

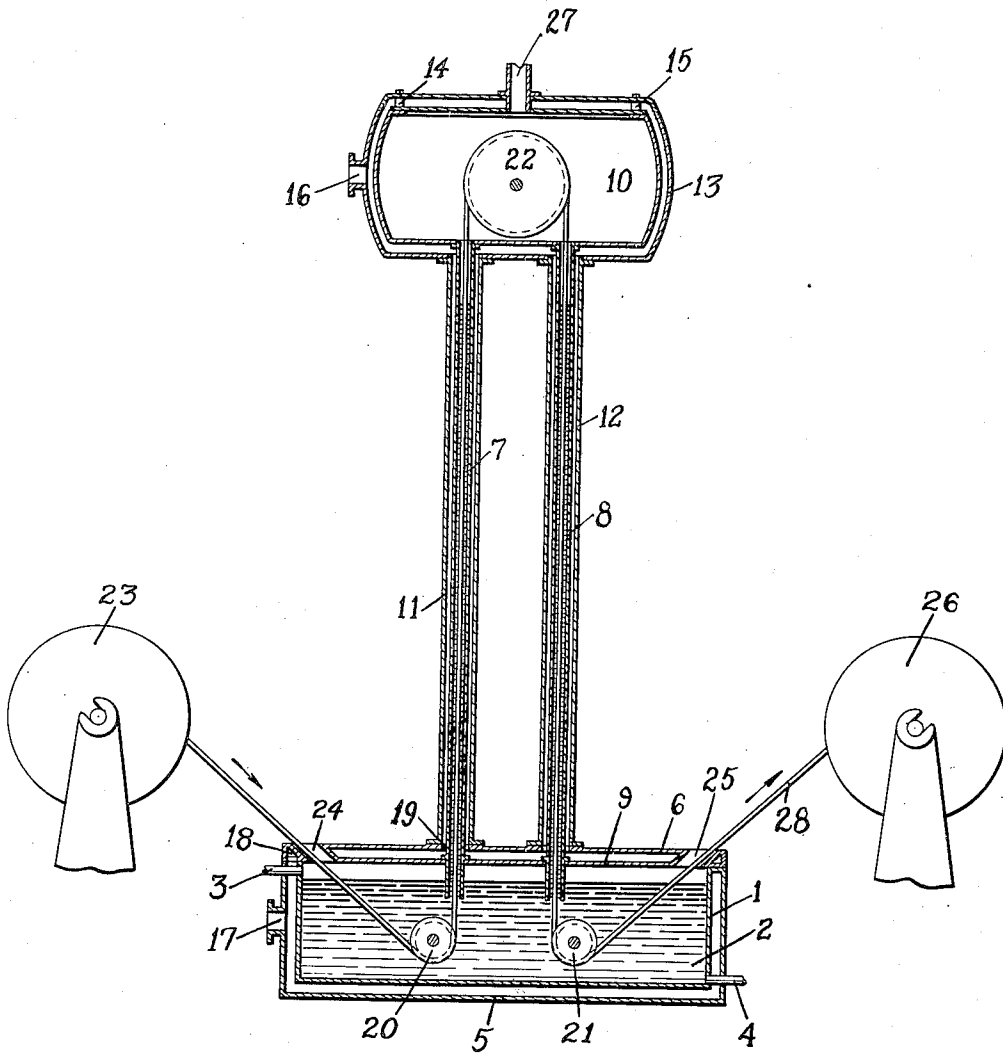
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IMPREGNATING APPARATUS

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IMPREGNATING APPARATUS

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This invention relates to new and improved apparatus for impregnating various porous materials, more particularly stranded materials such as cords, tapes, and the textile insulation of electric wires, cables and the like.

One of the objects of the invention is to provide an apparatus of the vacuum type where it is possible to hold a more perfect vacuum than has obtained in apparatus of this character as hitherto constructed.

Another object is to provide apparatus which can be operated more cheaply than it has been possible to do in similar apparatus now being utilized.

Other aims and objects of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and application of principles constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawings, wherein I have illustrated a preferred form of embodiment of my invention, the figure is a vertical sectional view of the said preferred embodiment.

Referring now to this drawing, the reference numeral 1 denotes a tank adapted to act as a receptacle for the impregnating material which is indicated at 2. The impregnating material is discharged into the tank through the pipe 3 and may be discharged from the tank as by means of the drain pipe 4.

The tank 1 is preferably steam jacketed as by means of the jackets 5 and 6. Leading upwardly from the interior of the tank 1 and from points beneath the level of the impregnating material are the conduits 7 and 8, said conduits being sealed through the upper wall of the tank, which in the present instance is formed by the lower wall 9 of the jacket 6.

The conduits 7 and 8, at their upper ends, lead into a vacuum chamber 10 and are sealed through the lower wall of said vacuum chamber. The conduits 7 and 8 are also preferably steam jacketed as by means of the surrounding conduits 11 and 12 which lead, at their lower ends, from the steam jacket 6, said

conduits at their upper end leading into the steam space provided by the jacket 13. The vacuum chamber 10 is suspended as at 14 and 15 from the upper wall of the steam jacket 13. Steam is delivered into the steam jacket 13 as by means of the conduit 16 and may be discharged from the steam jacket 5 as by means of the discharge conduit 17. It will be noted that the spaces within the steam jackets for the tank 1, the conduits 7 and 8 and the vacuum chamber 10 are interconnected, passageways 18 and 19 being provided between the jackets 5 and 6, respectively, and the latter jacket and the conduits 11 and 12.

Suitably journaled within the tank 1, beneath the normal level of the surface of the impregnating material 2 are the sheaves 20 and 21, and also journaled in the vacuum chamber 10 is the sheave 22.

The stock to be impregnated which, as above indicated, may be cord, tape, insulated electric wire, or the like, is delivered from the spool 23 through the passageway 24 provided in the wall of the steam jacket for the tank 1 whence it passes over the sheave 20 upwardly through the conduit 7 over the sheave 22, thence downwardly through the conduit 8 over the sheave 21 whence it passes outwardly through the passageway 25, to be rolled upon the spool 26.

At this point it may be noted that the sheaves 20, 21 and 22 are so located relatively to the conduits 7 and 8 that the material being treated will pass through said conduits along the central axes thereof so as not to come in contact with the inner walls of the conduits.

It may be also noted that vacuum chamber 10 will be located above the normal level of the impregnating material within the tank 1 at such a height that the atmospheric pressure within the tank 1 will not force the impregnating material into the vacuum chamber 10 no matter what degree of vacuum may be produced within said vacuum chamber. This height in practice will be, of course, under thirty-three feet, as that would be the approximate theoretical height to which any material as heavy as water could be forced upwardly in the conduits 7 and 8, assuming that a perfect vacuum could be main-

tained within the vacuum chamber 10. Most liquid impregnating materials are heavier than water.

The suction for producing the vacuum is applied through the suction pipe 27 connected to a suitable suction pump (not shown).

It is intended that the parts shall be so proportioned that the columns of impregnating material will rise in each of the conduits 7 and 8 due to the sub-atmospheric pressure produced in vacuum chamber and that the material being treated will pass upwardly through the column in the conduit 7 and downwardly through the column in the conduit 8.

Having thus described the construction of this preferred embodiment of my invention, the operation thereof, which should be largely obvious, is substantially as follows:

As already described, the material 28 being treated passes through the bath of impregnating material within the tank 1, whence it passes upwardly through the conduit 7 over the sheave 22, thence downwardly through the conduit 8 when it again passes through the bath of impregnating material within the tank 1 and then passes outwardly through the passageway 25.

The material being treated will therefore be subjected to gradually increasing sub-atmospheric pressure as it passes upwardly through the conduit 7, the object of which is to remove as much air as possible from the material being treated. When said material reaches the vacuum chamber 10 it is subjected to the maximum degree of sub-atmospheric pressure. As the material passes downwardly through the conduit 8 it is subjected to gradually increasing atmospheric pressure, the object being to force the heated liquid impregnating material into the interstices of said material which have been vacated by the air removed by the sub-atmospheric pressure produced within the apparatus.

It will accordingly be seen that I have provided an apparatus which is substantially continuous, which may be carried on in an economical manner and in which a maximum vacuum may be maintained, the only limitation on the height of the vacuum depending upon the degree of perfection of the pumping apparatus employed to create the sub-atmospheric pressure within the apparatus.

Due to the fact that the steam jacket of the apparatus always keeps the level of the columns of the impregnating material within the conduits 7 and 8 at a substantially uniform height, there is no danger of the material being treated carrying impregnating material from the column within the conduit 7 and discharging the latter into the column within the conduit 8, whereby that column

would be built up so as to overflow into the vacuum chamber.

As many changes could be made in this construction without departing from the scope of the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative only and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In apparatus of the class described, in combination, a receptacle for impregnating material, a vacuum chamber located above said receptacle, a pair of conduits connecting said receptacle with said vacuum chamber and means for conducting the material to be impregnated through the impregnating material in said receptacle, thence through one of said conduits to said vacuum chamber, then through the other of said conduits to said receptacle, and thence from said receptacle.

2. In apparatus of the class described, in combination, a receptacle for containing impregnating material, a pair of conduits extending upwardly from said receptacle from points beneath the surface of the impregnating material therein, a vacuum chamber connected with the upper ends of said conduits and means whereby a source of suction may be applied to the vacuum chamber.

3. In apparatus of the class described, in combination, a receptacle for holding impregnating material, a pair of conduits extending upwardly from said receptacle from points beneath the surface of said impregnating material, a vacuum chamber connected with the upper ends of said conduits, the length of said conduits being greater than any height to which liquid impregnating material could be lifted by a sub-atmospheric pressure and means for subjecting said vacuum chamber to a source of suction whereby to raise columns of impregnating material within said conduits, and means for conducting material to be impregnated through the impregnating material in said receptacle and in said conduits.

4. In apparatus of the class described, in combination, a receptacle for liquid impregnating material, a vacuum chamber located above the liquid of the impregnating material in said receptacle a distance greater than the liquid impregnating material can be lifted by any degree of sub-atmospheric pressure; a pair of conduits leading from said receptacle from a point beneath the surface of the liquid therein and extending vertically and having a sealed connection with said vacuum chamber, and means whereby a source of sub-atmospheric pressure may be applied to said vacuum chamber.

5. In apparatus of the class described, in

combination, a receptacle for holding liquid impregnating material, a vacuum chamber located above said receptacle a distance greater than any liquid impregnating material can be raised by sub-atmospheric pressure, a pair of conduits leading from said receptacle from points beneath the surface of the liquid impregnating material therein and extending upwardly to said vacuum chamber, said conduits having a sealed connection with said vacuum chamber, means for applying a source of sub-atmospheric pressure to said vacuum chamber whereby the liquid impregnating material will be raised into said conduits, and means for heating said receptacle, said conduits and said vacuum chamber.

6. In apparatus of the class described, in combination, a tank for holding liquid impregnating material, a vacuum chamber located above said tank at a vertical height therefrom greater than liquid impregnating material can be raised by sub-atmospheric pressure, a pair of conduits leading from said tank at points beneath the surface of the liquid impregnating material therein, said tank being open to the atmosphere, the upper ends of said conduits having a sealed connection with the vacuum chamber, means whereby a source of sub-atmospheric pressure may be applied to the vacuum chamber, means for guiding the material to be impregnated beneath the surface of the impregnating material in the tank, thence upwardly through one of said conduits into said vacuum chamber, thence downwardly through the other of said conduits beneath the surface of the impregnating material within the tank and then outwardly from said tank.

7. In apparatus of the class described, in combination, a tank for holding liquid impregnating material, a vacuum chamber located above said tank at a vertical height therefrom greater than liquid impregnating material can be raised by sub-atmospheric pressure, a pair of conduits leading from said tank at points beneath the surface of the liquid impregnating material therein, said tank being open to the atmosphere, the upper ends of said conduits having a sealed connection with the vacuum chamber, means whereby a source of sub-atmospheric pressure may be applied to the vacuum chamber, means for guiding the material to be impregnated beneath the surface of the impregnating material in the tank, thence upwardly through one of said conduits into said vacuum chamber, thence downwardly through the other of said conduits beneath the surface of the impregnating material within the tank and then outwardly from said tank and means for applying heat to said tank, said conduits and said vacuum chamber.

In testimony whereof, I affix hereunto my signature.

CARL KOOPS.