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F. F. CHUDOBA

METHOD OF AND APPARATUS FOR TREATING FELT ARTICLES

Filed April 21, 1924

Fig. 1.

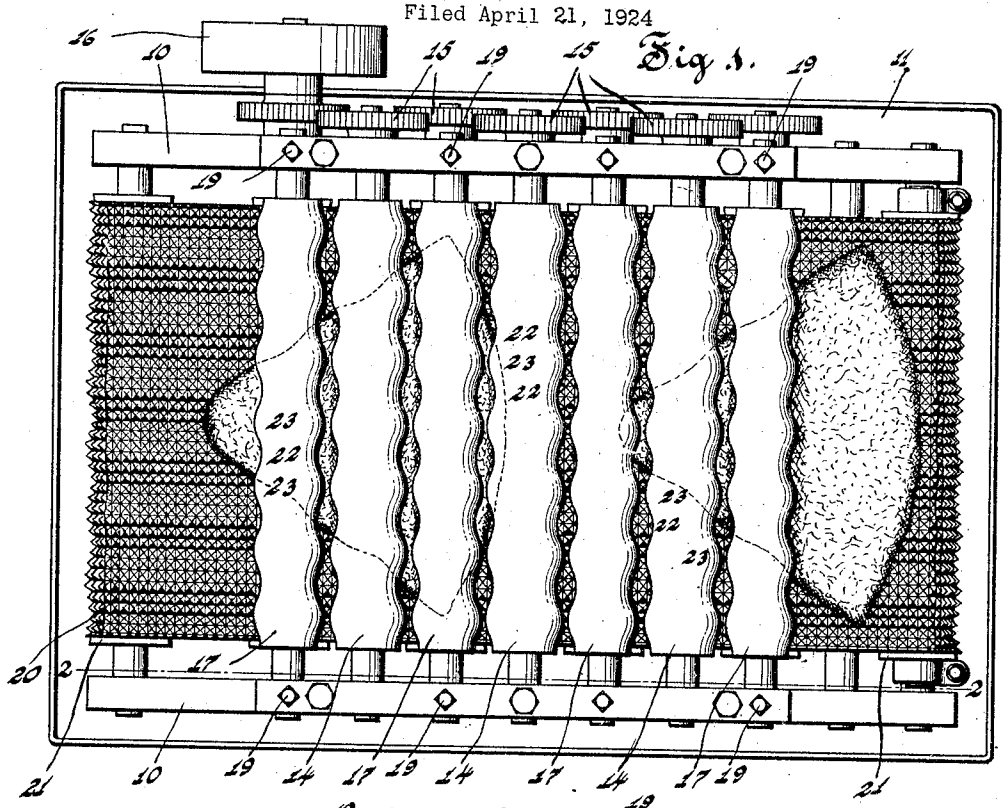


Fig. 2.

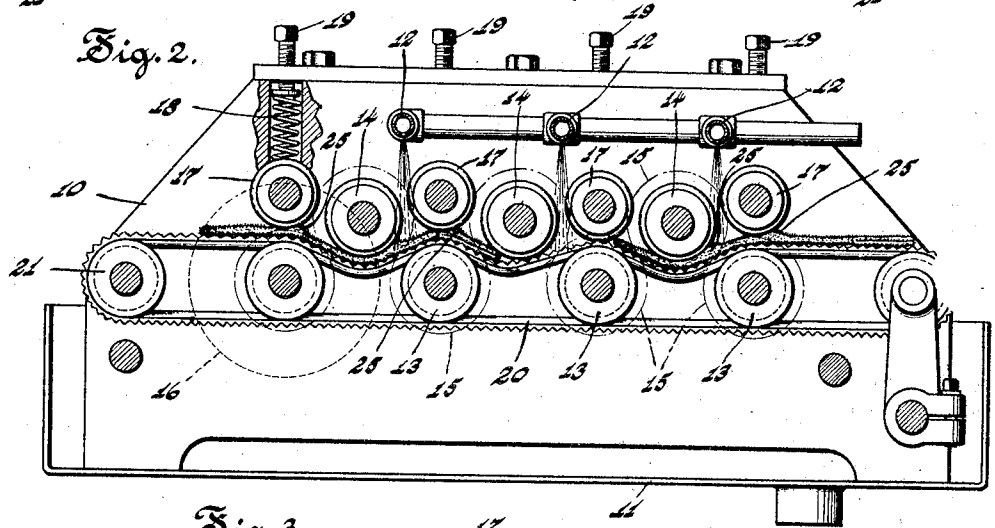
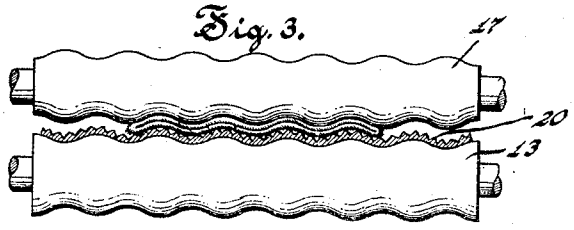


Fig. 3.



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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR TREATING FELT ARTICLES.

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This invention relates to a method of and apparatus for shrinking hat bats and the like. The aim of the present invention is to provide an improved method and apparatus by means of which hat bats and the like may be economically and effectively shrunk and felted. By proceeding in accordance with the present invention, the fibres of the hat bats are very rapidly and effectively interlaced and interwoven so that the bats are quickly brought down to the desired size and hardness, and a uniform, superior product is obtained.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawing, wherein I have shown, for illustrative purposes, one embodiment which the present invention may take, it being understood that this showing is by way of exemplification only,

Figure 1 is a top plan view of the machine;

Fig. 2 is a longitudinal vertical section taken substantially on line 2—2 of Fig. 1; and

Fig. 3 is a side view of two opposed rollers with the interposed belt in transverse section, a bat being shown in edge elevation.

In the illustrative showing of the drawing, the machine is provided with a plurality of rollers between which the bats pass and these rollers are so constructed and arranged that pressure is successively and progressively applied to the bats, and the rollers are corrugated so as to provide alternate grooves and ridges therein extending in the direction in which the bats are advanced; preferably, the bats are repeatedly bent back and forth progressively in the direction in which they are advanced so as to so flex and manipulate the bats that the fibres thereof will more rapidly interlace. Also, by preference, the bats are carried between the rollers on a belt, the surface of which is provided with a multiplicity of knuckles, preferably elastic, which serve to give to the bat, over its entire surface, a kneading action which expedites the vermicular movements of the fibres.

Referring to the drawing in detail, the frame of the machine may, of course, be of any suitable construction, but it is here illustrated, more or less diagrammatically or conventionally, as comprising two side frames 10 appropriately secured together. The machine may be located within a tank 11 into which falls the scalding hot water discharged onto the bats from the pipes 12. Journalled in the frame of the machine are a plurality of guide rollers which are preferably arranged in staggered relation so that, as the bats pass therebetween, they are repeatedly bent forwardly and backwardly. The lower set of guide rollers, which, for convenience, may be termed as supporting rolls, are designated by the numerals 13, 13. The intervening guide rollers are designated by the numerals 14, 14, and may be termed deflecting rolls, in that they cause the bats, together with the belt on which the bats are positioned, to travel in a wavy or zigzag course, resulting in bending or flexure of the belt alternately in opposite directions. Preferably, all of the guide rollers are driven. The manner in which they are driven is immaterial but, as illustrating one arrangement which may be adopted, I have shown, in Fig. 1, the ends of these rollers as being provided with intermeshing gears 15. 16 designates a drive pulley.

The machine is preferably provided with a plurality of pressure rollers 17 so arranged with respect to certain of the guide rollers that the bats, together with the belt on which the bats are carried, are progressively and repeatedly subjected to a squeezing action which accelerates the felting and shrinking of the bat. These pressure rollers are also of advantage in that they result in the plies of the bats being shifted or crozed one relative to the other in a succession of small increments. In the present illustrative disclosure, the pressure rollers are opposed to the supporting rolls 13, and they are urged towards the same by springs 18, the compression of which may be regulated

in any suitable manner, as by means of screws 19. The bats may be carried through the machine on a belt 20, the surface of which may have a plurality of kneading knuckles. In the present instance, the belt and knuckles are constructed of rubber, so that the knuckles are resilient, and these knuckles may have the pyramid form illustrated. The belt 20 is endless and passes about the rollers 21.

In accordance with the present invention, the guide and pressure rollers are circumferentially grooved at spaced intervals, thus providing each of these cylindrical members with circumferential grooves 22 and intervening ribs 23. The grooves of the pressure rollers and the deflecting rolls, as will be seen from Fig. 1, are in alinement with each other at right angles to the length of the rolls, while the supporting rolls have their ribs engaging in, or registering with, the grooves of the pressure rollers and deflecting rolls, as shown in Fig. 3. Thus, the pressure and guide rollers form a path for the bats which is corrugated longitudinally in the direction in which the bats are passed through the machine.

It will be seen, from the foregoing description, that when the machine is operating upon hat bats and the like, the belt 20 and the bats carried thereby have formed in them transversely spaced apart grooves which extend in the direction in which the bats are advanced; that is to say, the belt and the bats are given a transverse wave which is more or less uniformly maintained. Pressure is progressively applied to the bats as they pass between the successive supporting rolls and pressure rollers. The pressure rollers, which, preferably, are not driven, are capable of rotating at a lesser speed than the guide rollers, and the result is that when the forward end of the bat strikes one of these pressure rollers, the speed of rotation of the latter is retarded causing a ripple 25 in the upper ply of the bat which is advanced throughout that ply. Thus, there is formed in at least one of the plies of the bat a succession of small ripples, which means that the plies are shifted relative to one another in a succession of small increments. Owing to the staggered relation of the guide rollers, the belt and the bats carried thereby are given a wavy or zigzag course, that is to say the belt and bats are repeatedly flexed or bent backwardly and forwardly. As the belt passes between the opposed supporting rolls and pressure rollers, the knuckles thereon are squeezed or bent down out of shape, and when pressure is relieved they recover their forms, thereby locally manipulating the bat at a multiplicity of points. Furthermore, as the belt is given a wavy course, the knuckles thereof, as the belt passes over a supporting roll, will move slightly apart and then will move towards each other as the bat passes beneath a deflecting roll, and the effectiveness of this action is increased owing to the corrugated condition of the belt. Owing to these various combined local and general kneading and flexing actions, the shrinking of the bat is brought about in a very rapid and efficient manner, and the method results in a product of uniform and superior quality.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. The method of treating hat bats and the like, which consists in progressively applying pressure to the bats in unrolled condition while forming and maintaining grooves therein extending in the direction in which the pressure is progressed.

2. The method of treating hat bats and the like, which consists in repeatedly and progressively bending the bats in unrolled condition back and forth under pressure and forming and maintaining grooves in the bats extending in the direction in which the bending action is progressed.

3. The method of treating hat bats and the like, which consists in progressively and repeatedly applying pressure to the bats while forming and maintaining therein grooves extending in the direction in which the pressure is progressed, and relatively shifting the plies by progressing transverse waves in at least one of them in the direction in which the pressure is progressed.

4. The method of treating hat bats and the like, which consists in forming and maintaining parallel grooves in the bats, bending the bats to and fro under pressure progressively in the direction of the grooves, and forming a succession of transverse waves in at least one of the plies and advancing the waves to relatively shift the plies.

5. The method of treating hat bats and the like, which consists in forming and maintaining in the bats in unrolled condition parallel grooves and kneading the bats at a multiplicity of points under pressure progressed in the direction of the length of the grooves.

6. The method of treating hat bats and the like, which consists in forming in the bats in unrolled condition parallel grooves, bending the bats to and fro progressively under pressure in the direction of the length of the grooves while kneading the bats at a multiplicity of points.

7. The method of treating hat bats and the like, which consists in forming and maintaining parallel grooves in the bats in unrolled condition, and kneading the bats at a multiplicity of points while bending the bats to and fro progressively under pressure in the direction of the length of the grooves, and relatively shifting the plies.

8. In a machine for treating hat bats and the like, means for progressively applying pressure to the unrolled bats while forming and maintaining grooves therein extending in the direction in which the pressure is progressed, said means consisting of members to one side of the bat having alternate ridges and grooves with the grooves of the several members in alinement, and members to the other side of the bats having ridges extending into the grooves of said first mentioned members.

9. In a machine for treating hat bats and the like, a plurality of rollers between which the bats are advanced in flatwise condition, said rollers being constructed and arranged to form and maintain in the bats grooves extending in the direction in which the bats are advanced.

10. In a machine for treating hat bats and the like, a plurality of rollers between which the bats are passed, the rollers on one side of the bats having spaced apart grooves with the grooves of the several rollers in alinement at right angles to the length of the rollers, and the rollers to the other side of the bats being similarly formed and having their portions of larger diameter engaging in the grooves of the first rollers.

11. In a machine for treating hat bats and the like, means for repeatedly and progressively bending the bats to and fro while corrugating the same in the direction in which the bending action is progressed, said means including a plurality of rollers arranged in staggered relation and each having alternate circumferential grooves and ridges, the grooves of the rollers to one side of the bats being in alinement, and the ridges of the rollers to the other side of the bats registering with the grooves of the other rollers.

12. In a machine for treating hat bats and the like, a plurality of rollers between which the bats are passed, the rollers on one side of the bats having spaced apart grooves with the grooves of the several rollers in alinement at right angles to the length of the rollers, and the rollers to the other side of the bats being similarly formed and having their portions of larger diameter engaging in the grooves of the first rollers, some of said rollers being urged, under pressure, towards opposed rollers whereby to repeatedly and progressively compress the bats.

13. In a machine for treating hat bats and the like, a plurality of rollers, a belt adapted to support the bats and passing between said rollers, said rollers having alternating circumferential ridges and grooves with the grooves of the rollers to one side of the belt in alinement at right angles to the length of the rollers, and the ridges of the rollers on the other side of the belt engaging in the grooves of the rollers to the first side whereby the belt and bats thereon are grooved in the direction in which they are advanced.

14. In a machine for treating hat bats and the like, a plurality of staggeredly arranged rollers, a flexible belt passing over and under the successive rollers and adapted to support bats, the rollers having circumferential grooves and ridges arranged to form and maintain in the belt and bats as they pass between the rollers grooves extending in the direction in which the bats are advanced.

15. In a machine for treating hat bats and the like, a flexible member having a bat supporting surface provided with numerous kneading knuckles, and means for progressively and successively applying pressure to said member and bats while maintaining the same in corrugated condition.

16. In a machine for treating hat bats and the like, a belt having a bat supporting surface provided with a multiplicity of elastic kneading knuckles, and a plurality of rollers between which the belt and the bats thereon are advanced and arranged to form and maintain in the belt and bats grooves extending in the direction in which the bats are advanced.

17. In a machine for treating hat bats and the like, a plurality of rollers, a belt passing therebetween and having a bat supporting surface provided with a multiplicity of kneading knuckles, the rollers on one side of the belt having spaced apart grooves with the grooves of the several rollers in alinement at right angles to the length of the rollers, and the rollers to the other side of the belt being similarly formed and having their portions of larger diameter engaging in the grooves of the rollers on the first side of the belt.

18. In a machine for treating hat bats and the like, a flexible member having a bat supporting surface provided with a plurality of kneading knuckles, and means for progressively bending the said member and the bats thereon back and forth while forming and maintaining therein grooves extending in the direction in which the bending action is progressed.

19. In a machine for treating hat bats and the like, a belt having a bat supporting surface provided with a multiplicity of kneading knuckles, a plurality of rollers arranged in staggered relation and between which the belt and bats thereon pass, each of said rollers having alternate circumferential grooves and ridges, the grooves of the rollers to one side of the belt being in alinement, and the ridges of the rollers to the other side of the belt registering with the grooves of the rollers on the first side.

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