

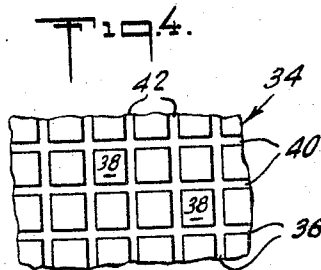
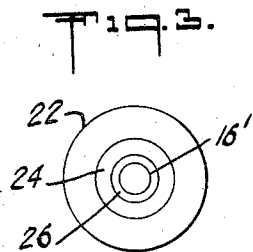
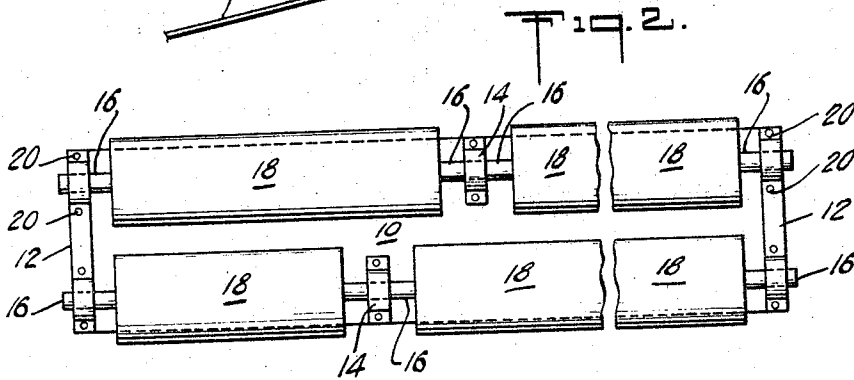
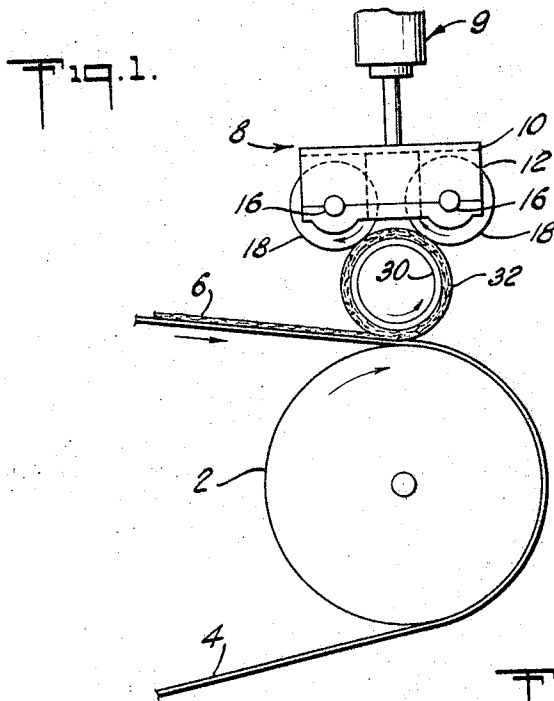
Sept. 19, 1961

J. H. SWENSEN

3,000,776

APPARATUS FOR FORMING ASBESTOS-CEMENT PIPE

Filed Oct. 15, 1956



INVENTOR
JOHN H. SWENSEN
BY *Nirgil O. Kline*
ATTORNEY

3,000,776

APPARATUS FOR FORMING ASBESTOS-CEMENT PIPE

John H. Swensen, Somerville, N.J., assignor to Johns-Manville Corporation, New York, N.Y., a corporation of New York

Filed Oct. 15, 1956, Ser. No. 616,052
12 Claims. (Cl. 162-122)

The present invention relates to the manufacture of asbestos-cement pipe and, more particularly, to a method and apparatus wherein wet asbestos-cement stock is collected upon a rotating mandrel and condensed thereon by pressure on the stock of at least about 300 lbs. per foot of pipe length.

The machines which have heretofore enjoyed perhaps the widest use in the manufacture of asbestos-cement pipe are of the type disclosed in U.S. Patent to Rembert No. 2,322,592. In such machines the pressure means for condensing the stock on the mandrel includes press rolls over which there travels an endless felt arranged to contact the stock on the mandrel and transmit thereto the pressure of the press rolls. The wear on such felts is excessive and under normal commercial operation replacement of felts can result in maintenance costs as high as \$40,000 per year per machine. In an attempt to eliminate use of the upper press section felt, press rolls of the type disclosed in U.S. Patent to Reid No. 2,177,810 have been arranged to contact the stock directly. While these rolls have been successfully used with some pipe stocks, they have been found unsatisfactory for formation of pipe with stocks including substantial quantities of slow filtering asbestos fiber. With such slow filtering formulations it has been found that the stock does not always remain on the mandrel but is in part transferred from the mandrel to the press rolls to such an extent that formation of satisfactory pipe is impossible. Thus, up to the present time in the manufacture of asbestos-cement pipe with machines of the general type referred to above, it has been necessary either to employ a felt in the press section of the machine or to restrict the use of the machine to the manufacture of pipe from the more free filtering stocks, which are usually more expensive.

The general object of the present invention is to provide a method and apparatus useful in the manufacture of asbestos-cement pipe from all grades of stocks but not requiring the use of an upper press section felt.

A more specific object of the present invention is to provide in a pipe machine of the general type referred to above, a new type of press roll arranged for direct contact with the stock on the mandrel, the roll being so constructed that normal grades of stock will not transfer thereto.

Briefly, the above objects have been attained by providing the pipe machine with a press roll (or rolls) having a peripheral portion arranged to engage the stock on the mandrel and to transmit thereto the pressure of the press section, such peripheral portion being provided with a peripheral surface which is roughened, i.e., includes a multiplicity of lands and valleys. While it is indeed surprising that the use of a roughened press roll could result in the elimination of the felt of prior pipe machines, a wholly unexpected result of the use of such rolls has been the ability, in machines including the same, to produce pipe of greater strength and density than was heretofore possible. A further wholly unexpected result of the use of roughened rolls has been the ability, with most of the normal pipe stocks, to employ uniform forming pressures throughout the pipe forming cycle, rather than being required gradually to reduce the pressure as the pipe thickness increases, as has been

2

heretofore necessary with either the felt or roll arrangements of the aforesaid Rembert and Reid patents.

The invention will be more fully understood and further objects and advantages thereof will become apparent when reference is made to the following detailed description and to the accompanying drawing, in which:

FIG. 1 is a side elevation illustrating the main parts of the forming section of the pipe machine of the present invention;

FIG. 2 is a bottom plan view of the upper press section of the apparatus of FIG. 1;

FIG. 3 is an end elevation of a press roll; and

FIG. 4 is an illustration (approximately to scale) of a portion of a roughened surface for a press roll.

Referring to the drawing, there is illustrated in FIG. 1 an anvil roll 2 over which there travels a felt 4 arranged to pick up wet-laid stock 6 from the cylinder mold or molds (not shown) of a conventional machine of the type shown in the aforesaid Rembert patent. The anvil roll 2 is a rigid element capable of withstanding pipe forming pressures without flexing, and is rotated by a conventional means (not shown) to drive the felt 4 in the direction of the arrow. Positioned above the anvil roll is an upper press section, generally designated 8, movable toward and away from the anvil roll 2 by a hydraulic or screw means 9. The upper press section includes a heavy bar 10 having depending end portions 12 and longitudinally offset pairs of depending intermediate portions 14 arranged to provide journals for the shafts 16 of two rows of press rolls 18. The depending portions 12 and 14 may each be formed of parts divided on a line bisecting shafts 16 and secured together by bolts 20 (FIG. 2). As illustrated in FIG. 2 each row of press rolls 18 includes a number of rolls at least one of which is of a different length than the others in the row and of a different length than the corresponding roll of the other row, whereby the spaces between adjacent rolls of one row are bridged by rolls of the other row. If desired, of course, one press roll extending the full width of the machine may be substituted for each row of press rolls 18, in which case a conventional arrangement of auxiliary pressure rolls bearing on such continuous press rolls will be required in order to prevent flexing of the press rolls.

The press rolls 18 may be of any conventional construction which will provide a peripheral portion suitable for directly contacting and applying pressure to pipe stock on a mandrel. One suitable press roll construction is illustrated in FIG. 3 and includes a cylindrical peripheral portion 22 secured to a cylindrical core 24 in each end of which is secured the base 26 of a stub shaft 16. In one specific embodiment of the invention the core 24 is formed of steel and the peripheral portion 22 is formed of a resilient material such as neoprene or other rubber-like material preferably of a hardness in the order of 55 durometer. It will be understood, however, that the roll need not be formed of these specific materials and need not be of composite construction. Thus, for example, the roll may be substantially solid with an integral peripheral portion, and the peripheral portion may be formed of any material having sufficient strength and resistance to wear to withstand the forces of pipe formation. Within these limitations of strength and resistance to wear, the peripheral portion of a composite roll construction may be of any thickness.

The apparatus as broadly described above is entirely conventional and is operated in a conventional manner. With the upper press section 8 in a raised position a mandrel 30 is placed between the anvil roll 2 and the press rolls 18. The upper press section is then lowered until the press rolls engage the mandrel and hold it in place on the anvil roll 2 which is then rotated in the

direction of the arrow. The pipe stock 6 on the felt 4 will adhere to the mandrel 30 rather than to the felt and will be wound upon the mandrel as the mandrel is caused to rotate by the movement of the felt. The stock 6 is collected on the mandrel and is condensed thereon by the press rolls 18 to form a pipe 32. In conventional machines the press rolls 18 are arranged to exert a pressure on the stock of at least about 300 lbs. per foot of pipe length at the beginning of the pipe forming cycle, but it has heretofore been necessary, in order to avoid distortion or destruction of pipe, to reduce this pressure gradually as the thickness of stock increases on the mandrel. It has always been the practice to employ relatively smooth surfaced press rolls 18, and with such rolls it has not been possible, because of transfer of stock from the mandrel to the rolls, to employ such rolls with all grades of pipe stock. Thus the cheaper pipe stocks, i.e., those including a greater percentage of slow filtering asbestos fiber, do not completely remain on the mandrel 30 but are partially transferred to the press rolls and hence cannot be formed into satisfactory pipe.

It will be apparent to those skilled in the art that it is not necessary to have two rows of press rolls but that one row of press rolls, or one full width press roll, may be employed in any machine otherwise provided with means for maintaining the mandrel in position. An example of such a machine is the conventional machine having two slightly spaced relatively small diameter anvil rolls providing, in association with the felt extending over them, a saddle in which the mandrel rests. It will also be understood that it is not essential that the press section be above the anvil roll, but may in some cases be to one side of or below the same.

The outstanding feature of the present invention is the provision, in an apparatus having a press roll or rolls directly contacting the stock on a mandrel, of means for assuring that the stock remains on the mandrel and is not transferred to the roll or rolls. In accordance with the invention this stock transfer preventing means which is incorporated in a press roll consists of a roughened peripheral surface for the peripheral portion of the press roll. By "roughened" it is meant that the peripheral surface which is to contact the pipe is provided with inequalities, ridges, projections, or the like, to result in a multiplicity of lands and corresponding valleys. The valleys should be of such depth, length and/or width that they are sufficiently open to fluid flow or are capable of retaining sufficient fluid that they remain, in effect, open to the atmosphere during the period of contact between the pipe stock and the adjacent lands of the press rolls whereby any "suction" which develops in the valleys when the adjacent lands move out of contact with the stock on rotation of the roll is insufficient to cause transfer of stock. The minimum satisfactory depth, length and/or width of valley may, of course, vary with different stocks and depend upon the relative size of the lands. The valleys must not be so large in relation to the size and number of lands that stock will tend to penetrate and remain in the valleys. The valleys are in the form of grooves; i.e., in the form of depressions, indentations, furrows or channels which may be either continuous or discontinuous and may be of either regular or irregular contour. If desired, the valleys may be so extended and directed as to communicate with each other and the lands may be of such a size in relation thereto that the surface resembles in effect a brush-like texture in which the lands correspond to bristles and the valleys correspond to communicating spaces around the bristles. The roughened peripheral surfaces of the press rolls may be formed in a variety of ways, as by cutting, grinding, molding, eroding, or the like, but for the sake of simplicity, it may be desirable that the roughening take the form of regular, continuous communicating grooves cut in an originally cylindrical surface.

Such a construction is illustrated in FIG. 4 of the drawing, wherein the roughened surface 34 includes valleys 36 located between lands 38, the valleys being in the form of grooves 40 extending in one direction on the surface and other grooves 42 extending at approximately right angles thereto, whereby the roughened surface includes a network of communicating grooves. Of course, the grooves 40 and 42 in FIG. 4 need not extend at right angles to each other and, in general, any angularity which will provide lands 38 of sufficient size in relation to the size of the grooves, will be suitable. In rather extended trials grooves 42 have been arranged to extend circumferentially of the roll, and the grooves 40 to extend longitudinally thereof with all grooves being .08" in width and .08" in depth, spaced 1/4" on centers. Such rolls have produced entirely satisfactory results in that they have prevented any transfer of stock from the mandrel to the rolls. Moreover, use of such rolls has permitted application of uniform pressures throughout forming cycles and has resulted in pipes of greater densities and strengths than were heretofore obtainable with comparable apparatus. If desired grooves 40 and 42 may extend around the roll on opposite helices to form diamond shaped lands 38 and, as indicated above, networks of other patterns have also been found suitable.

Having thus described my invention in rather full detail, it will be understood that these details need not be strictly adhered to but that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the subjoined claims.

What I claim is:

1. In an apparatus for forming asbestos-cement pipe, wherein wet asbestos-cement stock is collected upon a rotating mandrel and condensed thereon by pressure means exerting on the stock a pressure of at least about 300 lbs. per foot of pipe length, the improvement comprising a press roll constituting an active element of said pressure means, said roll having a peripheral portion of resiliently compressible material arranged to engage the stock on the mandrel and to transmit thereto the pressure of said pressure means, and means on said peripheral portion for preventing transfer of stock from the mandrel to the roll, said transfer preventing means comprising a peripheral surface roughened to provide therein a multiplicity of lands and corresponding valleys.
2. The apparatus of claim 1, wherein at least some of the valleys communicate with each other.
3. The apparatus of claim 1, wherein the valleys are in the form of grooves at least some of which extend around the roll.
4. The apparatus of claim 1, wherein the valleys are arranged to form a network of communicating grooves.
5. The apparatus of claim 4, wherein some of the grooves extend longitudinally of the roll and other of the grooves extend circumferentially around the roll.
6. The apparatus of claim 4, wherein some of the grooves extend helically around the roll in one direction and other of the grooves extend helically around the roll in the opposite direction.
7. The apparatus of claim 4, wherein the valleys and lands are of such a size and so arranged as to provide a brush-like texture on the peripheral surface.
8. The apparatus of claim 1, wherein said peripheral portion is composed of a rubber-like material of about 55 durometer hardness and said valleys are in the form of grooves about .08" deep and .08" wide and spaced about 1/4" on centers.
9. Apparatus for forming asbestos-cement pipe comprising, anvil means, a mandrel supported against the anvil means, a press including a roll arranged for movement into and out of engagement with the mandrel, said roll including a peripheral surface of resiliently compressible material and having a multiplicity of lands and valleys therein.

10. A method of forming asbestos-cement pipe comprising collecting wet asbestos-cement stock on a mandrel, contacting said stock with a press roll having a peripheral surface of resiliently compressible material roughened to provide therein a multiplicity of lands and corresponding valleys, applying pressure resiliently through said press roll and said multiplicity of lands on the peripheral surface thereof to condense the stock on the mandrel, the pressure so applied to said stock being at least about 300 lbs. per foot of pipe length.

11. In an apparatus for producing tubes wherein a thin layer of material is laminated on a rotating mandrel, the combination comprising a mandrel upon which the material is to be laminated, a press roll for applying pressure to said material on said mandrel, said press roll having a peripheral portion of resiliently compressible material arranged to contact the material on said mandrel, and said peripheral portion having a peripheral surface having provided therein a multiplicity of pressure elements, said pressure elements being at higher elevation than the surrounding portions of said surface and separated by intersecting valleys.

12. In an apparatus for forming asbestos-cement pipes wherein wet asbestos-cement stock is collected upon a rotating mandrel and condensed thereon by pressure means and wherein said pressure means comprises at least one press roll in contact with the wet asbestos-cement stock on the mandrel, the improvement comprising, said press roll having a peripheral portion of resiliently compressible material arranged to contact said wet asbestos-cement stock on said mandrel, and said peripheral portion having a peripheral surface having provided therein a multiplicity of pressure elements, said pressure elements being at higher elevation than the surrounding portions of said surface and separated by intersecting valleys.

References Cited in the file of this patent

UNITED STATES PATENTS

1,037,671	Seigle -----	Sept. 3, 1912
1,147,262	Parker -----	July 20, 1915
1,369,335	Goodfellow -----	Feb. 22, 1921