April 11, 1944. G. A. SCHREINER 2,346,190

CLOTH SHRINKING MACHINE

Filed Sept. 19, 1942 2 Sheets-Sheet 1

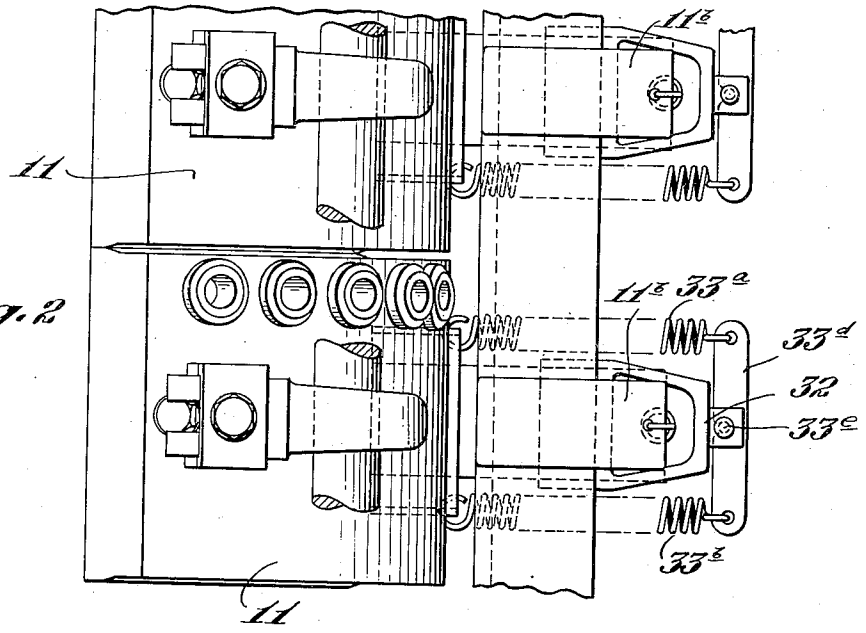

Fig. 2

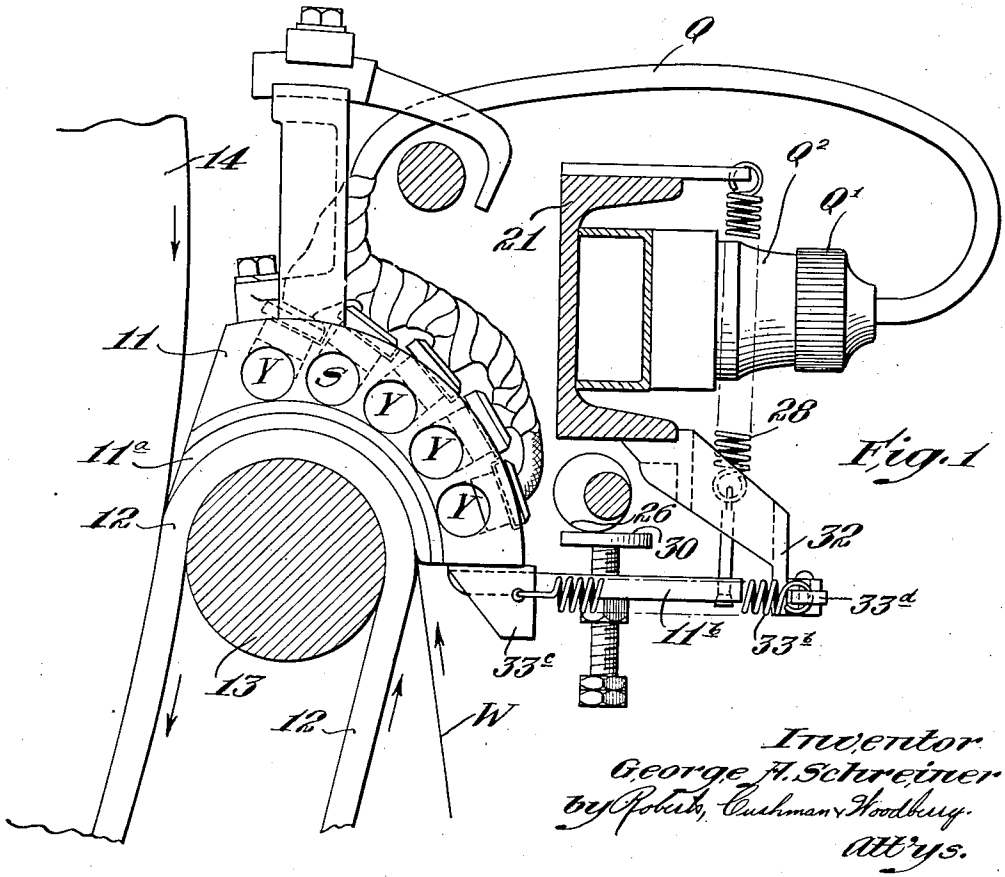

Fig. 1

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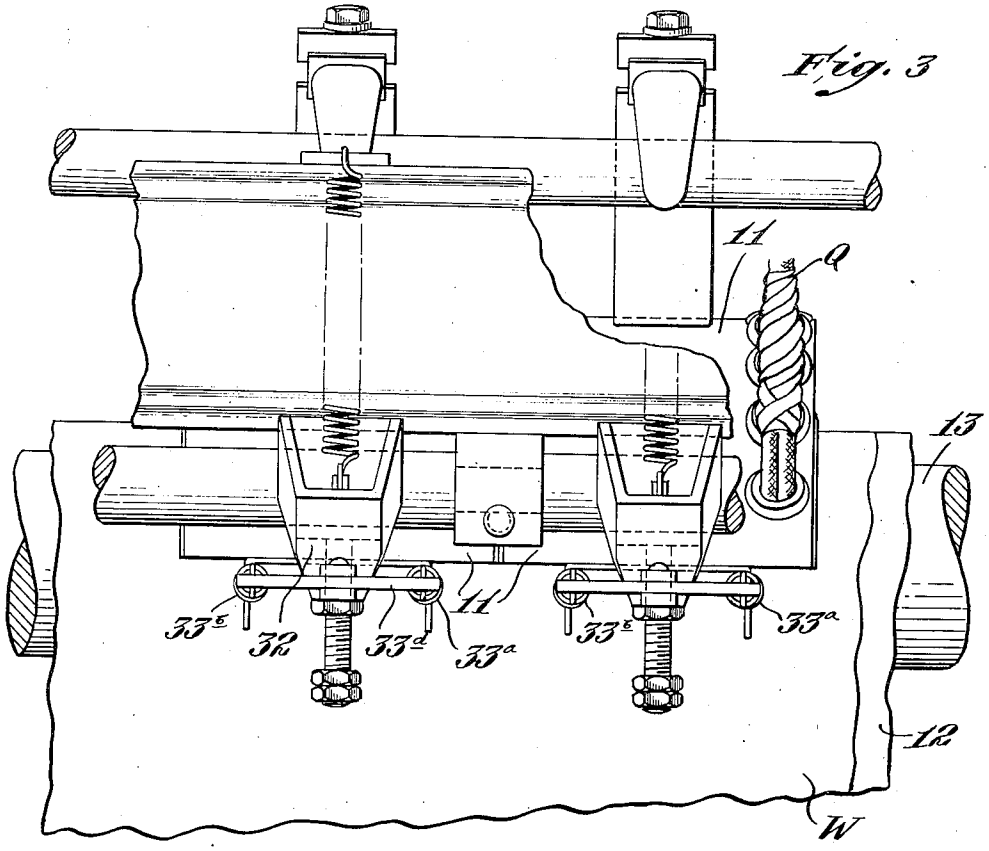
Fig. 3



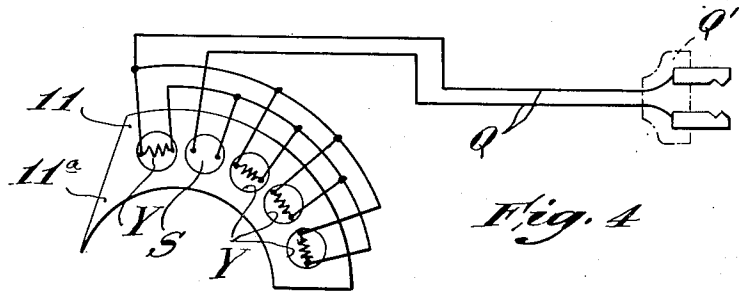


Fig. 4

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UNITED STATES PATENT OFFICE

2,346,190

CLOTH SHRINKING MACHINE

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Application September 19, 1942, Serial No. 458,970

5 Claims. (Cl. 26—18.6)

This invention relates to cloth shrinking machines of the type including an inlet roll, a heated cylinder, a belt running onto the roll and thence onto the cylinder, and a plurality of curved heated pressure members each conforming generally to the curvature of the outer surface of the belt on the roll and terminating in a pointed tip at the place where the belt runs onto the cylinder, such, for example, as described in United States Patent No. 1,861,424 and preferably embodying the improvements described in United States Patent No. 2,199,011. Such pressure members are electrically heated so as to reduce the coefficient of friction between them and the fabric and thus assist the fabric to adhere to the belt rather than to the pressure member. This effect of heat is like that noticed in an ironing operation where the iron slips easily over the fabric if the iron is kept sufficiently hot.

Among the objects of the invention are to prevent distortion of the pointed tip end of the pressure member in use, handling or cleaning, to prevent the pressure member from seizing and scoring the surface of the cylinder when adjusted so close to the cylinder that these parts make contact; to provide an improved control of the temperature of the pressure members; to distribute the heat within the pressure members in such a manner as to supply the greater quantity of heat adjacent to the end of the pressure member at which the moist fabric enters thereunder and a lesser quantity of heat in the portion of the pressure member adjacent to the pointed tip, and generally to impart a sufficient amount of heat to the pressure member where the pressure member acts on the moist entering fabric but without destruction of a temper in the pointed tip portion of the pressure member; and a further object of the invention is to improve the manner of yieldingly acting on the pressure members to urge the tip portions thereof into pressure contact with the fabric.

Other objects and advantages of the invention will be apparent from the specification and its drawings wherein the invention is explained by way of example.

In the drawings:

Fig. 1 is a vertical sectional view through the inlet roll of a shrinking machine embodying this invention, this view being similar to Fig. 4 of said Patent No. 2,199,011;

Fig. 2 is a fragmentary plan view of the parts shown in Fig. 1 with the electric wires and connections omitted;

Fig. 3 is a fragmentary right-hand elevation of the parts shown in Fig. 1; and

Fig. 4 is a wiring diagram of the heating elements and thermal switch in a single pressure member.

As in the aforesaid Patents Nos. 1,861,424 and 2,199,011, the shrinking machine includes a plurality of electrically heated pressure members 11 arranged closely side by side across the width of the fabric W entering the machine, so as to press the fabric firmly against the outer surface of a traveling belt 12 as the latter runs over an inlet roll 13 on its way to the heated cylinder 14.

Likewise as disclosed in said patents, the entire group of pressure members 11 is yieldingly urged downwardly into contact with the fabric. A tailpiece 11b extending rearwardly from each pressure member is acted upon by a spring 28 to urge the pressure member about an adjustable fulcrum provided by a tappet 30 and an adjustable cam 26, so as to urge the body of the pressure member 11 downwardly against the fabric W on the belt 12.

The device of the aforesaid Patent No. 2,199,011 yieldingly urges each pressure member horizontally to the right, as viewed in Fig. 1 of this application, so as to maintain the pointed tip end 11a thereof in pressure contact with the fabric about to leave the pressure member. In the improvided and preferred form of mounting of the pressure member shown in this application, there is substituted for the single horizontal spring which was attached to each pressure member in said patent, a pair of springs 33a and 33b, each connected at one end to a bracket 33c on the pressure member and connected at the opposite or rear end to an equalizing lever or whippletree 33d centrally pivoted at 33e to a bracket 32 attached to a channel iron 21. Each pressure member 11 is thus urged horizontally by two springs of which the pull is equalized, producing a more uniform pressure at each place along the inlet roll, and with the use of springs which are each less stiff and more readily responsive than the relatively stiff spring that was used in the construction shown in Patent No. 2,199,011. As shown in Fig. 2, the width of the tailpiece 11b is substantially less than the distance between the two springs 33a and 33b. Thus the tailpiece can move up and down between the springs without interference therewith.

The pressure members, according to this invention, instead of being made of relatively soft steel having a carbon content of about .5 or less as previously, are preferably made with a spring

temper at least at the tip portions thereof. Numerous compositions of steel and various heat treatments of the steel are suitable for this purpose. By "spring temper" is meant that the metal at the sharp tip portion of the pressure member is hard but will withstand a moderate degree of bending without permanent deformation. This spring temper may, for example, be obtained by making the pressure members of steel having a carbon content of for example .9, hardening them, and drawing them to the desired temper at the pointed tip portion 11ª.

The pointed tip portions of the pressure members engage the fabric during the first portion of the longitudinal shrinking. Uniformity of shape and pressure of these pointed tip portions is accordingly essential in order to provide uniformity of shrinking of the web of fabric at its various regions across its width, and any substantial distortion or injury to the tip portion, such as a bend or a nick, spoils the pressure member. In the past, with the usual relatively soft steel pressure members, it has even been found that in cleaning the pressure members a wiping cloth would sometimes hook onto the pointed portion of the pressure member near the end and bend the point. Danger of distortion of the tip portions of the pressure members is practically prevented by constructing them of hardened steel with a spring temper at the tip portion. A further advantage resulting from this construction is that the pointed tip portions do not tend to seize the surface of the large cylinder 14 when adjusted to make contact therewith, and do not score the surface of this cylinder. It has been found that, unlike the previous pressure member of soft steel, the pressure member of the present invention does not readily hold particles of dust and dirt and, moreover, does not act as a matrix to hold particles of abrasive nature which might scratch the main cylinder if the pressure member is adjusted to make contact therewith. While these advantages result from the pressure member having the spring temper at its tip portion, there is also a further advantage in having the whole concave lower surface of the pressure member formed of hardened steel for, when so formed, the lower surface of the pressure member is prevented from being scratched or roughened either in use or while starch or foreign matter is being removed from it during cleaning.

In previous constructions of machines of this type, it has been the practice to apply heat to the pressure members by means of electric heating elements embedded in holes bored conveniently in the pressure members, as shown for example at Y in Fig. 4 of said Patent No. 1,861,424, the heating elements being located in the pressure member without regard to the different action taking place at the entering end of the pressure member and the tip end, and all of the heating elements of a given machine being connected together and designed so that in the aggregate a sufficient amount of heat was applied by the pressure members to prevent undue friction between the fabric and the pressure members.

This previous arrangement and use of the electric heating elements would not permit the satisfactory use of pressure members having the advantageous spring temper at their pointed tip portions, without danger of destroying the spring temper by excessive heat at the tip portions. This is due in part to the fact that the demand for heat varies with the amount of moisture in the fabric, being different in various fabrics treated, different at the various stages of drying as the fabric passes under the pressure members, and may also be different at the various pressure members at various places across the width of the fabric. The heating elements are, according to the present invention, redistributed and controlled in a different manner so as to give, at all places across the width of the fabric, the proper supply of heat to make the fabric slip easily under the entering side of each pressure member as well as under the tip portion thereof, but without injury to the spring temper of these tip portions.

Referring to Figs. 1 and 4, the pressure members are drilled to receive horizontally located electric heating elements Y, but these are distributed around the pressure member in such proportion that a greater amount of heat is supplied to the pressure member adjacent to where the entering moist cloth is first contacted than adjacent to the tip portion. As illustrated, a typical pressure element will have three of these electric heating elements Y between its middle and the entering end at the right. A thermal switch S is then interposed between these three electric heating elements and a fourth electric heating element Y similar to the others and located adjacent to the tip end of the pressure member.

As shown by the wiring diagram of Fig. 4, the thermal switch S, which is responsive to the temperature of the pressure member, is connected in series with each of the electrical heating elements Y. This thermal switch, which is preferably of the type adapted to open the circuit when the temperature exceeds a predetermined amount and close the circuit when the temperature drops below a predetermined value, may, for example, be set to maintain approximately the desired temperature of 350° in the pressure member at this point. With such temperature, and with the heating elements distributed mainly on the side of the switch toward the entering end, the proper amount of heat can be supplied to provide the best slipping action on the entering moist fabric, a sufficient temperature of the pressure member adjacent to the tip end to provide for smooth passage of the fabric thereunder, and at the same time the temperature of the tip portion can be kept safely below a temperature which would impair or destroy the spring temper of the tip. The provision of individual thermal switches in the several pressure members further insures that these results will be secured uniformly at all points across the width of the running fabric.

As indicated in the wiring diagram of Fig. 4 and also in Fig. 1, each set of four electric heating elements and the thermal switch which controls them, receive their current through wires Q terminating in a detachable plug Q^1. Outlets Q^2 to receive the several plugs Q^1 are preferably provided as in Patent No. 1,861,424.

Patent No. 2,090,407, August 17, 1937, may be referred to as showing a preferred form of thermal switch of the cartridge type, although the invention is not limited to the use of this particular thermal switch.

In case certain of the pressure members have sufficient width (widthwise of the web of fabric), they may be equipped with two or more independent sets of heating equipment, each comprising the above-described group of electric

heating elements and the thermal switch therefor.

I claim:

1. In a cloth shrinking machine of the type including an inlet roll, a heated cylinder, a belt running onto the roll and thence onto the cylinder, and a plurality of curved steel pressure members pressing the running fabric against the belt, each pressure member conforming generally to the curvature of the outer surface of the belt on the roll and terminating in a pointed tip at the place where the belt runs onto the cylinder, the combination in the several pressure members of: the pressure member being hardened and drawn to a temper at least at the said pointed tip thereof, electric heating elements in said pressure member, and a thermal switch controlling the heating elements and limiting the temperature of the pressure member to a temperature less than would remove the said temper.

2. In a cloth shrinking machine of the type including an inlet roll, a heated cylinder, a belt running onto the roll and thence onto the cylinder, and a plurality of curved steel pressure members pressing the running fabric against the belt, each pressure member conforming generally to the curvature of the outer surface of the belt on the roll and terminating in a pointed tip at the place where the belt runs onto the cylinder, the combination in the several pressure members of: the pressure member being hardened and drawn to a temper at least at the said pointed tip thereof, electric heating elements in said pressure member, the distribution of said heating elements being such that a greater quantity of heat is generated adjacent to the end of the member at which the fabric enters thereunder than adjacent to said pointed tip, and a thermal switch controlling the heating elements and liimting the temperature of the pressure member to a temperature less than would remove the said temper.

3. In a cloth shrinking machine of the type including an inlet roll, a heated cylinder, a belt running onto the roll, and a plurality of curved steel pressure members pressing the running fabric against the belt, each pressure member conforming generally to the curvature of the outer surface of the belt on the roll at the place where the belt runs onto the cylinder and having a pointed tip portion: the pressure members being hardened and drawn to a temper at least at said pointed tip portions.

4. In a cloth shrinking machine of the type including an inlet roll, a heated cylinder, a belt running onto the roll and thence onto the cylinder, and a plurality of curved pressure members pressing the running fabric against the belt, each pressure member conforming generally to the curvature of the outer surface of the belt on the roll and terminating in a pointed tip at the place where the belt runs onto the cylinder: the combination of a plurality of electric heating elements distributed around the respective pressure members, and thermal switches located in the respective pressure members between heating elements thereof and arranged to control the current supply to said heating elements, with more of said heating elements located between the switch and the entering end of the pressure member than between the switch and said pointed tip.

5. In a cloth shrinking machine of the type including an inlet roll, a heated cylinder, a belt running onto the roll and thence onto the cylinder, and a plurality of curved pressure members pressing the running fabric against the belt, each pressure member conforming generally to the curvature of the outer surface of the belt on the roll and terminating in a pointed tip at the place where the belt runs onto the cylinder: the combination of a plurality of electric heating elements distributed around the respective pressure members, and thermal switches located in the respective pressure members between heating elements thereof and arranged to control the current supply of said heating elements, the distribution of said heating elements being such that a greater amount of heat is generated betwen the switch and the entering end of the pressure member than between the switch and said pointed tip.

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