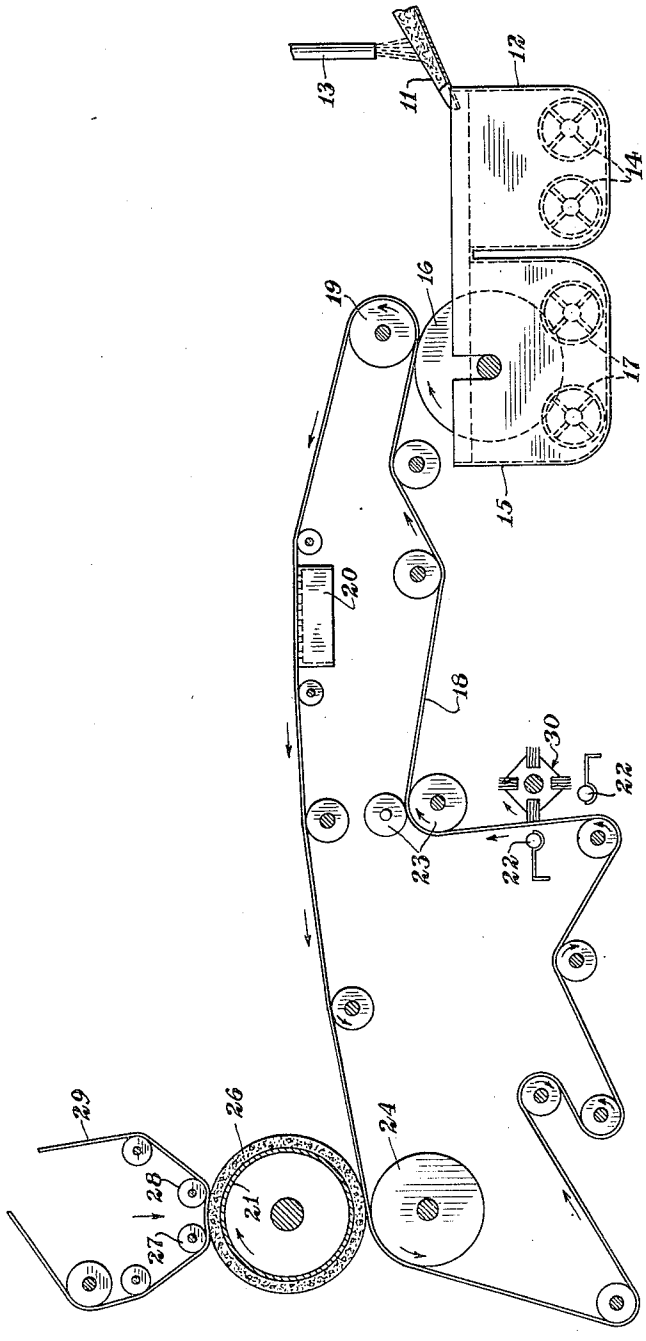
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METHOD OF MAKING ASBESTOS AND CEMENT PRODUCTS

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METHOD OF MAKING ASBESTOS AND CEMENT PRODUCTS

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This invention relates to a method of making asbestos and cement products. It relates particularly to the manufacture of compressed and densified and hardened asbestos and cement units, such as sheets or sections of pipe.

In making such products, with a so-called "wet machine", it is customary to mix asbestos fibres and Portland cement with water in a paper beater or the like, with the beater roll raised from the bed plate to avoid excessive cutting of the fibres, and then to transfer the mixture, as needed, to the wet end of the machine. Felting then proceeds.

We have now discovered that by shortening the average time of contact of the cement and fibres with water before the felting thereof, we can increase substantially the density and strength of the finished asbestos and cement unit, when other conditions of manufacture are comparable.

The invention will be illustrated in detail by reference to the making of asbestos and cement pipe and by description in connection with the attached drawing.

The figure shows, diagrammatically, a side elevation of a machine suitable for use in carrying out the method of the present invention.

The raw materials consisting largely of cement and fibres are mixed with water, say, 20 to 50 parts by weight of water to 1 of the mixture of asbestos and cement and delivered at once, by chute 11, to the leveling vat 12. In fact, the mixture of asbestos and cement is suitably delivered in dry form to the chute and flushed therefrom, by a measured amount of water from the supply 13, into the said vat.

From this point, the machine illustrated and the method are those that are used very successfully in making asbestos-cement pipe.

The vat 12 is provided with agitators 14. In this vat there is maintained a small supply of the suspended asbestos and cement mixture which passes through the vat into the cylinder mold vat 15. The cylinder mold vat contains the cylinder mold 16 and agitators 17. Water passes through the facing wire on the cylinder mold, which results in the deposition of a thin sheet of solid material on this wire. This sheet is continuously transferred from the wire to an endless belt of felt 18 at the zone of contact under the couch roll 19. The sheet on the felt then passes continuously over a suction box 20, through which a large portion of the water in the sheet is removed. The felt then passes to the press section of the machine, where the sheet is transferred from the felt to the forming mandrel 21. It is there continuously wrapped and composited under pressure with previously applied turns of the sheet, to form the tube 26. The felt, after losing the sheet to the mandrel, passes over several tension and guide rolls, past washers 22 and whipper 30, between the wringer rolls 23, and again to the couch roll 19, at which position the felt again picks up a thin sheet of the wet asbestos-cement mixture.

The press section of the machine, also, is that which is usual in a machine of this kind. It includes a heavy bottom press roll 24 on which the forming mandrel rests during the formation of the pipe or tube 26. Acting upon the pipe on the mandrel are two smaller press rolls 27 and 28 which are rotatably mounted in a frame (not shown) that is forced downwardly by the hydraulic pressure. These rolls are permitted to rise as the thickness of the pipe increases, the pressure on the rolls being controlled by means of an automatic relief valve on the hydraulic system. An endless belt 29 travels around the two top press rolls and loops over a sufficient number of guide and tension rolls to permit satisfactory manipulation and intermittent cleaning.

After the pipe 26 has been built up to the desired thickness of wall, the machine is stopped, a thin-pointed tool is inserted between the inside surface of the pipe and the surface of the forming mandrel, at each end thereof, the tool is withdrawn, the machine started, and the mandrel and pipe supported thereon are rotated several times to loosen the pipe over the entire length of the mandrel. The pressure is then released on the rolls 27 and 28, they are raised from position, the mandrel carrying the pipe is taken out of position as by being lifted from its supports at either end or by being swung on the support at one end, as a pivot, and the pipe subsequently slipped from the mandrel.

The pipe, after removal from the mandrel, is maintained in a suitable cradle and the Portland cement therein is hardened. Preferably, the raw materials include sand or other finely divided silica in the proportion of about 0.3 to 1.0 part by weight to each 1 part of Portland cement, and the pipe made as described and containing the silica is cured in steam at superatmospheric pressure, say, at 70 to 120 pounds to the square inch. Data given later herein, showing density and strength of my improved pipe, as compared to pipe made by the formerly used process, are for pipe made in each case with admixed sand and then steam-cured.

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The same method may be utilized in making flat asbestos and cement products. For this purpose, there may be used a cardboard machine, such as the one described in U. S. Patent Reissue 12,594 issued to Hatschek on January 15, 1907, in which a wet web of asbestos and Portland cement is wound upon itself on the forming roller or drum of the cardboard machine, to give a large cylinder of wall thickness approximately equal to the thickness desired in the finished asbestos and cement sheet. The cylinder of wet asbestos and cement is then severed, straightened, compressed, and hardened. The machinery is conventional and, therefore, not illustrated.

This machine is modified at the wet end to include the charging chute, the vat 12, cylinder mold vat, cylinder mold, couch roll, and cloth passing between the cylinder mold and roll being assembled essentially as in the pipe machine illustrated.

In making the pipes or sheets as described, there may be used the proportions of asbestos and cement and the kind or kinds of asbestos that are customary for the use to which the products are to be put.

Thus, it is customary to use and we may use chrysotile fibres and Portland cement in making flat sheets, say, in the proportion of 15 to 60 parts by weight of the fibres to 100 parts of total weight of the asbestos and cement.

In making the asbestos-cement pipe, it is desirable to use a relatively harsh, freely filtering fibre, such, for example, as crocidolite, Rhodesian chrysotile, Vimy Ridge (Canada) chrysotile, and/or Russian chrysotile. Such fibres may be used alone or mixed with chrysotile from Asbestos, Canada, say preferably in amount not exceeding substantially that of the selected harsh fibre. The proportion of total fibres used in the pipe is, suitably, about 15–25 parts by weight to 75–85 parts of the Portland cement.

The length, also, of fibres selected is about that which is ordinarily used for making similar products by the conventional method. For instance, there have been used satisfactorily, in making asbestos and cement pipe by the present method, fibres that in the Quebec standard screen test are rated 0—12—3—1 after opening in suitable equipment.

The fibres as supplied to the first step in the process described should be well opened.

Products made by the method described in which the asbestos and cement are supplied to the wet end of the machine promptly after being wetted are more dense and strong than similar products made in comparable manner, in which there is employed the usual method of wetting raw materials some time before they are charged to the machine. For instance, asbestos pipe made by our improved method has been found to be approximately 22% higher in flexual strength than comparable pipe made by the former method with the same raw materials, in the same proportions. These figures are for pipe of 4-inch diameter.

Once these important results have been observed a theory may be advanced to account for them, although the invention is not limited to any theory of explanation. In our improved method, there is a large decrease in the time in which the asbestos fibres and Portland cement are in contact with water before the fibres and cement are felted and the felt subsequently composited with itself upon the mandrel of the pipe machine or the drum of the cardboard machine. Thus, the average period of time that the particles of asbestos and Portland cement are wet, before being felted in our method, is estimated at 1 to 5 minutes, whereas formerly the wetting preceded the felting by a period of time estimated, for the average particles, at about 45 to 30 minutes for the pipe and cardboard machine, respectively.

It is probable that the improved density and strength of our products is due to the fact that in our process the felting proceeds before the asbestos fibres and/or Portland cement are swollen or hydrated to any large extent.

The effect of this felting practically immediately after wetting the asbestos and Portland cement is especially pronounced when the resulting felt is composited with itself into a laminated product comprising a large number of composited individually thin felts; swelling or hydrating the asbestos and cement, insofar as possible, after the individual felts have been composited, one upon another, appears to be very desirable.

The advantage of feeding new asbestos and cement to the system in fresh, substantially unhydrated condition, is pronounced also when a part of the asbestos and cement are supplied from a previously made dilute aqueous suspension of the materials, as, for example, from a save-all system. This is the case with the process and machine described. Some asbestos and cement pass with the water through the wire facing of the cylinder mold 16 and are collected, with the water, in a conventional save-all tank (not shown). This save-all material is returned to the machine, as through the pipe 13, and used in place of approximately equal amounts of the several raw materials. The proportion of the materials so supplied by the save-all system is substantial, say one-fifth to three-fourths of the total.

Another advantage of the method described is the quicker set of the asbestos and cement pipe. Thus, in a typical run, it has been found that pipe made with dry feed may be handled after an hour or so whereas 3 to 4 hours were formerly required.

The details given are for the purpose of illustration, not restriction, and that variations within the spirit of the invention are intended to be included in the scope of the appended claims.

What we claim is:

1. The method of manufacturing felted asbestos-cement products from a dilute aqueous pulp of Portland cement and asbestos fibres which comprises forming a dry mixture of asbestos fibres and Portland cement, adding to the dry mixture a sufficient quantity of water to form a dilute aqueous suspension of asbestos fibres and Portland cement containing 20–50 parts by weight of water to 1 part of asbestos and cement, forming a thin felt from the dilute suspension thus formed within ten minutes of the time of addition of the water to the dry mixture, and compositing the felt upon itself to produce a laminated composite asbestos-cement tube.

2. In a method for manufacturing felted asbestos-cement products including the steps of forming a dilute suspension of asbestos fibres and Portland cement with a relatively large quantity of water, forming a thin felt of asbestos and Portland cement from the suspension and separating during the felting operation the water content of the suspension together with a part of the asbestos and Portland cement content thereof, and returning the water and suspended

solids thus separated to the felting vat, the improvement which comprises adding to the liquid thus separated a dry mixture of asbestos fibres and Portland cement in amount sufficient to bring the solid content thereof to the required amount and forming a thin felt from the dilute suspension thus formed within ten minutes of the time of addition of the water to the dry mixture.

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