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METHOD OF STEAMING FIBROUS STRIP MATERIALS

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Fig. 1

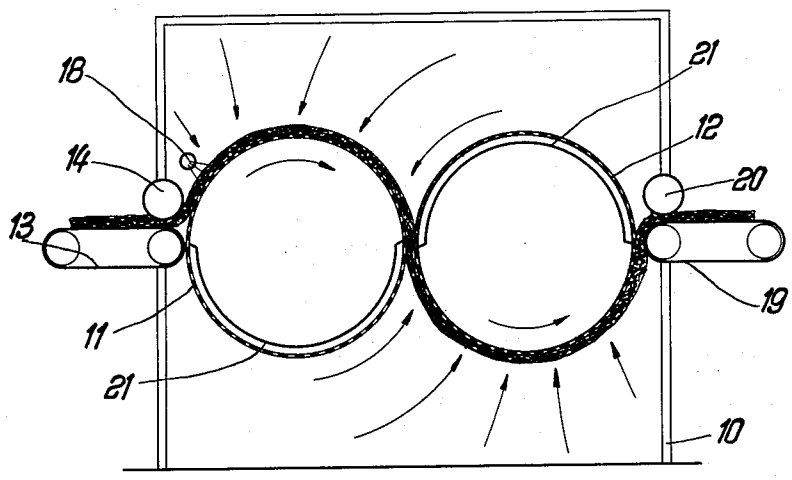
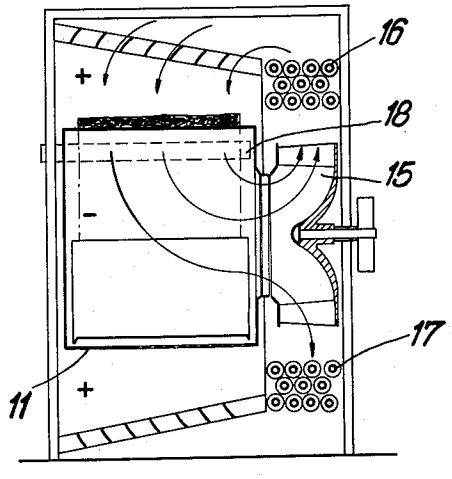


Fig. 2



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METHOD OF STEAMING FIBROUS STRIP MATERIALS

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1 Claim. (Cl. 34—23)

The invention relates to a method of steaming materials which are preferably in the form of strips, small pieces or of a fibrous nature. The steaming of such materials has heretofore been generally effected in autoclaves. When autoclaves are used, only intermittent operation is possible. The material must be placed in the autoclave, which is then sealed so that it is air-tight and evacuated by means of a vacuum pump. The vacuum chamber is thereupon charged with steam. This steam penetrates into the material under vacuum, but never in a completely uniform manner, since the outer parts of the material are more exposed to the steam than the parts which are located further towards the interior. The economy of operation using an autoclave is therefore relatively poor and it is the object of the invention to place the steaming process on a more economic basis in that it can be carried out continuously, whereby it is possible to save the time spent in preparing the autoclave and the staff required for handling the autoclave.

According to the invention, the material to be steamed is brought into fleece-like form and supplied to one or more perforated or sieve drums rotating in a closed chamber, over which drums it is carried away in the fleece form. Inside the chamber accommodating the sieve drums there is created a hot, humid atmosphere which is forced through the fleece running over the drums by means of fans. Such a method of operating a steaming apparatus permits of carrying out the steaming of the said materials in a completely continuous and automatic manner, without a considerable operating staff being required.

It has been found that the steaming method according to the invention can be carried into effect substantially by means of an apparatus such as has already become known in its basic features for drying such materials. More particularly, an apparatus for carrying the method into effect is so designed that the fans suck the humid atmosphere out of the interior of the sieve drums, force it away over heating elements and again blow it through the fleece of material to be steamed from the outside of the sieve drums, whereby the fleece clings to the drums. The fleece of material to be steamed runs over one or more sieve drums in succession and rests freely on the said sieve drums. Furthermore, the fleece of material to be steamed is carried along over the top and bottom of the sieve drums alternately, as is known in drying. The stationary cover plates disposed inside the drums prevent any induced draught and thus release the material, so that the latter can be drawn on by suction by the next drum.

Steam is delivered to the chamber in which the sieve drums are arranged in such quantity that the chamber has a moisture content of at least 95% to 97%. The fleece of material continuously entering and leaving a steam chamber is compressed at the entry and the exit by press rolls inserted in air-tight relationship in the wall of the apparatus. This arrangement has the advantage, on the one hand, that leakproof closure of the steam chamber in the outward direction is obtained and the advantage, on the other hand, that after the material has run through the press rolls it breathes again inside the steam chamber and in so doing duly absorbs the steam.

The fans of the apparatus are so designed that a very slight excess pressure prevails inside the steam chamber with respect to the outside air and prevents the drier outside air being able to pass into the interior of the steam chamber.

The steaming apparatus described operates in a completely continuous manner, the material to be steamed being fed at one end and also leaving continuously at the other end of the machine.

An embodiment of the invention is shown in the drawing, in which:

FIG. 1 is a longitudinal section through a steaming apparatus according to the invention;

FIG. 2 is a cross-section through the steaming apparatus in diagrammatic form.

In the box-like steam chamber **10** there are arranged side by side two perforated or sieve drums **11** and **12**, which are set in rotation by a drive (not shown) in such manner that they revolve in opposite directions. The material to be steamed is placed in fleece form on a conveyor belt **13** and is transferred by the latter under a press roll **14** to the sieve drum **11**. The press roll **14** compresses the material and is mounted in substantially air-tight relationship in the wall of the box **10**.

The interior of the sieve drum **11**, like that of the sieve drum **12**, is under the influence of the suction side of a separately driven fan **15**. This fan **15** produces a subpressure inside the sieve drum **11** and blows the sucked-out atmosphere radially at the sides of the sieve drums over heating elements **16**, **17** and both over and under the drums. At some point in the steam chamber **10** there is an arrangement **18** for supplying steam. The steam is fed in in a quanity such that the interior of the chamber **10** is about 95% to 97% moisture saturated. The heating elements **16** and **17** give the atmosphere a temperature of more than 100° C. The atmosphere is thus circulated inside the chamber **10** by the fan **15** by way of the heating elements **16**, **17** and as it passes through the fleece of material on the surfaces of the sieve drums comes into steaming interaction with the material. The material runs over the top of the sieve drum **11** and leaves the latter on the opposite side, then to run along on the underside of the following sieve drum **12**. It emerges again at the conveyor belt **19**. Over the conveyor belt **19** there is likewise mounted in air-tight relationship in the wall of the box **10** a press roll **20**, which compresses the material. The areas of the sieve drums which are not covered by material inside the steam chamber **10** are produced by plates **21**, because the latter prevent passage of the steam atmosphere and hence the induced draught.

The interior of the steam chamber **10** is sealed so that it is air-tight due to the arrangement of the press rolls **14** and **20**. The fans **15** are so designed that a very slight excess pressure is produced inside the box **10** with respect to the outside air, so that it is impossible for dry air to pass into the interior of the steam chamber **10** from outside during the steaming process.

The steaming apparatus according to the invention operates in a completely continuous manner. The material to be steamed is placed on the conveyor belt **13**, enters the steam chamber **10**, is steamed over and under the sieve drums and emerges again continuously by way of the conveyor belt **19**. In this way, a steaming apparatus which is very valuable, especially for the textile industry, is produced, but, of course, this apparatus can also, if necessary, be rendered practicable for other steaming purposes. In every case, the material fed in is uniformly and intensively permeated by steam, which is impossible in the known methods of steaming. The material is compressed at the entry by the roll **14** and breathes or opens up again after it has passed into the steam chamber, duly absorbing the steam immediately.

Due to the suction exerted by the fans, the material ad-

heres well to the sieve drums, which carry it through the whole of the steaming apparatus in a manner similar to that already known in drying apparatus.

What I claim is:

A process for moistening small individual pieces of fibrous material comprising continuously passing said pieces in the form of a fleece through an airtight housing over a plurality of rotating sieve drums contained within the housing, producing wet steam at greater than atmospheric pressure and having a temperature greater than 100° C. and from 95 to 97 percent moisture content within the housing, drawing the wet steam through one side only of said fleece while said fleece passes over one drum, recycling the wet steam withdrawn from the one drum similarly through the other side only of said fleece while said fleece passes over a second drum, and said steam being withdrawn from the interior of each drum at a subpressure sufficient for holding the fleece by suction upon the surface of each drum.

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