Dec. 23, 1952 C. R. MacDONALD 2,622,313

APPARATUS FOR APPLYING AN AQUEOUS BITUMINOUS EMULSION TO A FIBROUS WEB

Filed Dec. 4, 1948 2 SHEETS—SHEET 1

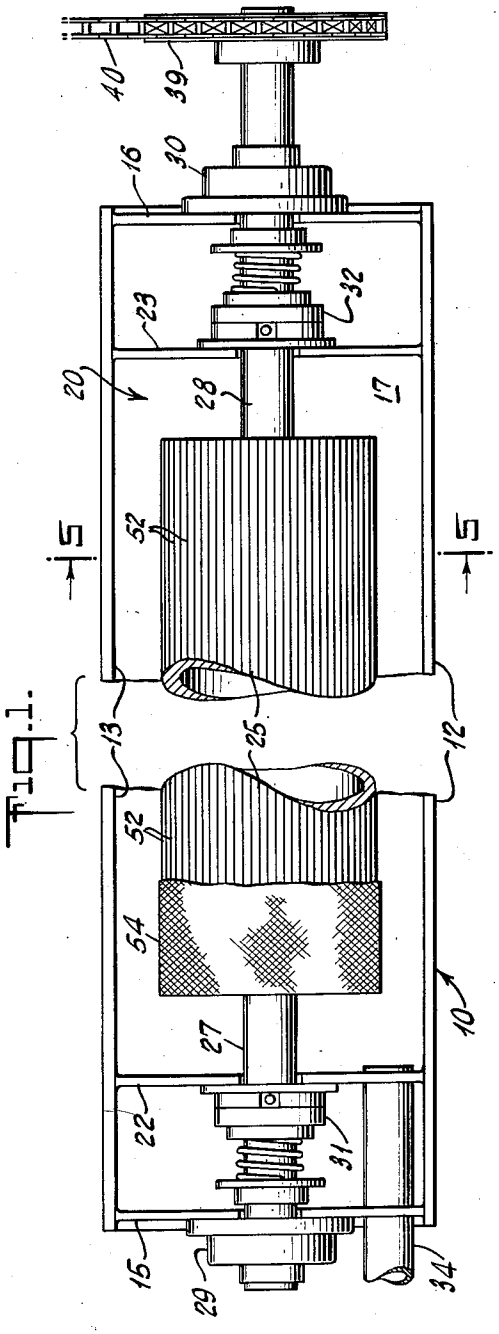


Fig. 1.

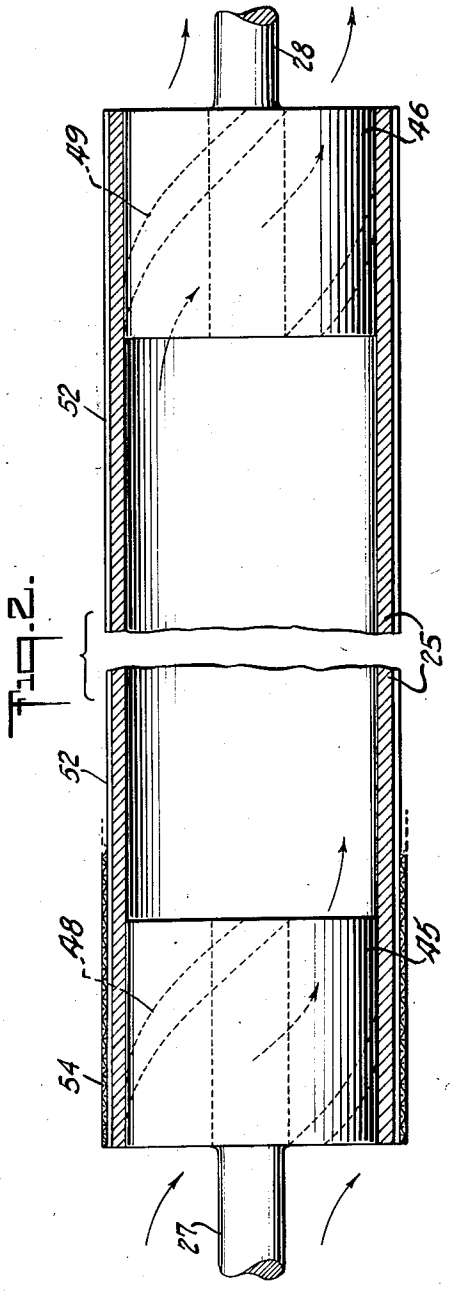


Fig. 2.

INVENTOR
CHESTER R. MACDONALD

BY
Samuel Steinman
ATTORNEY

Dec. 23, 1952 C. R. MacDONALD 2,622,313

APPARATUS FOR APPLYING AN AQUEOUS BITUMINOUS EMULSION TO A FIBROUS WEB

Filed Dec. 4, 1948 2 SHEETS—SHEET 2

Fig. 4.

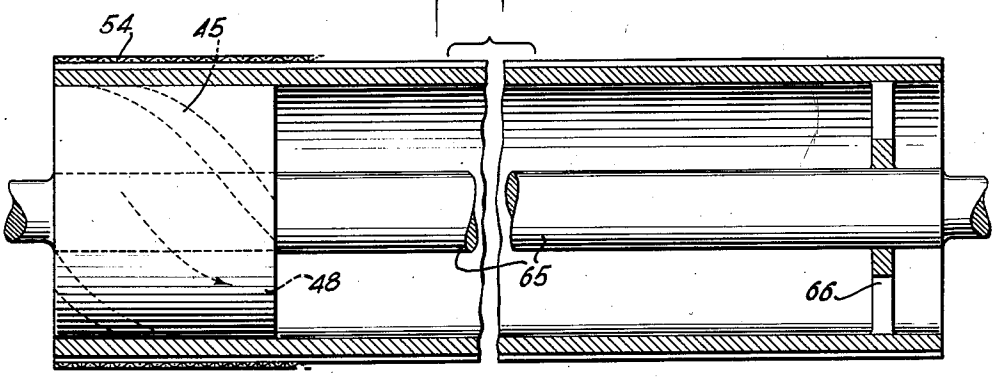


Fig. 3.

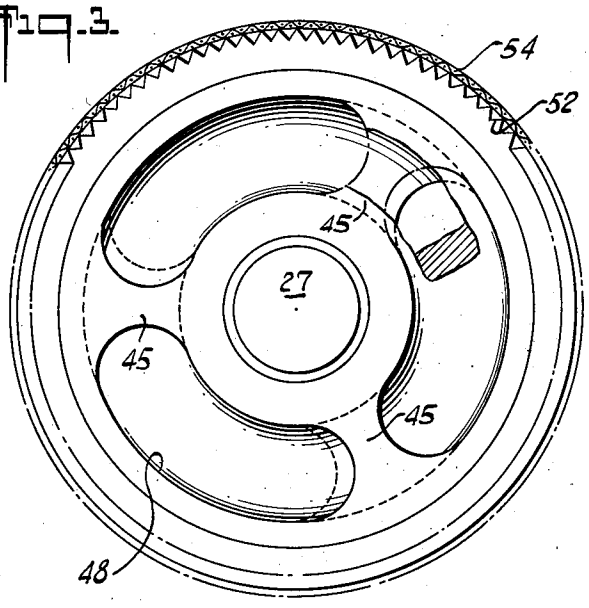


Fig. 6.

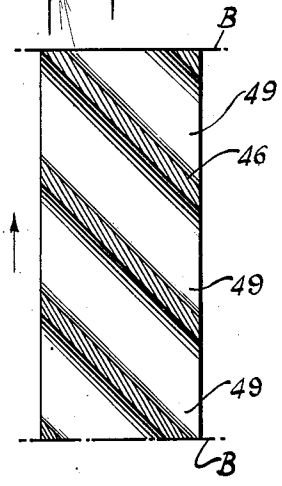
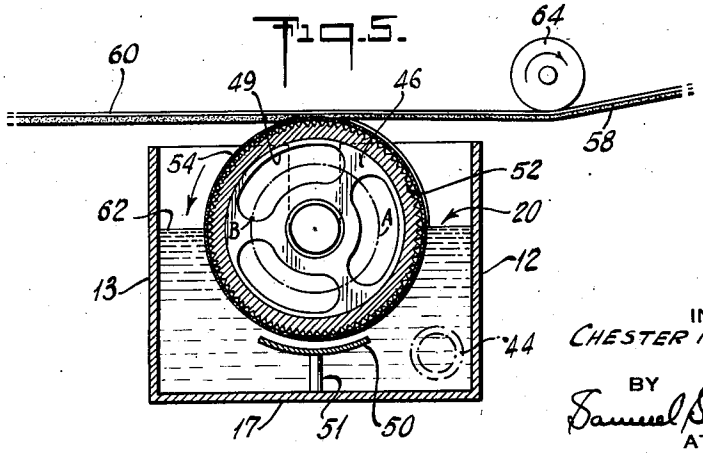


Fig. 5.



INVENTOR
CHESTER R. MACDONALD.

BY
Samuel Stearns
ATTORNEY

Patented Dec. 23, 1952 2,622,313

UNITED STATES PATENT OFFICE

2,622,313

APPARATUS FOR APPLYING AN AQUEOUS BITUMINOUS EMULSION TO A FIBROUS WEB

Chester Rice MacDonald, Ramsey, N. J., assignor to The Patent and Licensing Corporation, New York, N. Y., a corporation of Massachusetts

Application December 4, 1948, Serial No. 63,486

1 Claim. (Cl. 29—114)

1

This invention relates to improvements in apparatus for making waterproofed multi-ply paper and is particularly concerned with improvements in a device for applying a film of an aqueous bituminous emulsion to a freshly formed fibrous web.

Waterproofed multi-ply paper or paper board, such as boxboard, is manufactured by forming a plurality of fibrous plies on a cylinder type paper-making machine and applying a film of emulsified bitumen between selected plies of the sheet simultaneously with the formation thereof. The waterproofing film is commonly applied by an emulsion applicator unit interposed between two of the cylinder moulds of the paper making machine. This type of process is described, for example, in U. S. Patent 1,616,901, dated February 8, 1927. Emulsion applicator units which are used for this purpose comprise, essentially, a screen-covered roll which continuously revolves in a body of bituminous emulsion maintained in a suitable trough. A film of the emulsified bitumen is picked up by the screen on the roll and is transferred to the lower surface of a wet fibrous ply as it passes over the applicator roll. Fresh supplies of emulsion of the requisite consistency are continuously introduced into the trough to replace the emulsion taken up by the roll.

In applicator units commonly employed, there is a tendency for localized changes in the concentration of bitumen in the emulsion to occur, owing to lack of adequate means for maintaining the homogeneity of the emulsion throughout the trough, and unequal distribution of the bitumen in the trough results. This, of course, leads to unequal distribution of bitumen on the screen of the roll and subsequently in the film applied to the fibrous web.

Attempts to overcome this condition have involved somewhat elaborate systems of circulation wherein the emulsion is pumped out of one end of the trough and reintroduced at the other end. This approach to the problem is somewhat cumbersome, is not altogether satisfactory and may adversely affect the emulsion.

It is the principal object of this invention to provide means for maintaining circulation of bituminous emulsion in an emulsion applicator unit which does not have the aforesaid disadvantages.

It is a further object of the invention to provide an emulsion applicator unit for use in the manufacture of waterproofed multi-ply paper wherein circulation of emulsion in the unit is effected without the use of exteriorly positioned circulating means.

2

A still further object of the invention is to provide an improved emulsion applicator roll.

In accordance with the invention I provide an emulsion applicator roll which is hollow throughout substantially its entire length, and has, at least at one of its ends, a closure section provided with ducts or passageways extending obliquely through the closure section and communicating with the interior of the roll. These inclined ducts exert a pumping action upon the emulsion as the applicator roll revolves and propel the emulsion through the interior of the roll and thereby maintain the emulsion in constant and effective circulation in the trough in which the roll is mounted.

Other advantages and features of the invention will be apparent from the detailed description which follows and from the accompanying drawings in which:

Fig. 1 is a plan view of an emulsion applicator roll embodying the invention.

Fig. 2 is a view in section of the applicator roll shown in Fig. 1.

Fig. 3 is an enlarged end view of the roll shown in Fig. 2.

Fig. 4 is a view in section of a modified form of the roll shown in Fig. 1.

Fig. 5 is a sectional view of the applicator unit showing the relationship of the emulsion applicator roll to the blanket of the paper making machine and

Fig. 6 is a developed view taken along the line A through the roll shown in Fig. 5, and cut along the line B.

Referring to the drawings, the numeral 10 designates generally the rectangular vat of the emulsion applicator unit, formed by side walls 12 and 13, end walls 15 and 16 and a bottom 17. A trough 20, adapted to contain the emulsified bitumen, is formed within vat 10 by spaced transverse partition walls 22 and 23, secured as by welding to side walls 12 and 13 and bottom 17. A cylindrical applicator roll 25, provided at each end with stub shafts 27 and 28, is longitudinally mounted in trough 20 between partition walls 22 and 23. The shaft 27 passes through aligned recesses in end wall 15 and partition wall 22, respectively, and is supported in a bearing 29 secured as by bolting to end wall 15. Shaft 28 passes through recesses in partition wall 23 and end wall 16, respectively, and is supported in a bearing 30 secured to end wall 16. A liquid-tight gland 31 is provided on shaft 27 adjacent partition wall 22 to prevent escape of emulsion from trough 20 and a similar gland 32 is mounted on shaft 28, adjacent partition wall 23. Emulsion of prede-

termined consistency is continuously supplied to trough 20 through an inlet pipe 34 which passes through aligned openings in end wall 15 and partition wall 22. A sprocket wheel 39 is mounted on shaft 28 exteriorly of vat 10. Sprocket wheel 39 may be connected as by chain 40, to any suitable source of power.

Referring particularly to Fig. 2 and Fig. 5, the applicator roll 25 is hollow except for closure sections in the form of plugs 45 and 46 which are positioned in either end of the roll and in which are secured the stub shafts 27 and 28. The plugs 45 and 46 are provided with inclined ducts 48 and 49 respectively, which progress obliquely through the plugs and provide access to the interior of roll 25. In the embodiments illustrated, ducts 48 and 49 are kidney-shaped in cross-section and extend at an angle of about 45° from one end of the plug to the other. While I have found three ducts in each of the plugs 45 and 46 particularly effective, more or fewer ducts may be provided. Also, the angle of inclination of the ducts 48 and 49 may vary over a wide range. Preferably, however, the ducts 48 and 49 should be inclined at an angle between 30° and 60°.

As will be seen, particularly from Fig. 2, the ducts 48 in plug 45 are inclined in a direction opposite to that of the ducts 49 in plug 46, when viewed from the shaft ends. It will be observed, however, that the ducts are complementary, i. e. the ducts 48 when viewed from outside the roll are inclined in the same direction as ducts 49 when viewed from inside the roll. Thus, both sets of ducts propel the emulsion in the same direction.

As the roll 25 revolves in trough 20, ducts 48 and 49 exert a pumping action on the emulsion, drawing it into the interior of roll 25 at one end thereof and expelling the emulsion into the trough 20 at the other, thereby maintaining a circulation of the emulsion in the trough 20. Thus, for example, ducts 49 in plug 46 will draw emulsion into the interior of roll 25, at one end of trough 20, assuming the roll 25 rotates in a clockwise direction, as viewed from the left of Fig. 2, and ducts 48 in plug 45 will expel emulsion from the interior of roll 25 at the opposite end of the trough. On the other hand, assuming the roll 25 rotates in a counter-clockwise direction, emulsion will be drawn in through ducts 48 and expelled through ducts 49. Thus, during the operation of the emulsion applicator unit, the ducts 48 and 49 serve to circulate continuously the emulsion in trough 20 and thereby maintain the emulsion in a substantially homogeneous condition throughout trough 20, regardless of the direction of rotation of the roll 25.

An arcuate baffle 50, supported below roll 25 by legs 51 extends longitudinally of the emulsion trough 20 between partition walls 22 and 23. As the roll 25 revolves, baffle 50 effects increased agitation and mixing of the emulsion, thereby assisting in maintaining the homogeneity of the emulsion.

The outer surface of the roll 25 is formed with a series of parallel longitudinal ridges 52 over which a screen 54 is wound, the screen 54 being in contact with the roll 25 only along the apices of the ridges 52. The invention is, however, not limited to an applicator roll having a particular surface configuration. The ridges 52 provide a particularly effective method of supporting the screen 54 and at the same time permit free access of air to the underside of screen 54 and thus prevent the development of suction between the applicator roll and the wet web which passes over it during the operation of the machine.

Referring to Fig. 5, the roll 25 is shown in operative position in contact with a fibrous web 58 adhering to the underside of a blanket 60. A film of the emulsion 62, contained in trough 20, is picked up by screen 54 and transferred to web 58 upon rotation of the roll 25. A tension roll 64 maintains the web 58 in contact with roll 25.

While I have described a preferred embodiment of my invention, it will be apparent that my apparatus may take somewhat modified forms. Referring to Fig. 4, for example, the stub shafts 27 and 28 may be replaced by a continuous shaft 65 and, although somewhat less efficient circulation is attained, one of the perforated closures may be substituted by a spider 66 or other conventional support for the shaft 65.

Obviously, other modifications may be made without departing from the scope of the invention as defined in the appended claim and it is intended, therefore, that all matter contained in the foregoing description and in the drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

An applicator roll comprising an elongated hollow cylinder, closure plugs at each end of said cylinder having a plurality of ducts therethrough extending lengthwise obliquely to the axis of said cylinder in the manner of a screw thread, axial stub shafts fixed to said closure plugs and adapted for the rotation of said cylinder, a multiplicity of parallel longitudinal ridges on the outer surface of said cylinder and a screen wrapped around said cylinder outside said ridges.

CHESTER RICE MacDONALD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
436,525	Hemphill	Sept. 16, 1890
709,190	Wright	Sept. 16, 1902
825,094	Weinland	July 3, 1906
913,731	Kay	Mar. 2, 1909
944,607	Goldsmith	Dec. 28 ,1909
1,406,275	Norman	Feb. 14, 1922
1,497,196	Potdevin	June 10, 1924
1,724,137	Kirschbraun et al.	Aug. 13, 1929
1,955,442	Schwartz	Apr. 17, 1934
2,157,874	Webb	May 9, 1939
2,249,182	Sidebotham et al.	July 15, 1941
2,306,583	Yost	Dec. 29, 1942
2,352,978	Shoemaker	July 4, 1944