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COMPLETE SPECIFICATION

Improved Apparatus for the Production of Resin Reinforced Materials

We, MONTECATINI SOCIETA GENERALE PER L'INDUSTRIA MINERARIA E CHIMICA, a Body Corporate organised and existing under the laws of Italy, of 18 Via Filippo Turati, Milan, Italy, 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:—

10 This invention relates to the production of resin-reinforced fibrous material, particularly polyester resin reinforced glass fibre.

Resin-reinforced fibrous material has a wide variety of uses. It may be used either in flat form or in corrugated or any other shaped form as a transparent covering, for partitions or for merely decorative building purposes. Various apparatus and methods have been proposed for the production of such materials, but in all cases difficulty has been experienced in obtaining complete impregnation of the material and, further, in obtaining a finished product which is free of air blisters which impair the finish of the article.

25 It is an object of the present invention to provide improved apparatus for the production of resin reinforced fibrous material in which these and other disadvantages are partially or wholly obviated.

30 The invention provides apparatus for the production of resin-reinforced fibrous material which apparatus comprises a support for a layer of fibrous material, means for impregnating said material with a curable resin, a pair of rollers between which said fibrous material is passed after resin impregnation and means for applying to a surface of said impregnated material a layer of flexible resin-impervious non-adhesive material prior to its

40 passage between said rollers, the surface of one of said rollers being provided with a substantial covering of a deformable elastic material.

The fibrous material either in the form of

[Price 3s. 6d.]

a continuous web or in the form of free fibres (preferably having a length of from 10 to 15 cm) may be applied directly to the supporting surface or there may be interposed between the supporting surface and the fibrous material a layer of flexible resin-impervious non-adhesive material (e.g. cellophane).

According to a feature of the invention, means may be provided for heating the layer of fibrous material prior to impregnation. The means for impregnating the material conveniently comprise a bed of fluid resin, preferably having a viscosity of from 200 to 500 centipoises, through which the fibrous material passes, the bed being supplied from a storage vessel for the resin.

The pair of rollers, one of which is provided with a substantial covering of a deformable elastic material, is the most important feature of the invention. As the impregnated fibrous material passes into the nip formed between the two rollers, the covering is immediately deformed over a substantial part of the outer surface of the roller and the pressure exerted on the material passing between the two rollers gradually increases. In this way it is possible to exert on the material, a substantial pressure for a considerable length of time and further the difficulties which arise from exerting a momentary very high pressure are avoided. Further, as the pressure increases, the air which tends to be entrained is pushed outwards and the risk of there being air blisters in the finished product is minimised. In addition, in cases where free fibres, rather than a continuous web of fibrous material are employed, the gradually increasing pressure assists in maintaining the loose fibres in position on the support.

The diameter of the covered roller is preferably less than that of the other roller. Thus, the diameter of the covered roller may be from 30 to 50 cm, whereas that of the other roller is

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from 60 to 100 cm. A thickness of from 2 to 5 cm for the covering which is preferably of cellular rubber or like plastic material is preferred.

According to a feature of the invention, the axes of the two rollers are conveniently disposed in a plane having an inclination to the vertical of from 5 to 15°.

The invention is equally applicable to apparatus for the production of continuous lengths of reinforced fibrous material or to batch processes for the production of individual sheets of such material.

In the first case, the support for the layers of fibrous material may comprise a single fixed platen which extends to the impregnating means.

In the second case, the support for the layer of fibrous material may comprise a platen movable on support means from the position at which the fibrous material is applied to it, past the impregnating means and between the said pair of rollers. A plurality of platens may be provided, the platens being advanced in contact one with the other by means of chain conveyor means. After passage between the rollers, the platen with the impregnated fibrous material thereon and an outer covering of flexible resin impervious non-adhesive material may be advanced through partial or total curing means, said means preferably comprising a heated chamber provided with means for pressing the fibrous material against the platen during passage therethrough.

After partial curing the platen, with the partially cured material thereon may be removed, the material stripped from the platen and placed in a mould and the curing completed, whereafter the outer covering of flexible material is stripped from the fibrous material. In such a case the platen is preferably an aluminium plate. Corrugated sheets of the resin reinforced fibrous material may thus easily be produced in this way.

On the other hand, if flat plates of the material are required, then the resin may be totally cured while the material is still on the platen, the fibrous material stripped from the platen and the outer covering of flexible material removed therefrom. If a stainless steel plate is used as the platen and no sheet of flexible material is interposed between the platen and the fibrous material, a mirror-like finish to the article may readily be obtained.

The following is a description by way of example of several embodiments of the invention. Reference is made to the accompanying diagrammatic drawings in which

Figure 1 is a side elevation of apparatus for the continuous production of resin-impregnated glass fibre,

Figure 2 is a side elevation of a modification of the apparatus shown in Figure 1 in which glass fibres, rather than glass fibre mat

are employed,

Figure 3 is a side elevation of apparatus for the batchwise production of resin-impregnated glass fibre,

Figure 4 is a plan view of the apparatus shown in Figure 3,

Figure 5 is a sectional view of the impregnating rollers in the apparatus of Figure 3, and

Figure 6 is a side elevation of a modification of the apparatus illustrated in Figures 3 to 5, in which glass fibres are used instead of glass fibre mat.

Referring first to Figure 1 of the drawings, within a frame (not shown) there is mounted a reel 1, from which a sheet of Cellophane 2 (Cellophane is a Registered Trade Mark) is unwound, passing over rollers 3 and 4 on to a horizontal platen 5 and thence between rollers 6 and 7, hereinafter described in greater detail. A length of glass fibre mat 13 is unwound from a reel 12 mounted on the frame, the glass fibre mat passing between rollers 14, 14' to the platen 5 where it lies on top of the Cellophane sheet 2. The supply of glass fibre mat is synchronised with the supply of the Cellophane sheet 2 and they travel together over the platen 5, and ultimately between the rollers 6 and 7. Located above the platen is a set of infra red lamps 18. Immediately prior to passage between the rollers 6 and 7 the glass fibre mat 13 and Cellophane sheet 2 pass through a bed of impregnating material (e.g. a catalysed polyester resin) which is supplied from a tank 16. Lateral displacement of the bed of resin beyond the edges of the material is prevented by means of plates 17.

Of the two rollers 6 and 7, roller 6 is a conventional calendaring roller, whereas roller 7 is provided over its surface with a thick layer of deformable elastic material (e.g. cellular rubber or other plastic material). Due to the structure of this outer covering it is possible to adjust the roller so that the maximum pressure can be exerted on the material passing between it and the roller 6. The nearness of the periphery of the roller 7 to the roller 6 causes considerable deformation of the elastic material and the pressure exerted on the material which is firmly supported on the surface of the roller 6 gradually increases. In addition the air which tends to be entrained initially is forced back as the pressure increases. Thus, very effective impregnation and further the removal of any air present can be obtained and the quality of the finished product is correspondingly higher.

A length of Cellophane sheet 8 is supplied from a reel 11 over rollers 10 and 9 and thence to the periphery of the roller 7, where it is guided on to the upper surface of the impregnated glass fibre mat 13. The sandwich of impregnated glass fibre mat between Cellophane sheets 2 and 8 is discharged from between the rollers 6 and 7 in a slightly downwards direc-



curing

tion and thence passes under a roller 19 which guides it into a horizontal plane. Thereafter the sandwich of material proceeds to corrugation apparatus of the type described in Patent Specifications Nos. 748,368 or 824,755.

The apparatus shown in Figure 2 is similar to that shown in Figure 1, save that it is adapted to the use of free glass fibres rather than a preformed glass fibre mat. Thus the same arrangement is used for the supply of Cellophane sheets 2 and 8 and for impregnation and pressing and like reference numerals are employed. As has been stated above, this apparatus differs from that illustrated in Figure 1 solely in that it is adapted to make use of individual glass fibres rather than a mat. To this end, apparatus for producing the fibres in the required form is provided above the platen 5, this apparatus consisting of one or more reels 121 of continuous glass fibre yarn and a shearing device 120 which cuts the yarn into fibres of suitable size and deposits these fibres on the Cellophane sheet 2 on the platen 5 through an outlet 122. Means (not shown) are provided in the outlet 122 for ensuring uniform distribution of the fibres over the Cellophane sheet 2.

Due to the provision of the deformable covering on the roller 7, the loose glass fibres, after impregnation, are first held comparatively loosely in the nip between the two rollers 6 and 7. Thereafter, as they proceed between the rollers with the Cellophane sheet 8 over them, they are firmly gripped and there is no possibility of the fibres moving. As an added safeguard against displacement of the fibres it is convenient to ensure that the fibres have a certain minimum length. A length of from 10 to 15 cm has been found to be particularly satisfactory in practice. Moreover, the viscosity of the impregnating resin should be comparatively low. A viscosity of from 200 to 500 centipoises is the most satisfactory in practice.

Finally, as far as the roller 7 is concerned, in a preferred practical embodiment of the invention the roller 7 has a diameter of from 30 to 50 cm with a covering of deformable elastic material from 2 to 5 cm thick. The roller 6 is of larger diameter, for example between 60 and 100 cm.

It is found that reinforced fibrous materials produced by the apparatus shown in either Figure 1 or Figure 2, whether corrugated or not, have, after curing, a very high degree of translucence, a uniform thickness and are free of air blisters.

The apparatus illustrated in Figures 3 to 5 is adapted for the batch production of resin reinforced fibrous materials in separate lengths.

The apparatus consists of a frame (not shown) within which is provided a roller supporting surface 41 adapted to move a series of metal platens between positions 42, 43, 44,

45, 46 and 47. A metal platen is initially placed on the rollers at the left-hand end (position 42) of the supporting roller surface 41 and is kept in contact with a platen (at position 43) which precedes it by a driving roller 48 which is one of the rollers of the supporting roller surface 41. Teeth 49 carried by chains 410, 410¹ engage holes 411, 411¹ in the platen and advance it. When the platen is in position 43, a sheet of resin impermeable non-adhesive material (e.g. Cellophane), supplied from a reel 412 is deposited on the platen. Lengths of fibrous material (preferably glass fibre mat) supplied from reels 413, 414 (only one reel or more than two reels may be provided depending upon the type of laminate which is required) and cut into the required lengths by shears 415 are deposited on the Cellophane sheet on the platen at this position 43. The length of the fibrous material is preferably slightly less than the length of the platen so that there is no difficulty in ensuring that the fibrous material is centrally located on the platen.

In some cases an underlining of Cellophane may not be required, the impregnated fibrous material being prepared directly on the metal platen. If this is the case, the Cellophane supply reel 412 is dispensed with and in order to ensure continuity between the various platens a strip of adhesive tape is applied between adjoining platens.

The platen is then moved to position 44 where, if desired, additional thin sheets for decorative purposes e.g. embossed sheets, can be applied to the glass fibre. The assembly then passes beneath infra red lamps 416, through an impregnating bed 421 supplied from a vessel 422, guides 423 being provided to prevent the resin spreading beyond the edge of the fibrous material on the platen.

The impregnated material then passes into the nip formed between rollers 417 and 418 (i.e. at position 45). A length of Cellophane or like resin impermeable non-adhesive material is supplied from a reel 420 and passes round the edge of roller 417 so as to cover the impregnated material. The impregnating means and the rollers 417 and 418 are to all intents and purposes similar to those described above with reference to Figures 1 and 2 of the drawings. They are illustrated in greater detail in Figure 5 of the drawings. As is clearly shown the roller 417 is provided with an outer covering 419 of a deformable elastic material such as cellular rubber. The effect produced by this covering is as already described.

The metal platen, carrying the impregnated fibrous material emerging from between the rollers 417 and 418 at position 45 passes under chains 424 placed at the side of the apparatus and carrying cross members 425 which, during the lower run of the chains 424, are prevented by guides 426 from rising and compress the impregnated material against the



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supporting platen. In this way, the movement is transmitted to the material and its Cellophane covering without there being any risk of slipping. The chain 424 and the cross members 425 are so arranged that there is always one cross member 25 in mesh. During this run, partial curing of the impregnated material may be effected by infra red lamps 427.

As the cross member 425 disengages the assembly on the platen at position 46, the top layer of Cellophane is severed along the connecting line between it and the next platen approaching position 45 and is then pushed by hand on to a truck 428. The platen engages a stop 429 at the end of the truck to position it on the truck. The truck is so shaped that the end remote from the stop 429 may be pushed under the supporting roller surface 41.

The platens form a pile 430 on the truck each platen carrying an impregnated assembly which is kept flat by the weight of the platen above it. As will be described more fully hereinafter the pile 430 removed from the machine on the truck 428 may then be cured at room temperature or in an oven in order to obtain flat laminates. When there is an under-layer of Cellophane the assembly can be detached from the platen immediately and after reaching a certain degree of curing it can be placed in various moulds, for instance corrugation moulds, where the curing is completed. The freed platens are then returned to the other end of the machine for re-use.

The apparatus illustrated in Figure 6 of the drawings is basically the same as that illustrated in Figures 3 to 5, save that it is modified for use with individual glass fibres, rather than a glass fibre mat.

The apparatus consists of a horizontal roller support 223 supporting metal platens 205 which are advanced by teeth on a chain 224. A length of Cellophane sheet 202 supplied from a reel 201 and passing over rollers 203 and 204 is laid on the platen 205. As has been explained with the embodiment of Figures 3 to 5, it is not essential that a sheet of Cellophane should be placed on the platens, but if it is not done, then adjacent platens should be joined by suitable means, e.g. adhesive tape. Free glass fibres are deposited on the platen (with or without the Cellophane) from a chamber 222. These fibres are obtained by cutting continuous lengths of yarn supplied from one

or more reels 221, with the aid of a cutter 220. As has been stated in connection with the description with reference to Figure 2 of the drawings, the ideal length for the fibres is from 10 to 15 cm and the impregnating resin should preferably have a viscosity of between 200 and 500 centipoises.

Means (not shown) are provided within the chamber 222 for ensuring uniform distribution of the fibres on the platen.

The platen, with a mattress 213 of fibres thereon then passes under a series of infra red lamps 218, through an impregnating bed 215 supplied by a tank 216 and between the nip formed by two rollers 206 and 207. These rollers are of the same type as those described with reference to Figures 1, 2 or 3 and 5 of the drawings, i.e. the roller 207 is provided with a covering of a deformable elastic material such as cellular rubber.

A length of Cellophane 208 supplied from a reel 211 and passing over rollers 209, 210 and the roller 207 is placed on top of the impregnated mattress 213. Thereafter, the platen is advanced by means similar to those described in Figure 3 to a partial curing and ultimately a collecting station. The partial curing means consists of a plurality of infra red lamps 229 mounted within support means carrying a chain 226 and cross-members 227 a guide 228 being provided to compress the impregnated material against the platen, the platens and the material thereon thereafter being collected in a truck 230, the Cellophane sheet being severed between adjoining platens.

The material and the platens are then removed for further processing as with those produced using the apparatus illustrated in Figures 3 to 5.

The individual lengths of impregnated fibrous material produced using the apparatus illustrated in Figures 3 to 5 or in Figure 6 are particularly suited for the production of flat or corrugated sheets for use as transparent coverings, partition walls or merely as decorative elements.

The following examples of two methods of using the apparatus described with reference to Figures 3 to 5 or 6 are given.

EXAMPLE 1

Glass fibre is impregnated in apparatus as described with reference to Figures 3 to 5 or Figure 6 with a resin having the following composition.

- 110 Polyester resin (of the rigid type with a low reactivity and low viscosity)
- Methyl-ethyl-ketone peroxide (50% peroxide)
- Cobalt naphthenate (60% cobalt)

98.3 Parts by weight

1.5 Parts by weight

0.2 Part by weight

115 The platens consist of highly polished stainless steel plates and Cellophane is employed as the covering sheet (no Cellophane is applied directly to the platens). As the metal platens carrying the impregnated glass fibre leave the

apparatus they are piled up in the trucks and left in this state until the resin is completely cured (this curing can take place at room temperature).

After curing the impregnated fibrous

material is stripped from the platen and the covering sheet of Cellophane is also removed. Flat pieces are obtained which present a particularly high and uniform transparency and also have a flat and mirror-like surface. It will be appreciated that this method obviates the need for using presses and moreover it is possible to obtain much larger pieces than

would be obtainable with known presses.

EXAMPLE 2

Glass fibre supported on a sheet of Cellophane placed on a metal (preferably aluminium) platen is impregnated in the apparatus described in Figures 3 to 5 or Figure 6 with a resin having the following composition.

Polyester resin (of the rigid type having a low viscosity and reactivity and which is light stable)
Cumene hydroperoxide (with 50% peroxide)
Benzoyl peroxide (with 50% peroxide)
Cobalt naphthenate (60% cobalt)

97.8 Parts by weight

1 Part by weight

1 Part by weight

0.2 Part by weight

After impregnation, the sandwich of impregnated fibrous material between two sheets of Cellophane, is part cured. Thereafter, this sandwich is removed from the supporting platen and placed in a mould having any desired shape (e.g. corrugated). The mould is closed and then placed in an oven heated to 90 to 100° C to complete the curing of the resin. Shaped articles having a high degree of transparency and also uniformity of thickness are thus obtained.

8. Apparatus according to any one of the preceding claims, wherein the means for impregnating the material comprise a bed of fluid resin through which the fibrous material passes, the bed being supplied from a storage vessel for the resin.

9. Apparatus according to Claim 8, wherein the viscosity of the resin is from 200 to 500 centipoises.

10. Apparatus according to Claim 8 or Claim 9, wherein the resin is polyester resin admixed with minor proportions of a catalyst such as methyl-ethyl-ketone peroxide and an accelerator such as cobalt naphthenate.

11. Apparatus according to any one of the preceding claims, wherein the diameter of the covered roller is less than that of the other roller.

12. Apparatus according to Claim 11, wherein the diameter of the covered roller is from 30 to 50 cm and that of the other roller is from 60 to 100 cm.

13. Apparatus according to Claim 11 or Claim 12, wherein the thickness of the covering is from 2 to 5 cm.

14. Apparatus according to any one of Claims 11 to 13, wherein the axes of the two rollers are disposed in a plane having an inclination to the vertical of from 5 to 15°.

15. Apparatus according to any one of the preceding claims, wherein the support comprises a single fixed platen extending to said impregnating means.

16. Apparatus according to any one of Claims 1 to 14, wherein said support comprises a platen movable on support means from the position at which the fibrous material is applied to it, passed the impregnating means and between the said pair of rollers.

17. Apparatus according to Claim 16, wherein a plurality of platens are provided, the platens being advanced in contact one with the other by means of chain conveyor means.

18. Apparatus according to Claim 16 or Claim 17, wherein after passage between the rollers the platen, with the impregnated fibrous material thereon and an outer covering of flexible resin-impervious non-adhesive material, is advanced through partial or total curing means.

WHAT WE CLAIM IS:—

1. Apparatus for the production of resin-reinforced fibrous material which apparatus comprises a support for a layer of fibrous material, means for impregnating said material with a curable resin, a pair of rollers between which said fibrous material is passed after resin impregnation and means for applying to a surface of said impregnated material a layer of flexible resin-impervious non-adhesive material prior to its passage between said rollers, the surface of one of said rollers being provided with a substantial covering of a deformable elastic material.

2. Apparatus according to Claim 1, wherein means are provided for supplying to said support a layer of flexible resin-impervious non-adhesive material, said layer of flexible material being interposed between the support and the layer of fibrous material.

3. Apparatus according to Claim 1 or Claim 2, wherein said fibrous material is supplied from one or more reels as a continuous web.

4. Apparatus according to Claim 1 or Claim 2, wherein said fibrous material is supplied in the form of free fibres.

5. Apparatus according to Claim 4, wherein said free fibres have a length of from 10 to 15 cm.

6. Apparatus according to Claim 4 or Claim 5, wherein said fibres are obtained by cutting from one or more continuous yarns, means being provided for uniformly distributing the cut fibres over the support.

7. Apparatus according to any one of the preceding claims, wherein means are provided for heating the layer of fibrous material prior to impregnation.



material is stripped from the platen and the covering sheet of Cellophane is also removed. Flat pieces are obtained which present a particularly high and uniform transparency and also have a flat and mirror-like surface. It will be appreciated that this method obviates the need for using presses and moreover it is possible to obtain much larger pieces than

would be obtainable with known presses.

EXAMPLE 2.

Glass fibre supported on a sheet of Cellophane placed on a metal (preferably aluminium) platen is impregnated in the apparatus described in Figures 3 to 5 or Figure 6 with a resin having the following composition.

Polyester resin (of the rigid type having a low viscosity and reactivity and which is light stable)
Cumene hydroperoxide (with 50% peroxide)
Benzoyl peroxide (with 50% peroxide)
Cobalt naphthenate (60% cobalt)

97.8 Parts by weight

1 Part by weight

1 Part by weight

0.2 Part by weight

After impregnation, the sandwich of impregnated fibrous material between two sheets of Cellophane, is part cured. Thereafter, this sandwich is removed from the supporting platen and placed in a mould having any desired shape (e.g. corrugated). The mould is closed, and then placed in an oven heated to 90 to 100° C to complete the curing of the resin. Shaped articles having a high degree of transparency and also uniformity of thickness are thus obtained.

8. Apparatus according to any one of the preceding claims, wherein the means for impregnating the material comprise a bed of fluid resin through which the fibrous material passes, the bed being supplied from a storage vessel for the resin.

9. Apparatus according to Claim 8, wherein the viscosity of the resin is from 200 to 500 centipoises.

10. Apparatus according to Claim 8 or Claim 9, wherein the resin is polyester resin admixed with minor proportions of a catalyst such as methyl-ethyl-ketone peroxide and an accelerator such as cobalt naphthenate.

11. Apparatus according to any one of the preceding claims, wherein the diameter of the covered roller is less than that of the other roller.

12. Apparatus according to Claim 11, wherein the diameter of the covered roller is from 30 to 50 cm and that of the other roller is from 60 to 100 cm.

13. Apparatus according to Claim 11 or Claim 12, wherein the thickness of the covering is from 2 to 5 cm.

14. Apparatus according to any one of Claims 11 to 13, wherein the axes of the two rollers are disposed in a plane having an inclination to the vertical of from 5 to 15°.

15. Apparatus according to any one of the preceding claims, wherein the support comprises a single fixed platen extending to said impregnating means.

16. Apparatus according to any one of Claims 1 to 14, wherein said support comprises a platen movable on support means from the position at which the fibrous material is applied to it, passed the impregnating means and between the said pair of rollers.

17. Apparatus according to Claim 16, wherein a plurality of platens are provided, the platens being advanced in contact one with the other by means of chain conveyor means.

18. Apparatus according to Claim 16 or Claim 17, wherein after passage between the rollers the platen, with the impregnated fibrous material thereon and an outer covering of flexible resin-impervious non-adhesive material, is advanced through partial or total curing means.

WHAT WE CLAIM IS:—

1. Apparatus for the production of resin-reinforced fibrous material which apparatus comprises a support for a layer of fibrous material, means for impregnating said material with a curable resin, a pair of rollers between which said fibrous material is passed after resin impregnation and means for applying to a surface of said impregnated material a layer of flexible resin-impervious non-adhesive material prior to its passage between said rollers, the surface of one of said rollers being provided with a substantial covering of a deformable elastic material.

2. Apparatus according to Claim 1, wherein means are provided for supplying to said support a layer of flexible resin-impervious non-adhesive material, said layer of flexible material being interposed between the support and the layer of fibrous material.

3. Apparatus according to Claim 1 or Claim 2, wherein said fibrous material is supplied from one or more reels as a continuous web.

4. Apparatus according to Claim 1 or Claim 2, wherein said fibrous material is supplied in the form of free fibres.

5. Apparatus according to Claim 4, wherein said free fibres have a length of from 10 to 15 cm.

6. Apparatus according to Claim 4 or Claim 5, wherein said fibres are obtained by cutting from one or more continuous yarns, means being provided for uniformly distributing the cut fibres over the support.

7. Apparatus according to any one of the preceding claims, wherein means are provided for heating the layer of fibrous material prior to impregnation.

19. Apparatus according to Claim 18, wherein said partial or total curing means comprise a heated chamber provided with means for pressing the fibrous material against the platen during passage therethrough. 5
20. Apparatus according to Claim 18 or Claim 19, wherein after partial curing the platen with the partially cured material thereon is removed, the material stripped from the platen and placed in a mould and the curing completed, whereafter the outer covering of flexible material is stripped from the fibrous material. 10
21. Apparatus according to Claim 20, wherein the platen is an aluminium plate. 15
22. Apparatus according to Claim 18, wherein the resin is totally cured whilst the material is still on the platen, said platen comprising a plate of stainless steel.
23. Apparatus for the production of resin-reinforced fibrous material substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings. 20
24. Apparatus for the production of resin-reinforced fibrous material substantially as hereinbefore described with reference to Figure 2 of the accompanying drawings. 25
25. Apparatus for the production of resin-reinforced fibrous material substantially as hereinbefore described with reference to Figures 3 to 5 of the accompanying drawings. 30
26. Apparatus for the production of resin-reinforced fibrous material substantially as hereinbefore described with reference to Figure 6 of the accompanying drawings. 35
27. The method of preparing resin-reinforced fibrous material substantially as hereinbefore described with reference to the foregoing Examples.
28. Resin-reinforced fibrous material when produced by the apparatus claimed in any one of Claims 1 to 26 or by the method claimed in Claim 27. 40

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* C L M S *

