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H. A. DU BOIS

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PAPER MAKING

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Fig. 1

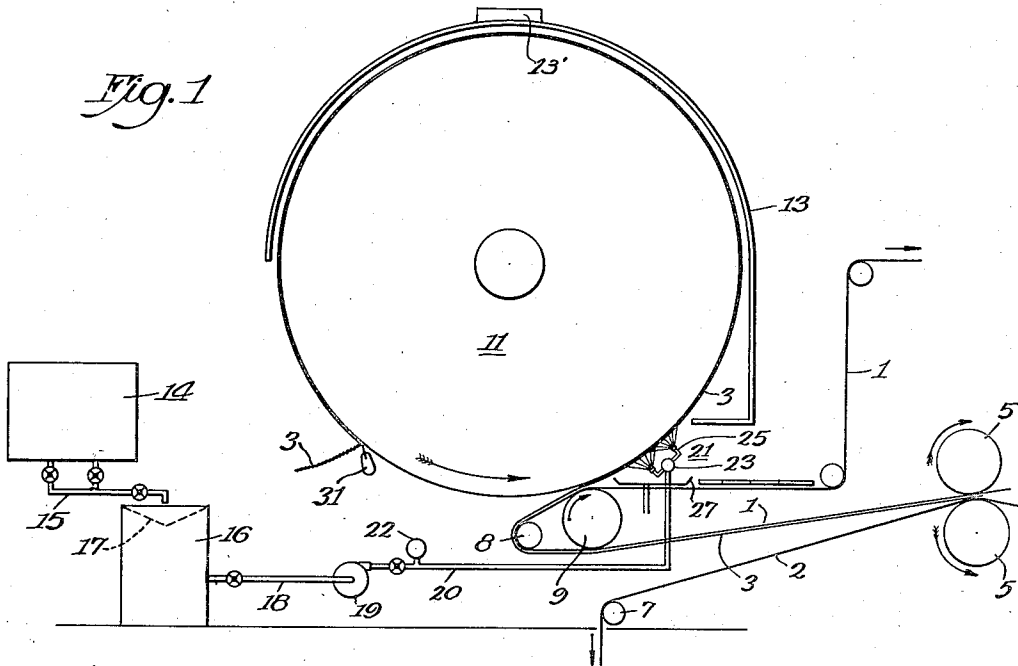


Fig. 4

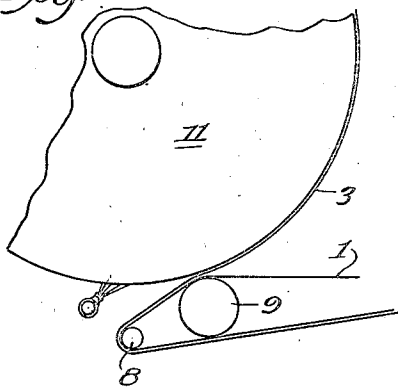


Fig. 5

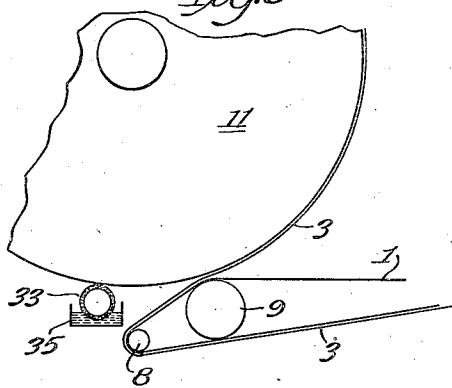


Fig. 3

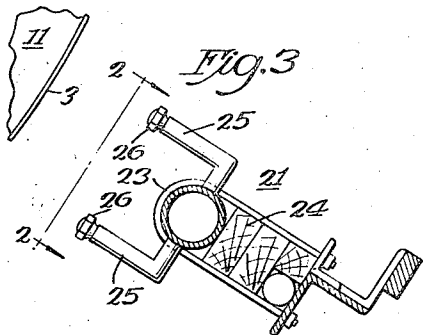
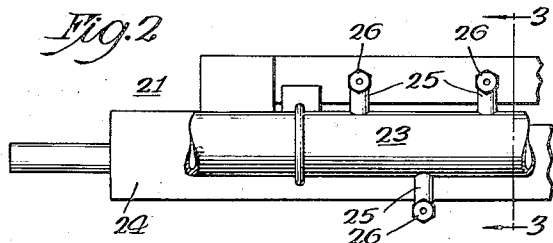


Fig. 2



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UNITED STATES PATENT OFFICE

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PAPER MAKING

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Application April 20, 1936, Serial No. 75,262

1 Claim. (Cl. 92—69)

My invention relates to the art of paper making and particularly to the making of thin, creped, cellulosic fiber wadding of the type which is commonly arranged into multi-layer pads or bats for use as packing or as a heat insulator.

The principal objects of the invention are to provide a simple, commercially practical method for fireproofing or otherwise treating crepe paper wadding during its manufacture; to provide a novel, aqueous solution of fireproofing salts capable of accomplishing this fireproofing during the manufacturing of the wadding; to provide a method of manufacture whereby a web of cellulosic fiber, the individual fibers of which have been substantially impregnated with asphalt, gum or the like for the purpose of waterproofing the final product, may be fireproofed during the final stages of the manufacturing operation, and to provide a manufacturing method whereby creped cellulosic wadding of the subject type which is both fireproof and waterproof can be manufactured in a continuous sheet or web on conventional paper making machinery. Other objects and advantages of the invention will be made apparent in the following specification and the single sheet of drawings, wherein

Fig. 1 is a schematic view of the drier end of a paper making machine embodying the features of my invention;

Fig. 2 is a fragmentary view showing the spray nozzle assemblage forming a part of the apparatus illustrated generally in Fig. 1; the view is taken on the general line 2—2 of Fig. 3;

Fig. 3 is a sectional view on the general line 3—3 of Fig. 2, and

Figs. 4 and 5 are schematic views illustrating modified processes suitable for use in conjunction with a drying roll such as illustrated in Fig. 1.

The upper and lower felts of a paper making machine are indicated at 1 and 2, and a thin cellulosic web of the type usually formed during the manufacture of creped wadding of the subject type is indicated at 3. The cellulosic web 3 is carried through the final press rolls, indicated at 5, intermediate the upper and lower felts 1 and 2. At this stage in the manufacturing operation the cellulosic web, while still wet, is completely formed. A short distance beyond the final press rolls 5 the bottom felt 2 is led over a suitable roll 7 to the felt pit. The upper felt 1 with the web thereon continues over suitable couch and press rolls 8 and 9, at which point the web 3 is transferred to the drier roll, illustrated schematically at 11, the upper felt being returned to the paper making machine.

Preferably, the drier roll 11 is of the conventional Yankee type, that is to say, it comprises a relatively large diameter roll having a smooth cylindrical outer surface and including means whereby the roll may be heated by passing steam through the interior thereof. To facilitate the drying operation, the roll 11 is enclosed within a suitable hood 13 which is vented at the top thereof as is indicated at 13'.

The means for fireproofing the web consists essentially in a suitable supply system for a liquid fireproofing material, and means for spraying or otherwise applying this fluid to the web. In the preferred form of the invention illustrated in Fig. 1, the fireproofing solution is normally contained within a mixing tank 14 which is connected with a storage or supply tank 16 by suitable piping 15. Preferably, a filter screen 17 is utilized intermediate the mixing and the supply tanks for preventing undesirably large portions of the fireproofing material or foreign matter from getting into the supply tank. Suitable piping 18 connects the supply tank 16 to a pump 19, and the pump 19 is in turn connected to the spray assemblage 21 by other piping 20. If desired, a pressure gauge, as indicated at 22, may be provided for aiding in controlling the spray.

One suitable spray assemblage 21 comprises a length of lead pipe 23 suitably supported upon a frame 24 and having a plurality of outwardly projecting arms 25 formed integrally therewith. Each of the arms 25 terminates in a spray nozzle 26 which, in one form of the apparatus, utilizes a $\frac{3}{4}$ mm. circular orifice. The piping 20 may be connected to the spray pipe 23 by any suitable means. The dimensions of the spray assemblage and the spacing of the spray nozzles 25 are so arranged that the resultant spray cones overlap at the point of impingement on the drying roll. This assures complete wetting of the web with the fireproofing solution. Suitable trays 27 are provided for collecting the fireproofing solution which drops from the web during the spraying operation.

Preferably the fireproofing material comprises an aqueous solution of suitable inorganic salts. One solution which I have found to be particularly satisfactory consists of 80 per cent ammonium sulphate, 10 per cent ammonium phosphate, and 10 per cent borax mixed with water in such proportions that each gallon of solution contains from .7 to 1.1 pounds of salts. The fireproofing solution is sprayed onto the web while it is still wet. This assures complete coating of the web fibers and a thorough charging or impregnation thereof by the fireproofing salts.

As the web moves along on the drier, the moisture is removed therefrom and the drying operation completed in the ordinary manner. The web is removed from the drying roll by a suitable creping doctor as indicated at 31.

The above described method of applying the fireproofing material to the web is particularly advantageous in that it completely prevents any contamination of the felts of the paper making machine, which would contaminate the entire white water system of the machine. Further, waste of the fireproofing salt solution is reduced to the minimum possible amount by virtue of the fact that the intensity of the spray action can be carefully controlled to such point that substantially all of the solution sprayed onto the roll and web is taken up by the web.

This fireproofing method is of particular value in fireproofing cellulosic webs, the individual fibers of which contain or have been charged or impregnated with asphalt or similar materials for making the resultant creped wadding waterproof. The provision of a commercially practical method for manufacturing creped wadding which is fireproof as well as waterproof has presented a very troublesome problem to the art, and prior to the discovery of the above disclosed process, it has not been considered economically practical to manufacture a wadding of this type. It is believed that the utility of my process in making possible the convenient and economical manufacture of this highly desirable product results, at least in part, from the fact that the fireproofing salts are sprayed onto the web after the web has been fully formed, but before it has been completely dried. To completely cover the individual web fibers or otherwise charge them with the fireproofing salts, particularly when those fibers have been previously charged with a waterproofing material such as asphalt, it appears necessary that the fireproofing shall be accomplished while the individual fibers are still wet.

Modified forms of the invention are illustrated in Figs. 4 and 5. In the device illustrated in Fig. 4, the fireproofing solution is sprayed onto the bottom of the drying roll 11 prior to the point at which the web is transferred thereto. The alternative method illustrated in Fig. 5 utilizes a felt-surfaced or other form of absorbent roll 33, the bottom of which passes through a suitable tank 35 containing the fireproofing solution.

By either of these alternative methods, the fireproofing solution initially contacts the inner surface of the web, thereby accomplishing a satisfactory charging of the web fibers with the minimum possible amount of solution. Fur-

ther, since the initial wetting of the web is at the interior surface thereof, there is little if any contamination of the felt by the fireproofing solution. Contamination is further reduced by virtue of the extremely small area of contact between the felt and the fireproof solution-bearing portions of the roll. These modified forms of the invention are particularly economical in their operation for the reason that they permit the utilization of a normally unused part of the drying roll for accomplishing at least a partial drying of the treating solution, thus making possible more rapid operation of the drier.

From the foregoing it will be seen that I have disclosed a novel and efficient process for fireproofing creped, cellulosic wadding. My improved process makes possible the economical manufacture of a creped wadding which is fireproof as well as waterproof, and it is readily applicable to existing paper making apparatus at a very low cost and without the necessity of providing any complicated or expensive machinery. I have also disclosed a novel fireproofing solution particularly intended for use in conjunction with the process of my invention, this solution being of particular value in accomplishing the fireproofing of cellulosic webs, the individual fibers of which are charged with asphalt or other waterproofing materials.

The invention may also be used for treating or impregnating a web with a liquid containing an insecticide, vermicide, fungicide, bactericide, or the like.

Various modifications may be made in my invention without departing from the novel principles disclosed in the foregoing. It is my intention, therefore, that the accompanying claim shall be accorded the broadest reasonable construction consistent with the state of the art.

I claim the following as my invention:

The process of manufacturing a very thin, fireproof, creped, cellulosic sheet suitable for use in making wadding on a paper making machine which includes sheet or web forming equipment and a single drying cylinder of relatively large diameter for drying the web, comprising the steps of forming a suitable cellulosic web through the use of the web forming equipment, transferring the formed web to the drying cylinder, charging or impregnating the web while it is on the drying cylinder and while it is still wet by applying directly to the outer face of the web most remote from the cylinder a solution of fireproofing salts, drying the impregnated web on the cylinder, and finally removing the dry web from the drying cylinder by a creping doctor.

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