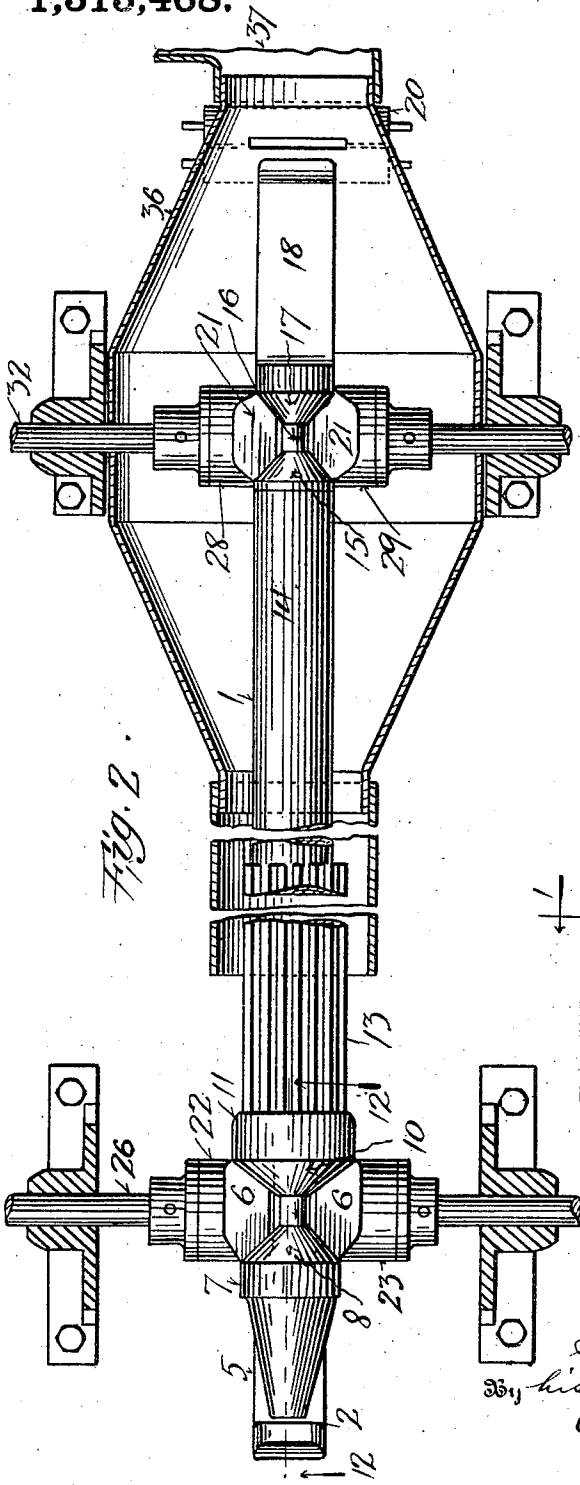


Fig. 2.

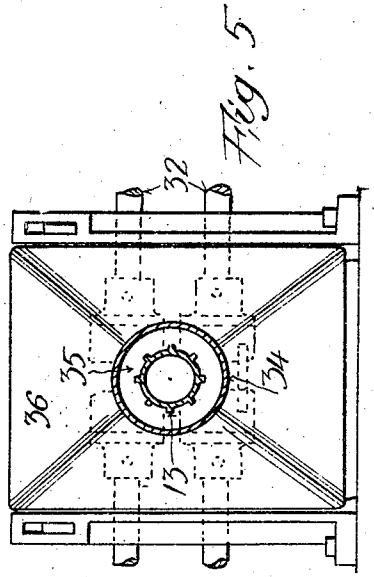


Fig. 5

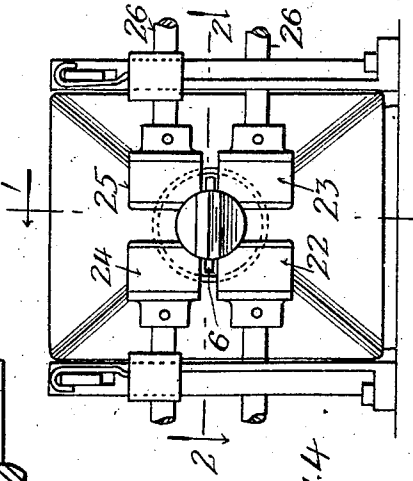


Fig. 4

Inventor

Samuel Cohn

By his Attorney

Charles G. Hensley.

S. COHN.

MACHINE FOR STRETCHING AND DRYING TUBULAR FABRICS.

APPLICATION FILED AUG. 1, 1917.

**1,313,468.**

Patented Aug. 19, 1919

3 SHEETS—SHEET 3.

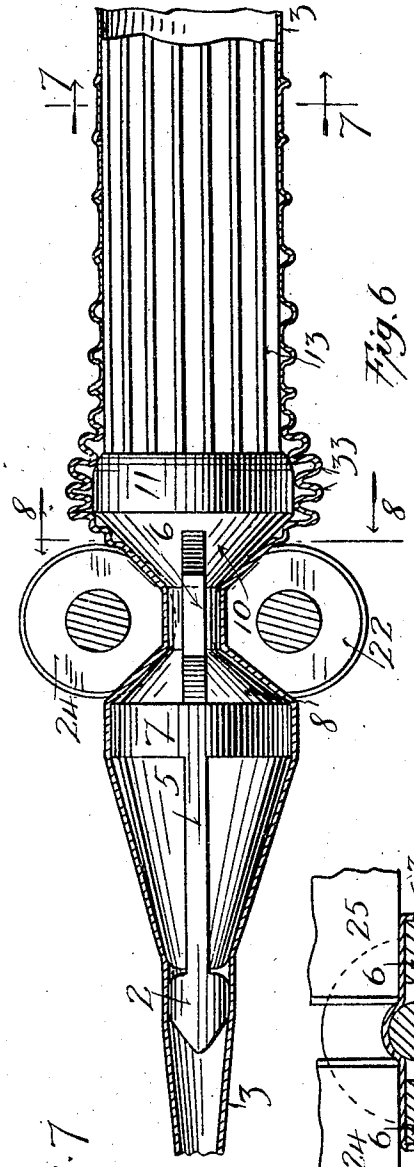


Fig. 6

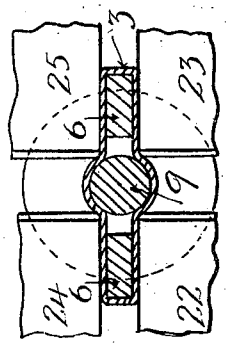


Fig. 8

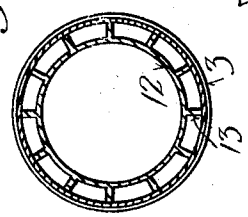


Fig. 7

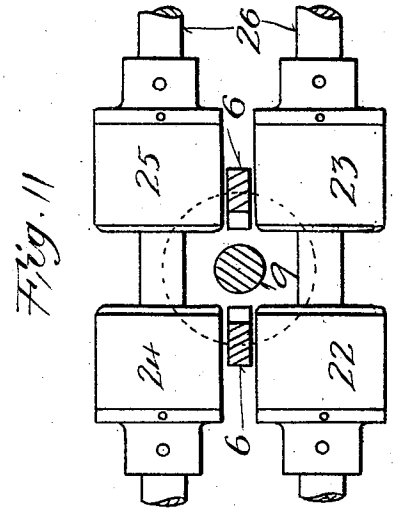


Fig. 11

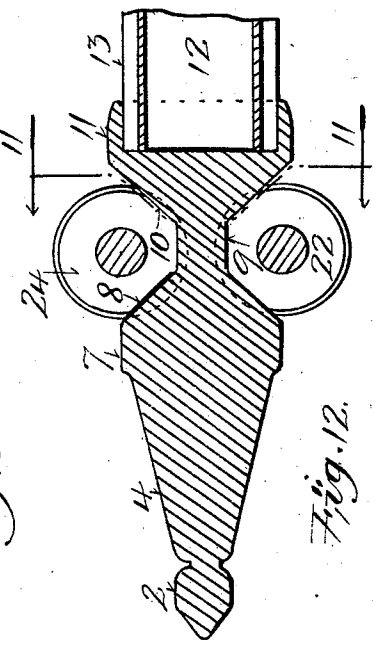


Fig. 12

Inventor

Samuel Cohn

By his Attorney

Charles G. Hensley.

# UNITED STATES PATENT OFFICE.

SAMUEL COHN, OF NEW YORK, N. Y.

## MACHINE FOR STRETCHING AND DRYING TUBULAR FABRICS.

1,313,468. Specification of Letters Patent. Patented Aug. 19, 1919.

Application filed August 1, 1917. Serial No. 183,929.

*To all whom it may concern:*

Be it known that I, SAMUEL COHN, a citizen of the United States, and a resident of the borough of Bronx, city and State of New York, have invented certain new and useful Improvements in Machines for Stretching and Drying Tubular Fabrics, of which the following is a specification.

The present invention relates to a machine for stretching and drying tubular fabrics whereby they may be dried while evenly stretched, and the machine is particularly useful for drying knitted tubular fabrics from which incandescent gas mantles are made.

The object of the present machine is to evenly stretch a tubular fabric both laterally and lengthwise whereby it may be dried in evenly stretched condition. The fabric is propelled in a continuous piece over a mandrel which lies inside the tubular fabric, and by means which exert a continuous and even propelling stress upon the fabric, so that all parts thereof are stretched to the same extent and degree. Preferably, though not necessarily, the same means which propel the fabric over the mandrel also support the mandrel and hold it in its proper position within the fabric.

Another object of my invention is to provide simple and effective devices for circulating heated air currents against the tubular fabric to more rapidly dry it while it is being stretched. It will be understood that the fabric may be dried under ordinary atmospheric conditions while it is stretched, but in order to dry it more rapidly, and thus shorten the time of the drying operation, it is preferable to apply heated air evenly upon the tubular fabric.

Attempts have been made to propel a continuous tubular fabric over a mandrel for stretching and drying it, but the present machine is an improvement in that the fabric is more evenly stretched and it is stretched both laterally and lengthwise and it is moved evenly over the mandrel by a rolling action.

In the drawings forming part of this application—

Figure 1 is a vertical sectional view of the invention and is taken on the line 1—1 of Fig. 4,

Fig. 2 is a horizontal sectional view and is taken on the line 2—2 of Fig. 4,

Fig. 3 is an elevation of the air heating and circulating members,

Fig. 3ª is a detail view of the heating chamber,

Fig. 4 is an end elevation of the machine, looking at the end where the fabric is first fed,

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1,

Fig. 6 is an enlarged sectional view of the receiving end of the mandrel, and some of the rollers,

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6,

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 6,

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 1,

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 9,

Fig. 11 is a sectional view showing the receiving end of the mandrel with the fabric omitted, and

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 2.

The fabric is stretched over a member lying within it and which will be referred to herein as a mandrel. The length of this member will depend upon how fast the fabric may be dried and upon how fast the fabric is to be advanced, but the method herein shown of advancing the fabric renders it possible to move the fabric over a sufficiently long mandrel to accomplish the desired results.

In the drawings the mandrel 1 is shown as having a receiving end 2 on which the tubular fabric 3 is first received from any source of supply, and after the fabric has been impregnated and while it is still wet. There is a gradually tapering part 4 following the member 2 and the fabric in passing along the part 4 is gradually opened up. There are lateral ribs 5 along each side of the tapering member 4 which prepare the fabric to be received properly over the lateral plates or wings 6. From the larger diameter at 7 the mandrel gradually tapers down conically at 8 to the intermediate connecting portion or neck 9, the part 8 forming an abutment surface, and then it gradually increases in diameter, conically, at 10 to the part 11 of maximum diameter the part 10 forming another abutment surface. The fabric having been opened up to the extent

of the diameter of the part 7 it has reached a dimension greater than the diameter of the neck 9 over which it subsequently passes. Instead of the fabric being allowed to draw back to a smaller diameter it begins to pass over the laterally projecting wings or plate 6 which are so proportioned that, together with the neck 9 they will keep the fabric extended to about the same size as when it passed over the part 7; only the shape of the fabric will change from circular to the contour shown in Fig. 8 while passing over the neck 9 and plates 6. At 11 the mandrel is of the maximum diameter. Beyond this position the mandrel preferably, though not necessarily, comprises the shell 12, having a number of projecting ribs 13 over which the fabric travels. The object of these ribs is to reduce the area of contact of the fabric and mandrel during a part of its travel over the mandrel in order that the latter may be longer and still permit the fabric to be drawn over it. The circumference of the ribbed portion of the mandrel is preferably slightly smaller than the part 11 in order that the fabric may start more freely over the ribbed portion by reason of its having passed over the part 11 of larger diameter.

Beyond the ribs 13 the mandrel is smooth and cylindrical at 14 for the greater part of the remainder of its length.

Beyond the cylindrical part 14 the mandrel again tapers smaller in cone shape at 15 to form another abutment surface and it forms a tubular neck at 16 and again enlarges conically forming another abutment surface 17. The end of the mandrel is flattened at 18 and the fabric passes from this end between the rollers 19, 20. At each side of the neck 16 there are lateral plates 21 which, with the neck 16 retain the fabric stretched to the same degree as when it passes over the part 14 but the contour of the fabric at this position is as shown in Fig. 9.

To advance the fabric over the mandrel I employ rollers which operate on the fabric so that the latter will not only advance but so that the stretching action will be uniform.

At opposite sides of the neck portion 9, there are rollers 22, 23, which lie just under the lateral plates 6 and which press the fabric against these plates. At opposite sides of the neck 6 there are other rollers 24, 25 which press on the fabric and against the upper sides of the plates 6. The several rollers are mounted upon suitable shafts 26 journalled in supports 27 and driven by any suitable driving means.

The rollers 22—25 are preferably resilient and have a frictional surface and for this purpose they may be made partly or wholly of rubber.

The rollers 22—25 not only engage the fabric on the plates 6 but they lie partly between the abutment surfaces 8 and 10 and therefore they engage the portions of the fabric which are traveling down the cone 8 and up the cone 10.

Near the take off end of the mandrel there is a similar set of rollers. The rollers 28, 29 are at opposite sides of the neck 16 and press the fabric on the under surfaces of the plates 21; while the rollers 30, 31 press the fabric on the upper surfaces of these plates. The rollers 28—31 are shown extending into the space between the abutment surfaces 15 and 17 so that they press the fabric on these. The rollers 28—31 may also be made partly or wholly of rubber, and the they are mounted on shafts 32 and revolved by any suitable driving means.

The peripheral speed of the rollers 28—31 is preferably greater than that of the rollers 22—25 and this may be provided for by turning the former faster than the latter.

When the tubular fabric has been properly placed over the mandrel and the several rollers set into operation the first set of rollers, 22—25, will draw the fabric over the end 2 and the conical part 4 by frictional engagement with the fabric against the plates 6 and against the conical parts 8 and 10.

These rollers also push the fabric over the part 11 of the mandrel so that plaits 33 are formed in the fabric as it passes over this enlarged part of the mandrel. Without this pushing action it is only possible for the rollers 28—31 to pull the fabric over a very short length of mandrel, whereas with the pushing action at the receiving end the take up or drawing rollers 28—31 may advance the fabric over a much longer mandrel. The plaits 33 are formed by manipulating the fabric when it is first placed into the machine and they continue to form at the receiving end of the mandrel, but they disappear where the tension is exerted on the fabric. From the part 11 the fabric travels over the ribs 13 and the stretching effect of the rollers 28—31 increases as the fabric approaches these rollers. The rollers 28—31 acting on the fabric against the plates 21 and the abutment surfaces 15, 17 draw the fabric and advance it continuously over the mandrel.

As the fabric leaves the part 11 the plaits or loops gradually separate and diminish, until finally they disappear altogether and the fabric becomes smooth. The fabric is stretched tighter and tighter, but gradually and evenly, as it travels toward the rollers 28—31 because the resistance to the pulling or drawing action of these latter rollers increases the nearer the fabric approaches these rollers, since the frictional resistance of the fabric on the mandrel increases, the farther the fabric travels on the mandrel. This is true even if the mandrel is substan-

tially of the same diameter over its stretching area. The drawing action of the rollers 28—31 stretches the tubular fabric lengthwise while the mandrel keeps it under lateral tension.

It is to be understood that the fabric is drying while passing over the mandrel but it cannot shrink because of the double stretching action.

It will be apparent that the stretching action of the rollers is uniform at all times and that they affect the fabric the same throughout its length.

It will be apparent that the several rollers, by engaging the plates 6 and 21, and the abutment surfaces 8, 10 and 15, 17 not only support the mandrel but prevent its moving laterally and longitudinally and from turning.

The principle of the invention is in having at least one set of rollers, such as 28—31 to frictionally engage the fabric and by the rolling pressure to advance it with an even stretching action over a stationary mandrel by engagement between abutment surfaces of the mandrel. In the preferred form of the invention the pushing rollers 22—25 are also employed and the same rollers which act upon the fabric support the mandrel and hold it in place.

I have provided simple and effective means for drying the fabric while it is being evenly stretched. This comprises means for blowing a current of air on the fabric and the air may be first heated to increase its effectiveness.

There is a tube 34 surrounding the mandrel 1 and of larger diameter, thus forming an annular air space 35 around the fabric. There is a hood 36 by means of which the current of air is admitted to the annular space 35 although the air may be introduced into this space in any other way. The pipe 37 supplies the air to the hood 36 whereby a current of air is passed over the fabric while it is traveling over and being stretched on the mandrel. Owing to the air being confined in the tube 34 it passes over the fabric at a high velocity and thereby the fabric is dried very rapidly. It affects the fabric uniformly throughout. By controlling the condition of the air which enters the tube and by controlling the speed at which the fabric moves it is possible to dry the fabric uniformly.

To heat the air there may be provided a chamber 38 heated by a gas burner 39 or any other heating device. The heated air from this chamber is drawn through a pipe 40 by a blower 41 and the blower forces the air through the outlet pipe 37 to the hood. If the pipe 37 passes through the chamber 38 the air in the pipe is further heated before it enters the drying tube.

With this drying device the air is passed evenly and with great velocity over the fabric and the latter is dried rapidly and evenly.

Having described my invention what I claim is:

1. A machine for evenly stretching a tubular fabric, comprising a mandrel supported by rolling supports, over which mandrel the tubular fabric is adapted to be advanced continuously past the rolling supports, said mandrel having abutment surfaces, and rolling members exerting a rolling pressure on the fabric and against the mandrel, said rolling members engaging the mandrel between said abutment surfaces.

2. A machine for evenly stretching a tubular fabric, comprising a mandrel supported by rolling supports and over which mandrel the tubular fabric is adapted to be advanced, said mandrel having abutment surfaces, and rolling members exerting a rolling pressure on the fabric and against the mandrel, said mandrel lying between the rolling members and said rolling members engaging the mandrel between said abutment surfaces.

3. A machine for evenly stretching a tubular fabric, comprising a mandrel supported by rolling supports over which the tubular fabric is adapted to be advanced said mandrel having abutment surfaces and rolling members exerting a rolling pressure on the fabric and against the mandrel and adapted to advance the fabric over the mandrel and to support the latter, said rolling members engaging the mandrel between said abutment surfaces.

4. A machine for evenly stretching a tubular fabric, comprising a mandrel supported by rolling supports over which the tubular fabric is adapted to be advanced, said mandrel having abutment surfaces, and rolling members of yieldable material exerting a rolling pressure on the tubular fabric and against the mandrel, said rolling members engaging the mandrel between said abutment surfaces.

5. A machine for stretching a tubular fabric comprising a mandrel supported by rolling supports over which mandrel the fabric is adapted to be advanced, and having abutment surfaces, and a plurality of rolling members spaced apart lengthwise of the mandrel and adapted to operate by a rolling pressure on the tubular fabric against the mandrel and between said abutment surfaces, to advance the tubular fabric over the mandrel.

6. A machine for evenly stretching a tubular fabric, comprising a mandrel supported by rolling supports over which mandrel the tubular fabric is adapted to be advanced, said mandrel being circumferentially grooved to form adjacent abutment

surfaces and rolling members opposite each other and lying in said groove, said rollers exerting rolling pressure on the fabric and against said abutment surfaces to advance the fabric over the mandrel.

7. A machine for evenly stretching a tubular fabric, comprising a mandrel supported by rolling supports over which mandrel the tubular fabric is adapted to be advanced, said mandrel being circumferentially grooved to form adjacent abutment surfaces and rolling members opposite each other and lying in said groove said rollers exerting a rolling pressure on the fabric and against the mandrel and adapted to advance the fabric over the mandrel and to support the latter, said rolling members engaging the mandrel between said abutment surfaces.

8. A machine for evenly stretching a tubular fabric, comprising a mandrel supported by rolling supports over which mandrel the tubular fabric is adapted to be advanced, said mandrel being grooved circumferentially to form adjacent abutment surfaces, and rolling members of yieldable material opposite each other and lying in said groove, said rollers exerting a rolling pressure on the tubular fabric and against the mandrel, to advance the fabric said rolling members engaging the mandrel between said abutment surfaces.

9. A machine for stretching a tubular fabric comprising a mandrel over which the fabric is adapted to be advanced, and grooved circumferentially to form adjacent abutment surfaces, and a plurality of pairs of rolling members, said pairs being spaced apart lengthwise of the mandrel and adapted to operate by a rolling pressure on the tubular fabric against the mandrel the rollers of each pair lying in one of said grooves and between adjacent abutment surfaces, and adapted to advance the tubular fabric over the mandrel.

10. A machine for stretching a tubular fabric comprising a mandrel over which the tubular fabric is adapted to be advanced, said mandrel being grooved circumferentially to form adjacent inclined surfaces and having laterally extending plates near the groove and rollers lying opposite each other, lying in said grooves and engaging opposite sides of said plates and acting on the tubular fabric by rolling pressure to advance the tubular fabric over the mandrel.

11. A machine for stretching a tubular fabric comprising a mandrel over which the tubular fabric is adapted to be advanced, said mandrel being grooved circumferentially to form adjacent inclined surfaces and having laterally extending plates near the groove and rollers opposite each other, lying in said groove and engaging opposite sides of said plates and engaging said inclined surfaces and acting on the tubular fabric by a rolling pressure to advance it over the mandrel.

12. A machine for stretching a tubular fabric comprising a mandrel over which the tubular fabric is adapted to be advanced, said mandrel being grooved circumferentially to form adjacent abutment surfaces and having a portion of larger diameter following a portion of lesser diameter, rolling members lying opposite each other and engaging between certain of said adjacent abutment surfaces and acting by rolling pressure on the tubular fabric and against the mandrel to advance the fabric over said portion of larger diameter and rolling members lying opposite each other and engaging between other adjacent abutment surfaces and acting beyond said portion of the mandrel of larger diameter by rolling pressure on the tubular fabric and against the mandrel to draw the fabric as it is advanced by said first mentioned rolling members.

Signed at the city, county and State of New York, this 20th day of July, 1917.

SAMUEL COHN.