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(72) Inventor MICHAEL EDWARD RICHARD COLLIS



(54) AN IMPROVED CLOTH IMPREGNATING MACHINE

(71) We, VOSPER THORNYCROFT LIMITED, (formerly John I. Thornycroft & Co. Limited of Victoria Road, Woolston, Southampton, in the county of Hampshire), of Vosper House, 223 Southampton Road, Paulsgrove, Portsmouth in the county of Hampshire, a British company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a machine for continuously impregnating a web of cloth, for example glass cloth, woven rovings or the like, with a resin mixture, and has for its object to minimise cleaning time and wastage of materials.

According to the invention, a machine for continuously impregnating a web of cloth with a resin mixture comprises at least one stationary applicator arranged to apply the mixture to one side of the web and a plurality of rollers located on, and contacting, the other side thereof to work the mixture into and through the cloth, wherein the web is advanced along a bed provided on the same side of the web as the applicator, the applicator having adjacent but separated ducts for applying separate components of the mixture.

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings of which:—

Fig. 1 is a side elevation of a cloth impregnating machine; and

Fig. 2 is a plan view thereof.

Referring now to the drawings, a cloth impregnating machine comprises a frame 10 having secured to it a horizontal bed 11 the surface of which is slightly undulating. At the input end of the bed 11, there is provided a spindle 13 carrying a roll 12 of glass cloth, the end portions of said spindle being supported on rollers 14 which are rotatably mounted on the frame 10. A web 15 of glass cloth is drawn from the roll 12 and

passes first between two guide rollers 16 of small diameter which are rotatably mounted on the frame 10, next between a plain idling roller 17 and the surface of the bed 11, and then between a circumferentially grooved idling roller 18 and said surface. The rollers 17, 18 are journaled at their ends in bearings secured to the bed 11, the roller 18 being positioned at the lowest point of one of the undulations in said bed. After passing between the bed 11 and the roller 18, the web 15 passes over a pair of transverse slots 19, 20 in the bed 11 which are positioned at the highest point of one of the undulations therein and beneath a plate 21 extending transversely across the bed 11 over said slots. Each end of the plate 21 is connected to the bed 11 by spring-loaded clamps 22 which urge said plate towards the bed. As the web 15 of glass cloth advances towards the output end of the bed 11 from beneath the plate 21, it passes between a circumferentially grooved power driven roller 23 and the bed 11, over a further pair of transverse slots 24, 25 in the bed 11 and beneath a plate 26 which extends transversely across the bed 11 over said slots and is connected at its ends by spring-loaded clamps 27 to said bed, and finally between a circumferentially grooved power driven roller 28 and the bed 11, after which said web proceeds to the output end of said bed. Each of the rollers 23, 28 is positioned at the lowest point of one of the undulations in the bed 11, and the slots 24, 25 are positioned at the highest point of one of the undulations therein. At the output end of the bed 11, the web 15 of impregnated glass cloth passes around a power driven plain roller 29 of large diameter, doubles back beneath the output end of said bed and then passes around a longitudinally grooved delivery roller 30 from which it is dispensed vertically downwards. Two resin tanks 31, 32 (see Fig. 2) containing respectively an accelerated resin and a catalysed resin are each suspended from the frame 10 by a spring balance 33. Said tanks are connected

[Price 25p]

by pipes 34 to a pump 35 which in turn is connected by pipes 36 to the slots 19, 20, 24 and 25 in the bed 11. The pump 35 is of the type having a rotor (not shown) which acts upon four flexible pipes 37 to progressively deform said pipes as said rotor rotates, thus causing resin to be pumped through them. The pipe 34 from the tank 31 is connected via two of the flexible pipes 37 to the pipes 36 connected to the slots 19 and 24 in the bed 11, and the pipe 34 from the tank 32 is connected via the two other pipes 37 to the pipes 36 connected to the slots 20 and 25 in the bed 11. The rotor of the pump 35 is driven by an electric motor (not shown) via a speed transmission unit (not shown) which is infinitely variable between predetermined limits and is controlled by a hand lever 38 at the output end of the bed 11. An electric motor 39 is drivably connected via another speed transmission unit (not shown), which is infinitely variable between predetermined limits and is controlled by a hand lever 40 at the output end of the bed 11, a torque limiting device (not shown) and a drive train comprising a chain drive 41, a right angled gear drive unit 42, a shaft 43 and a right angled gear drive unit 44 to the roller 29. The rollers 23, 28 are drivably connected by a drive train (not shown) to the electric motor 39 via the infinitely variable speed transmission unit and the torque limiting device associated with said motor. The respective speed transmission ratios of the drive train associated with the roller 29 and the drive train associated with the rollers 23, 28 are such that the peripheral speeds of all three of said rollers are equal. One end of the roller 17 is drivably connected to a gear unit 45 mounted on the bed 11. Said unit is connected by a flexible driving cable 46 to a meter 47 which records the length of glass cloth dispensed from the roll 12 and is located adjacent the delivery end of the bed 11. The delivery roller 30 is pivotable in an arc about bearings 48 by means of a lifting bar 49 in order to vary the angle at which the web 15 of glass cloth leaves the roller 29 and passes to the delivery roller 30.

In operation, the electric motor 39 drives the rollers 23, 28 and 29 via the associated infinitely variable speed transmission unit and torque limiting device, and said rollers draw the web 15 of glass cloth from the roll 12 and advance it along the bed 11 of the machine at a speed which can be varied by changing the ratio of said transmission unit by means of the hand lever 40. The lower surface of the web 15, adjacent the bed 11, is supplied with accelerated resin from the slots 19 and 24 and with catalysed resin from the slots 20 and 25. The delivery rate of accelerated resin and catalysed resin from the slots 19, 20, 24 and 25 is

dependent upon the speed of rotation of the pump 35 which can be varied by changing the ratio of the infinitely variable speed transmission unit, via which said pump is driven, by means of the hand lever 38. The ratio of the delivery rate of accelerated resin relative to the delivery rate of catalysed resin is, however, fixed as this controls the gelatinization time of the resin mixture. The circumferentially grooved rollers 23, 28 not only assist in advancing the web 15 of glass cloth along the bed 11, but also work the resin mixture into and through said web without causing the mixture to build up behind said rollers which could occur if plain rollers were used. The delivery rate of the resin mixture and the speed of advance of the web 15 of glass cloth along the bed 11 are so inter-related by the operator that the resin mixture tends not to reach the upper surface of the web 15 until said web reaches the roller 29 at the output end of the bed 11. Any of the resin mixture which drips from the output end of the bed 11, or from the web 15 of glass cloth as it passes around the roller 29, falls on to said web where it is doubled back beneath the output end of the bed before passing around the delivery roller 30 from which it is dispensed vertically downwards. The spring balances 33 are used to indicate the amount of resin remaining in the tanks 31, 32 and the meter 47 indicates the length of resin impregnated glass cloth dispensed by the machine.

When a thicker web of glass cloth is to be impregnated with resin, additional driven rollers and pairs of slots are provided on the bed 11 of the machine between the roller 28 and the roller 29.

An additional roll 12 of glass cloth is mounted on the frame 10 in the position shown in broken lines in Fig. 1 of the drawings, to facilitate continuity of production.

WHAT WE CLAIM IS:—

1. A machine for continuously impregnating a web of cloth with a resin mixture comprising at least one stationary applicator arranged to apply the mixture to one side of the web and a plurality of rollers located on, and contacting, the other side thereof to work the mixture into and through the cloth, wherein the web is advanced along a bed provided on the same side of the web as the applicator, the applicator having adjacent but separated ducts for applying separate components of the mixture.

2. A machine according to claim 2, wherein the bed has undulations along its length.

3. A machine according to claim 2, wherein the web is caused to double back beneath the output end of the bed.

4. A machine according to claim 2 or 3, wherein an accelerated resin and a cata-

by pipes 34 to a pump 35 which in turn is connected by pipes 36 to the slots 19, 20, 24 and 25 in the bed 11. The pump 35 is of the type having a rotor (not shown) which acts upon four flexible pipes 37 to progressively deform said pipes as said rotor rotates, thus causing resin to be pumped through them. The pipe 34 from the tank 31 is connected via two of the flexible pipes 37 to the pipes 36 connected to the slots 19 and 24 in the bed 11, and the pipe 34 from the tank 32 is connected via the two other pipes 37 to the pipes 36 connected to the slots 20 and 25 in the bed 11. The rotor of the pump 35 is driven by an electric motor (not shown) via a speed transmission unit (not shown) which is infinitely variable between predetermined limits and is controlled by a hand lever 38 at the output end of the bed 11. An electric motor 39 is drivably connected via another speed transmission unit (not shown), which is infinitely variable between predetermined limits and is controlled by a hand lever 40 at the output end of the bed 11, a torque limiting device (not shown) and a drive train comprising a chain drive 41, a right angled gear drive unit 42, a shaft 43 and a right angled gear drive unit 44 to the roller 29. The rollers 23, 28 are drivably connected by a drive train (not shown) to the electric motor 39 via the infinitely variable speed transmission unit and the torque limiting device associated with said motor. The respective speed transmission ratios of the drive train associated with the roller 29 and the drive train associated with the rollers 23, 28 are such that the peripheral speeds of all three of said rollers are equal. One end of the roller 17 is drivably connected to a gear unit 45 mounted on the bed 11. Said unit is connected by a flexible driving cable 46 to a meter 47 which records the length of glass cloth dispensed from the roll 12 and is located adjacent the delivery end of the bed 11. The delivery roller 30 is pivotable in an arc about bearings 48 by means of a lifting bar 49 in order to vary the angle at which the web 15 of glass cloth leaves the roller 29 and passes to the delivery roller 30.

In operation, the electric motor 39 drives the rollers 23, 28 and 29 via the associated infinitely variable speed transmission unit and torque limiting device, and said rollers draw the web 15 of glass cloth from the roll 12 and advance it along the bed 11 of the machine at a speed which can be varied by changing the ratio of said transmission unit by means of the hand lever 40. The lower surface of the web 15, adjacent the bed 11, is supplied with accelerated resin from the slots 19 and 24 and with catalysed resin from the slots 20 and 25. The delivery rate of accelerated resin and catalysed resin from the slots 19, 20, 24 and 25 is

dependent upon the speed of rotation of the pump 35 which can be varied by changing the ratio of the infinitely variable speed transmission unit, via which said pump is driven, by means of the hand lever 38. The ratio of the delivery rate of accelerated resin relative to the delivery rate of catalysed resin is, however, fixed as this controls the gelatinization time of the resin mixture. The circumferentially grooved rollers 23, 28 not only assist in advancing the web 15 of glass cloth along the bed 11, but also work the resin mixture into and through said web without causing the mixture to build up behind said rollers which could occur if plain rollers were used. The delivery rate of the resin mixture and the speed of advance of the web 15 of glass cloth along the bed 11 are so inter-related by the operator that the resin mixture tends not to reach the upper surface of the web 15 until said web reaches the roller 29 at the output end of the bed 11. Any of the resin mixture which drips from the output end of the bed 11, or from the web 15 of glass cloth as it passes around the roller 29, falls on to said web where it is doubled back beneath the output end of the bed before passing around the delivery roller 30 from which it is dispensed vertically downwards. The spring balances 33 are used to indicate the amount of resin remaining in the tanks 31, 32 and the meter 47 indicates the length of resin impregnated glass cloth dispensed by the machine.

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An additional roll 12 of glass cloth is mounted on the frame 10 in the position shown in broken lines in Fig. 1 of the drawings, to facilitate continuity of production.

WHAT WE CLAIM IS:—

1. A machine for continuously impregnating a web of cloth with a resin mixture comprising at least one stationary applicator arranged to apply the mixture to one side of the web and a plurality of rollers located on, and contacting, the other side thereof to work the mixture into and through the cloth, wherein the web is advanced along a bed provided on the same side of the web as the applicator, the applicator having adjacent but separated ducts for applying separate components of the mixture.

2. A machine according to claim 2, wherein the bed has undulations along its length.

3. A machine according to claim 2, wherein the web is caused to double back beneath the output end of the bed.

4. A machine according to claim 2 or 3, wherein an accelerated resin and a cata-



lysed resin are fed separately through adjacent apertures in the bed.

5 5. A machine according to claim 4, wherein the rate of feed of the accelerated resin relative to that of the catalysed resin is fixed.

6. A machine according to any one of claims 1 to 5, wherein the rate of advance of the web along the bed is variable.

10 7. A machine according to any one of the preceding claims, wherein the rate of feed of the resin mixture is variable.

8. A machine according to claim 4 or claim 5, wherein the adjacent apertures comprise pairs of transverse slots spaced at intervals along the length of the bed.

15 9. A machine according to claim 8, wherein the web passes between each pair of transverse slots and a plate which is spring-loaded towards said slots.

20 10. A machine according to any one of the preceding claims, wherein the rollers for working the resin mixture into and through the cloth are power driven and the web passes around a power driven roller of large diameter relative to the diameter of the resin working rollers.

25 11. A machine according to claims 1 and 10, wherein the power driven roller of large

diameter is located at the output end of the bed. 30

12. A machine according to claims 3 and 10, wherein a delivery roller is provided below and on the input side of the power driven roller of large diameter. 35

13. A machine according to claim 12, wherein the delivery roller is adjustable in position to vary the angle at which the web leaves the power driven roller of large diameter. 40

14. A machine according to claim 12 or claim 13, wherein the delivery roller is longitudinally grooved.

15. A machine according to any one of the preceding claims, wherein the rollers for working the resin mixture into and through the cloth are circumferentially grooved. 45

16. A machine for continuously impregnating a web of cloth with a resin mixture constructed, arranged and adapted to operate substantially as hereinbefore described with reference to, and as illustrated by, the accompanying drawings. 50

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