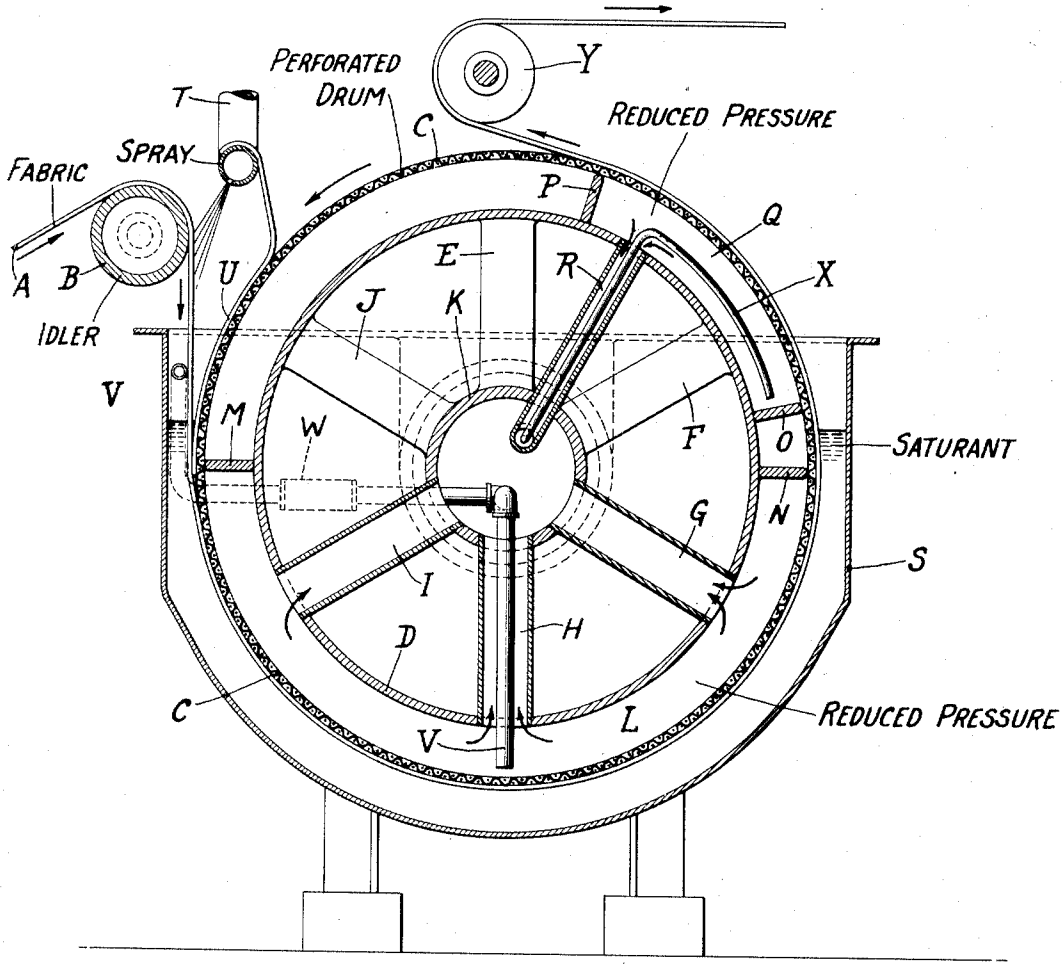
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PROCESS FOR SATURATING FABRICS

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PROCESS FOR SATURATING FABRICS

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Our invention relates to a process and apparatus for the impregnation of porous fabrics such as paper, felt, strawboard, cloth, and the like. It pertains more particularly to the production of roofing paper, artificial shingles, building-paper, and similar materials, by impregnation of porous fabrics with hot tar or asphalt, but it is generally applicable to the impregnation of porous fabrics with any saturant in fluid condition.

In the production of roofing paper or artificial shingles, the continuous impregnation process is usually employed. A roll of felt or other suitable fabric is unwound by machinery and the moving felt is passed through a bath of a fluid saturant, after which it travels out of the bath and moves in the air for a sufficient time to permit the hot fluid saturant to harden. Squeeze rolls are sometimes employed to express the excess saturant and to give any desired surface appearance to the product.

Our invention is particularly useful in the continuous type of saturation process described, although it is also applicable to a batch process, in which only one piece of fabric is treated at a time.

One of the advantages of our process is the production of an impregnated fabric of uniform and controlled quality. Any excess quantity of saturant applied during the impregnation will be removed by our process and may be returned to the impregnating bath. Other advantages will become apparent.

In describing our invention, reference will be made to the appended drawing showing in cross-section an apparatus in which our process may be practised.

In the drawing, (A) indicates a sheet of fabric undergoing treatment, and (B) is an idler roll, preferably heated, over which it passes. After passing over the idler roll (B) the fabric (A) moves downwardly, as indicated by arrows, and contacts with the revolving drum (C). The drum (C) shown in the drawing has a perforated or foraminous cylindrical surface, the ends of which are closed by solid plates to which may be fixed suitable mechanism for rotating the drum, such as a hollow shaft to which a driving gear is keyed (not shown in the cross-sectional drawing.) The perforated or foraminous surface of the drum (C) is preferably of such width that the fabric (A) will completely cover the perforations. A stationary drum (B) is concentrically positioned within the drum (C) and is supported by means of radial spokes (E), (F), (G), (H), (I), (J) from a hollow shaft (K) of smaller diameter than the inside diameter of the shafts supporting the ends of the drum (C). The ends of the hollow shaft (K) may pass through the hollow shafts supporting the ends of the rotary drum (C).

The radial spokes (G), (H) and (I) are hollow and serve as connecting passages between the space within the shaft (K) and the lower portion (L) of the annular space between the cylindrical surfaces of the drums (C) and (D). The plates (M) and (N) are fixed to the cylindrical surface of the stationary drum (D) and fit closely at their outer edges against the inner surface of the drum (C). These baffle plates (M) and (N) are connected by end plates having their inner edges fixed to the cylindrical surface of the drum (D) and extending across the annular space between the stationary and movable drums. The end plates (which are not shown in the cross-sectional drawing) and the plates (M) and (N) form the boundaries of the annular space or chamber (L) connected by the hollow radial spokes to the shaft (K), and these plates may be positioned to make the chamber (L) of suitable volume and location. Plates (O) and (P), similar to the plates (M) and (N), are fixed to the stationary drum (D). These plates are also connected by end plates similar to those connecting the plates (M) and (N) and form a closed chamber (Q). In each of these chambers (L) and (Q) the upper surface is constantly changing as the drum (C) rotates.

The concentric drums (C) and (D) are positioned in a tank (S) which is filled with a saturant to a point preferably between the plates (O) and (N). Suitable stuffing boxes may be used where the shafts supporting the

tank (C) pass through the ends of the tank (S).

A partial vacuum may be maintained within the annular space (L) by a suction applied to the hollow shaft (K) and transmitted to this space through the hollow radial spokes (G), (H) and (I). Pressure in the chamber (Q) may be reduced by separate means, such as a pipe (R) extending through the hollow shaft (K), or if desired, the chamber (Q) may be connected to the hollow shaft (K) by hollow spokes, as described in connection with the chamber (L). By using a separate means, such as the pipe (R), the chamber (Q) may be maintained at a lower or higher degree of vacuum than the chamber (L).

As the fabric (A) leaves the idler roll (B) its top (drum-side) surface is coated with a liquid, which may be the same as the saturant in the tank (S), at a rate sufficient to effectively cover the surface of the fabric which later is to contact with the surface of the drum (C). This liquid may be applied by a spray from a pipe (T). An apron (U), extending downwardly to a point below the center line of the drum (C) and adapted to rest upon that drum, may be suspended from the pipe (T) to prevent the sprayed saturant from passing into the drum (C) before contacting with the fabric (A), or before passing the baffle (M).

The liquid sprayed upon the drum-side of the fabric will serve to render the fabric pliable and causes it to adjust closely to the surface of the drum (C). The fabric thus coated travels at the same speed as the periphery of the drum (C) and the saturant forms a complete seal between that portion of the perforated surface of the drum (C) which is opposite the space (L), and the adjacent surface of the fabric (A).

As the fabric (A), coated upon its drum-side passes through the saturant in the tank (S), the saturant is forced into and through the pores of the fabric by the differential pressure applied to its opposite sides. The degree of penetration may be controlled by regulating the differential pressure or by regulating the speed of rotation of the drum (C).

Any excess of saturant upon the inner side of the drum (C) may be withdrawn through a pipe (V) and may be returned to the tank (S) by means of a pump (W). The liquid level in the tank (S) may be kept constant by adjusting the quantity of liquid added through the spray-pipe (T) or by adding saturant directly to the tank (S).

After passing through the liquid in the tank (S), the fabric (A) moves with the drum (C) over the chamber (Q), where it is subjected to a degree of differential pressure sufficient to withdraw any excess of saturant deposited while passing through the liquid in the tank (S). The outer surface of the fabric may be exposed to a heated atmosphere while passing over the chamber (Q). The differential pressure to which this portion of the fabric (A) is subjected may be adjusted to provide for the degree of withdrawal which is desired. Any excess of saturant in the chamber (Q) may be withdrawn by some suitable means, such as the pipe (X). After passing over the chamber (Q), the fabric (A) is withdrawn over the idler roll (Y).

Our invention has been described with reference to an apparatus in which a partial vacuum is maintained upon one side of the fabric (A) as it passes over the chambers (L) and (Q). It is apparent that the difference in pressure applied to opposite sides of the fabric could be obtained by increasing the pressure upon the outside of the fabric rather than by reducing that upon its inside.

The advantages of our invention thus described, are believed to be obvious. In impregnating a fabric by passing it through a saturant as described above, or by exposing it to a series of sprays while subjected to a differential pressure, the fabric will contain a larger percentage of saturant than the trade requires and in almost all instances a film of the liquid will adhere to the outer surface of the fabric. If this film of liquid is not removed, the saturated fabric, upon seasoning, may stick together when wound into rolls, with a result that it will be unsuitable for the trade. Our process provides for the removal of any such excess saturant and the accurate control of the quantity of saturant in the finished product.

While we have described our process as applied to an apparatus in which the excess of saturant is removed while the fabric is in contact with the drum (C), other means may be used for accomplishing this result, such as by substituting for the chamber (Q) an additional pair of drums, similar to (C) and (D), providing separate means for submitting the fabric to a differential pressure while exposed to air, or some other suitable medium. If such a structure is used, it may be advisable to pass the fabric over heated idler rolls as it traverses the space between the revolving drums. It is apparent that many other forms of apparatus may be designed for use with our process.

Although we have described a particular embodiment of our invention in which the fabric is passed over separate chambers (L) and (Q), it is apparent that the plates (N) and (O) may be omitted to provide a continuous chamber over which the fabric passes during and after impregnation. It is also apparent that means other than the spray pipe may be used for applying liquid to the fabric (A) before contacting with the drum (C).

When our invention is employed for the purpose of saturating fabric with a bituminous material, such as tar, asphalt, or pitch,

the saturant must be used while hot, since it tends to solidify at normal temperatures. In such a case, the saturant may be readily maintained in a fluid condition by means of heat applied in any convenient manner to the pipe (T), the tank (S) or their contents. It should be noted, however, that our invention is equally applicable to the saturation of fabric at room temperature with substances that remain fluid at such temperatures.

Now having described our invention, we claim:

1. A process for impregnating fabric with a bituminous saturant, which comprises applying a liquid to one side of the fabric, supporting the coated side of the fabric upon a perforated surface, applying a saturant to the other side of said fabric, continuously subjecting the fabric to a differential pressure during the application of the saturant thereto, and further subjecting the fabric to a differential pressure after applying the saturant.

2. A process for impregnating fabric which comprises passing a web of fabric into contact with a foraminous support, moving said web of fabric while in contact with said support into and out of a bath of saturant to immerse said fabric in said saturant, applying differential pressure to the opposite sides of said fabric throughout that portion thereof which is in contact with said bath of saturant to impregnate said fabric, and applying differential pressure to said fabric while still in contact with said support and after said fabric has been moved out of contact with said bath of saturant whereby excess saturant is removed from said fabric.

3. A process for impregnating fabric which comprises passing a web of fabric into contact with a cylindrical foraminous support rotating in a bath of saturant, moving said web of fabric while in contact with said support into and out of said bath of saturant, applying suction to the side of said fabric in contact with said support throughout that portion of said fabric which is in contact with said saturant to impregnate the same, retaining said fabric in contact with said support after said fabric has been moved out of contact with said saturant, and applying suction to the side of said fabric in contact with said support subsequent to impregnation thereof to remove excess saturant therefrom while subjecting the other side of said fabric to a heated atmosphere.

4. A process for impregnating fabric with a bituminous saturant which comprises applying a liquid to one side of said fabric, passing said fabric into contact with a cylindrical foraminous support rotating in a bath of saturant, moving said web of fabric while in contact with said support into and out of said bath of bituminous saturant, applying differential pressure to the opposite sides of said fabric throughout that portion thereof which is in contact with said bath of saturant, and applying differential pressure to said fabric while still in contact with said support and after said fabric has been moved out of contact with said bath of saturant whereby excess saturant is removed from said fabric.

In testimony whereof, we have signed our names to this application this 20th day of July, 1929.

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