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PROCESSES FOR THE SUPPLY OF MOISTURE TO PRODUCTS OF FIBROUS SUBSTANCES WITH A BITUMINOUS COATING

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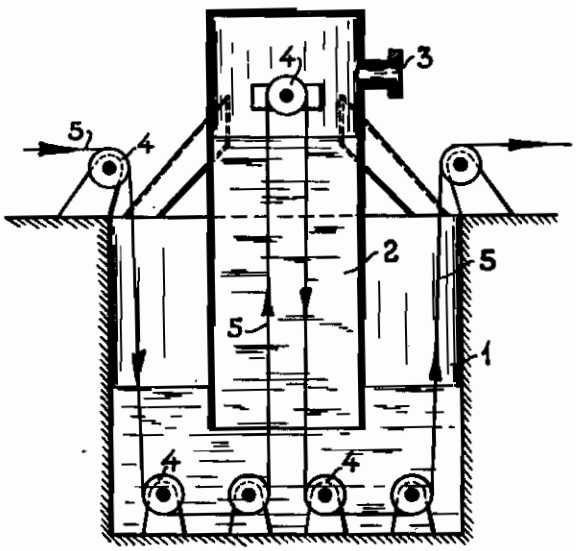

Fig. 1.

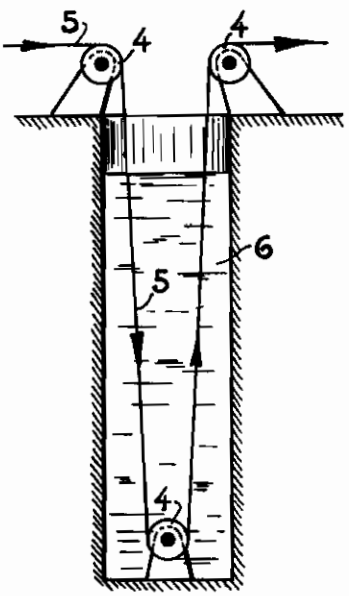

Fig. 2.

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PROCESSES FOR THE SUPPLY OF MOISTURE TO PRODUCTS OF FIBROUS SUBSTANCES WITH A BITUMINOUS COATING

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The present invention relates to a process for the supply of moisture to products of fibrous substances with a bituminous coating. The invention has for its objects, first to effect this supply of moisture to such an extent that the product will not subsequently be subject to volume changes owing to the absorption of moisture, second, to render possible the addition of moisture during the manufacture of the product at the same speed at which the product is manufactured, and third, to render possible the supply of moisture by the use of unheated water.

Products of fibrous substances with bituminous coating, for instance roofing pasteboards or felts, insulating pasteboards and similar kinds of pasteboard, insulating jute etc. are known to be manufactured by impregnating the raw material with bituminous substances, at temperatures higher than 100° C. At the same time as the impregnation takes place, a portion of the natural moisture present in the fibres of the raw material will be driven out, and thus a decrease in volume is effected, in such a manner that the impregnated product will occupy a smaller volume than the non-impregnated raw material.

In spite of the surface coating, the fibres of the impregnated product will gradually again absorb their natural content of humidity, corresponding to the conditions of humidity under which the product is used. Therefore the volume of the impregnated product will increase again. The increase in thickness is without importance to the use of the product, while on the contrary the longitudinal and transversal expansion will become plainly apparent by the formation of cross-wise folds in the impregnated product fixed in position at the place of use.

It has therefore been attempted in various manners to add moisture to such impregnated products corresponding to the contents of moisture of the raw product. For instance, watering with hot water of the raw bitumen-impregnated felt has been used, before the surface coating is applied thereto. This method involves the drawback that the bitumen surfaces coatings may easily become filled with small water or vapour bubbles which especially in the case of roofing felts or pasteboards, when influenced by the heat of the sun, will form further blisters and will loosen the coatings whereby the appearance of the roofing will become spoiled, and the length of life of the pasteboard will become reduced.

It has also been attempted to increase the humidity in the finished bitumen-impregnated fibrous substances by depositing rolls of the same in lukewarm water for a longer period, all the way up to several days. Owing to the long time required for supplying the moisture, this method is not very satisfactory from a manufacturer's point of view. The hotter the water used is, the quicker the supply of moisture will be effected, but it is impossible to reduce the time of treatment to less than 3 or 4 hours, because water with temperatures essentially higher than 40° C. cannot be employed, as any sprinkling materials held in the bituminous coatings will become loosened altogether too much at higher temperatures, and similarly the bituminous coating itself will melt, and thus the appearance of the product will be spoiled.

In order to prevent an undesired formation of folds, it has also been attempted to use an impregnation with highly fluid oil. Such a treatment, however, does not lead to the desired result, because water alone, as is well known, can cause the fibres to swell, wherefore such fibres even if they are impregnated with oil may absorb water and hereby increase their volume.

It has finally been proposed during the manufacture to direct the product through rooms that are filled with water vapour, but the quantity of moisture absorbed in this manner is altogether too small to prevent a later absorption of water.

The present invention has also for its object to remedy these various drawbacks, and this and the first named objects are attained in that the air contained in the product is exposed to a change of volume in the presence of moisture. Such a change in volume may either consist in an expansion or a compression of the air contained in the impregnated product. If the impregnated product is exposed to a reduced pressure, in such a manner that the enclosed air can expand, a portion of the air will escape from the product. When subsequently the product is again exposed to a higher pressure, maybe atmospheric pressure, in the presence of moisture, the latter will penetrate into the product, as in the bituminous surfaces there will always be found quite small, maybe microscopic, holes by way of which the moisture will rapidly enter and wherefrom it will distribute itself in the fibres of the product. This forced entrance of moisture will take place during the course of a quite short time, amounting only to a few minutes or less, even if unheated water be used, which is of essential importance to the present processs, as thus any danger of softening or fusing of the bituminous coating of the product will be avoided.

The product may also be subjected to an in-

creased pressure, and thus the contents of air will become compressed at the start, at the same time as moisture penetrates into the interior of the product, and distributes itself in the fibres of the substance. When subsequently the product is again exposed to a lower pressure, maybe the atmospheric pressure, then the previously compressed air will again expand, but the moisture absorbed in the fibres will remain in the interior of the product. The process may be carried out by the use of water and by the use of steam as a source of moisture. Finally, the product may also be exposed to several consecutive treatments, and a partial vacuum as well as an excess pressure may be used.

A vacuum of 4 lbs per square inch to 10 lbs per square inch or an excess pressure of 8 to 20 lbs per square inch will in most cases be suitable.

The drawing shows in outline two apparatuses for carrying out the process.

Fig. 1 shows one apparatus in vertical section, viewed from the side, and

Fig. 2 in the same manner the other apparatus.

The apparatus shown in Fig. 1 consists mainly of a vessel 1, into which a bell 2 dips down. The apparatus is partially filled with water which is maintained raised in the bell 2 by pumping by way of a nipple 3. The apparatus has guide and controlling rolls 4 along which a length of bituminous roofing pasteboard 5 is directed, in such a manner that it is directed down into the water in the vessel 1, and is then directed up into the bell 2, and subsequently again out from the vessel 1, as shown in Fig. 1. During its passage through the apparatus, at the speed of manufacture, the roofing felt is thus directed from the vessel 1 up into the bell 2, while the felt is thus exposed to a rising vacuum. During this upward motion, a portion of the air contained in the roofing felt is sucked out and removed by way of the nipple 3. During the subsequent downward motion, the roofing felt is exposed to an increasing pressure, and thus the remaining air will again become compressed, and moisture will be forced in, at a high speed.

The apparatus shown in Fig. 2 consists of a deep vessel 6 having guide rolls 4 along which the length of roofing felt 5 is directed, in such a manner that it is directed from the top of the vessel and down to the bottom of the latter, and thence again up to the top and away. The vessel 6 contains water. During the downward motion of the roofing felt the latter will be exposed to a constantly increasing pressure, and thus the air contained in the felt will become compressed, at the same time as moisture will penetrate. During the upward motion, the compressed air will again expand, and will partly escape, while the water bound in the fibres will be retained in the roofing felt.

The process may be performed in many other manners than by using the apparatuses shown here, but both apparatuses are constructed in such a manner that the supply of moisture may be performed during the manufacture of the product itself, by the use of unheated water, and thus security is attained against any injury to the surface of the product.

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