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METHOD OF PRODUCING ABSORBENT FELT

Original Filed Aug. 19, 1931 2 Sheets-Sheet 1

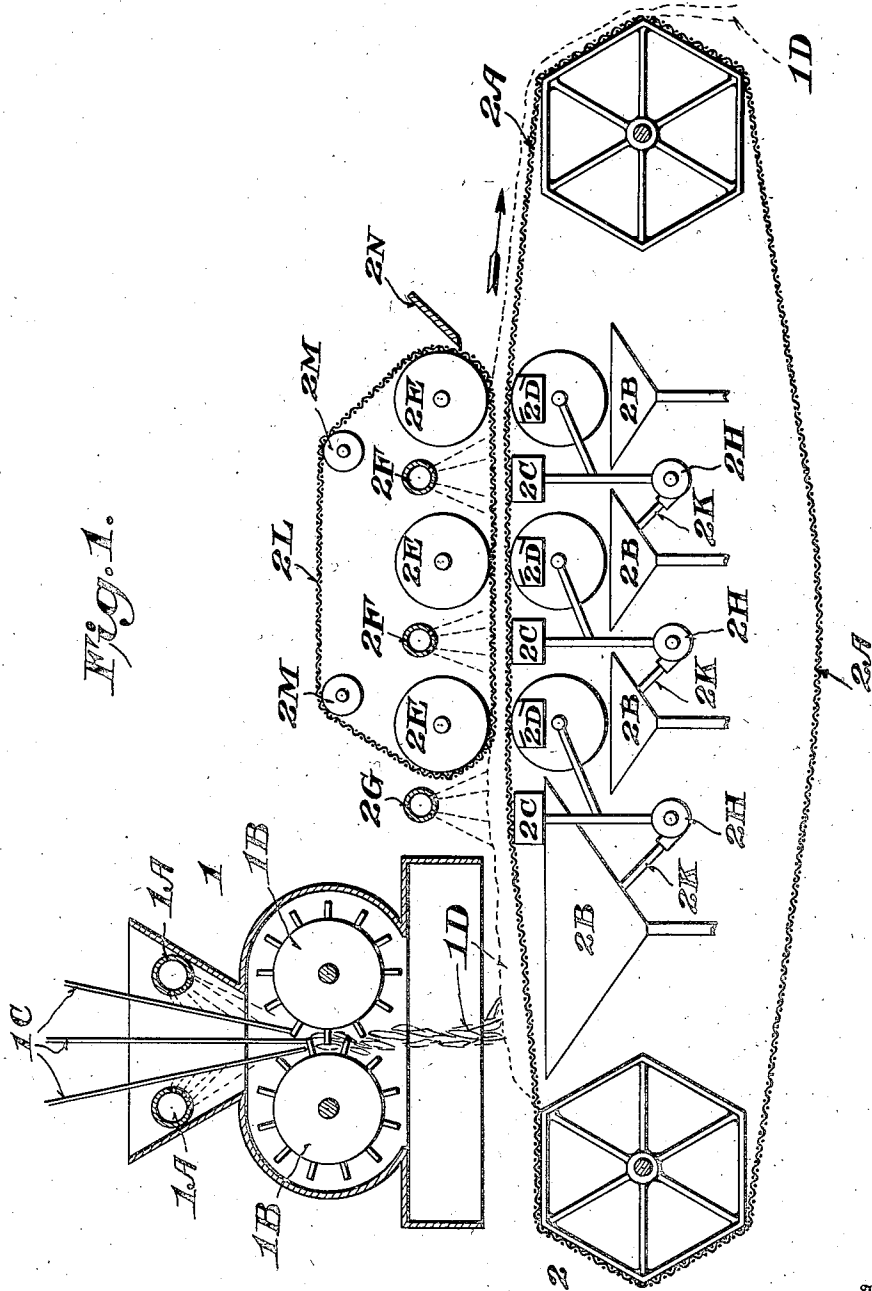


Fig. 1.

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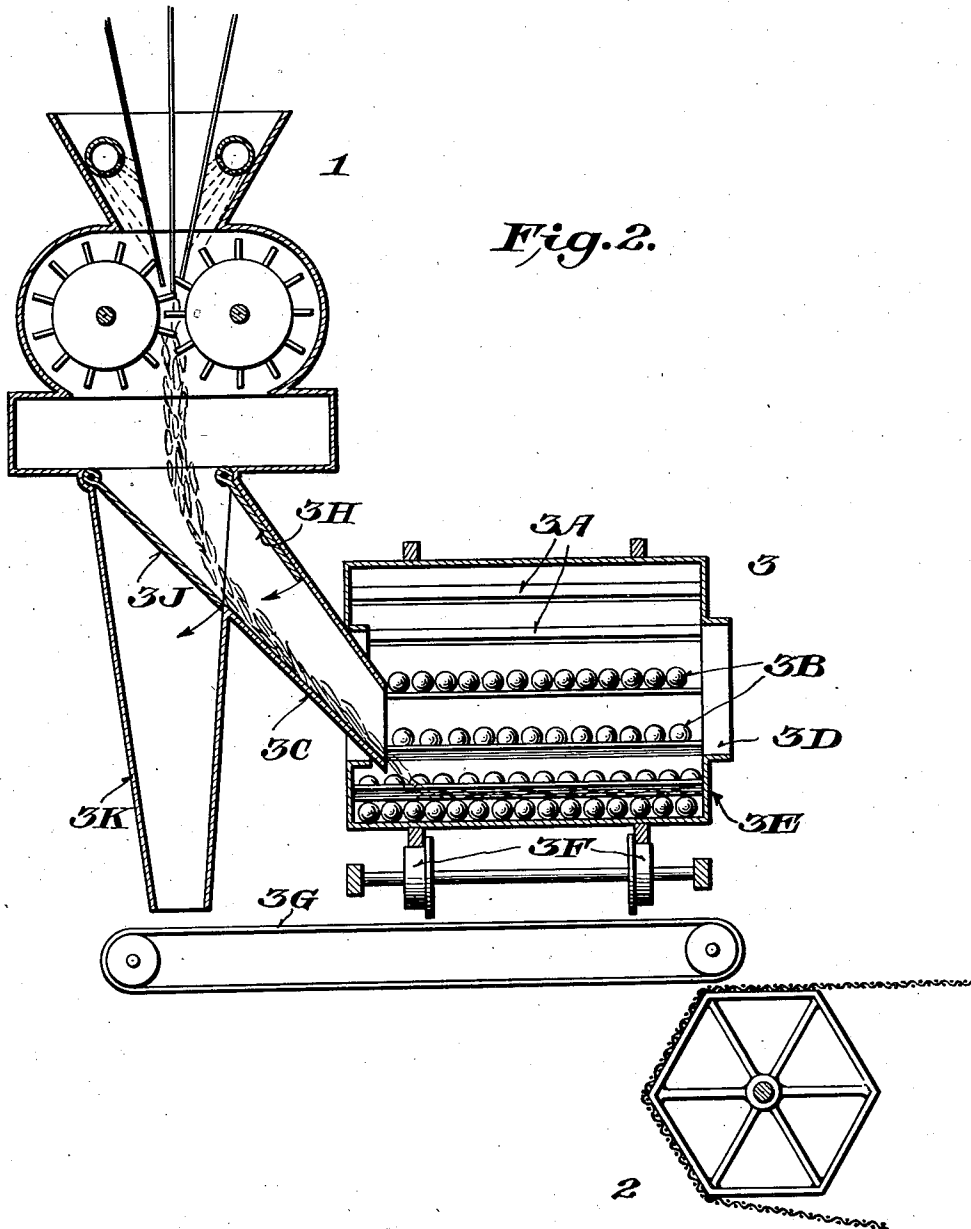
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# UNITED STATES PATENT OFFICE

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## METHOD OF PRODUCING ABSORBENT FELT

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Application August 19, 1931. Serial No. 558,184  
Renewed November 23, 1932

22 Claims. (Cl. 92—13)

The invention is an improved method of producing curled fibrous cellulosic pulp for the production of a highly absorbent felted sheet.

An object of the invention is to produce a flushing of the treating solution through the pulp without substantial dilution to produce the curling action, and to effectively remove the treating solution from the pulp mass in substantially one continuous action.

Another object is to provide means for effectively showering and partially impregnating with treating solution and shredding finished or prepared pulp, with flushing of the treating solution through the pulp and removal of the treating solution in substantially one continuous operation.

Another object is to provide means for showering and partially saturating or impregnating with treating solution and shredding finished pulp, to prepare the pulp for completion of the saturation and flushing by means of a roller squeezing action which substantially simultaneously removes the treating solution.

A further object is to provide for washing the pulp in transit and substantially simultaneously with the flushing pressing action, or to provide for additional showering with treating solution at this point.

The invention aims to accomplish flushing and substantially simultaneous removal or expressing of the treating solution by means of gravity and/or by means of pressure and/or suction.

The invention further aims to produce the gravity flushing action by damming or pooling of the liquid at the rolls.

The invention further aims to accelerate the curling and crimping action of the treating solution by subjecting the pulp showered with treating solution to a limited bruising action prior to removal of the treating solution.

Other objects will appear hereinafter.

The invention consists in the method and features of construction hereinafter described and pointed out particularly in the claims for effecting the curling of pulp.

The drawings show an embodiment of the invention in which

Figure 1 is a diagrammatic view of the assembled apparatus for carrying out my invention.

Figure 2 is a diagrammatic representation of similar apparatus including an interposed fibre bruising apparatus.

In the drawings, 1 represents generally the shredder impregnator portion of my improved

apparatus. The apparatus as a whole is designed for effectively producing kinked, curled, or crimped cellulosic fibres by flushing treating solution through the fibres and substantially concurrently removing the solution from the fibres. The impregnating shredder portion prepares the pulp by showering the sheets 1C of cellulosic material with treating solution from impregnating showers 1A and shredding the showered sheets by means of shredder rolls 1B. The sheets of cellulosic material 1C pass between the showers 1A and between the shredder rolls 1B and the shredded impregnated pulp material 1D is delivered from the shredder impregnator 1 onto the endless screen 2A of the flushing press washer portion of the apparatus represented generally by the numeral 2.

The shredder rolls cause a preliminary mixing which results in a more or less complete saturation or impregnation of the cellulose mass with the treating solution, and prepares the mass for the completion of the saturation by means of the squeezing and flushing action of the squeeze rolls 2E, 2D and drainer screen 2A.

The treating solution in the shredded impregnated pulp material 1D passes therethrough by gravity and flushes the fibres of the pulp, which gravity flushing is enhanced by damming or pooling of the treating liquid as the pulp material is carried by the endless screen 2A and is passed between the presser rolls 2D and 2E while the passage of the treating liquid between the presses is retarded by the presses.

Solution classifiers 2B are disposed beneath the endless screen 2A as shown and suction boxes 2C are also arranged at spaced intervals beneath the endless screen to aid in the flushing action of the fibrous pulp by the treating solution by providing suction to flush the solution thoroughly through and in contact with the fibres and by the same action to draw off the treating solution.

As shown, the suction boxes 2C are arranged alternately with the presses 2D, which in the embodiment shown, are shown as suction press rolls.

Vacuum pumps 2H are provided to receive the solution from rolls 2D and boxes 2C and the pumps separately deliver the extracted and drained solution to the classifiers 2B by suitable conduits 2K as shown.

It is not desired to limit the invention to press rolls 2D being suction rolls, as they may be ordinary press rolls without departing from the invention. As shown, the rolls 2D are provided with conduits leading to pumps 2H, but

these, of course, would be dispensed with if rolls 2D were ordinary press rolls.

The solution classifiers 2B receive the gravity flow and pump flow in diminishing concentration of treating solution in the direction of progress of the pulp, and the last classifier to the right, if used, receives only gravity waste drainage.

Washing showers 2F are provided above the pulp on the endless screen and are preferably alternately arranged with respect to the upper presses 2E, and preferably substantially above the suction boxes 2C.

Washing of the pulp is by this means effected substantially concurrently with the flushing action producing the curling of the pulp.

A sheet maintaining or top screen 2L is preferably provided passing over upper press rolls 2E and over carrying rolls 2M, and into contact with the sheet of pulp between it and the screen 2A to maintain the sheet form. A doctor 2N is preferably provided to prevent the pulp from riding up the top screen 2L.

If desired, further treating solution may be used at shower 2G instead of using washing water at this point. Or, if desired, the washer at 2G may be cut off entirely in order to secure a strong effluent at the first suction box 2C.

The use of treating solution at 2G is particularly desirable where it is desired to use strong treating solution to impart flexibility and softness and increased curling effect to the pulp fibres following weak caustic treating in a bruising apparatus which may be interposed between the shredder impregnator portion 1 of my apparatus and the flushing press washer portion 2.

The interposed bruising apparatus is represented diagrammatically in Fig. 2 as a ball mill 3. The ball mill 3 is designed to be used to accelerate curling and crimping of the fibres by localized or focal bruising resulting from treatment in the ball mill for a limited time. The ball mill or mechanical bruising treatment enables the use of less drastic treating solution which will be effective at the bruised points of the fibres to curl or crimp the same. This partial bruising treatment with less drastic treating solution than ordinary caustic treating solution is disclosed in my copending application for Method of producing absorbent felt, filed September 4, 1931, Serial No. 561,242.

The present invention involves the utilization of such bruising ball mill treatment to accelerate the curling and crimping of the fibres during its treatment with the caustic or other treating solution, which may or may not be as drastic as usual treating solution, as by using weaker chemicals or diluting in the process as by the washing showers.

It will be understood that the present invention deals with treatment of pulp after it has been in finished condition by the usual preparation treatment.

I am fully aware that various chemicals in solution, including sodium sulfide and caustic soda have been used for many years for the purpose of reacting with the acid cementaceous inter-cellular materials which nature has provided to bind together the cellulose fibres of wood and other vegetable substances.

It is not the purpose of this invention to perform the preliminary pulp producing operation of neutralizing and dissolving these cementaceous substances but the purpose of this invention is to take cellulose fibres which have been previously separated and cleansed by any of the well known

chemical processes and to treat these fibres as herein described for the purpose of presenting a product different from that produced by any of the usual pulp producing processes namely, the soda process, the sulfite process, the mono-sulfite process or the sulfate or kraft process. These are the well known processes for producing ordinary pulp from vegetable raw material.

The ball mill is intended to be diagrammatically representative of any equivalent apparatus for effecting the partial bruising of the fibres. At 3A are represented the horizontal bars or ribs for elevating the balls so that they may fall through to the bottom. The balls are indicated at 3B, the feed inlet at 3C and discharge outlet at 3D. Suitable drive means for the cylinder 3E are indicated diagrammatically at 3F.

For some particular grades of product it might be desired to produce an extremely soft and downy texture. The ball mill treatment tends to harden, strengthen and stiffen the product. For the extremes of soft material a high strength or high drasticity solution may be used and the ball mill by-passed as indicated in Fig. 2, by a conveyor 3G, by closing gate 3H and opening gate 3J and allowing the material to fall through spout 3K.

I claim:

1. The hereindescribed process of producing curled pulp for the production of a highly absorbent felted sheet, consisting in showering fibrous cellulosic pulp with treating solution, shredding and defelting the pulp in the presence of the treating solution, delivering the shredded defelted showered pulp material to a screen for flushing the treating solution there-through and therefrom by gravity, passing the shredded impregnated material between presser rolls to flush the treating solution therethrough in intimate contact with the separated individual fibres and to remove treating solution by pressure.

2. The process of claim 1 in which the flushing and removal of treating solution by pressure of said rolls is supplemented by application of suction beneath the screen.

3. The method according to claim 1 including washing the pulp in transit and substantially simultaneously with the flushing of the treating solution through and from the fibres.

4. The method according to claim 1 including the step of delivering treating solution to the shredded defelted material on the screen.

5. The method according to claim 1 including delivering treating solution to the shredded defelted material on the screen and applying suction beneath the screen.

6. The method according to claim 1 including the step of delivering treating solution to the shredded defelted material on the screen prior to passing it between the said press rolls.

7. The hereindescribed process of producing a highly absorbent felted sheet of pulp material consisting in showering fibrous cellulosic pulp with treating solution, shredding and defelting the pulp in the presence of the treating solution, delivering the shredded defelted showered material to a screen for flushing the treating solution there-through and therefrom by gravity, passing the shredded impregnated material between presser rolls to flush the treating solution there-through in intimate contact with the separated individual fibres and to remove treating solution, washing the pulp in transit and substantially simultaneously with the flushing of the treating

solution through and from the fibres, and then forming the pulp into a sheet.

8. The process of claim 7 in which the flushing and removal of the treating solution by pressure of said rolls, is supplemented by application of suction beneath the screen.

9. The hereindescribed process of producing a highly absorbent felted sheet of pulp material, consisting in showering fibrous cellulosic pulp with treating solution, shredding and defelting the pulp in the presence of the treating solution, partially or focally bruising the separated individual fibres as by limited ball mill treatment and thereby also impregnating and curling and crimping the fibres with treating solution, delivering the shredded impregnated and crimped material to a screen for flushing the treating solution there-through and therefrom by gravity, passing the shredded impregnated crimped material between roll presses to flush the treating solution there-through in intimate contact with the individual fibres and to remove the treating solution by pressure, and forming the pulp into a sheet.

10. The method according to claim 9 including applying suction beneath the screen to aid in the treating solution flushing and removal.

11. The method according to claim 9 including washing the pulp in transit and substantially simultaneously with the flushing of the treating solution through and from the fibres.

12. The method according to claim 9 including the step of delivering relatively strong treating solution to the shredded impregnated and crimped material on the screen to increase the curling effect in the fibres and the softness and flexibility of the material.

13. In combination in apparatus for preparing finished pulp for formation into highly absorbent felted material, showering and shredding means for the finished pulp, and means for flushing, pressing and washing the pulp delivered by said showering and shredding means, said flushing press washer means including a screen and press roll cooperating with the screen and washing showers above the screen.

14. In combination in apparatus for preparing finished pulp for formation into highly absorbent felted material, shower shredder means providing an inlet for sheets of finished or prepared fibrous cellulosic pulp material, treating solution showers adjacent said inlet and directed against said sheets, shredders beneath said inlet and solution

showers, and flushing press washer means receiving the showered and shredded pulp and providing an endless traveling screen, and press rolls cooperating with said screen, and washing showers disposed alternately with respect to the rolls above the screen.

15. Apparatus according to claim 14 including suction means disposed beneath the screen in substantial alignment with said washing showers above the screen.

16. Apparatus according to claim 14 including a treating solution shower disposed to shower the pulp on the screen in advance of the rolls.

17. Apparatus according to claim 14 including a treating solution shower disposed to shower the pulp on the screen in advance of the rolls, and a suction box beneath the screen and pulp and substantially in alignment with said treating solution shower.

18. Apparatus according to claim 14 including suction boxes disposed beneath the screen in substantial alignment with said washing showers above the screen, the lower press rolls being suction rolls, and solution classifiers receiving the solution from said suction boxes and suction rolls, there being a separate classifier to receive the solution from each suction box and the adjacent suction roll, and pumps for conveying the drained solution to the classifiers.

19. In combination in apparatus for preparing finished pulp for formation into highly absorbent felted material, showering and shredding means for the finished pulp, means for partially bruising the showered and shredded material, and means for flushing, pressing and washing the pulp.

20. Apparatus according to claim 19 in which said bruising means comprises a ball mill.

21. Apparatus according to claim 19 including conduit means for by-passing the pulp material around and past the said bruising means and valve means controlling the passage of the pulp either through the ball mill or around the ball mill through said by-pass conduit.

22. Apparatus according to claim 13 including an interposed ball mill to receive the showered and shredded material and to partially bruise the same and to then deliver it to the flushing press washer means, and a by-pass conduit with valve means determining whether the pulp material passes through the ball mill or is by-passed around the same through said conduit.

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