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06-20503

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para la fabricación de éste, con recubrimiento de
esina extendible

51. CLASIFICACIÓN INTERNACIONAL E04C 2/292

71. SOLICITANTE Metecno S.P.A.

DOMICILIO Tribiano, Italia.

74. APODERADO Dilia María Rodríguez D'Alencar

22. BOGOTÁ, D. C., Marzo 1/06.

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☒ Patente de invención		☐ Patente de Modelo de Utilidad	
☒ Capítulo I		☐ Capítulo II	
2) SOLICITANTE (71)	Nombre: METECNO SPA Dirección: Via per Cassino 19, I-20067 Tribiano, Italia Nacionalidad o domicilio: Tribiano, Italia Lugar de constitución: Italia		IDENTIFICACIÓN C.C. ☐ NIT. ☒ C.E. ☐ OTRO ☐ Cual _____ NÚMERO _____
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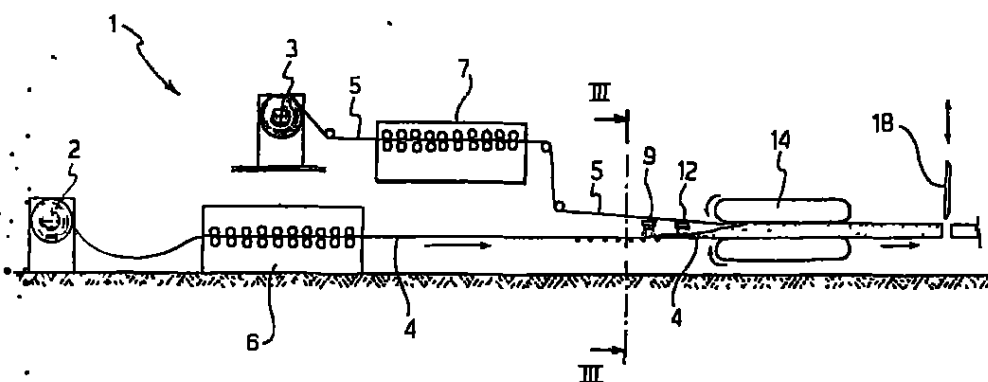
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(54) Title: INSULATING PANEL, PROCESS AND APPARATUS FOR MANUFACTURING THEREOF, WITH EXPANSIBLE
RESIN SPRAYING



(57) Abstract: There is disclosed an insulating panel (20) and a method for continuous manufacturing thereof, wherein a
polyurethane expansible resin (13) of the quick-reaction type is sprayed on a strip (4), after the sprayed resin has expanded,
another resin (17) is poured in liquid condition, thereby obtaining the insulating core of the panels. The invention also concerns
the apparatus for carrying out the method

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Insulating panel, process and apparatus for manufacturing thereof, with expansible resin spraying

The invention relates in general to the production of composite insulating panels.

As is known, these panels, which are also commonly known as "sandwich" panels, are widely used in the civil and industrial construction field to form walls, roofs, coverings, slabs, sectional doors, etc.; they are also used to construct cold-storage rooms, or containers intended for low temperatures.

The panels considered herein comprise basically two opposed faces between which there is an insulating core made of expanded resin, also commonly known as foam; the latter is generally a polyurethane foam but may also be phenolic foam or foam of another type.

The industrial production of these panels can be carried out in a continuous or discontinuous manner.

In the first case it is particularly useful for mass productions of panels with metal outer faces; to this purpose two sheet metal strips are made to advance one upon the other along the in line production plant, unrolling them from respective coils.

After an initial step of profiling of the strips, the resin is applied on the lower strip and then expands whilst the strips pass through a continuous press which keeps them apart by a distance equal to the thickness of the finished panel.

This continuous production process has been known since a long time and, for further information on this matter, reference should be made to existing publications and to the many patents of which the applicant for the present application is the proprietor.

On the other hand, the discontinuous production of the panels is more suitable for small series or for special panels; the latter may have outer faces made of metal or another material, such as for example plastic materials (polycarbonate or the like) or others (i.e. wood etc.).

The faces of the panels are prepared separately and then arranged in a mould where the polymer resin application and expansion take place, thereby forming the insulating foam.

It can be appreciated that this production process requires a longer time with respect to the continuous one, since there are unavoidably idle times when the faces must be accommodated in the mould and the finished panel removed therefrom.

However, beyond the different production methods seen above, what pointed out is that in order to produce quality panels, it is important that the expansion of the polymer resin takes place evenly; for this purpose, one of the conditions to be complied with is that there should be no bubbles of air or other gases in the vicinity of their outer faces because these may cause problems.

One of these problems is delamination of the panels, that is to say the detachment of their faces.

Indeed, as the temperature conditions vary between day and night or between summer and winter, the gas contained in the bubbles expands cyclically, leading to progressive fatigue of the foam and the propagation of the void regions inside it; in the long term, this situation leads to detachment of the face of the panel.

For this reason, a method for the continuous production of panels in which the liquid resin poured from a nozzle bar is spread uniformly on the surface of the strip by air jets is known from German patent application No. 197 41 523.

The effect of these air jets is to eliminate the gas bubbles from the mass of liquid resin, thus producing the desired result.

However, this method of application of the resin does not seem to be easy to implement because the impact of the air on the resin cannot be uniform over the entire width of the strip; the device described in the German patent application in fact has suitable devices for limiting the edge effects, that is to say, the accumulations of resin which form along the edges of the strip because of the non-uniformity of the effect of the air in this region.

Moreover, this known application method appears to depend significantly on the viscosity of the resin since the effect of the air thereon will clearly be different according to how liquid the resin is.

In other words, the known method may be difficult to implement according to the type of panels to be produced; thus, for example, it is not stated that it is effective

in the same manner both for the production of panels with polyurethane resins and for the production of panels with phenolic resins.

The same applies if the speed of advance of the sheet-metal strip to which the resin is applied is increased in order to increase panel production or if the quantity of resin applied is increased because it is desired to make thicker panels.

In the light of these remarks, the problem underlying the present invention is therefore that of providing a method for the continuous production of insulating panels in which the polymer resin is applied uniformly to at least one of the strips in a manner such as to prevent the formation of bubbles in the vicinity of the strips, also achieving improved adhesion between the foam and the surface of the strip.

The concept for the solution of this problem consists in the spray application of a first layer of resin onto the surface of the strip; the surface is in fact thus covered uniformly without lack of homogeneity which might give rise to bubbles.

Once the spray-applied layer has expanded, a second layer of liquid resin can be poured thereon, thus producing an insulating core of the desired thickness and density.

These and further characteristics of the invention are set out in the appended claims; they will become clearer from the following description of a non-limiting embodiment of the invention which is illustrated in the appended drawings, in which:

Figure 1 shows schematically apparatus for the continuous production of panels according to the invention,

Figure 2 shows a detail of the apparatus of Figure 1,

Figure 3 is a section taken on the line III-III of Figure 1,

Figure 4 is a perspective view of a panel formed in accordance with the invention, and

Figures 5 and 6 show a variant of the above-mentioned apparatus in views similar to those of Figures 2 and 3, respectively;

Figures 7 and 8 show a perspective view and a sectional view of a variant of the panel of the invention;

Figures 9 and 10 are a section and a perspective view of a manufacturing phase of the panel in fig. 7, 8;

Figure 11 is a variant of the manufacturing phase in fig. 9.

The first of these drawings shows an apparatus, generally indicated 1, for the continuous manufacturing of panels according to the invention, starting from two coils 2, 3 of metal strips 4 and 5.

In the apparatus 1 after the strips have been unrolled, they are processed by respective forming machines 6 and 7 to form therein the usual edges, ribs, profiling, etc., in known manner.

Downstream of the forming machines, the strips 4 and 5 advance close together up to the zone for the application of expansible resin; this operation is performed in two steps.

In particular, the first step is constituted by the spraying application of a quick-reaction resin by a head 9; for this purpose, the head 9 moves to and fro (as indicated by the arrows in Figure 3) along a cross-member 10 arranged above the strip 4 and is provided with a spray nozzle of a type known *per se* and not shown in the drawings. The speed of advance of the lower strip 4 is set in a manner such that the resin sprayed thereon expands (at least partially), forming a layer 13 which covers the strip 4 uniformly, before reaching a position below a second cross-member 11.

A pouring nozzle 12 of known type (which may be a single nozzle or a comb nozzle such as that of German published application No. 197 41 523) is movable to and fro along the second cross-member 11 and performs the second resin-application step, by pouring onto the expanded layer 13 a resin of the same type as that sprayed previously but in the liquid condition (the vertical broken line in Figure 3 indicates the pouring line).

The liquid resin then expands, filling the space between the strips 4 and 5 whilst they pass through a continuous press 14, also known *per se*.

Downstream of the continuous press, a semi-finished product 16 formed by the two strips 4 and 5 with the expanded sprayed layer 13 and an insulating core 17 of

foam of the second resin is thus obtained; the semi-finished product is then cut by a cutter 18, thereby obtaining finished panels 20 like that of Figure 4.

The production process described above solves the problem underlying the invention.

Indeed, the spray application distributes the resin uniformly over the entire surface of the strip 4, so that the resulting layer 13 is free of internal voids or bubbles.

This is due to the atomization of the resin supplied by the spray system, which enables the surface of the strip 4 to be covered with a thin film of small droplets similar to that of paints applied by the same method, wherein gas bubbles cannot build up.

In order to achieve a good spray application of the resin it will suffice to select the speed of movement of the head 9 along the cross-member 10 appropriately in dependence on various parameters such as, for example, the width of the strip, its speed of advance, the type of spray nozzle mounted on the head 9, the supply pressure of the nozzle, its distance from the strip, the type of resin applied, etc.

Moreover, since the resin is of the quick-reaction type, it produces a film 13 of foam on which the liquid resin can subsequently be applied in known manner; the interface between the two resins advantageously reduces the presence and/or the size of any voids in the mass of the second resin when it expands.

In contrast with the prior art referred to above, this production method is reliable, easy to implement and does not require complex adaptive modifications when the resin, the speed of the strip 4, or other production parameters are changed.

Indeed basically all polymer resins (polyurethane resins or the like), either of one-component and of two-component type, can be applied with the spray technique; this technique is well known and has been used since a long time, so that changes in the type of resin do not alter the efficacy of the production process of the invention.

Similarly, if the speed of advance of the strip is changed (for example, to increase panel production) it will suffice to move the spray head 9 with the cross-member 10 upstream slightly, so as to allow the quick-reaction resin to expand before it reaches the second nozzle bar 11.

Finally, as a further advantageous result achieved by the invention, it should be pointed out that it prevents the poor or inadequate adhesion of the foam to the face of the panel which sometimes occurs when liquid resin is deposited on the strip.

Naturally, variants of the above-described embodiment of the invention are possible.

First of all, it should be pointed out that the type and shape of the panels may differ from that shown in Figure 4; as a consequence, there may be panels profiled on one or both faces, or even curved panels produced with moulds and methods developed by the applicant for the present application.

Moreover, the production process may include also heating steps carried out with ovens or lamps disposed along the path of the strips 4 and 5, as is already known in the panel manufacturing; for example, an oven or lamps may be arranged upstream of the resin-application zone, that is before the spray head 9 and the cross-member 10, in order to accelerate the expansion of the resin sprayed onto the lower strip 4.

With regard to the spraying of the resin, in addition to the nozzles described above, it should be pointed out that there may be various solutions in relation to the type and shape of the nozzles; as a consequence, the nozzles will be selected among the most suitable for the operative conditions existing, such as the size and shape of the panel (profiled, corrugated, flat, curved, etc.), the type of apparatus (continuous, discontinuous) by which it is produced, the resins used as insulation, etc.

A possible alternative to the spray head 9 movable along the cross-member 10 of the previous embodiment is shown in Figures 5 and 6 in which, for simplicity, the same numbering has been retained for the same elements.

As can be seen, in this embodiment instead of the head 9 there is a fixed nozzle bar 30 in which a plurality of nozzles spray the resin onto the strip 4, with jets which cover its surface uniformly.

Likewise, for the application of the liquid resin instead of the pouring nozzle 12 movable along the cross-member 11, in this variant a fixed bar 31 of pouring nozzles is provided (the vertical broken lines indicate the pouring lines).

Finally, it should be pointed out that the spraying of the resin may also be performed on the upper strip, as an alternative to or in combination with the spraying on the lower strip; there may consequently be methods and apparatus for the production of panels in accordance with the invention, wherein the spraying is carried out on only one of the strips (that is, only the upper strip or the lower strip) or on both strips.

The spraying of the expansible resin fits well also with the discontinuous manufacturing process of the panels, referred to at the beginning; several solutions are possible for carrying out this operation, which are mainly based upon the use of moulds.

For instance there can be used a spraying head like that of fig. 3 or a nozzle bar as in fig. 6; in both cases after the sprayed layer has expanded, liquid resin will be poured and the mould closed so as to let it expand thereby obtaining the desired thickness of the panel.

Likewise it has been seen before in the case of continuous production, also in the panels made in a discontinuous manner according to the invention it is prevented the formation of harmful empty spaces or air bubbles, between the insulating foam and the outer faces.

This result is rather important especially for the architectural panels, that is to say panels used for the façades of buildings as schematically shown in fig. 7; indeed, because of the particular purpose to which they are intended, it can be understood that their outer aspect is very important.

As can be seen from the drawings the peculiar feature of the architectural panels referred to as 40, is that they have outer faces 41 and 42 without fretting, ribbing or the like; they are therefore smooth and this renders critical the manufacturing process, because the presence of air bubbles between the outer faces and the foam of the insulating core 43, gives rise to surface defects which can disfigure the facade of the building where the panels are applied.

Furthermore, the lack of ribbings renders the outer faces of the panels less stiff and more deformable, so that actually they do not remain plane when there are defects in the core of insulating foam.

Another particular feature of the aforesaid panels is that they are generally mounted upon structures formed by pillars and beams 45, 46 by means of bolts 47, brackets 48 and similar; as a consequence their peripheral edges are shaped with long and thin appendices 49, to allow the coupling of the panels with the mounting elements.

However these appendices generate problems during the production of the panels, because the insulating foam does not always fill all the inside thereof; indeed these panels are made by preparing the faces in moulds and pouring the liquid resin thereon, but the viscosity of the latter does not allow to reach well all the inner zones of the appendices, so that inside them empty spaces can remain with all the problems involved and already stated before.

On the contrary, the spray application of a layer of resin upon one or both faces 41, 42 of the panel, allows to reach even the innermost zones of the appendices 49 thereby creating a thin layer 50 of expanded resin which fills all the spaces nearby the faces.

On this expanded layer 50 it can thus be poured the liquid resin, thereby obtaining the insulating core 42 of the panel in accordance with the desired thickness.

Also in this embodiment of the invention the sprayed resin is preferably of the rapid reaction type, because it has resulted that this allows to obtain better results.

Furthermore, as mentioned above, the resin can be sprayed also on the other face 42 of the panel 40, thereby forming a layer (indicated with broken line in fig. 8) adjacent thereto which prevents the formation of air bubbles or empty spaces in the appendices.

Last, in the example shown schematically in fig. 9 and 10, for avoiding the undulations which can appear on the sheet metal of the faces, the discontinuous manufacturing process of the panels is carried out using a vacuum support plane or base 52 where it is laid the sheet metal of the face 41 of the panel 40.

This plane is provided inside with channels 54 through which air is sucked in a manner known per se, thereby obtaining a depression under the face 41 which keeps it adhering to the plane 52 and eliminates the aforesaid undulations.

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The plane 52 is also horizontally movable (as indicated by the arrow in fig. 8 and 9) with respect to a nozzle bar 30 of the type already seen in the example of fig. 5 and 6: as a consequence the resin is sprayed on the face 41 by carrying out one or more passes.

Of course also in this case changes can be made; for instance porous support planes could be used, which do not require channels formed therein because the air can be sucked through them: to this purpose reference can be made to planes made of chipboards, plastic material with open cells or spongy material.

Pneumatic vacuum systems like that considered before can operate on all types of surfaces, either metallic, plastic or other, for keeping the planarity of the faces where the resin is sprayed.

Nevertheless it can be understood that they might be replaced by other systems, based for instance on the use of magnets in the case of sheet metal, or of suction caps or other similar holding means.

The first of these alternatives is shown in fig. 11 where the support plane 52 is provided with magnets incorporated therein, which apply an attractive force on the face 41 made of sheet metal; the magnets can be either of natural type or electromagnets and, as mentioned above, they might be replaced with suction caps or other equivalent holding means.

All of these variants fall within the scope of the following claims.

CLAIMS

1. Insulating panel characterised in that it comprises two opposed faces (4, 5; 41, 42), a layer (13; 50) of a first polymeric expanded resin sprayed on at least one of said faces, an insulating core (17; 43) made of a second polymeric expanded resin contiguous to said layer (13).
2. Panel according to claim 1, wherein the opposed faces (4, 5; 41, 42) are substantially smooth.
3. Panel according to claims 1 and 2, comprising peripheral appendices (49) along the edge, filled by said layer (50) of expanded resin applied by spraying.
4. Panel according to the preceding claims, wherein the faces (4, 5; 41, 42) are of sheet metal.
5. Method for the continuous production of insulating panels, comprising the steps of:
 - advancing an upper strip (5) and a lower strip (4) longitudinally in a substantially superimposed condition,
 - applying a substantially liquid expansible polymeric resin between the strips (4, 5), and
 - causing the resin to expand whilst the strips (4, 5) are kept spaced apart at a predetermined distance substantially equal to the thickness of the panels to be produced,characterized in that it comprises a step of spraying an expansible polymeric resin onto at least one of the strips (4, 5).
6. Method according to Claim 5, wherein the substantially liquid resin is applied on a layer (13) formed by the sprayed and at least partially expanded resin.
7. Method according to claims 6 and 7, wherein the sprayed resin is of the quick-reaction type.
8. Method according to Claims from 5 to 7, wherein the strip onto which the quick-reaction expansible resin is sprayed, is the lower strip (4).
9. Method according to the preceding claims, wherein the strips (4, 5) are made of metal.

10. Method according to the preceding claims, wherein the resins applied are one-component or two-component polyurethane resins.

11. Apparatus for the production of panels according to the method of the preceding claims, characterized in that it comprises means (9, 10; 30) for spraying a first expansible polymer resin and means (11, 12; 31) for applying a second, substantially liquid, expansible polymer resin onto at least one of the strips (4).

12. Apparatus according to Claim 11, wherein the means (9, 10; 30) for spraying the first resin are arranged upstream of the means (11, 12; 31) for applying the second, substantially liquid resin.

13. Apparatus according to Claims 11 and 12, wherein the means for spraying the first resin comprise a spraying head (9) movable to and fro transversely relative to the advance direction of the strip (4) onto which the resin is sprayed.

14. Apparatus according to claims 11 and 12, wherein the means for spraying the first resin comprises a fixed nozzle bar (30), extending transversely to the advancing direction of the strip (4, 5) where the resin has to be sprayed.

15. Method for the discontinuous production of insulating panels according to claims 1 to 4, comprising the steps of:

- spraying on at least one of the faces (41, 42) a layer (50) of an expansible polymer resin;
- applying an expansible polymer resin in a substantially liquid condition;
- allowing the liquid resin to expand while keeping the faces (41, 42) in a mould, spaced apart at a predetermined distance substantially equal to the thickness of the panel to be produced.

16. Method according to claim 15, wherein the resin substantially liquid is applied on a layer (50) of resin sprayed and at least partially expanded.

17. Method according to claims 15 and 16, wherein the sprayed resin is of the quick-reaction type.

18. Method according to the claims from 15 to 17, wherein the expansible resins are one-component or two-component polyurethane resins.

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19. Method according to the claims from 15 to 18, wherein the face (41) on which the resin is sprayed, is supported by a support plane (52) provided with means (54) for causing a depression under said face to avoid the presence of undulations on it.

20. Method according to the claims from 15 to 18, wherein the face (41) on which the resin is sprayed, is supported by a support plane (52) provided with means (64) of magnetic type acting under said face to avoid the presence of undulations on it.

21. Method according to claims 19 and 20, wherein the support plane (52) is movable with respect to the nozzles (30) for spraying the resin.

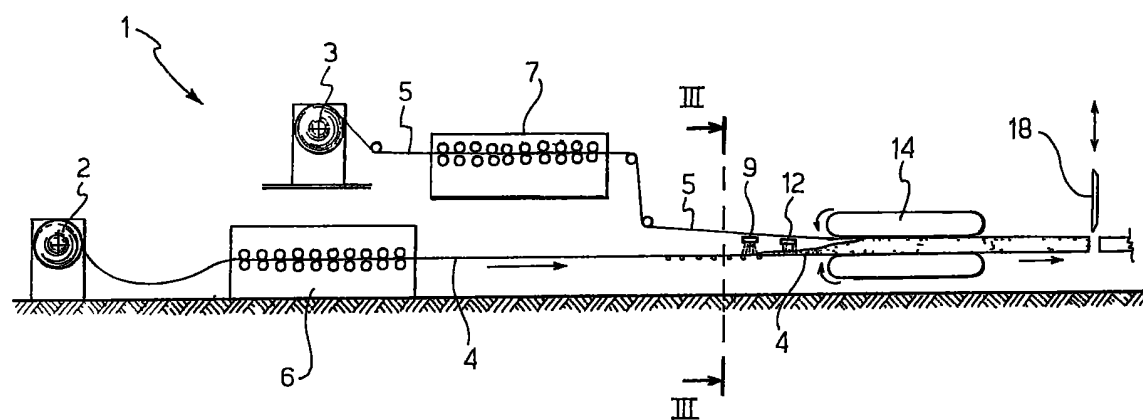
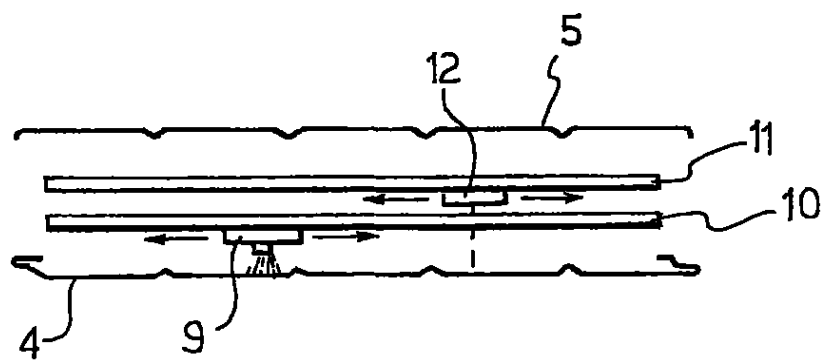
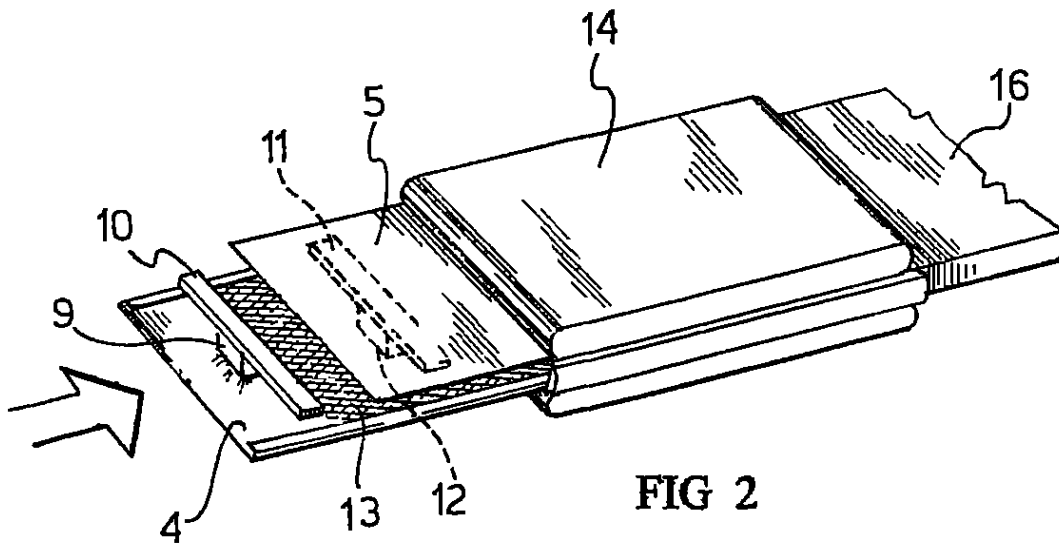
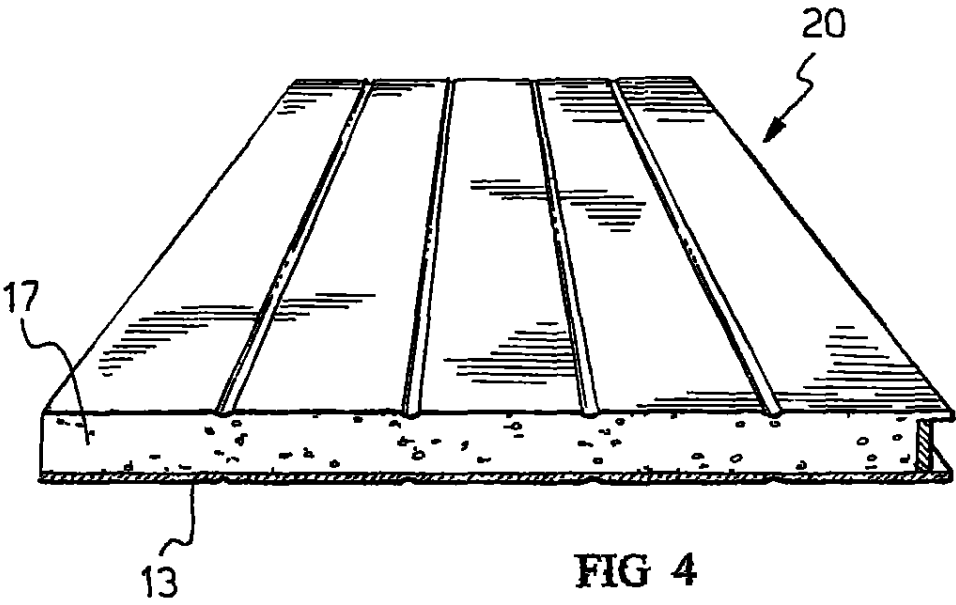


FIG 1



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19



20

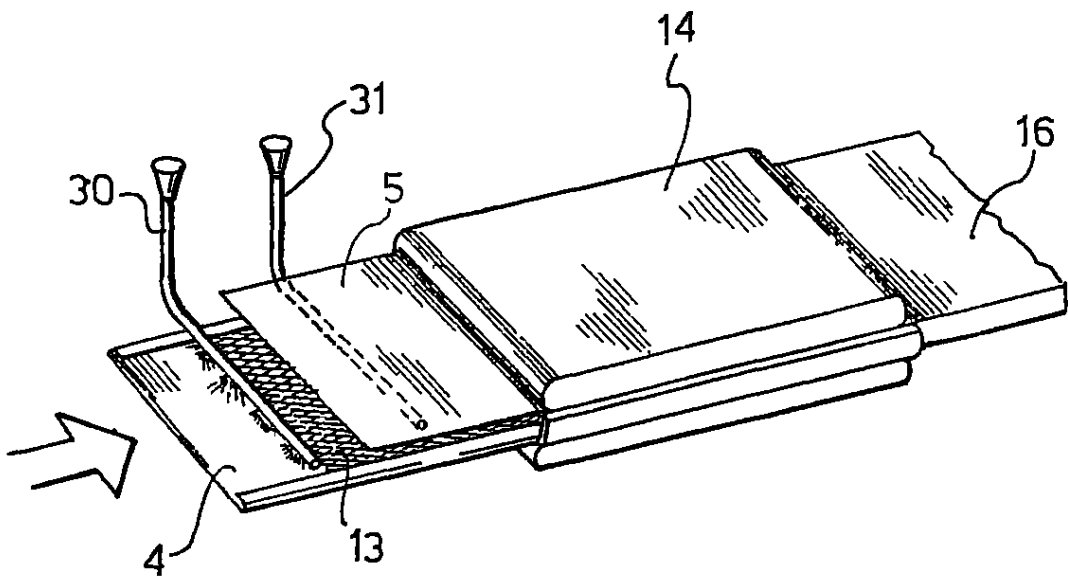


FIG. 5

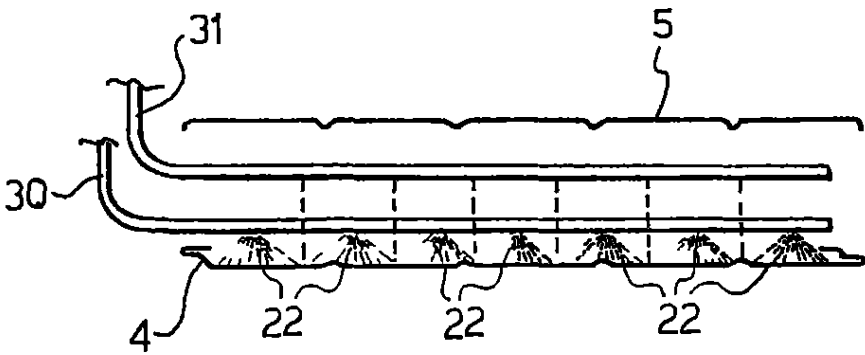


FIG. 6

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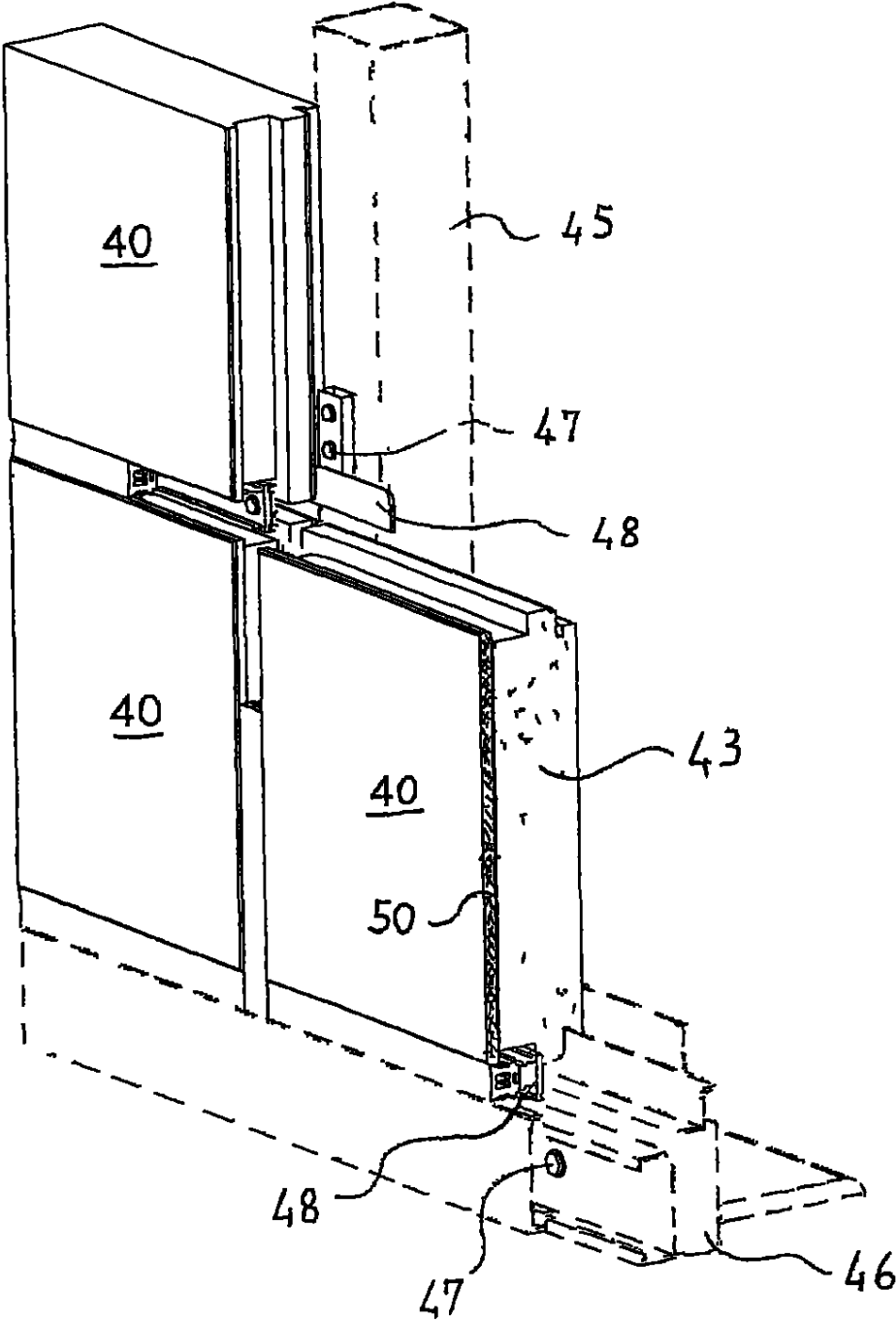


FIG 7

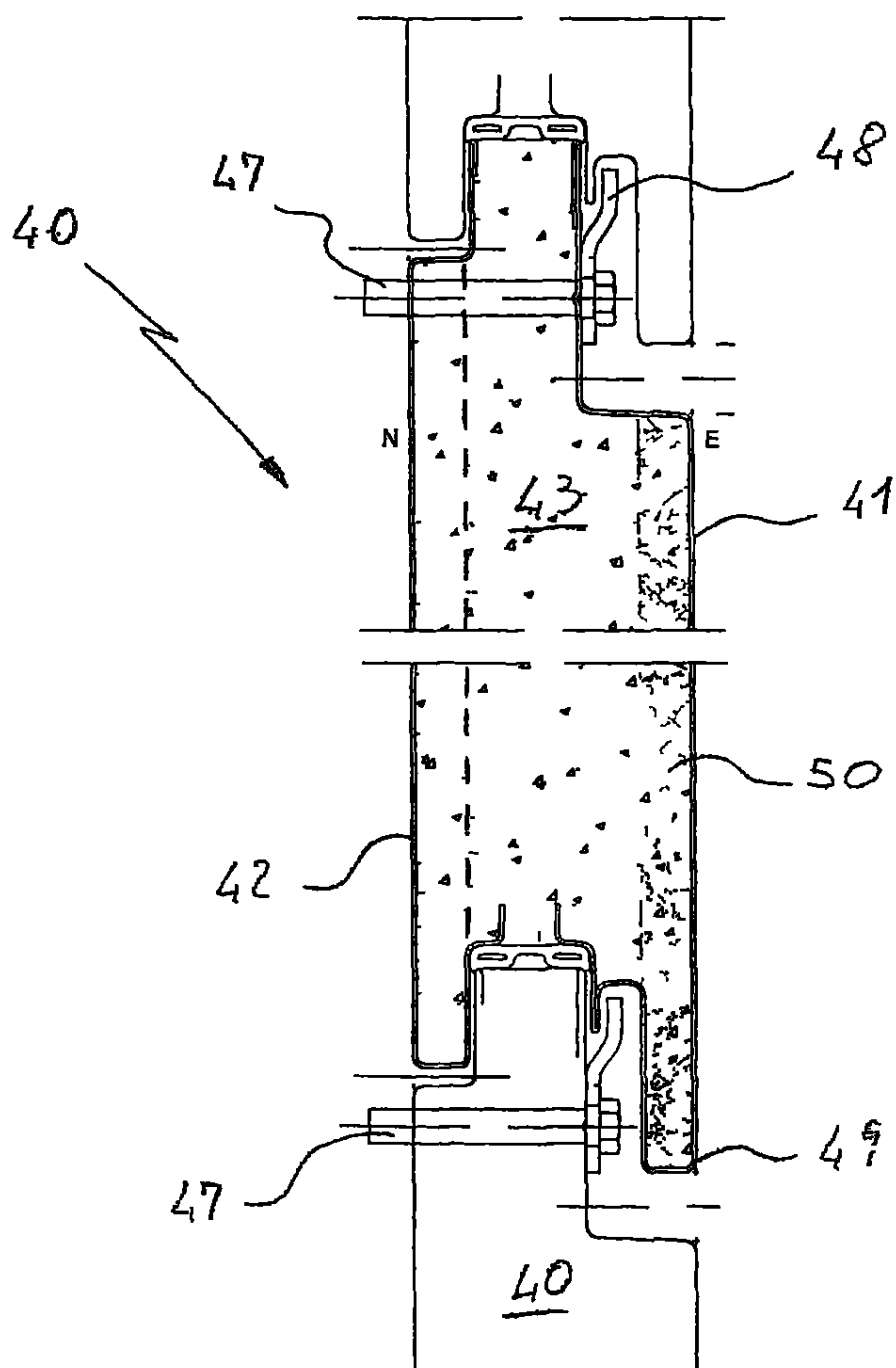


FIG 8

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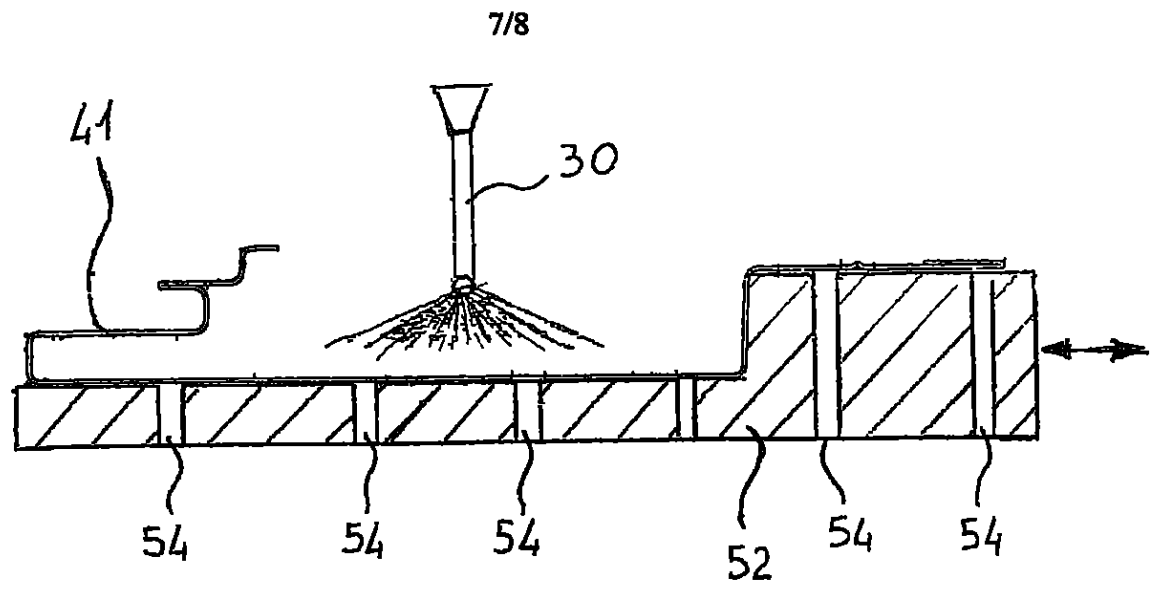


FIG 9

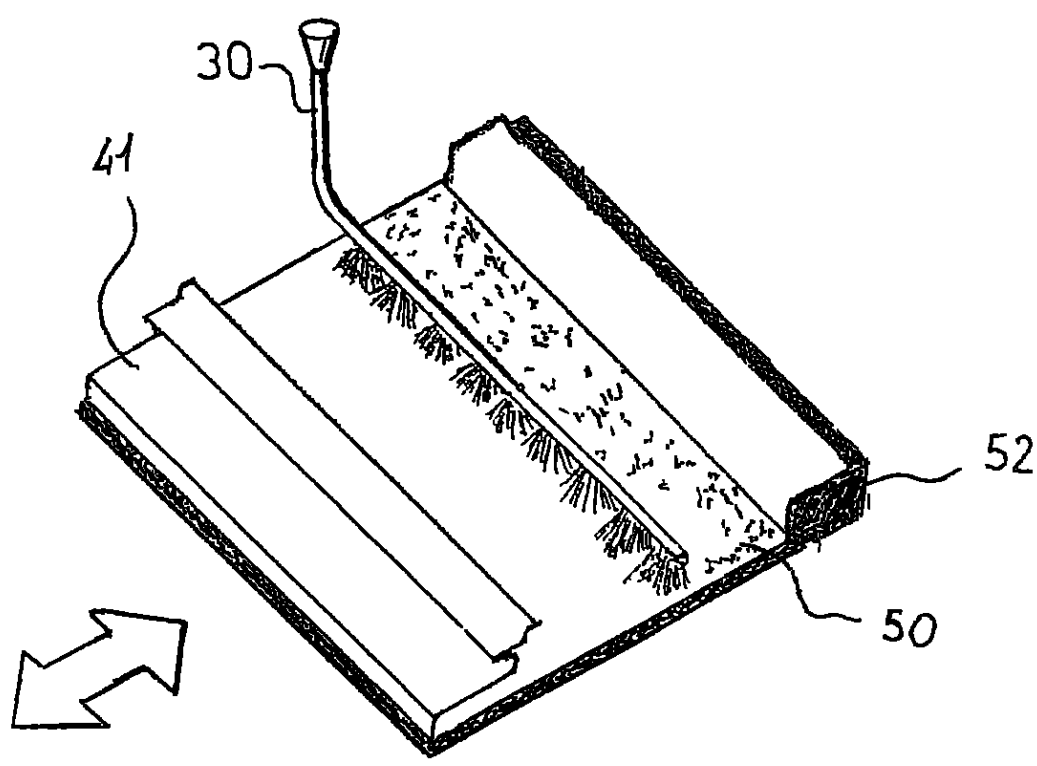


FIG 10

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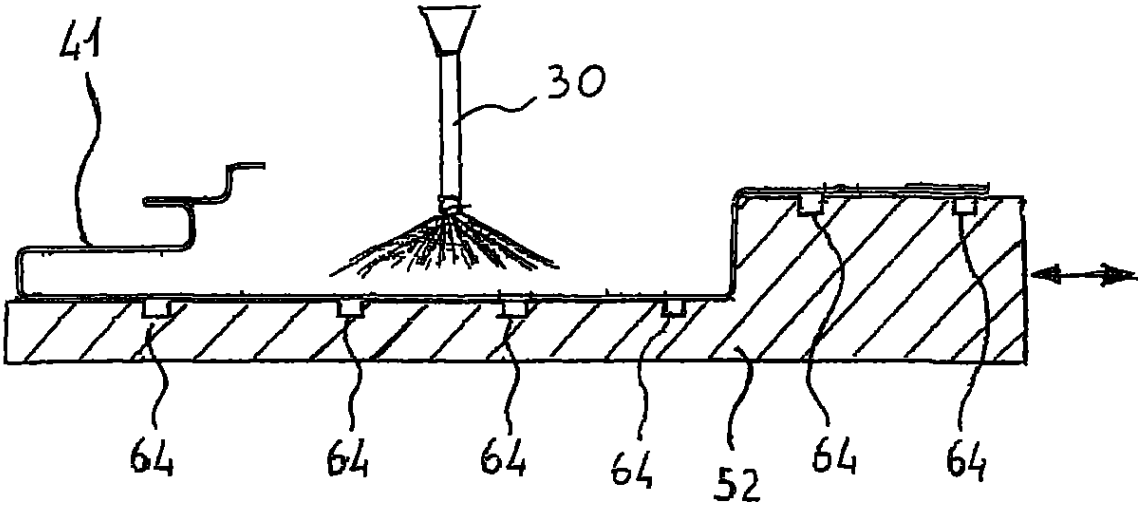


FIG 11

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PANEL DE AISLAMIENTO, PROCESO Y APARATO PARA LA FABRICACIÓN
DE ÉSTE, CON ROCIADO DE RESINA EXTENSIBLE

La invención se relaciona en general con la producción de paneles de aislamiento compuesto. Como se sabe, estos paneles, que también se conocen comúnmente como paneles "multicapa", se utiliza ampliamente en el campo de la construcción civil e industrial para formar paredes, techos, recubrimientos, losas, paredes seccionales, etc.; ellos también se utilizan para construir cuartos fríos, o contenedores destinados a bajas temperaturas.

Los paneles considerados aquí comprenden básicamente dos caras opuestas entre las que hay un núcleo de aislamiento hecho de resina expandida, también conocida comúnmente como espuma; la última es generalmente una espuma de poliuretano pero también puede ser espuma fenólica o espuma de otro tipo.

La producción industrial de estos paneles se puede llevar a cabo en una forma continua o discontinua.

En el primer caso es particularmente útil para producción en masa de paneles con caras exteriores de metal; para este propósito dos bandas de lámina de metal se hacen para avanzar

una sobre la otra a lo largo de la línea de planta de producción, enrollándolas desde bobinas respectivas.

Después de una etapa inicial de perfilado de las bandas, la resina se aplica sobre la banda inferior y entonces se expande mientras las bandas pasan a través de una prensa continua que las mantiene aparte una distancia igual al espesor del panel terminado.

Este proceso de producción continua se ha conocido desde hace tiempo y, para información adicional sobre esta materia se debe hacer referencia a las publicaciones existentes y a las muchas patentes de las cuales el solicitante de la presente invención es el propietario.

De otra parte, la producción discontinua de los paneles es más adecuada para series pequeñas o para paneles especiales; la última puede tener caras exteriores hechas de metal u otro material, tal como por ejemplo materiales plásticos (policarbonato o similares) u otros (es decir madera etc.).

Las caras del panel se preparan separadamente y luego se disponen en un molde en donde tiene lugar la aplicación y expansión de resina de polímero, formando por lo tanto la espuma aislante.

Se puede apreciar que este proceso de producción requiere un tiempo mayor con respecto al continuo, en razón a que existen tiempos ociosos inevitables cuando las caras se deben acomodar en el molde y el panel terminado se remueve de éste.

Sin embargo, más allá de los diferentes métodos de producción vistos anteriormente, cuando se destaca que con el fin de producir paneles de calidad, es importante que la expansión de la resina de polímero tenga lugar uniformemente; para este propósito, una de las condiciones a ser cumplida es que no debe haber burbujas de aire u otros gases en la vecindad de su cara exterior debido a que esto puede originar problemas.

Uno de estos problemas es la deslaminación de los paneles, esto quiere decir el despegue de sus caras.

De hecho, como las condiciones de temperatura varían entre el día y la noche o entre el verano y el invierno, el gas contenido en las burbujas expande cíclicamente, conduciendo a fatiga progresiva de la espuma y a la propagación de regiones vacías dentro de ésta; a largo plazo, esta situación conduce al despegue de la cara del panel.

Por esta razón, un método para la producción continua de paneles en los que la resina del líquido vertido desde una barra de boquilla se esparce uniformemente sobre la

superficie de la banda mediante chorros de aire se conocen de la solicitud de patente Alemana No. 197 41 523.

El efecto de estos chorros de aire es eliminar las burbujas de gas de la masa de resina líquida, produciendo así el resultado deseado.

Sin embargo, este método de aplicación de resina no parece ser fácil de implementar en razón a que el impacto del aire sobre la resina no puede ser uniforme sobre el ancho completo de la banda; el dispositivo descrito en la solicitud de patente Alemana de hecho tiene dispositivos adecuados para limitar los efectos de borde, es decir que, las acumulaciones de resina que se forman a lo largo de los bordes de la banda en razón a la no uniformidad del efecto del aire en esta región.

Más aún, este método de aplicación conocido parece depender significativamente de la viscosidad de la resina en razón al efecto del aire en esta serán claramente diferentes de acuerdo con que tan líquida está la resina.

En otras palabras, el método conocido puede ser difícil de implementar de acuerdo con el tipo de paneles a ser producidos; así, por ejemplo, no se establece que es efectiva en la misma forma para la producción de paneles con resinas

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de poliuretano y para la producción de paneles con resinas fenólicas.

Lo mismo aplica si la velocidad de avance de la banda de lámina de metal a la que se aplica la resina se incrementa con el fin de incrementar la producción de panel o si la resina aplicada se incrementa debido a que se desea hacer paneles más delgados.

En claridad de estas observaciones, el problema resaltado de la presente invención es por lo tanto el de suministrar un método para la producción continua de paneles de aislamiento en el que la resina de polímero se aplica uniformemente a por lo menos una de las bandas en una forma tal para evitar la formación de burbujas en la vecindad de las bandas, también alcanza la adhesión mejorada entre la espuma y la superficie de la banda.

El concepto para la solución de este problema consiste en la aplicación de rociado de una primera capa de resina sobre la superficie de la banda; la superficie de hecho está así cubierta uniformemente sin falta de homogeneidad que pueda dar origen a burbujas.

Una vez se ha expandido la capa aplicada por rociado, una segunda capa de resina líquida se puede verter en esta,

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produciendo así un núcleo aislante del espesor y densidad deseados.

Estas y características adicionales de la invención se establecen en las reivindicaciones adjuntas; ellas serán claras a partir de la siguiente descripción de una modalidad no limitante de la invención que se ilustra en los dibujos adjuntos, en los cuales:

La Figura 1 muestra aparato esquemáticamente para la producción continua de paneles de acuerdo con la invención,

La Figura 2 muestra un detalle del aparato de la Figura 1,

La Figura 3 es una sección tomada sobre la línea III-III de la Figura 1,

La Figura 4 es una vista en perspectiva de un panel formado de acuerdo con la invención, y

Las Figuras 5 y 6 muestran una variante del aparato mencionado anteriormente en vistas similares a aquellas de las Figuras 2 y 3, respectivamente;

Las Figuras 7 y 8 muestran una vista en perspectiva y una vista seccional de una variante del panel de la invención;

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Las Figuras 9 y 10 son una sección y una vista en perspectiva de una fase de fabricación del panel en la Figura 7, 8;

La Figura 11 es una variante de la fase de fabricación en la Figura 9.

El primero de estos dibujos muestra un aparato, indicado generalmente por 1, para la fabricación continua de paneles de acuerdo con la invención, partiendo de dos bobinas 2, 3 de bandas de metal 4 y 5.

En el aparato 1 después que se han desenrollado las bandas, ellas se procesan por máquinas de formación respectivas 6 y 7 para formar los bordes usuales, costillas, perfiles, etc., en forma conocida.

Corriente debajo de las máquinas de formación, las bandas 4 y 5 avanzan cercanas juntas a la zona para la aplicación de resina expandible; esta operación se desarrolla en dos etapas.

En particular, la primera etapa está constituida por la aplicación de rociado de una resina de rápida reacción por una cabeza 9; para este propósito, la cabeza 9 se mueve hacia y desde (como se indica por las flechas en la Figura 3) lo

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largo de un miembro transversal 10 dispuesto sobre la banda 4 y se suministra con una boquilla de rociado de un tipo conocido *per se* y no mostrado en los dibujos. La velocidad de avance de la banda inferior 4 se establece en una forma tal que la resina rociada en esta se expande (al menos parcialmente), formando una capa 13 que cubre una banda 4 uniformemente, alcanzando una posición por debajo de un segundo miembro transversal 11.

Una boquilla de vertido 12 de tipo conocido (que puede ser una boquilla sencilla o una boquilla de panal tal como aquella de la solicitud Alemana publicada No. 197 41 523) es móvil hacia y desde lo largo del segundo miembro transversal 11 y ejecuta la segunda etapa de aplicación de resina, al verter sobre la capa expandida 13 una resina del mismo tipo como aquella rociada previamente pero en condición líquida (la línea intermitente vertical en la Figura 3 indica la línea de vertido).

La resina líquida entonces se expande, llenando el espacio entre las bandas 4 y 5 mientras que ellas pasan a través de una prensa continua 14, como se conoce *per se*.

Corriente debajo de la prensa continua, un producto semi-terminado 16 formado por las dos bandas 4 y 5 con la capa rociada expandida 13 y un núcleo aislante 17 de espuma de la

segunda resina se obtiene de esta manera, el producto semi-terminado se corta entonces mediante un cortador 18, obteniendo por lo tanto paneles terminados 20 similares a aquellos de la Figura 4.

El proceso de producción descrito anteriormente resuelve el problema resaltado por la invención.

De hecho, la aplicación de rociado distribuye la resina uniformemente sobre la superficie completa de la banda 4, de tal forma que la capa resultante 13 es libre de vacíos internos o burbujas.

Esto se debe a la atomización de la resina suministrada por el sistema de rociado, que permite a la superficie de la banda 4 ser cubierta con una película delgada de gotas pequeñas similares a aquellas de tinturas aplicadas por el mismo método, en donde no se pueden formar burbujas de gas.

Con el fin de alcanzar una buena aplicación de rociado de la resina será suficiente seleccionar la velocidad de movimiento de la cabeza 9 a lo largo del miembro transversal 10 apropiadamente dependiendo de varios parámetros tales como, por ejemplo, el ancho de la banda, su velocidad de avance, el tipo de boquilla de rociado montada en la cabeza 9, la

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presión de suministro de la boquilla, su distancia desde la banda, el tipo de resina aplicada, etc.

Más aún, en razón a que la resina es de tipo de reacción rápida, esta produce una película 13 de espuma sobre la que la resina líquida puede posteriormente ser aplicada en forma conocida; la interfaz entre las dos resinas reduce ventajosamente la presencia y/o el tamaño de cualquier vacío en la masa de la segunda resina cuando esta se expande.

En contraste con la técnica mencionada anteriormente, este método de producción es confiable, fácil de implementar y no requiere modificaciones adaptativas complejas cuando la resina, la velocidad de la banda 4 u otros parámetros de producción se cambian.

De hecho básicamente todas las resinas de polímero (resinas de poliuretano o similares), ya sean de tipo un componente o de dos componentes, se puede aplicar con técnica de rociado; esta técnica es bien conocida y se ha utilizado hace mucho tiempo, de tal forma que los cambios en el tipo de resina no alteran la eficacia del proceso de producción de la invención.

De forma similar, si la velocidad de avance de la banda se cambia (por ejemplo, para incrementar la producción de panel)

será suficiente mover la cabeza de rociado 9 con el miembro transversal 10 ligeramente corriente arriba, para permitir de esta forma que la resina de reacción rápida se expanda antes que esta alcance la segunda barra de boquilla 11.

Finalmente, como un resultado ventajoso adicional alcanzado por la invención, se destaca que esta evita la pobre e inadecuada adhesión de la espuma a la cara del panel que algunas veces ocurre cuando la resina líquida se deposita en la banda.

Naturalmente, variantes de la modalidad descrita anteriormente de la invención son posibles.

Primero que todo, se debe destacar que el tipo y forma de los paneles puede diferir de aquellos mostrados en la Figura 4; como una consecuencia, puede haber paneles perfilados en una o ambas caras, o aún paneles curvos producidos sin moldes y métodos desarrollados por el solicitante para la presente solicitud.

Más aún, el proceso de producción puede incluir también etapas de calentamiento llevadas a cabo con hornos o lámparas dispuestas a lo largo de la trayectoria de las bandas 4 y 5, como ya se conoce en la fabricación de panel, por ejemplo, un horno o lámparas pueden estar dispuestas corriente arriba de



la zona de aplicación de resina, que es por lo tanto la cabeza de rociado 9 y el miembro transversal 10, con el fin de acelerar la expansión de la resina rociada sobre la banda inferior 4.

Con respecto al rociado de la resina, en adición a las boquillas descritas anteriormente, se debe destacar que puede haber varias soluciones en relación con el tipo y forma de las boquillas, como una consecuencia, las boquillas se seleccionarán entre las más adecuadas para las condiciones operativas existentes, tal como el tamaño y forma del panel (perfilado, corrugado, plano, curvo, etc.), el tipo de aparato (continuo, discontinuo) mediante el cual esta se produce, las resinas utilizadas como aislamiento, etc.

Una alternativa posible a la cabeza de rociado 9 movible junto con el miembro transversal 10 de la modalidad previa se muestra en la Figura 5 y 6 en la cual, para simplicidad, el mismo número se ha retenido para los mismos elementos.

Como se puede ver, en esta modalidad en cambio de la cabeza 9 hay una barra de boquilla fija 30 en la que una pluralidad de boquillas de rociado sobre la banda 4, con chorros que cubren su superficie uniformemente.

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De la misma forma, para la aplicación de la resina líquida en cambio de la boquilla de vertido 12 movable a lo largo del miembro transversal 11, en esta variante una barra fija 31 de boquilla de vertido se suministra (las líneas intermitentes verticales indican las líneas de vertido).

Finalmente, se debe puntualizar que el rociado de la resina se puede desarrollar sobre la banda superior, como una alternativa o en combinación con el rociado sobre la banda inferior; consecuentemente, pueden haber métodos y aparatos para la producción de paneles de acuerdo con la invención, en donde el rociado se lleva a cabo sobre solamente una de las bandas (esto es, solamente la banda superior) o la banda inferior o sobre ambas bandas.

El rociado de la resina expandible se ajusta tan bien con el proceso de elaboración discontinua de los paneles, mencionado al inicio; con posibles varias soluciones para llevar a cabo esta operación, que están principalmente basadas en el uso de moldes.

Por ejemplo se puede utilizar una cabeza de rociado como aquella de la figura 3 o una barra de boquilla como en la figura 6; en ambos casos después de que se ha expandido la capa de rociado, la resina líquida será vertida en el molde

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cerrado con el fin de permitirle expandirse oprimiendo de esta manera el grosor deseada del panel.

De manera similar se ha visto antes en el caso de la producción continua, también en los paneles hechos de manera discontinua de acuerdo con la invención se evita la formación de espacios vacíos dañinos o burbujas de aire, entre la espuma aislante y las caras exteriores.

Este resultado es muy importante especialmente para los paneles arquitectónicos, es decir los paneles utilizados para fachadas de edificios como se muestran esquemáticamente en la figura 7; de hecho, en razón del propósito particular para el cual están destinados, se puede entender que su aspecto exterior es muy importante.

Como se puede ver en los dibujos la característica peculiar de los paneles arquitectónicos denominados como 40, es que ellos tienen caras exteriores 41 y 42 sin rozamiento, estriado o similares: ellos por lo tanto son suaves y esto hace crítico el proceso de elaboración, porque la presencia de burbujas de aire entre las caras exteriores de la espuma del núcleo aislante 43, da origen a defectos de superficie que pueden desfigurar la fachada del edificio cuando se aplican los paneles.

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Adicionalmente, la falta de estriado hace las caras exteriores de los paneles menos rígidos y más deformables, de tal forma que de hecho ellos no permanecen planos cuando existen defectos en el núcleo de la espuma aislante.

Otra característica particular de los paneles anteriormente mencionados es que ellos son generalmente montados sobre estructuras formadas por pilares y vigas 45, 46 por medio de pernos 47, ganchos 48 y similares; como consecuencia sus bordes periféricos se conforman con apéndices largos y delgados 49, para permitir el acoplamiento de los paneles con los elementos montantes.

Sin embargo, estos apéndices generan problemas durante la producción de los paneles, porque la espuma aislante no siempre llena el interior de esta; de hecho estos paneles se hacen al preparar las caras en moldes y verter la resina líquida sobre esta, pero la viscosidad del último no permite alcanzar bien todas las zonas interiores de los apéndices, de tal forma que dentro de ellos pueden permanecer espacios vacíos con todos los problemas involucrados y ya establecidos anteriormente.

Por el contrario, la aplicación de rociado de la capa de resina sobre una o ambas caras 41, 42 del panel permite alcanzar a unas zonas más interiores de los apéndices 49

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creando de esta manera una capa delgada 50 de resina expandida que llena todos los espacios circundantes a las caras.

Sobre esta capa expandida 50 se puede verter así la resina líquida, obteniendo de esta forma el núcleo aislante 42 del panel de acuerdo con el grosor deseado.

También esta modalidad de la invención la resina rociada es preferiblemente del tipo de reacción rápida en razón a que ha resultado que esto permite tener mejores resultados. Adicionalmente, como se mencionó anteriormente, la resina se puede rociar también sobre la otra cara 42 del panel 40, formando de esta manera una capa (indicada con línea intermitente en la figura 8) adyacente a esta que evita la formación de burbujas de aire o espacios vacíos en los apéndices.

Por último, en el ejemplo mostrado esquemáticamente en la figura 9 y 10, para evitar las ondulaciones que pueden aparecer sobre el metal de lámina de las caras, el proceso de elaboración discontinuo de los paneles se lleva a cabo utilizando un plano o base de soporte vacío 52 donde descansa el metal de lámina de la cara 41 del panel 40.

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Este plano se suministra al interior con canales 54 a través de los cuales el aire se chupa de una forma conocida per se, obteniendo de esta manera una depresión bajo la cara 41 que la mantiene adherida al panel 52 y elimina las ondulaciones anteriormente mencionadas.

El plano 52 es también horizontalmente movable (como se indica por la flecha de la figura 8 y 9) con respecto a la barra de boquilla 30 del tipo ya visto en el ejemplo de la figura 5 y 6: como consecuencia la resina es rociada sobre la cara 41 al llevar a cabo uno o más pasos.

Por su puesto también en este caso se pueden hacer cambios; por ejemplo se pueden utilizar los planos de soporte poroso, que no requieren canales formados en este porque se debe absorber el aire a través de ellos; para este propósito se hace referencia a los plano hechos de tableros de fragmentos, material plástico con celdas abiertas o material esponjoso.

Los sistemas de vacío neumático como aquel considerado antes pueden operar sobre todos los tipos de superficies, bien sea mecánica, plástica u otra, para mantener la planicie de las caras donde se esparce la resina.

Sin embargo, se puede entender que se podrían reemplazar por otros sistemas, basados por ejemplo en el uso de magnetos en

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el caso de metal de lámina, o de tapas de succión u otros medios de soporte similares.

La primera de estas alternativas se muestra en la figura 11 en donde plano de soporte 52 se suministra con aletas incorporadas en este, los cuales aplican una fuerza de atracción sobre la cara 51 hecha de metal de lámina; los elementos pueden ser del tipo natural o electromagnetos y, como se mencionó anteriormente, ellos podrían ser reemplazados con tapas de succión y otros medios de soporte equivalentes.

Todas estas variantes caen dentro del alcance de las siguientes reivindicaciones.

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REIVINDICACIONES

1. Panel aislante caracterizado porque comprende dos caras opuestas (4, 5; 41, 42), una capa (13, 50) de una primera resina polimérica expandida rociada sobre al menos una de dichas caras, un núcleo aislante (17; 43) hecho de una segunda resina polimérica expandida contigua a dicha capa (13).
2. Panel de acuerdo con la reivindicación 1 (4, 5; 41, 42) son sustancialmente lisas.
3. Panel de acuerdo con la reivindicación 1 y 2, que comprende apéndices periféricos (49) a lo largo del borde, llenado con dicha capa (50) de resina expandida aplicada por rociado.
4. Panel de acuerdo con las reivindicaciones precedentes, en donde las caras (4, 5; 41, 42) son de metal de lámina.
5. Método para producción continua de paneles aislantes, que comprende las etapas de:

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- avanzar una banda superior (5) y una banda inferior (4) y longitudinalmente en condición sustancialmente superimpuesta,
- aplicar una resina polimérica expandible sustancialmente líquida entre las bandas (4, 5), y
- hacer que la resina se expanda mientras las bandas (4, 5) se mantienen separadas a distancia predeterminada sustancialmente igual al grosor de los paneles a ser producidos,

caracterizado porque este comprende la etapa de rociar una resina polimérica expandida sobre al menos una de las bandas (4, 5).

6. Método de acuerdo con la reivindicación 5, en donde la resina sustancialmente líquida se aplica sobre una capa (13) formada por el rociado y la resina al menos parcialmente expandida.

7. Método de acuerdo con la reivindicación 6 y 7, en donde la resina rociada es del tipo de reacción rápida.

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8. Método de acuerdo con las reivindicaciones 5 a 7, en donde banda sobre la cual se esparce la resina expansiva de reacción rápida, es la banda inferior (4).
9. Método de acuerdo con las reivindicaciones precedentes en donde las bandas (4, 5) se hacen de metal.
10. Método de acuerdo con las reivindicaciones precedentes, en donde las resinas modificadas son resinas de poliuretano de un componente a dos componentes.
11. Aparato para la producción de paneles de acuerdo con el método de las reivindicaciones precedentes, caracterizado porque este comprende medios (9, 10) para rociar una resina y medios de primer polímero expandible (11, 12; 31) para aplicar un segundo líquido en una segunda resina de polímero expandible sustancialmente líquida sobre al menos una de las tiras.
12. Aparato de acuerdo con la reivindicación 11, en donde los medios (9, 10; 30) para rociar la primera resina están dispuestas corriente arriba de los

medios (11, 12; 31) para aplicar la segunda resina sustancialmente líquida.

13. Aparato de acuerdo con la reivindicación 11 y 12, en donde los medios para rociar la primer resina comprenden una cabeza rociadora (9) movable hacia y transversalmente con relación a la dirección de avance de la banda (4) sobre la cual se rocía la resina.

14. Aparato de acuerdo con las reivindicaciones 11 y 12; en donde los medios para rociar la primer resina comprenden una barra de boquilla fija (30), que se extiende transversalmente a la dirección de avance de la banda (4, 5) donde la resina tiene que ser rociada.

15. El método para la producción discontinua de paneles aislantes de acuerdo con las reivindicaciones 1 a 4, que comprende las etapas de:

- rociar al menos una de las caras (41, 42) una capa (50) de una resina de polímero expandible;
- aplicar una resina de polímero expandible en una condición sustancialmente líquida;

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- permitirle a la resina líquida expandirse aunque el material de las caras (41, 42) en un molde, separado a una distancia predeterminada sustancialmente igual al grosor de los paneles a ser producidos.

16. Método de acuerdo con la reivindicación 15, en donde la resina de acuerdo con el líquido se aplican sobre una capa (50) de resina rociada y al menos parcialmente expandida.
17. Método de acuerdo con las reivindicaciones 15 y 16, en donde la resina rociada es del tipo de reacción rápida.
18. Método de acuerdo con las reivindicaciones 15 a 17, en donde las resinas expandibles son resinas de poliuretano de un componente o de dos componentes.
19. Método de acuerdo con las reivindicaciones 15 a 18, en donde la cara (41) sobre la cual se esparce la resina, se soporta por un plano de soporte (52) provisto con medios (54) para originar una depresión bajo dicha cara para evitar la presencia de ondulaciones sobre esta.

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20. Método de acuerdo con la reivindicación 15 a 18 en donde la cara (41) sobre la cual se esparce la resina, se soporta por un plano de soporte (52) provisto con medios (64) de tipo magnético que actúan bajo dicha cara para evitar la presencia de ondulaciones sobre ésta.

21. Método de acuerdo con la reivindicación 19 y 20 en donde el plano de soporte 52 es movable con respecto a la boquilla (30) para rociar la resina.

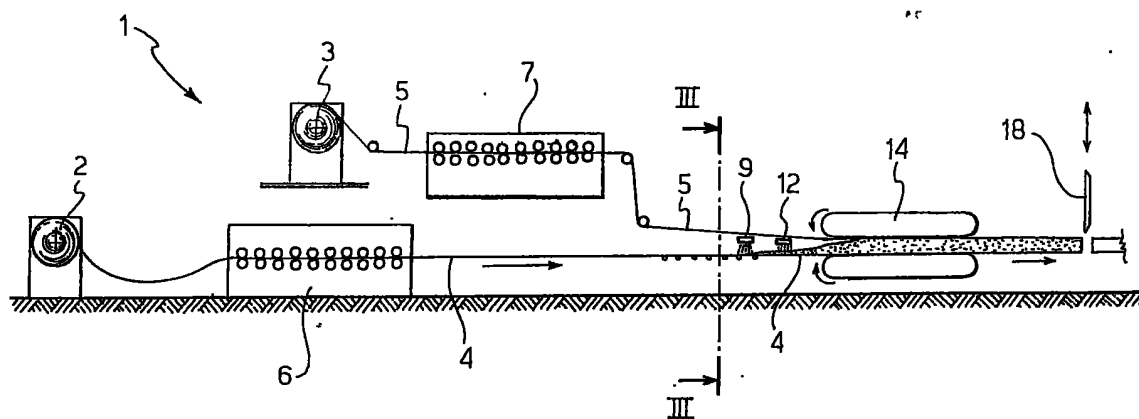
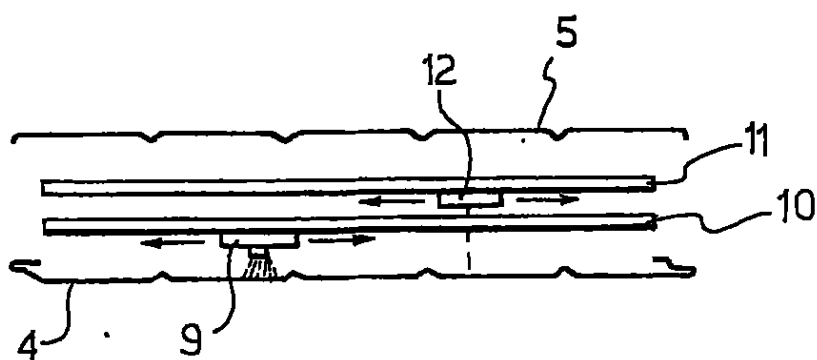
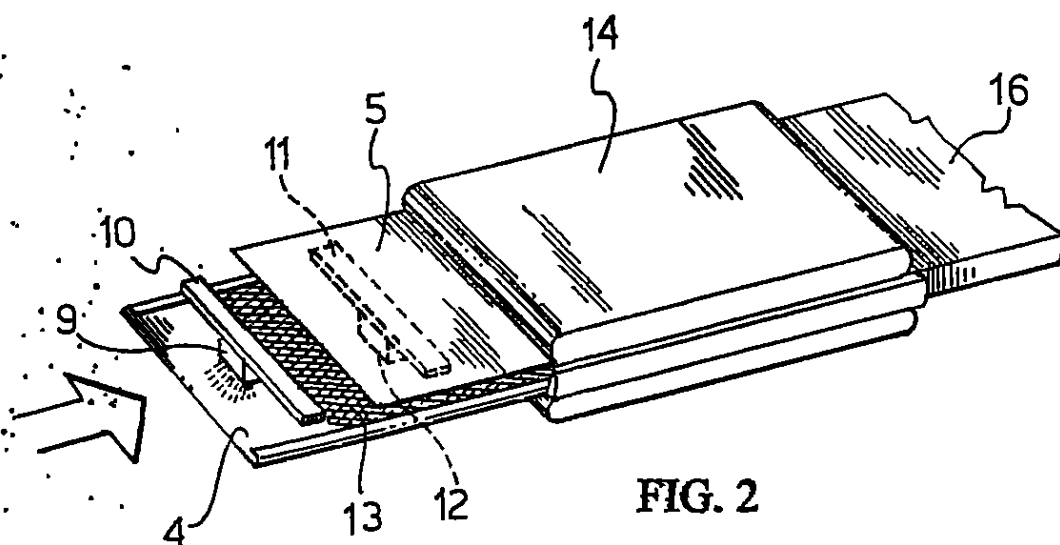


FIG. 1



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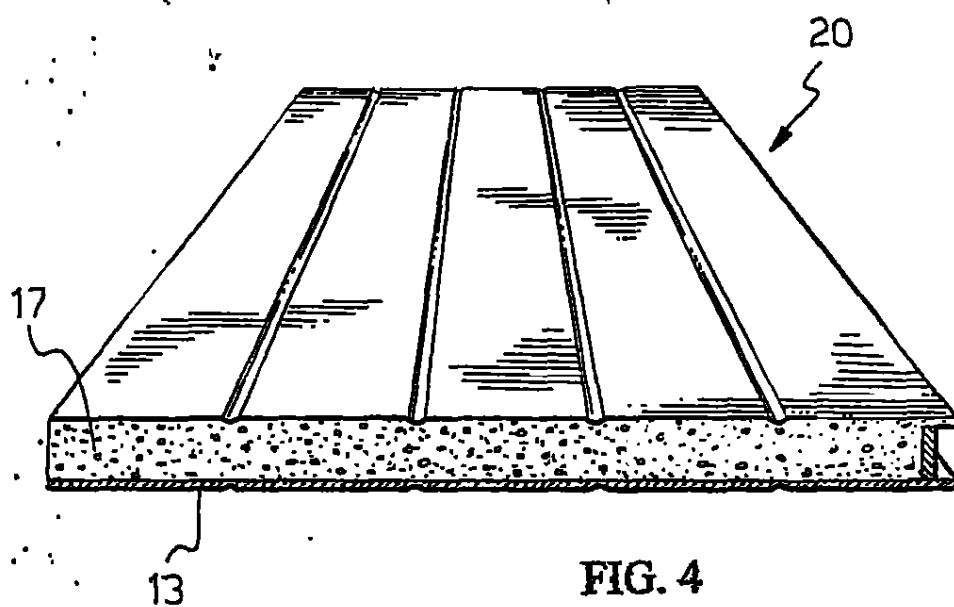


FIG. 4

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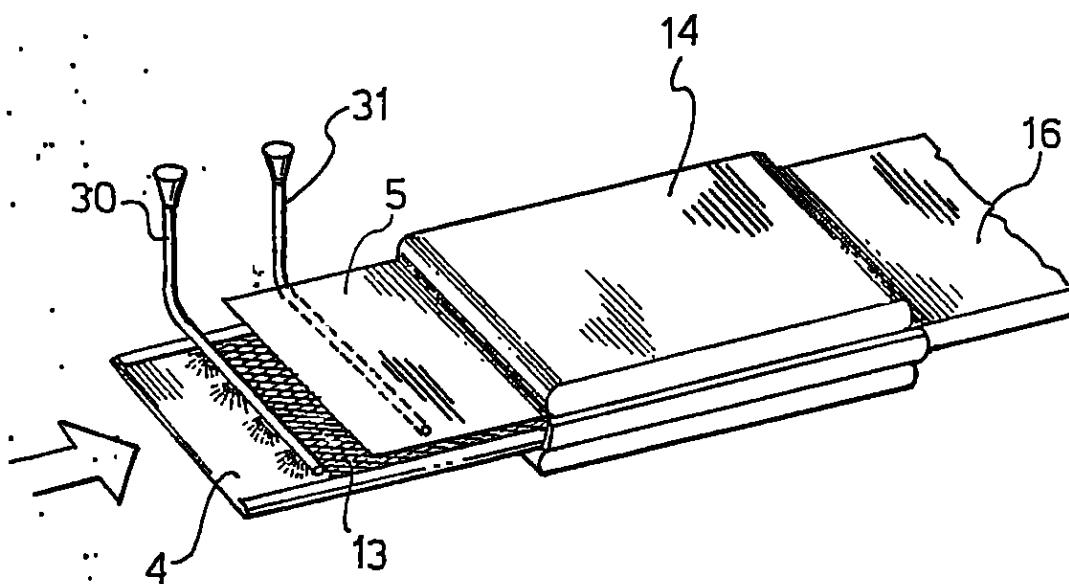


FIG. 5

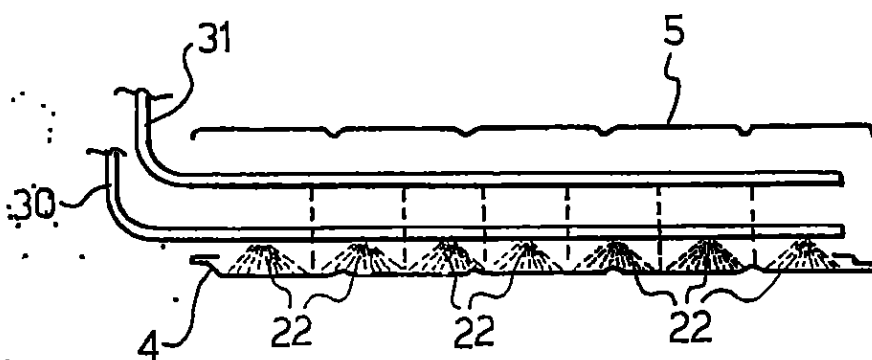


FIG. 6

3/5

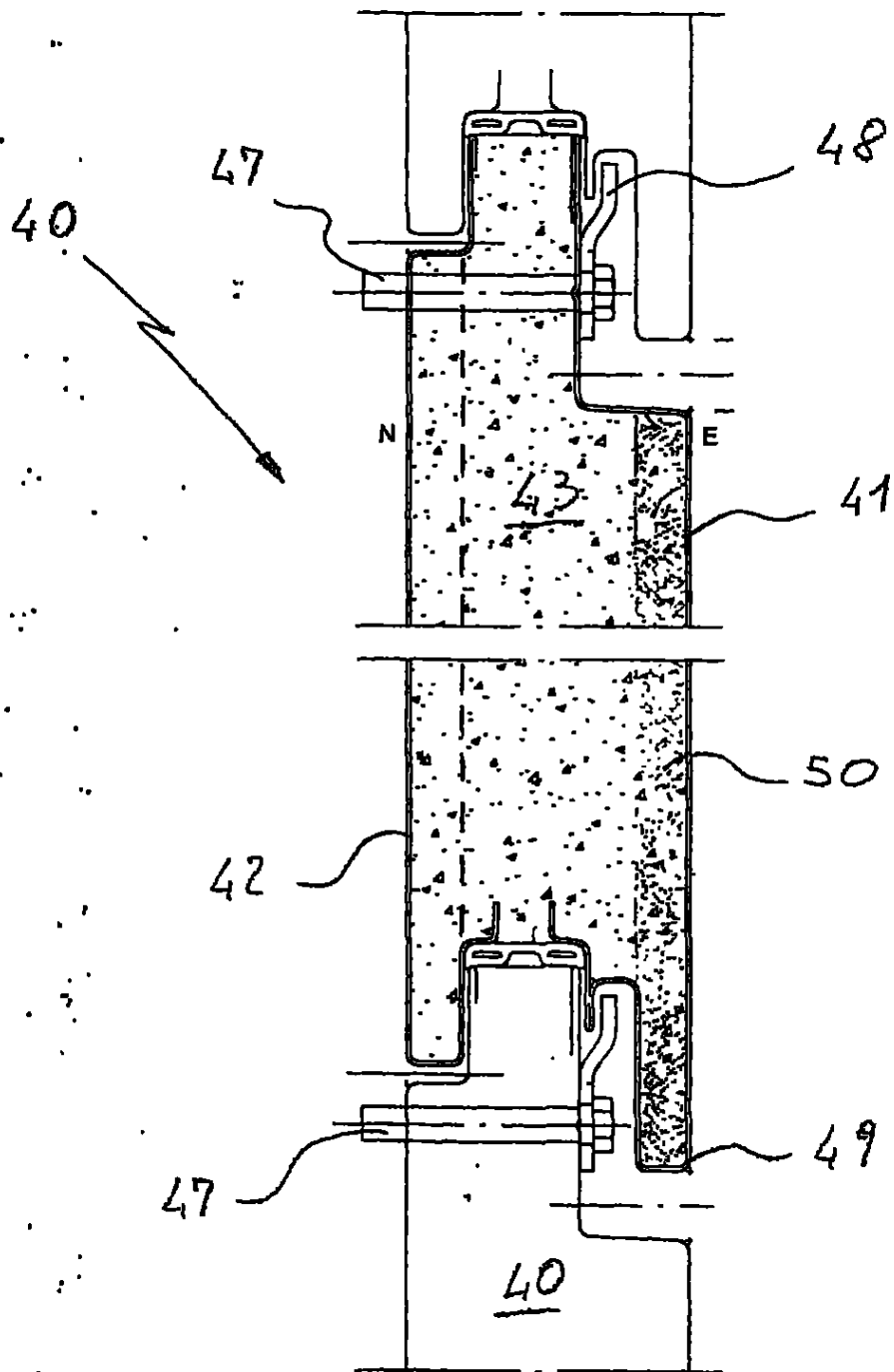


FIG. 8

552

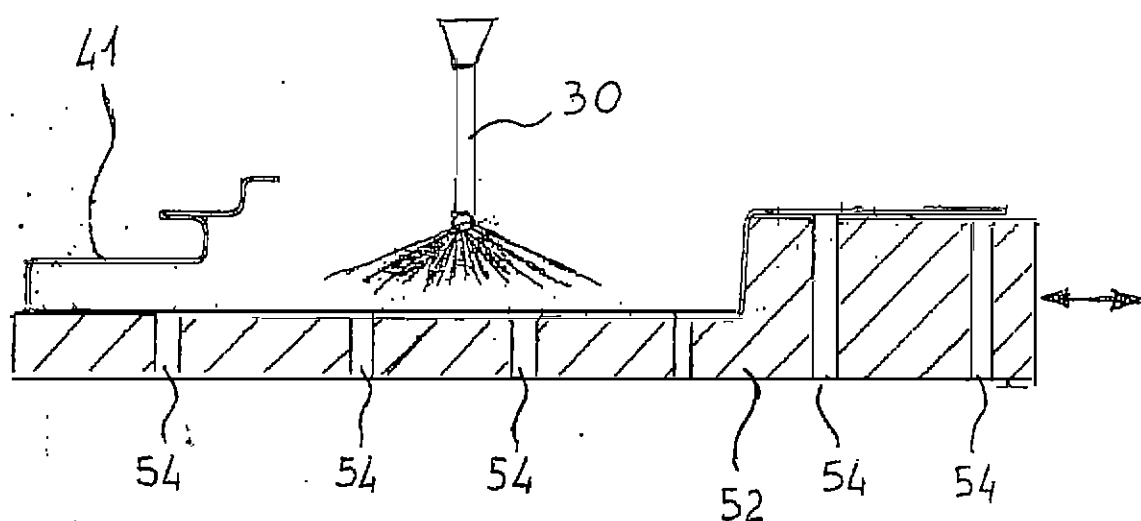


FIG. 9

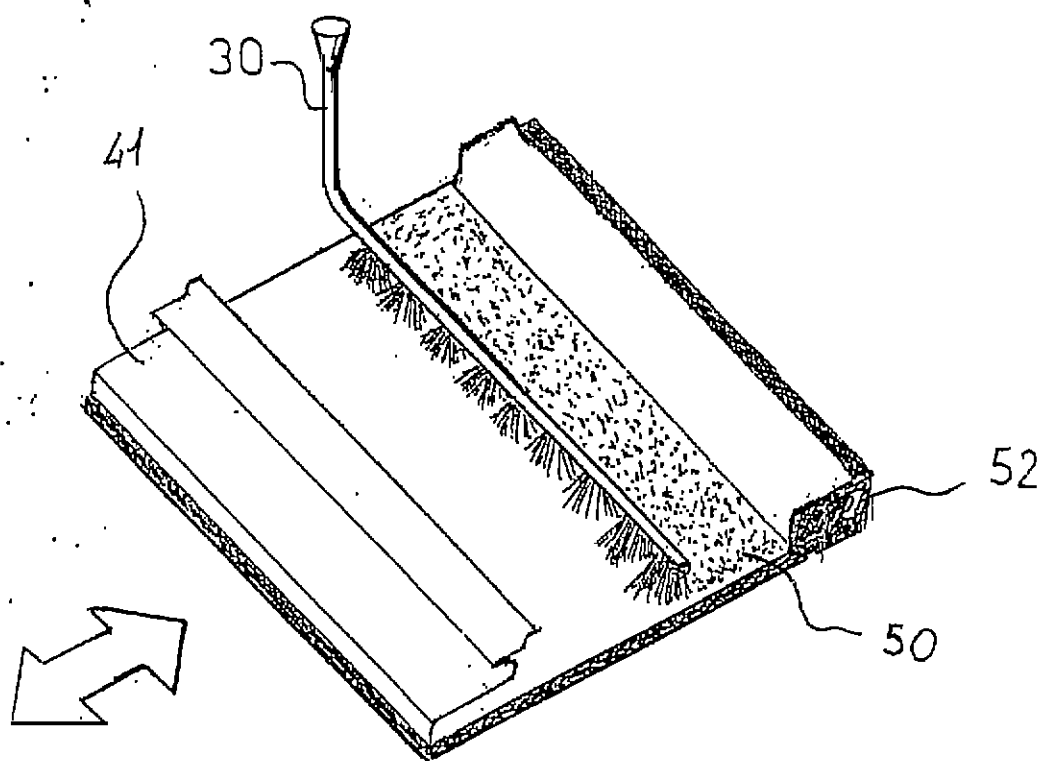


FIG. 10

56
57

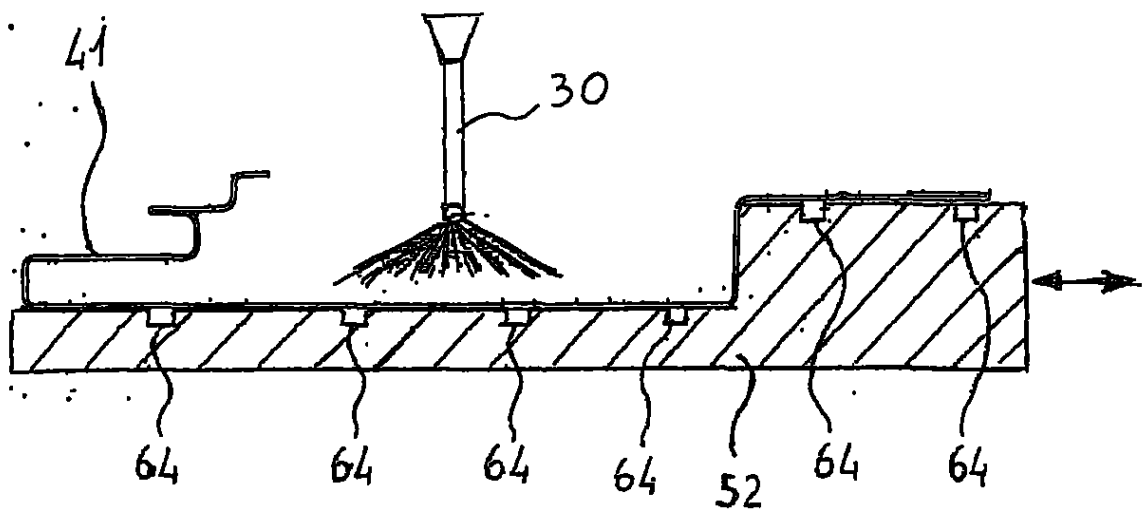


FIG.11

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 03-ST-33-E	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below	
International application No. PCT/IT 03/00577	International filing date (day/month/year) 29/09/2003	(Earliest) Priority Date (day/month/year) 01/08/2003
Applicant METECNO SPA		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

Basis of the report

1. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 29.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing

☐ contained in the international application in written form

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

3. ☐ Certain claims were found unsearchable (See Box I).

4. ☐ Unity of invention is lacking (see Box II).

5. With regard to the title,

☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

6. With regard to the abstract,

☐ the text is approved as submitted by the applicant

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

7. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures

INTERNATIONAL SEARCH REPORT

International application No

PCT/IT 03/00577

Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

There is disclosed an insulating panel (20) and a method for continuous manufacturing thereof, wherein a polyurethane expansible resin (13) of the quick-reaction type is sprayed on a strip (4); after the sprayed resin has expanded, another resin (17) is poured in liquid condition, thereby obtaining the insulating core of the panels. The invention also concerns the apparatus for carrying out the method.

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B29C44/38 B29C44/32 B29C44/46		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 B29C		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 05, 14 September 2000 (2000-09-14) & JP 2000 052466 A (MORIYA FIELD:KK), 22 February 2000 (2000-02-22) abstract; figure	1,2,5,6, 10-12, 15,16,18
X	US 3 872 199 A (OTTINGER LESTER V) 18 March 1975 (1975-03-18) column 3, line 47 - column 4, line 15; figures	1,5-12, 15-18,21 13
X	US 3 834 967 A (JENNINGS R ET AL) 10 September 1974 (1974-09-10) abstract	1,5,8-10 13
	-/--	
☒ Further documents are listed in the continuation of box C ☒ Patent family members are listed in annex		
* Special categories of cited documents "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "Z" document member of the same patent family		
Date of the actual completion of the international search 11 01 2005		Date of mailing of the international search report 14 01 2005
Name and mailing address of the ISA European Patent Office, P B 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel (+31-70) 340-2040, Tx 31 651 epo nl, Fax (+31-70) 340-3016		Authorized officer Pipping, L

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	US 3 541 639 A (ENICKS JAMES H) 24 November 1970 (1970-11-24) figures	1,5,11
A	----- PATENT ABSTRACTS OF JAPAN vol. 0170, no. 26 (M-1354), 19 January 1993 (1993-01-19) - & JP 04 250009 A (DAIDO STEEL SHEET CORP), 4 September 1992 (1992-09-04) abstract; figures	1-5,11, 15
A	----- EP 0 767 037 A (ATOMA INT INC) 9 April 1997 (1997-04-09) claim I	19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IT 03/00577

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 2000052466	A	22-02-2000	NONE	
US 3872199	A	18-03-1975	CA 981862 A1	20-01-1976
US 3834967	A	10-09-1974	CA 969459 A1	17-06-1975
			DE 2221397 A1	23-11-1972
			SE 380319 B	03-11-1975
US 3541639	A	24-11-1970	NONE	
JP 04250009	A	04-09-1992	JP 6051304 B	06-07-1994
EP 0767037	A	09-04-1997	US 5683796 A	04-11-1997
			AT 240825 T	15-06-2003
			AU 701205 B2	21-01-1999
			AU 6587096 A	10-04-1997
			CA 2186332 A1	06-04-1997
			DE 69628255 D1	26-06-2003
			DE 69628255 T2	27-11-2003
			EP 0767037 A2	09-04-1997
			JP 9216538 A	19-08-1997
			US 5721038 A	24-02-1998

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) 03 ST 33 E

Box No. I TITLE OF INVENTION

Insulating panel, process and apparatus for manufacturing thereof, with expansible resin spraying

Box No. II APPLICANT

☐ This person is also inventor

Name and address. (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

METECNO SPA
Via per Cassino 19
20067 TRIBIANO (MILANO)
Italy

Telephone No

Facsimile No.

Teleprinter No.

Applicant's registration No. with the Office

State (that is, country) of nationality

IT

State (that is, country) of residence.

IT

This person is applicant
for the purposes of:☐ all designated
States☒ all designated States except
the United States of America☐ the United States
of America only☐ the States indicated in
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address. (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

MORANDI Maurizio
Via Raffaello Lambruschini 12
10143 MILANO
Italy

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box
is marked, do not fill in below)

Applicant's registration No. with the Office

State (that is, country) of nationality:

IT

State (that is, country) of residence

IT

This person is applicant
for the purposes of:☐ all designated
States☐ all designated States except
the United States of America☒ the United States
of America only☐ the States indicated in
the Supplemental Box☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf
of the applicant(s) before the competent International Authorities as☒ agent☐ common
representative

Name and address. (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

FERRONI Filippo
Dragotti & Associati Srl
Galleria San Babila 4/C
20122 MILANO
Italy

Telephone No

02 799340

Facsimile No.

02 784427

Teleprinter No

Agent's registration No. with the Office

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. V DESIGNATION OF STATES

Mark the applicable check-boxes below; at least one must be marked

The following designations are hereby made under Rule 4.9(a):

Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZM Zambia, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT (if other kind of protection or treatment desired, specify on dotted line)
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, BG Bulgaria, CH & LI Switzerland and Liechtenstein, CY Cyprus, CZ Czech Republic, DE Germany, DK Denmark, EE Estonia, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, HU Hungary, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, RO Romania, SE Sweden, SI Slovenia, SK Slovakia, TR Turkey, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GQ Equatorial Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line).

- | | | |
|---|--|---|
| ☒ AE United Arab Emirates | ☒ HR Croatia | ☒ OM Oman |
| ☒ AG Antigua and Barbuda | ☒ HU Hungary | ☒ PG Papua New Guinea |
| ☒ AL Albania | ☒ ID Indonesia | ☒ PH Philippines |
| ☒ AM Armenia | ☒ IL Israel | ☒ PL Poland |
| ☒ AT Austria | ☒ IN India | ☒ PT Portugal |
| ☒ AU Australia | ☒ IS Iceland | ☒ RO Romania |
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| ☒ BB Barbados | ☒ KG Kyrgyzstan | ☒ SD Sudan |
| ☒ BG Bulgaria | ☒ KP Democratic People's Republic of Korea | ☒ SE Sweden |
| ☒ BR Brazil | ☒ KR Republic of Korea | ☒ SG Singapore |
| ☒ BY Belarus | ☒ KZ Kazakhstan | ☒ SK Slovakia |
| ☒ BZ Belize | ☒ LC Saint Lucia | ☒ SL Sierra Leone |
| ☒ CA Canada | ☒ LK Sri Lanka | ☒ SY Syrian Arab Republic |
| ☒ CH & LI Switzerland and Liechtenstein | ☒ LR Liberia | ☒ TJ Tajikistan |
| ☒ CN China | ☒ LS Lesotho | ☒ TM Turkmenistan |
| ☒ CO Colombia | ☒ LT Lithuania | ☒ TN Tunisia |
| ☒ CR Costa Rica | ☒ LU Luxembourg | ☒ TR Turkey |
| ☒ CU Cuba | ☒ LV Latvia | ☒ TT Trinidad and Tobago |
| ☒ CZ Czech Republic | ☒ MA Morocco | ☒ TZ United Republic of Tanzania |
| ☒ DE Germany | ☒ MD Republic of Moldova | ☒ UA Ukraine |
| ☒ DK Denmark | ☒ MG Madagascar | ☒ UG Uganda |
| ☒ DM Dominica | ☒ MK The former Yugoslav Republic of Macedonia | ☒ US United States of America |
| ☒ DZ Algeria | ☒ MN Mongolia | ☒ UZ Uzbekistan |
| ☒ EC Ecuador | ☒ MW Malawi | ☒ VC Saint Vincent and the Grenadines |
| ☒ EE Estonia | ☒ MX Mexico | ☒ VN Viet Nam |
| ☒ ES Spain | ☒ MZ Mozambique | ☒ YU Serbia and Montenegro |
| ☒ FI Finland | ☒ NI Nicaragua | ☒ ZA South Africa |
| ☒ GB United Kingdom | ☒ NO Norway | ☒ ZM Zambia |
| ☒ GD Grenada | ☒ NZ New Zealand | ☒ ZW Zimbabwe |
| ☒ GE Georgia | | |
| ☒ GH Ghana | | |
| ☒ GM Gambia | | |

Check-boxes below reserved for designating States which have become party to the PCT after issuance of this sheet:

☐ ☐ ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Supplemental Box

If the Supplemental Box is not used, this sheet should not be included in the request.

1. If, in any of the Boxes, except Boxes Nos. VIII(i) to (v) for which a special continuation box is provided, the space is insufficient to furnish all the information in such case, write "Continuation of Box No. ..." (indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:
 - (i) If more than two persons are to be indicated as applicants and/or inventors and no "continuation sheet" is available, in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;

Continuation of Box No. IV.

DRAGOTTI GIANFRANCO
MICHELOTTI GIULIANO
PISTOLESI ROBERTO
DE ROS ALBERTO
AGOSTINI AGOSTINO
 - (ii) If, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked, in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;

all of

Dragotti & Associati Srl
Galleria San Babila 4/C
20122 Milano - Italy
 - (iii) If, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
 - (iv) If, in addition to the agent(s) indicated in Box No. IV, there are further agents in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
 - (v) If, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part" in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
 - (vi) If, in Box No. VI, there are more than five earlier applications whose priority is claimed in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI
2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded

See Notes to the request form

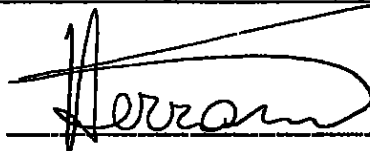
Box No. IX CHECK LIST; LANGUAGE OF FILING

This international application contains:	This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item):	Number of items
(a) in paper form, the following number of sheets:	1 ☒ fee calculation sheet	1
request (including declaration sheets) : 5	2. ☐ original separate power of attorney	
description (excluding sequence listings and/or tables related thereto) : 11	3. ☐ original general power of attorney	
claims : 3	4. ☐ copy of general power of attorney, reference number, if any:	
abstract : 1	5. ☐ statement explaining lack of signature	
drawings : 8	6. ☐ priority document(s) identified in Box No. VI as item(s)	
Sub-total number of sheets : 28	7. ☐ translation of international application into (language):	
sequence listings	8. ☐ separate indications concerning deposited microorganism or other biological material	
tables related thereto	9. ☐ sequence listings in computer readable form (indicate type and number of carriers)	
(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (c) below)	(i) ☐ copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application)	
Total number of sheets : 28	(ii) ☐ (only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter	
(b) ☐ only in computer readable form (Section 801(a)(i))	(iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listings mentioned in left column	
(i) ☐ sequence listings	10. ☐ tables in computer readable form related to sequence listings (indicate type and number of carriers)	
(ii) ☐ tables related thereto	(i) ☐ copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application)	
(c) ☐ also in computer readable form (Section 801(a)(ii))	(ii) ☐ (only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quater)	
(i) ☐ sequence listings	(iii) ☐ together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column	
(ii) ☐ tables related thereto	11. ☐ other (specify):	
Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the		
☐ sequence listings:		
☐ tables related thereto		
(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)		
Figure of the drawings which should accompany the abstract: 1	Language of filing of the international application: Italian	

Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request)

Milan, September 29, 2003



Filippo Ferroni

For receiving Office use only

1. Date of actual receipt of the purported international application:	2. Drawings: ☐ received: ☐ not received
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA /	6. ☐ Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

PCT**FEE CALCULATION SHEET**

Annex to the Request

For receiving Office use only

International Application No

Applicant's or agent's
file reference

03 ST 33 E

Date stamp of the receiving Office

Applicant

MEJECNO SPA

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE 30,99 T

2. SEARCH FEE 945,00 S

International search to be carried out by

(If two or more International Searching Authorities are competent to carry out the international search, indicate the name of the Authority which is chosen to carry out the international search)

3. INTERNATIONAL FEE

Basic Fee

Where items (b) and/or (c) of Box No. IX apply, enter Sub-total number of sheets } 28

Where items (b) and (c) of Box No. IX do not apply, enter Total number of sheets }

b1 first 30 sheets 444,00 b1

b2 $\frac{\text{number of sheets in excess of 30}}{\text{fee per sheet}}$ x $\frac{\text{fee per sheet}}{\text{fee per sheet}}$ = b2

b3 additional component (only if sequence listings and/or tables related thereto are filed in computer readable form under Section 801(a)(i), or both in that form and on paper, under Section 801(a)(ii)):

400 x $\frac{\text{fee per sheet}}{\text{fee per sheet}}$ = b3

Add amounts entered at b1, b2 and b3 and enter total at B

B

Designation Fees

The international application contains all designations.

 $\frac{5}{\text{number of designation fees payable (maximum 5)}} \times \frac{96}{\text{amount of designation fee}} = 480,00 D$

Add amounts entered at B and D and enter total at I 924,00 I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D)

P

4. FEE FOR PRIORITY DOCUMENT (if applicable)

5. TOTAL FEES PAYABLE 1.899,99

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time**MODE OF PAYMENT**☐ authorization to charge deposit account (see below) ☒ postal money order ☐ cash ☐ coupons
☐ cheque ☒ bank draft ☐ revenue stamps ☐ other (specify)**AUTHORIZATION TO CHARGE (OR CREDIT) DEPOSIT ACCOUNT**
(This mode of payment may not be available at all receiving Offices)☐ Authorization to charge the total fees indicated above.
☐ (This check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) Authorization to charge any deficiency or credit any overpayment in the total fees indicated above
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Receiving Office: RO/

Deposit Account No.

Date:

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Signature:

PATENT COOPERATION TREATY

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To

FERRONI, Filippo
Dragotti & Associati S.r.l.
Galleria San Babila, 4/C
I-20122 Milano
Italy

Date of mailing (day/month/year) 09 March 2004 (09.03.2004)	
Applicant's or agent's file reference 03 ST 33 E	IMPORTANT NOTIFICATION
International application No. PCT/IT2003/000577	International filing date (day/month/year) 29 September 2003 (29.09.2003)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 01 August 2003 (01.08.2003)
Applicant METECNO SPA et al	

1 By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

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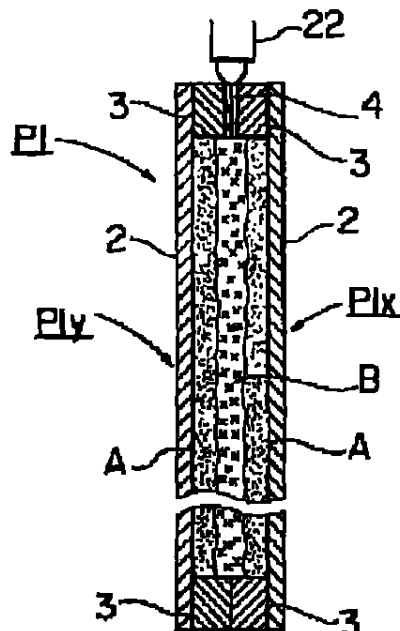
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INVENTOR : MORIYA KATSUO;

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TITLE : MANUFACTURE OF HEAT INSULATION PANEL



ABSTRACT : PROBLEM TO BE SOLVED: To eliminate a need for large scale facilities and greatly reduce costs, and obtain a heat insulation panel having high sound absorbing qualities and high sound insulating properties

SOLUTION: Frame members 3 along a penpheral part are fitted to one side of a panel member 2. In an expanded urethane spraying process, a closed- cell expanded urethane A is sprayed on a surface of the panel member 2 surrounded by the frame members 3 up to a position lower than the height of the frame members 3, and a heat insulation panel half P1x is manufactured. A pair of heat insulation panel halves P1x..., namely the heat insulation panel half P1x and a heat insulation panel half P1y obtained in the expanded urethane spraying process are prepared. The frame members 3 and 3 of each of the heat insulation panel halves P1x and P1y are put on top of each other. In an expanded urethane pouring process, an open cell expanded urethane B having lower expanding pressure than that of the expanded urethane A is filled to a gap between the opposite expanded urethanes A and A, and a heat insulation panel P1 is manufactured.

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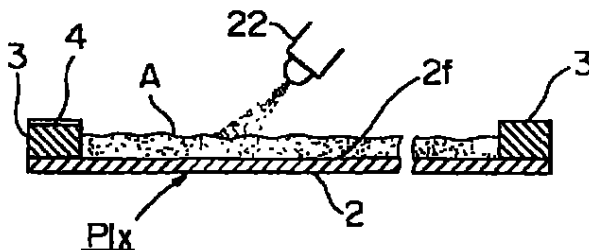
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(54)【発明の名称】 断熱パネルの製造方法

(57)【要約】

【課題】大規模な設備を不要にして大幅なコストダウンを図るとともに、吸音性及び遮音性の高い断熱パネルを得る。

【解決手段】パネル部材2の一方の面2f上に、周縁部に沿ったフレーム部材3を取付け、このフレーム部材3に囲まれたパネル部材2の面2f上に、独立気泡タイプの発泡ウレタンAをフレーム部材3の高さよりも低い位置まで吹き付けて断熱パネル半体P1xを製造する発泡ウレタン吹付工程と、この発泡ウレタン吹付工程で得られた断熱パネル半体P1x…を一对、即ち、断熱パネル半体P1xとP1yを用意し、各断熱パネル半体P1xとP1yのフレーム部材3と3同士を重ね合わせ、対向する発泡ウレタンAとA間の空間に当該発泡ウレタンAよりも発泡圧の小さい連続気泡タイプの発泡ウレタンBを充填して断熱パネルP1を製造する発泡ウレタン注入工程を備える。



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【特許請求の範囲】

【請求項1】 パネル部材の一方の面上に、周縁部に沿ったフレーム部材を取付け、このフレーム部材に囲まれた前記パネル部材の面上に、独立気泡タイプの発泡ウレタンを前記フレーム部材の高さよりも低い位置まで吹き付けて断熱パネル半体を製造する発泡ウレタン吹付工程と、この発泡ウレタン吹付工程で得られた断熱パネル半体を一対用意し、各断熱パネル半体のフレーム部材同士を重ね合わせ、対向する前記発泡ウレタン間の空間に当該発泡ウレタンよりも発泡圧の小さい連続気泡タイプの発泡ウレタンを充填して断熱パネルを製造する発泡ウレタン注入工程を備えることを特徴とする断熱パネルの製造方法。

【請求項2】 前記発泡ウレタン注入工程により得た断熱パネルから、前記パネル部材と前記フレーム部材を取外して発泡ウレタンパネルを得る発泡ウレタンパネル製造工程を備えることを特徴とする請求項1記載の断熱パネルの製造方法。

【請求項3】 パネル部材の一方の面上に、周縁部に沿ったフレーム部材を取付け、このフレーム部材に囲まれた前記パネル部材の面上に、独立気泡タイプの発泡ウレタンを前記フレーム部材の高さ又はこの高さよりも低い位置まで吹き付けて断熱パネル半体を製造する発泡ウレタン吹付工程と、この発泡ウレタン吹付工程で得られた断熱パネル半体のフレーム部材に対して、第二のパネル部材を直接又は第二のフレーム部材を介して重ね合わせ、対向する前記発泡ウレタンと前記第二のパネル部材間の空間に、前記発泡ウレタンよりも発泡圧の小さい連続気泡タイプの発泡ウレタンを充填して断熱パネルを製造する発泡ウレタン注入工程を備えることを特徴とする断熱パネルの製造方法。

【請求項4】 前記発泡ウレタン注入工程により得た断熱パネルから、前記第一パネル部材と前記第二パネル部材及び前記第一フレーム部材と前記第二フレーム部材を取外して発泡ウレタンパネルを得る発泡ウレタンパネル製造工程を備えることを特徴とする請求項3記載の断熱パネルの製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は発泡ウレタンを用いた断熱パネルの製造方法に関する。

【0002】

【従来の技術】 一般に、一対のパネル部材（アウトパネル）の内側に発泡ウレタンを充填して断熱性及び防音性等を高めた断熱パネルは知られている。

【0003】 従来 この種の断熱パネルを製造するに際しては、図7に示すように、一対のパネル部材50と50間に、周縁部に沿ったフレーム部材51を挟み、さらに、発泡ウレタンの発泡時に発生するかなり大きな発泡圧によるパネル部材50の変形を防止するため 各

パネル部材50の外側を一対のプレス板Mp、Mpにより押さえるとともに、フレーム部材51に設けた注入孔52を通して不図示の発泡ウレタン吹付装置におけるヘッドガン60から発泡ウレタン、特に、独立気泡タイプの発泡ウレタンAを内部に充填することにより、目的の断熱パネルPrを製造していた。

【0004】

【発明が解決しようとする課題】 しかし、上述した従来における断熱パネルの製造方法は、次のような問題点があった。

【0005】 第一に、製造時には、各パネル部材50の外側を押さえる一対のプレス板Mp、Mpが必要になるとともに、かなり大きな発泡圧に耐える必要があるため、大型（高圧）のプレス板Mp、Mpを含む大規模の設備が必要になり、大経なコストアップを招いてしまう。

【0006】 第二に、製造できる断熱パネルの形態が限られ、特に、吸音性及び遮音性の高い断熱パネルを得られない。

【0007】 本発明は、このような従来技術に存在する課題を解決したものであり、大規模な設備を不要にして大幅なコストダウンを図れるとともに、加えて吸音性及び遮音性の高い断熱パネルを得ることができる断熱パネルの製造方法の提供を目的とする。

【0008】

【課題を解決するための手段及び実施の形態】 本発明の第一の態様に係る断熱パネルの製造方法は、パネル部材2の一方の面2f上に、周縁部に沿ったフレーム部材3を取付け、このフレーム部材3に囲まれたパネル部材2の面2f上に、独立気泡タイプの発泡ウレタンAをフレーム部材3の高さよりも低い位置まで吹き付けて断熱パネル半体P1xを製造する発泡ウレタン吹付工程と、この発泡ウレタン吹付工程で得られた断熱パネル半体P1xを一対、即ち、断熱パネル半体P1xとP1yを用意し、各断熱パネル半体P1xとP1yのフレーム部材3と3同士を重ね合わせ、対向する発泡ウレタンAとA間の空間に当該発泡ウレタンAよりも発泡圧の小さい連続気泡タイプの発泡ウレタンBを充填して断熱パネルP1を製造する発泡ウレタン注入工程を備えることを特徴とする。

【0009】 一方、本発明の第二の態様に係る断熱パネルの製造方法は、パネル部材2の一方の面2f上に、周縁部に沿ったフレーム部材3を取付け、このフレーム部材3に囲まれたパネル部材2の面2f上に、独立気泡タイプの発泡ウレタンAをフレーム部材3の高さ又はこの高さよりも低い位置まで吹き付けて断熱パネル半体P2xを製造する発泡ウレタン吹付工程と、この発泡ウレタン吹付工程で得られた断熱パネル半体P2xのフレーム部材3に対して、第二のパネル部材2を直接又は第二のフレーム部材3を介して重ね合わせ 対向する発泡ウレ

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ダンAと第二のパネル部材2間の空間に、発泡ウレタンAよりも発泡圧の小さい連続気泡タイプの発泡ウレタンBを充填して断熱パネルP2を製造する発泡ウレタン注入工程を備えることを特徴とする。

【0010】この場合、いずれの態様においても、発泡ウレタン注入工程により得た断熱パネルP1、P2から、パネル部材2…とフレーム部材3…を取外して発泡ウレタンパネルP10、P20を得る発泡ウレタンパネル製造工程を設けてもよい。

【0011】

【実施例】次に、本発明に係る好適な実施例を挙げ、図面に基づき詳細に説明する。

【0012】まず、本実施例に係る断熱パネルの製造方法に用いる発泡ウレタンの吹付装置について、図3を参照して説明する。

【0013】発泡ウレタンの吹付装置10は、原料となる主剤を収容する第一タンク11及び硬化剤を収容する第二タンク12を備える。また、主剤供給部13と硬化剤供給部14を備え、主剤供給部13は第一タンク11の下方に配した第一ポンプ（プロポーションポンプ）15とこの下方に配した第一ヒータ16を備えるとともに、硬化剤供給部14は第二タンク12の下方に配した第二ポンプ（プロポーションポンプ）17とこの下方に配した第二ヒータ18を備える。そして、第一タンク11の底部と第一ポンプ15の吸入口、第一ポンプ15の吐出口と第一ヒータ16の流入口、第二タンク12の底部と第二ポンプ17の吸入口、第二ポンプ17の吐出口と第二ヒータ18の流入口は、それぞれ配管により接続する。この場合、各タンク11及び12に収容された主剤及び硬化剤はそれぞれ自重落下により各ポンプ15及び17に供給される。

【0014】一方、第一切換弁19及び第二切換弁20を備え、第一切換弁19の流入ポートは配管を介して第一ヒータ16の流出口（下流側）に接続するとともに、第二切換弁20の流入ポートは配管を介して第二ヒータ18の流出口（下流側）に接続する。また、第一切換弁19の一方の流出ポートは後端の位置が固定されたフレキシブルなチューブ21を介してヘッドガン22に接続するとともに、他方の流出ポートは配管を介して第一タンク11に接続する。さらに、第二切換弁20の一方の流出ポートは後端の位置が固定されたフレキシブルなチューブ23を介してヘッドガン22に接続するとともに、他方の流出ポートは配管を介して第二タンク12に接続する。各切換弁19、20は、それぞれ駆動部24、25により切換えられる。また、26は制御部であり、制御信号を各駆動部24、25に付与することにより、各駆動部24、25を制御する。これにより、各切換弁19、20は、制御部26によって切換えられ、第一ヒータ16から付与される主剤は第一タンク11又はヘッドガン22に選択的に供給可能になるとともに、第

二ヒータ18から付与される硬化剤は第二タンク12又はヘッドガン22に選択的に供給可能になる。さらに、第一タンク11には内部に収容した主剤の温度を検出する第一温度センサ27を付設するとともに、第二タンク12には内部に収容した硬化剤の温度を検出する第二温度センサ28を付設し、各温度センサ27及び28は制御部26に接続する。

【0015】このように構成される吹付装置10は、次のように動作する。まず、電源の投入により、制御部26は制御信号を駆動部24、25に付与し、第一切換弁19を第一タンク11側に、第二切換弁20を第二タンク12側にそれぞれ切換える。図3はこの状態を示す。また、各ヒータ16、18に通電するとともに、各ポンプ15、17を作動させる。これにより、第一タンク11内の主剤は、第一ポンプ15→第一ヒータ16→第一切換弁19→第一タンク11の経路で循環し、第一タンク11内の主剤が加熱されるとともに、第二タンク12内の硬化剤は、第二ポンプ17→第二ヒータ18→第二切換弁20→第二タンク12の経路で循環し、第二タンク12内の硬化剤が加熱される。

【0016】一方、各温度センサ27、28により各タンク11、12内の主剤及び硬化剤の温度が検出され、この検出結果は制御部26に付与される。制御部26は検出した温度を監視し、設定温度に達したなら制御信号を駆動部24、25に付与して各切換弁19、20をヘッドガン22側に自動で切換える。これにより、第一タンク11内の主剤は、第一ポンプ15→第一ヒータ16→第一切換弁19→チューブ21の経路でヘッドガン22に供給されるとともに、第二タンク12内の硬化剤は、第二ポンプ17→第二ヒータ18→第二切換弁20→チューブ23の経路でヘッドガン22に供給され、通常の使用モードとなる。このように、第一タンク11内の主剤及び第二タンク12内の硬化剤は、既設の第一ヒータ16及び第二ヒータ18によって予備加熱が行われる。したがって、別途の加熱装置は不要になる。この場合、予備加熱時における主剤と硬化剤に対する設定温度は別々に設定し、双方が設定温度に達したなら、第一切換弁19と第二切換弁20を同時に切換える。

【0017】次に、本発明の第一実施例に係る断熱パネルの製造方法について、図1及び図2を参照して説明する。

【0018】まず、矩形のパネル部材（アウトパネル）2を用意し、図1に示すように、パネル部材2の一方の面2f上に、周縁部に沿った矩形棒状のフレーム部材3を接着剤或いは固定ネジ等を用いて取付ける。この場合、パネル部材2及びフレーム部材3は金属製であってもよいし、合成樹脂製であってもよい。また、フレーム部材3の一辺中央には溝状の注入部4を形成する。

【0019】そして、図1に示すように、このフレーム部材3に囲まれたパネル部材2の面2f上に、前述した

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吹付装置10のヘッドガン22から独立気泡タイプの発泡ウレタンAを吹き付ける。この場合、発泡ウレタンAは、フレーム部材3の高さよりも低い位置まで吹き付ける。以上の工程が、断熱パネル半体P1xを製造する発泡ウレタン吹付工程となる。

【0020】次いで、発泡ウレタン吹付工程で得られた断熱パネル半体P1xを一對、即ち、断熱パネル半体P1xとP1yを用意する。断熱パネル半体P1xとP1yは同一である。そして、図2に示すように、各断熱パネル半体P1xとP1yにおけるフレーム部材3と3同士を重ね合わせて固着する。この際、溝状の注入部4は相互に重なり注入孔を形成する。次いで、前述した吹付装置10のヘッドガン22を注入部4にタッチさせ、当該ヘッドガン22から前述した発泡ウレタンAよりも発泡圧の小さい連続気泡タイプの発泡ウレタンBを注入し、図3に示すように、対向する発泡ウレタンAとA間の空間に充填する。以上の工程が、断熱パネルP1を製造する発泡ウレタン注入工程となる。

【0021】この場合、発泡ウレタンAを吹き付ける量を任意に変更することにより、発泡ウレタンAとBの層の厚さの割合を変更できる。また、発泡ウレタン注入工程では、発泡圧の小さい連続気泡タイプの発泡ウレタンBを使用するとともに、既に、パネル部材2には発泡圧の比較的大きい独立気泡タイプの発泡ウレタンAが吹き付けられているため、従来のように、各パネル部材2の外側を押さえてパネル部材2の変形を防止するプレス板は不要或いは使用する場合であっても小型（低圧）のプレス板と小規模の設備で足りるため、大幅なコストダウンが図られる。また、得られる断熱パネルP1は、独立気泡タイプの発泡ウレタンAと連続気泡タイプの発泡ウレタンBの二層構造となるため、独立気泡タイプの発泡ウレタンAによる良好な遮音特性と、連続気泡タイプの発泡ウレタンBによる良好な吸音特性により、断熱パネルP1全体の防音性（遮音性及び吸音性）が向上し、前述した従来の技術における断熱パネルPに対して20パーセント程度向上させることができる。

【0022】なお、前述した発泡ウレタン吹付工程において、予めパネル部材2の一方の面2f上に離型剤を塗布し、発泡ウレタン注入工程により得た断熱パネルP1からパネル部材2、2とフレーム部材3、3を取外す発泡ウレタンパネル製造工程を設ければ、図4に示す発泡ウレタンのみによる発泡ウレタンパネルP1oを得ることができる。

【0023】次に、本発明の第二実施例に係る断熱パネルの製造方法について、図1、図5及び図6を参照して説明する。

【0024】第二実施例は、前述した第一実施例における発泡ウレタン吹付工程において、独立気泡タイプの発泡ウレタンAを吹き付ける量を異ならせる。即ち、第二実施例では、発泡ウレタンAを、図5に示すように、フ

レーム部材3の高さまで吹き付けることができる。勿論、この場合、フレーム部材3の高さよりも低い位置であってもよい。以上の工程が、断熱パネル半体P2xを製造する第二実施例における発泡ウレタン吹付工程となる。

【0025】次いで、発泡ウレタン吹付工程で得られた断熱パネル半体P2xのフレーム部材3に対して、第二のパネル部材2を第二のフレーム部材3を介して重ね合わせ、一体に固着する。第二のパネル部材2及び第二のフレーム部材3は、基本的に断熱パネル半体P2xで用いたパネル部材2及びフレーム部材3と同じであるが、注入部4は、図5に示すように、第二のフレーム部材3にのみ設けることができる。そして、同図に示すように、前述した吹付装置10のヘッドガン22を注入部4にタッチさせ、当該ヘッドガン22から、前述した発泡ウレタンAよりも発泡圧の小さい連続気泡タイプの発泡ウレタンBを注入することにより、発泡ウレタンAと第二のパネル部材2間の空間に充填する。以上の工程が、断熱パネルP2を製造する第二実施例における発泡ウレタン注入工程となる。

【0026】この場合、発泡ウレタンAを吹き付ける量を任意に変更することにより、発泡ウレタンAとBの層の厚さの割合を変更できる点は第一実施例と同じである。また、断熱パネル半体P2xに使用するフレーム部材3の高さを二倍にすれば、発泡ウレタン注入工程では、第二のパネル部材2のみを、直接、断熱パネル半体P2xのフレーム部材3に重ね合わせればよい。さらに、従来のように、各パネル部材2の外側を押さえてパネル部材2の変形を防止するプレス板は不要或いは使用する場合であっても小型のプレス板と小規模の設備で足りる点、また、防音性を向上できる点は、第一実施例と同じである。

【0027】なお、前述した発泡ウレタン吹付工程において、予めパネル部材2の一方の面2f上に離型剤を塗布し、発泡ウレタン注入工程により得た断熱パネルP2からパネル部材2、2とフレーム部材3、3を取外す発泡ウレタンパネル製造工程を設ければ、図6に示す発泡ウレタンのみによる発泡ウレタンパネルP2oを得ることができる点も、基本的に第一実施例と同じである。

【0028】以上、実施例について詳細に説明したか、本発明はこのような実施例に限定されるものではなく、細部の構成、形状、手法、素材、材料等において、本発明の要旨を逸脱しない範囲で任意に変更できる。例えば、応用例として、発泡ウレタンAの代わりに、FRP（合成樹脂）を用いることもできる。また、発泡ウレタンパネルP1o、P2oの表面には耐火材をコーティングするなど、任意の表面処理を施すことができる。

【0029】

【発明の効果】このように、本発明に係る断熱パネルの製造方法は、第一の態様として、パネル部材の一方の面

上に、周縁部に沿ったフレーム部材を取付け、このフレーム部材に囲まれたパネル部材の面上に、独立気泡タイプの発泡ウレタンをフレーム部材の高さよりも低い位置まで吹き付けて断熱パネル半体を製造する発泡ウレタン吹付工程と、この発泡ウレタン吹付工程で得られた断熱パネル半体を一対用意し、各断熱パネル半体のフレーム部材同士を重ね合わせ、対向する発泡ウレタン間の空間に当該発泡ウレタンよりも発泡圧の小さい連続気泡タイプの発泡ウレタンを充填して断熱パネルを製造する発泡ウレタン注入工程を備えるとともに、第二の態様として、パネル部材の一方の面上に、周縁部に沿ったフレーム部材を取付け、このフレーム部材に囲まれたパネル部材の面上に、独立気泡タイプの発泡ウレタンをフレーム部材の高さ又はこの高さよりも低い位置まで吹き付けて断熱パネル半体を製造する発泡ウレタン吹付工程と、この発泡ウレタン吹付工程で得られた断熱パネル半体のフレーム部材に対して、第二のパネル部材を直接又は第二のフレーム部材を介して重ね合わせ、対向する発泡ウレタンと第二のパネル部材間の空間に、当該発泡ウレタンよりも発泡圧の小さい連続気泡タイプの発泡ウレタンを充填して断熱パネルを製造する発泡ウレタン注入工程を備えるため、次のような顕著な効果を奏する。

【0030】①、各パネル部材の外側を押さえてパネル部材の変形を防止するプレス板は、不要或いは使用する場合であっても小型（低圧）のプレス板と小規模の設備で足りるため、大幅なコストダウンを図ることができる。

【0031】② 異なる発泡ウレタンを含む二層構造となるため、防音性を従来の断熱パネルに対して20パーセント程度向上させることができるなど、断熱パネル全体の防音性（遮音性及び吸音性）を大幅に向上させるこ

とができる。

【図面の簡単な説明】

【図1】本発明の第一実施例に係る製造方法における発泡ウレタン吹付工程を説明するための断熱パネル半体の断面側面図、

【図2】同製造方法における発泡ウレタン注入工程を説明するための断熱パネルの断面側面図、

【図3】同製造方法に用いる吹付装置のブロック構成図、

【図4】同製造方法により製造した発泡ウレタンパネルの断面側面図、

【図5】本発明の第二実施例に係る製造方法における発泡ウレタン注入工程を説明するための断熱パネル半体の断面側面図、

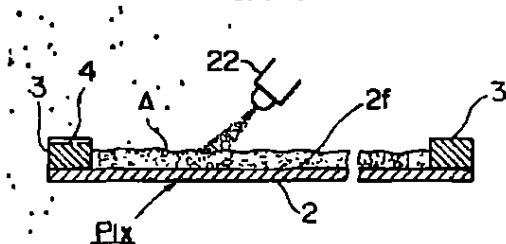
【図6】同製造方法により製造した発泡ウレタンパネルの断面側面図、

【図7】従来の技術に係る製造方法を説明するための断熱パネルの断面側面図、

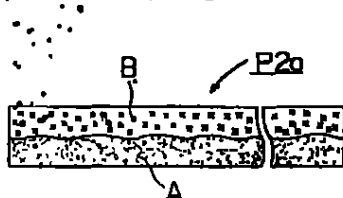
【符号の説明】

- | | |
|-----|----------------|
| 2 | パネル部材 |
| 2f | パネル部材の一方の面 |
| 3 | フレーム部材 |
| A | 独立気泡タイプの発泡ウレタン |
| B | 連続気泡タイプの発泡ウレタン |
| P1 | 断熱パネル |
| P2 | 断熱パネル |
| P1x | 断熱パネル半体 |
| P1y | 断熱パネル半体 |
| P2x | 断熱パネル半体 |
| P1o | 発泡ウレタンパネル |
| P2o | 発泡ウレタンパネル |

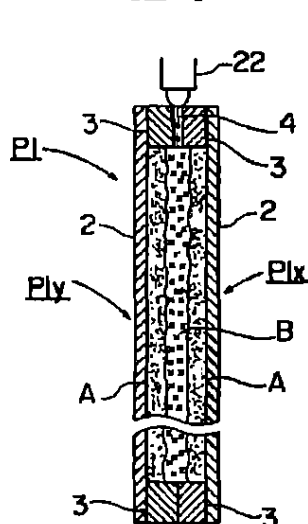
【図1】



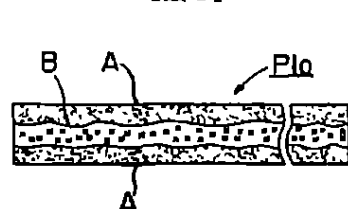
【図6】



【図2】

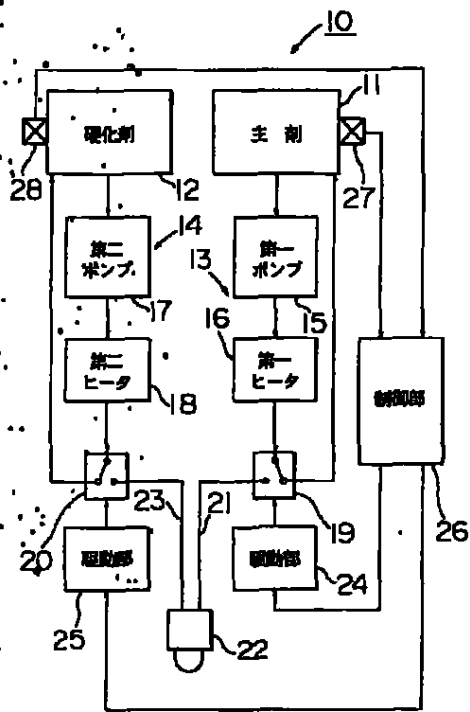


【図4】

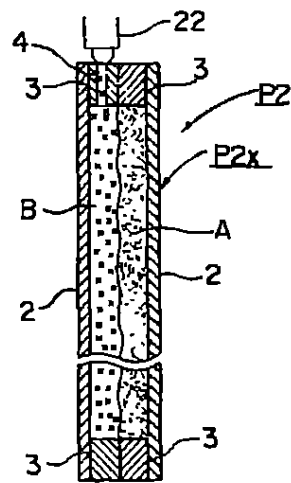


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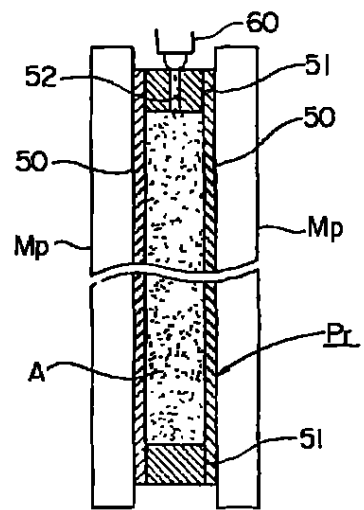
【図3】



【図5】



【図7】



[54] **METHOD OF MANUFACTURING A
FOAMED URETHANE STRUCTURAL
PRODUCT HAVING HIGH AND LOW
DENSITY PORTIONS**

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Corporation, New York, N.Y.

[22] Filed: June 16, 1971

[21] Appl No.: 153,604

[52] U.S. Cl. 264/46.4, 52/309, 52/316,
161/124, 161/159, 161/160, 161/166,
264/52, 264/54, 264/46.3, 264/92, 264/309,
425/4 C, 425/134, 425/224

[51] Int. Cl. B29d 27/04

[58] Field of Search 264/46, 45, 54, 46, 338,
264/47; 156/78, 79, ; 117/104 R, 105.5,
161/161, 52/309, 316; 425/4 C, 134, 224

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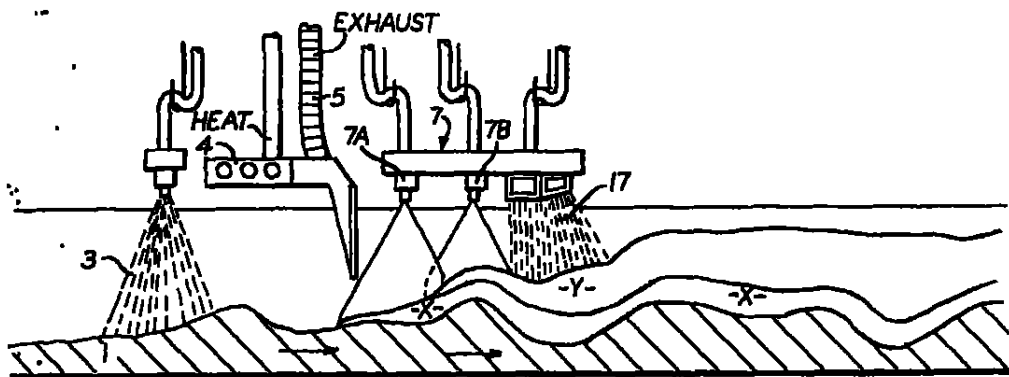
Primary Examiner—Philip E. Anderson

Attorney, Agent, or Firm—Evelyn M. Sommer, Esq.,
James M. Heilman, Esq., Anthony J. Casella, Esq.

[57] **ABSTRACT**

Invention covers high quality molded urethane structural products comprising a unique mixture of a high density foam and a low density foam and a high speed process for manufacturing the same. In essence, two (or more) urethane formulations are spray applied from one (or more) bank of application nozzles. The initial spray cures almost immediately and is of high density while the secondary spray slightly overlaps, cures slightly slower, and is of a relatively low density.

13 Claims, 13 Drawing Figures



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PATENTED MAR 18 1975

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SHEET 1 OF 3

FIG. 1.

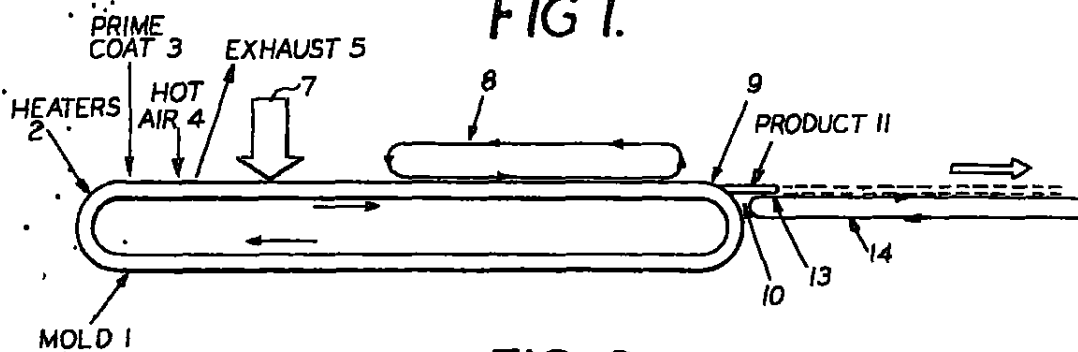


FIG. 2.

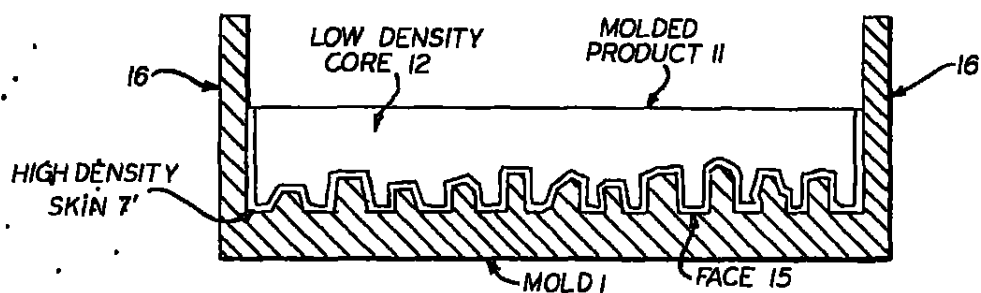


FIG. 3.

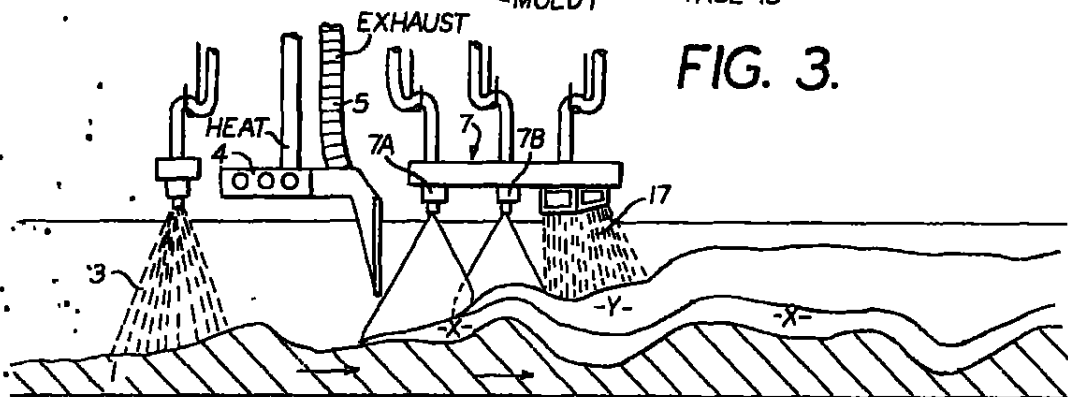
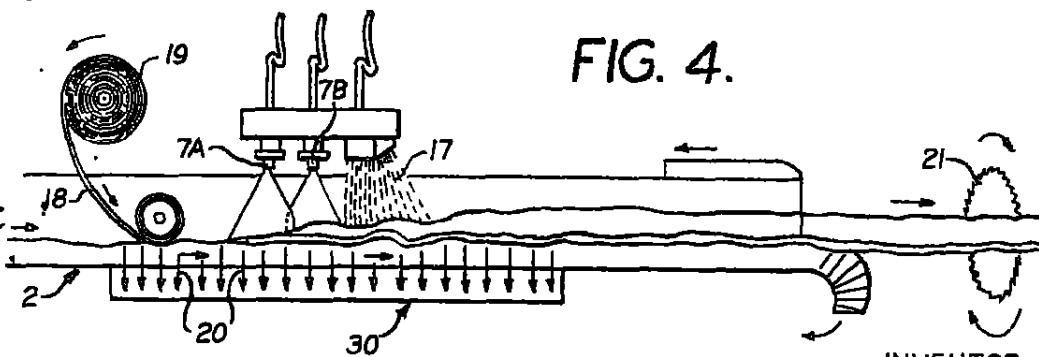


FIG. 4.



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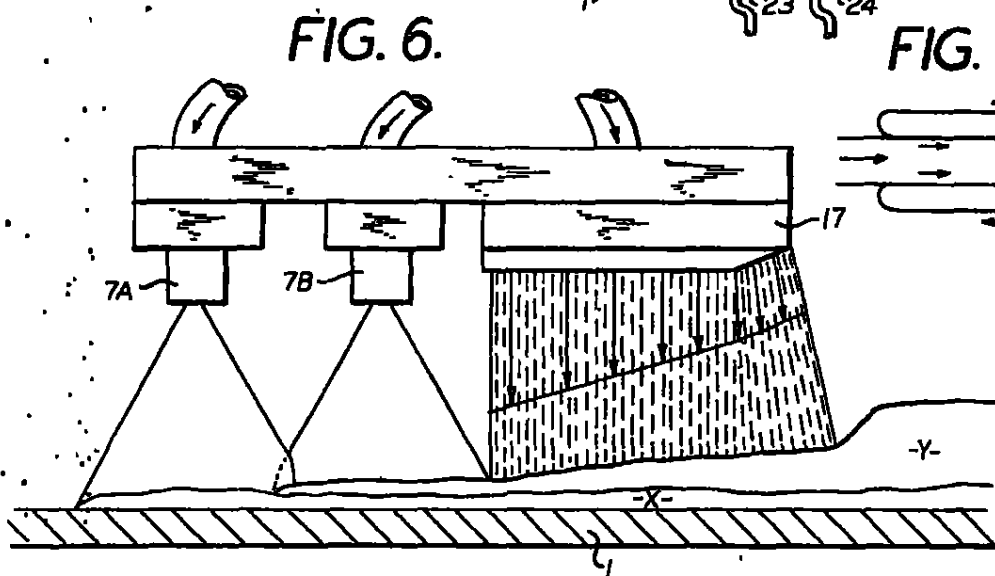
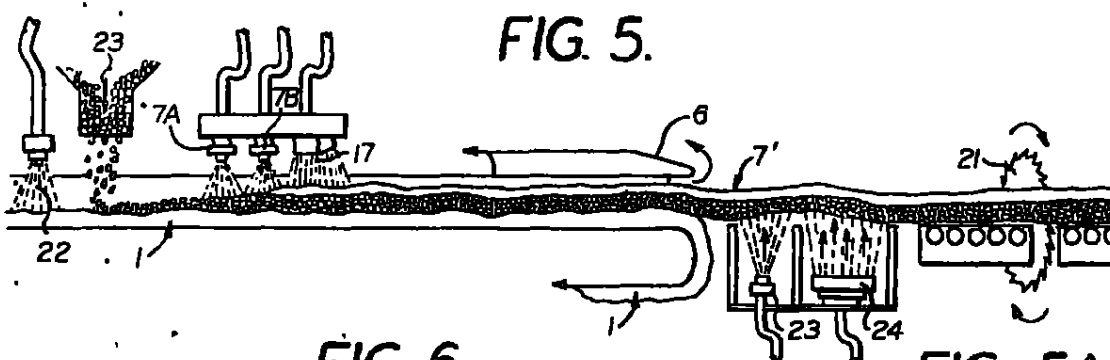


FIG. 5A.

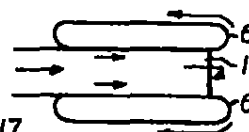
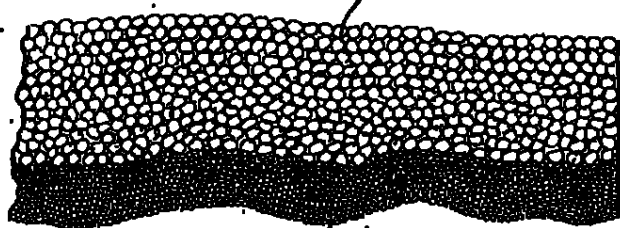


FIG. 7.

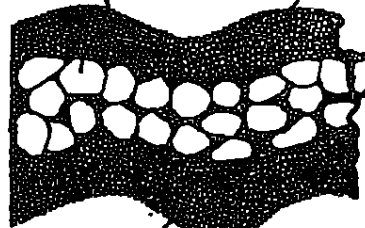
BACK-UP LAYER 33



FACE LAYER 32

FIG. 8.

CORE LAYER 36 BACK LAYER 35



FACE LAYER 34

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FIG. 9.

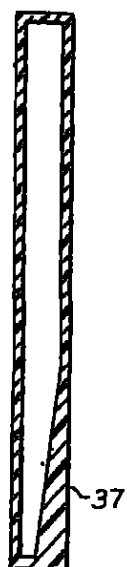


FIG. 10.

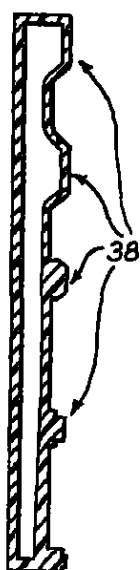
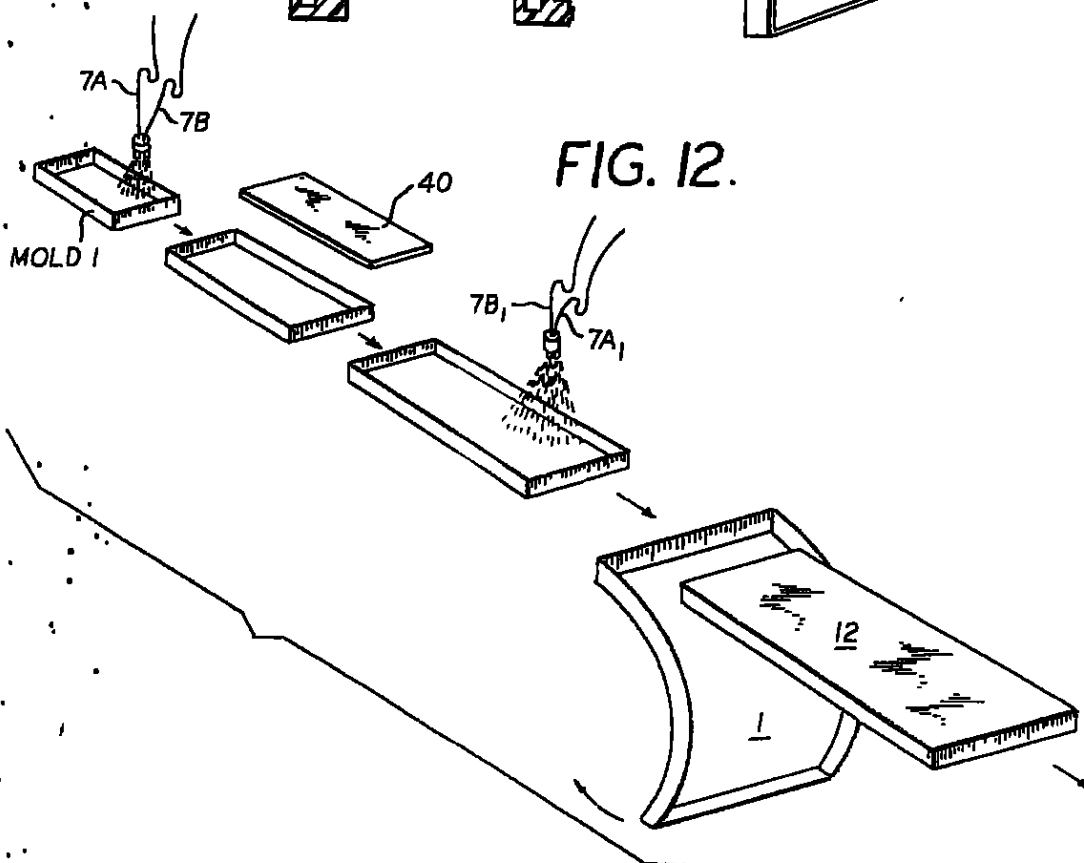
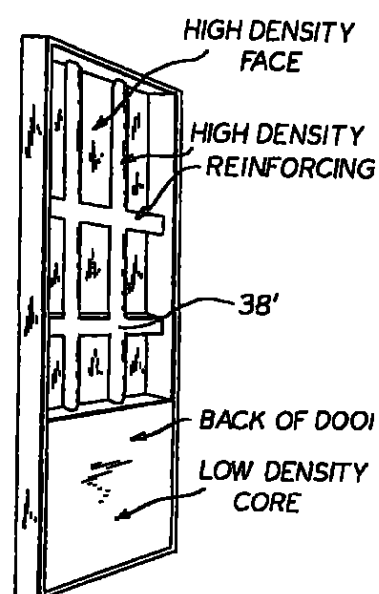


FIG. 11.



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METHOD OF MANUFACTURING A FOAMED URETHANE STRUCTURAL PRODUCT HAVING HIGH AND LOW DENSITY PORTIONS

The use of urethane foams and the method of manufacture are well known in the art. The present invention is concerned with urethane foam such as described in "Encyclopedia of Chemical Technology," Kirt-Othmer, Second Edition, Volume 21, pages 84-94, published Interscience Publishers, a division of John Wiley and Sons, Inc., 605 Third Ave., New York, N.Y. The present invention is concerned with high quality urethane molded structural elements and with a spray application and open back molding technique wherein the foam is sprayed into an open mold and wherein two (or more) sprays or one (or more) spray banks are used

In conventional molding of urethane foams, considerable pressure on the mold is generated by the foaming action of the urethane. As a result of the polymerization of the urethane resins (which is an exothermic reaction-generates high heat) an internal liquid blowing agent is caused to boil releasing bubbles. These expand the volume of the foam and force the resin into all mold detail. This high internal pressure makes very sturdy molds necessary, or the use of restraining presses to prevent the foam from warping the mold. The pressure exerted by the foam causes the catalyst to migrate through the barrier coating (that has previously been put into the mold) into the silicone elastomer itself. After many molding cycles each of 10-20 minutes duration, some of the chemicals which have migrated into the silicone rubber start bonding with new foam parts being produced. As the part is demolded, this bond causes "chunk-out" (small pieces of silicone rubber tearing loose) which is one of the major causes of mold degradation. With the present process, practically no pressure is exerted on the mold medium, thus eliminating the need for heavy weight and bulky mold frames. A second and more vital result of eliminating high pressures and greatly reducing mold dwell time is a tremendous extension in mold life. With the foam exerting little pressure on the mold surface, catalyst or other chemical migration through the barrier coating in the mold is practically eliminated. Therefore increased mold life for silicone, urethane or other elastomer molds will be at least four to five times as long with the present process than with conventional closed molding techniques.

When attempting to mold articles having very thick sections, conventional urethane molding is not practical. To lower the cost of a conventionally produced part, it is necessary to lower the density of the foam which reduces its effectiveness to withstand impact or surface abrasion. The only way to solve this problem is to use a urethane foam that is self-skinning. This would be a urethane which could be placed into the mold in one shot and as it expands and foams, it creates a skinned layer on its periphery with a low density core. To date, there are a few self-skinning foams available but they are highly restrictive as to (1) the thickness of the skin formed, usually less than one-eighth of an inch, and (2) in the achievable difference in density between the formed skin and the core. Also, the uniformity of skin thickness cannot be controlled in a heavily textured or contoured mold. Satisfactory products have only been made in primarily flat sheets. With the pres-

ent technique, which consists of a specific sequence of mechanical applications, it is possible to form a continuous, closely controlled thickness of any density urethane foam in as many different layers as desired with each layer being capable of having its own density without dependency on what the density is of contacting layers. Even though this is a mechanical application of layers, it is done in a sequence which allows permanent and integrated bonding of one layer to the other resulting in a homogeneous molecular structure, multi-density, controllably engineered product with predetermined end product characteristics.

This present process is made possible through the modification and innovation in spray equipment for applying the required raw materials to the molding surface. The high quality of the finish of the resultant article is provided by the process with a tremendous reduction in mold abuse with the added advantage of being able to engineer the product to meet specific end use requirements.

This invention allows molding of a foamed thermoset or thermoplastic article by means of a specific sequence of applications at prescribed temperatures and pressures, maintaining the degree of mold fidelity equal to conventional closed molding, or gravity molding, of thermoset or thermoplastic materials. Innovations in spray equipment, specifically related to the nozzle involved, and the means in which raw materials are applied, allows for the controlled deposition of materials in layers of various densities but cures to be a homogeneous molecular structured part throughout, without sharp definition of density change interfaces.

The temperature of the mold is preferably maintained slightly above the processing temperature of the plastic material thus maintaining the optimum in mold detail fidelity in the resultant part as well as maximizing the bond of the plastic material with the prime coat which has previously been applied to the mold. This prime coat comes out of the mold with the formed part and serves as a base color coat as well as the prime coat for better adhesion of post finishing steps (this prime coat is not a necessity but allows extension of mold life and eliminates several steps from the finishing operation).

The present invention may be readily understood by reference to the diagrammatical drawings illustrating embodiments of the same.

FIG. 1 illustrates a preferred sequence of processing steps or stages;

FIG. 2 illustrates a typical part and its mold, being a cross sectional view thereof.

FIGS. 3, 4 and 5 show in some detail the dual spray technique of the present invention, while FIG. 5A is a plan of the side guide belts 6 shown schematically in FIG. 5.

FIG. 6 illustrates one technique of reducing the intensity of the hot air blast;

FIGS. 7, 8, 9, 10 and 11 illustrate other molded parts or elements produced in accordance with the present process, and

FIG. 12 illustrates the steps in producing a molded structural element in accordance with the present process with each exterior surface having a layer of high density foam backed up by a layer of low density foam and the total encapsulating of a reinforcing sheet.

Referring specifically to FIG. 1, a continuous, or linked section, mold 1, preferably with heaters 2, ro-

tates as shown. This mold-belt may be made of any suitable flexible material such as, "Dow Corning Silastic B RTV Silicone Rubber." This mold-belt element moves by the various processing stations. It first passes by a bank of heaters 2 where the mold temperature is raised to about 120°F to about 160°F, preferably about 140°F. The barrier prime coat is applied, preferably by spraying. This barrier coat may be any suitable material as for example, a Dow Corning 509 barrier Coat — 15% solid solution in methyl isobutyl ketone with a viscosity of 50 centistokes. The coat is applied by spray with a line pressure of 20 psi. The thickness of the coating may be varied but preferably is about 0.0002 inch to 0.0005 inch dry film thickness.

** Trademark-DuPont Co.

This barrier coat facilitates the removal of the fabricated structural element from the mold 1, and also functions as a prime and base color coat for the finishing of the formed structural element or part.

Immediately after the barrier prime coat is applied to the mold, a hot air blast is applied at 4 to speed its cure. The temperature of the hot air is in the range of about 90°F to 150°F, such as about 125°F. Following the hot air application at station 4, exhaust means 5 are applied to draw off solvents that might impair the formation of the structural part in the mold which involves urethane foaming chemical reactions. At point or station 7 the form is ready to receive the dual application of urethane foam which dual application will be hereinafter more specifically described.

The form or mold containing the expanding urethane foam passes under a molding belt surface 8 so that a flat back of the formed part is secured. This element however is optional. Mold separating flanges 9 allow the molded part 11 to be removed from mold 1 and to be picked up by vacuum 13 action on conveyor 14 and held in place for subsequent finishing operations. Air blast 10 helps dislodge part 11, which may be a small individual part or a large continuous part.

Referring specifically to FIG. 2, an end view of one type of molded product is illustrated and also an end view of the mold to make the same. The formed urethane foam element 11 is molded on the face 15 of mold 1 between sides 16 of the mold as described. The skin 7' is of relatively high density while the core 12 is of relatively low density.

Referring to FIG. 3, continuous belt-mold 1 preferably after being heated by heaters 2 as illustrated in FIGS. 1 and 4, moves under application spray station 3 of barrier prime coating. Thus, under certain conditions, may be omitted. Heat is applied by heaters 4 in order to facilitate the curing of this release coat, and fumes are exhausted by fan means 5.

The dual foam applicator 7 consists of an initial bank of nozzles 7A that apply the foam formulation that gives the relatively high density foam (layer X) and a secondary bank of nozzles 7B for the application of a relatively low density backing or core (foam layer Y). The foams are those as described in the above mentioned literature art.

The high density foam is preferably in the range from about 10 to 30 lbs/ft³, such as about 25 lbs/ft³, while the low density foam is preferably in the range from about 2 to 4 lbs/ft³, such as about 3 lbs/ft³. The thickness of the high density coat as applied is about one-sixteenth inch to one-half inch, such as about one-fourth inch. Following the application of the back up low density

layer of urethane foam the reacting and volume expanding foam is subjected to an auxiliary hot air blast 17 in order to expedite the cure and improve the mold detail pickup. The initial high density foam application 7A forms a layer (x). This layer (x) expands only about 15% to 20% of its original volume and does so almost immediately upon contact with the mold.

The back-up or core layer Y from bank 7B is sprayed simultaneously with a slight overlap of about one-fourth inch to 1 inch, such as about one-half inch. It is obvious that the speed of the mold will determine the thickness of the respective layers for a uniform fixed rate of application from the sprayers. The cured foam thickness of the combined layers is about 3 inches for the specific product described.

Face layer X must be of sufficient "green strength" when layer Y is applied so that its cell structure is not destroyed by the secondary spray application. The overlap of sprays 7A and 7B blends a small amount of each foam material so that even though layer X has "green strength" which would otherwise decrease a bond with subsequent applications, no line of demarcation of layers exists. Thus there is no point or line of structural part weakness due to inadequate bonds of different layers of one with the other. Layer Y begins to foam when applied and when unrestrained increases its volume about 20 to 50 times, such as about 30 fold. As it begins to foam, the blast of hot air 17 is directed so that as the heat facilitates foam expansion, the air pressure holds or retards the foam expansion. The foam therefore as it expands forces itself into the mold details. The hot air blast decreases in intensity so that it is just strong enough to repress cell expansion within the foam without rupturing the cells on their internal pressure increases. The intensity of the blast of hot air as the molded foam leaves the blast is about 10% to 40%, such as about 20% of the intensity of the blast when the molded foam first contacts the blast.

As the mold-belt continues to move, the applied layers leave the air blast 17 and the still foaming back layer Y expands freely to its full height and cures. Due to the air blast and low viscosity of the layer Y as well as its slow cure time as compared to X, more material collects in the lower part of the mold. Thus, more material will rise and compensate for a low part of the mold. Thus, a self-regulating action occurs to produce a part with a relatively flat back.

Referring specifically to FIG. 4, the elements are similar to those described with respect to 3 except the barrier coat application has been eliminated. Instead, a plastic sheet of film 18 is introduced from holder 19. The mold is replaced with a modified belt 20 drilled with small diameter holes (one-thirty-seconds inch), or is made of an open celled or open weave material to allow air to move through it but across its thickness only. As this mold moves, film holder 19 continuously supplies material 18 down into the mold 1. As the mold moves on, it passes over a bed 30 that draws a vacuum through the mold and pulls the film or sheet material downward against the mold surface and holds it there through spray foam application station 7 and releases the vacuum when the foam is cured. This mold is automatically stripped and the film surfaced part moves on to a cutter 21 or other subsequent sizing and packaging operations.

FIG. 5 shows an adaption wherein an adhesive 22 is applied to mold 1 to adhere aggregate 23. These mate-

rials are introduced into the mold prior to applying the dual foam at 7A and 7B. Air and adhesive solvent blast 23' aids in the removal of loose unbonded aggregate from the molded part while air blast 24 aids in drying the cleansed product face.

The method of decreasing the intensity of the hot air blast 17 is shown in FIG. 6. The individual jets in the direction of movement of the mold are designed by any suitable means to secure a less intense blast or pressure as designated by the length of the respective arrows.

Referring specifically to FIGS. 7, 8, 9, 10 and 11, various structural molded elements are shown. FIG. 7 illustrates a high density (small air cells) face layer 32 and low density back-up layer 33 part construction. FIG. 8 illustrates a three layer part construction 34, 35 and 36 with each layer at a different density. In all interfaces of different density layers the lines of demarcation are eliminated since the materials are applied as described so as to expand together and form a homogeneous part. By the present technique it is possible to change the thickness at any layer and the density of any layer by merely altering equipment controls.

In FIGS. 9, 10 and 11 it is shown how by controlling the movement of the spray unit over the mold it is possible to alter layer thickness in the molded part to meet specific part needs.

FIGS. 9 and 10 illustrate sections of doors. In FIG. 9 the high density layer for the face has been increased in thickness at its bottom 37 where kicking causes door damage. In FIG. 10 the same thing has been done but there is also added the thicker layer areas 38 where pressure may cause damage as a concentrated load at that point on the door.

FIG. 11 illustrates integrally formed reinforcing ribs 38' made by extra spray passes of only the high density component in these areas prior to application of the low density core material.

Referring specifically to FIG. 12, the method of manufacture is as hereinbefore described. FIG. 12 diagrammatically illustrates a technique of manufacturing a molded structural element, such as a door wherein each face comprises a layer of high density foam backed up by a layer of low density foam. Mold 1 is first contacted with a quantity of high density foam from 7A and then with a quantity of low density foam from 7B applied as described and as shown in FIG. 3. A reinforcing sheet 40 is then applied. A low density foam is supplied from 7B, and then a high density foam from spray 7A. The finished molded product 12 is then removed from mold 1.

Thus, in accordance with the present invention molded urethane foam structural elements or parts are produced. By the present process foam and cure completion times are reduced to one minute or less as compared to 10 to 20 minutes required by conventional techniques. Also since the mold is open, negligible, if any, pressures are involved and parts can be produced as large as desired, for example 10 feet X 70 feet.

Parts produced with this technique can have rigid walls which, in cross-section, have a dense surface zone and an integrally formed cellular core. The rigidity of an article varies with the cube of the thickness and varies in approximately an inverse proportion to changes in density. Thus, the low density cellular core with high density cellular walls as a construction has greater flexural strength than a uniform higher density wall of the same weight of material. The placement of the denser

layer further enhances the flexural strength because, in the exterior zone where it is placed, the flexural stresses are the greatest. In addition to the high strength characteristics of the high density surface area — low density interior construction, decreased heat conductivity and, consequently, increased insulation properties are provided over conventional uniform high density urethane parts, due to the increase in internal gas bubbles or cells without loss of surface impact resistance.

The various types of additives, fillers and/or reinforcing fibers which can be employed to produce a change in the physical properties of a resultant molded product must be mixed with the plastic material in other processing techniques at an early stage of raw material mixing. With the present process, it is possible to add these agents directly to the mold while the plastic material is still in a liquid state thereby obtaining a uniform dispersal of the material within the molten plastic. This is done without employing additional mixing apparatus thereby maintaining a high degree of control, in the molded product wherein the filler, reinforcing fiber, or liquid additive is placed.

In conventional urethane casting, mold temperatures above 150°F induce mold fill problems. This degree of temperature causes premature blowing of the foam and increased polymer viscosity. This inhibits the spreading of the material evenly over the mold surface which results in unwanted, uncontrollable variations in densities and incomplete mold filling.

With the present process it is advantageous to have mold temperatures in the 175°-200°F range. With the sequential mechanical application as described, the polymeric material (which is highly catalyzed) needs to cure almost immediately on contact with the mold. This rapid cure prevents sagging on highly contoured mold surfaces and prohibits seepage of polymer to the face side of any decorative foreign materials (such as stone aggregate) previously placed in the mold. The faster the cure time, the more production per mold and less cost per produced item. Also, with limited dwell time in the mold, catalyst migration (main cause of mold deterioration) is nearly eliminated and mold life (usually 200-300 parts with conventional molding techniques) is tremendously increased (on the order of 1,000-3,000%).

Molds for thickwall parts (4 inches or more thick) for conventional urethane molding are extremely costly because of the high pressures they must withstand. Conventional molding of medium to high density (8-30 lb/ft³) foams generate pressures of 10-15 psi. For a 3 feet-0 inch X 6 feet X 1 1/4 inches door, the mold must stand approximately 43,200 lbs of pressure with conventional techniques. The present process exerts no pressure on the mold.

During urethane molding the reaction of the isocyanate groups with hydroxyl groups is exothermic, and in conventional urethane foam molding the production of thick sections of high density foam generates large amounts of heat. This heat causes internal scorch and splits and fissures within the foam. The present process using open molds allows the heat to dissipate rapidly as soon as polymerization is sufficiently completed thus eliminating scorch or splitting problems. With this process new formulations with greater emphasis on the silicone surfactants will allow extremely rapid cell growth. The normal tendency of cell bubbles to collapse, particularly as the temperatures of the foaming polymer

increases, is magnified by the high initial operating temperatures of the polyol and isocyanate materials as well as the increased mold temperatures of the present processing technique. Therefore, the proper silicone surfactants are critical to lowering of surface tension and aiding nucleation which gives cell stability at rapid processing rates.

The invention may be more fully understood by the following examples illustrating the same.

Example 1. Manufacture of interior wall panels.

Continuous or individual silicone elastomeric molds are heated to 175°-200°F. A barrier coat is sprayed into the mold. This barrier coat acts as both a mold release agent and initial prime or color coat on the produced part. The solvent is flashed off with forced hot air and a following exhaust. The high density outer skin formula is spray applied as described previously to achieve a cured thickness of three-sixteenths inch. The polyol temperature is 135°F; the isocyanate 115°F. Both materials are applied under 575 psi line pressure. The core or low density formula to achieve a cured thickness of thirteenth-sixteenths inch is applied almost immediately and actually slightly overlaps the high density spray. The polyol of the low density is applied as 120°F; the isocyanate at 95°F. Both materials are applied under 400 psi line pressure. The two layers interact (as previously described in the disclosure) and cure. Whether open mold or closed molded just prior to completed cure, the remainder of operations are handled with normal material handling equipment.

Example 2

Manufacture of film or sheet material, surfaced products. Tedlar** film for siding products in particular is used, but any film or sheet material (such as wood veneer for interior or exterior usage) may also be used.

The new feature of this concept is the placing of the supporting substrate onto the film instead of laminating the film onto the supporting substrate. It is possible to maintain support and shaping of the film during processing by two methods: (A) tensioned over a perimeter-type frame, or (B) held in a mold with a vacuum. Once the film is positioned and shaped, the polymer application process described in manufacturing Example 1 above is followed. A roll of Tedlar** is continuously feeding the film under infra-red heaters bringing film temperatures to 220°-280°F. The film progresses into a stretching apparatus that puts tension on the film in both axial directions (90° apart in the same plane as the film). The film then passes under a soft rubber roll that causes the film to come into contact with the continuously revolving mold surface as shown in FIG. 3B. The mold can be perforated (each mold contour requires different size and location of perforations), or be of an open celled or open weave material to allow air to move through it but across its thickness only. The film makes contact with the mold over a vacuum box (18 to 26 inches Hg. vacuum depending on mold configurations) under the mold which draws the film down into the preheated mold (170°-180°F) picking up all of the mold's detail. Some simple configurations allow use of high volume exhaust fans to cause air pressure differential instead of vacuum to hold down the film. A nip roll of flexible material (rubber, for example), with a Shore A durometer of 45 to 60 presses the film against the mold surface causing the film to conform to the mold profile. The polymer application station is immediately after this film positioning station. The polymers are ap-

plied (as previously explained in manufacturing Example 1) and cured as the mold continues to move away from the application station (still over the vacuum area). Where the foam has completed the cure, the vacuum area stops. The mold continues on for a few feet then turns downward pulling itself away from the continuously formed product. The product moves on to the cutting, trimming, and packaging stations.

* Trademark-Dow Corning Co

Example 3

Manufacture of aggregate surfaced exterior and/or interior building panels (aggregate may be other than stone-e.g., wood chips, plastic particles, etc.)

A continuously moving mold-belt (temp 200°F) receives an evenly (or designed layout) bed of aggregate designated the primary pattern material. This material is hot — 170°-190°F. A second and third pattern material can be added if desired. These too, must be heated. Just prior to polymer application, a barrier layer of fine particles, for example, sand, (150°-165°F) is sprinkled over the deposited pattern material and any residue on upper surfaces is blown off. This layer serves as a face coating preventing any urethane from being exposed between the larger pattern aggregate. Exposure to ultra-violet radiation causes polymer degradation so the sand (or other fine particles) is required to prevent this action. The next station is for polymer application. After the polymers have cured, the mold moves away from the product and any loose aggregate or sand is caught and recycled. As the aggregate and sand serve to eliminate polymer-mold contact, no mold release agent is required. The panel continues on to panel trimming and packaging.

Example 4

Manufacture of reinforced panels and doors. Producing reinforced products can be done three ways.

1. A reinforcing sheet (e.g., one-half inch Novoply,** one-half inch plywood, etc.) is sandwiched in the middle of the product during processing.

2. A reinforcing sheet of material is applied to the back of the product either immediately after the last step of processing the polymer or as a post-processing application (glued on after polymer is cured).

3. Reinforcing ribs, stiles, rails or framework (aluminum, wood, plastic, etc.) are inserted into the mold during processing to become an integral and totally encapsulated (optional — some areas can be left exposed for hardware application) product reinforcement.

Example 5

Manufacture of sheet, molding or beam products coated with urethane foam with the design formed by a contacting mold-belt.

A sheet (or molding or beam) of plywood, Novoply,** or lauan, for example, passes through heaters bringing its surface temperature to 180°F. It then passes under the spray equipment but the sprays are reversed — the low density is applied first (can be omitted) and then the high density is applied. Immediately after the polymers are applied, a rubber mold comes into contact with the surface and remains in contact for a few seconds as the material foams and cures and is shaped to the surface design of the mold. The mold is then pulled away from the foam decorated product and recycles to mold again.

***Trademark Champion International Corporation

The advantages of this process especially for low grade plywood (open knots, splits, etc.) and lauan (core voids) is that the foam fills all unwanted deficien-

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cies while giving nearly any grain or pattern desired to the polymer surface. The process is readily adaptable to current in-line prefinished panel manufacturing procedures (at reduced line speeds). The cost of the product over a completely plastic panel is reduced because the substrate acts as the self-supporting structure and the urethane foam as a decorative and mar resistant element of the product.

The embodiments of the invention in which an exclusive property is claimed are defined as follows:

1. Process for manufacturing a high quality molded urethane structural product which comprises introducing a relatively high density foamable urethane mixture into a moving mold from a first spray applicator, subsequently continuously introducing additional relatively low density foamable urethane mixture into said mold from a second spray applicator in a manner that the spray from said second applicator slightly overlaps the spray from said first applicator, and in a manner that the foamable urethane mixture from said second applicator completely covers the foamable urethane mixture from said first applicator in said mold.

2. Process as defined in claim 1 wherein the foamable urethane mixture from said first applicator has a density in the range from about 10 to 30 lbs/ft³ and wherein the foamable urethane mixture from said second applicator has a density in the range from about 2 to 4 lbs/ft³.

3. Process as defined by claim 2 wherein the thickness of the applied relatively high density foamable urethane mixture is about one-sixteenth inch to one-half inch, and wherein the thickness of the applied relatively low density foamable urethane mixture is about one-fourth inch to 1 inch.

4. Process as defined by claim 1 wherein the foamable urethane mixture from said second applicator overlaps the foamable urethane mixture from said first applicator by about one-fourth inch to 1 inch.

5. Process as defined by claim 1 wherein a primer barrier coat is first introduced into said mold.

6. Process as defined by claim 5 wherein said barrier coat is dissolved in methyl isobutyl ketone and applied to a thickness of about 0.0002 inch to 0.0005 inch.

7. Process as defined by claim 1 wherein said mold is first heated to a temperature in the range from about 120°F to 160°F.

8. Process for manufacturing a high quality molded urethane structural product which comprises preheating a flexible moving mold to a temperature in the range from about 120°F to 160°F, introducing into said mold a relatively high density foamable urethane mixture having a density in the range from about 10 to 30 lbs/ft³, then introducing a relatively low density foamable urethane mixture into said mold from a second spray applicator, said relatively low density foamable mixture having a density in the range from about 2 to 4 lbs/ft³, and in a manner that the spray from said second applicator slightly overlaps the spray from said first applicator, and in a manner that the foamable urethane mixture from said second applicator completely covers the foamable urethane mixture from said first applicator in said mold, applying a hot air blast to said foamable urethane mixture as they expand in a manner to

retard foam expansion, and thereafter receiving said molded urethane products.

9. Process as defined in claim 8 wherein said relatively high density foamable urethane mixture is first applied to a thickness in the range of about one-sixteenth inch to one-fourth inch and wherein said relatively low density foamable urethane mixture is first applied to a thickness in the range of about one-fourth inch to 1 inch and wherein said mixtures expand to a thickness of about 3 inches, said mixtures being applied in a manner that the spray from said second applicator overlaps the spray from said first applicator and wherein the intensity of the hot air blast which retards foam expansion decreases in the direction of the movement of the mold.

10. Process as defined by claim 9 wherein the relatively high density foamable urethane mixture has a density of about 25 lbs/ft³ and wherein the relatively low density foamable urethane mixture has a density of about 3 lbs/ft³.

11. Process for the manufacture of a high quality molded urethane structural product which comprises preheating a moving mold, introducing a relatively high density foamable urethane mixture into said moving mold from a first spray applicator, subsequently continuously introducing a relatively low density urethane mixture into said mold from a second spray applicator in a manner that the spray from said second applicator slightly overlaps the spray from said first applicator, and in a manner that the foamable urethane mixture from said second applicator completely covers the foamable urethane mixture from said first applicator in said mold, and maintaining forming conditions to secure an expansion increase of said relatively high density foamable urethane mixture to about 15% to 20% of its original volume and expansion increase of said relatively low density foamable urethane mixture to about 20 to 50 times its original volume, and subjecting said foamable urethane mixtures in said mold to an air blast, the intensity of which decreases in the direction of movement of said moving mold.

12. Process as defined in claim 11 wherein subsequent to said air blast a reinforcing sheet is securely positioned above said relatively low density foamable urethane mixture, followed by the introduction of a second relatively low density foamable urethane mixture onto said reinforcing sheet, followed by the introduction of a second relatively high density foamable urethane mixture in a manner to overlap the introduction of said second relatively low density foamable urethane mixture, and subjecting said second mixtures to a final air blast which decreases in the direction of movement of said moving mold.

13. Process as defined by claim 12 wherein said overlaps are about one-fourth inch to 1 inch, wherein said relatively high density foamable urethane mixtures are about 10 to 30 lbs/ft³ and said relatively low density foamable urethane mixtures are about 2 to 4 lbs/ft³, and wherein said final air blast decreases to about 10% to 40% of the intensity of the blast when said second mixtures first contact said final air blast.

* * * * *

5052

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,834,967 Dated September 10, 1974

Inventor(s) William E. Lowery et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 20, the word "providing" should read
-- producing --.

Column 3, line 45, the word "into" should read -- onto --.

Column 3, line 55, the word "a" has been omitted between
the words "in" and "substantially".

Column 6, line 29, the words "movement to the pair of
facings" should read -- of the space between
panel facings --.

Signed and sealed this 19th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

Sept. 10, 1974

W. E. LOWERY ET AL

3,834,967

APPARATUS FOR FORMING POOLED PANELS

Filed April 30, 1971

4 Sheets-Sheet 1

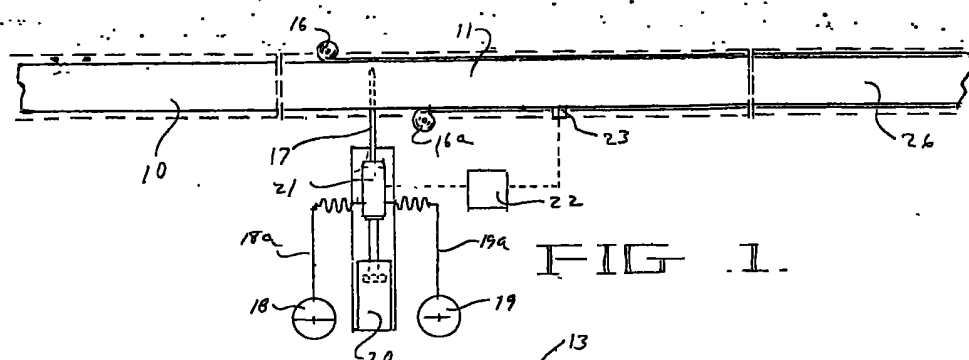


FIG. 1.

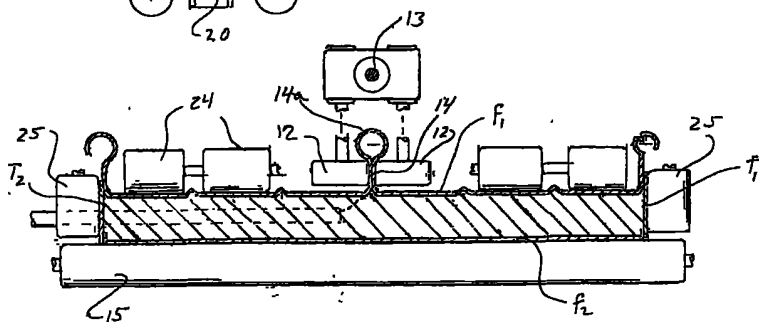


FIG. 2.

Sept. 10, 1974

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3,834,967

Filed April 30, 1971

APPARATUS FOR FORMING FOAMED PANELS

4 Sheets-Sheet 2

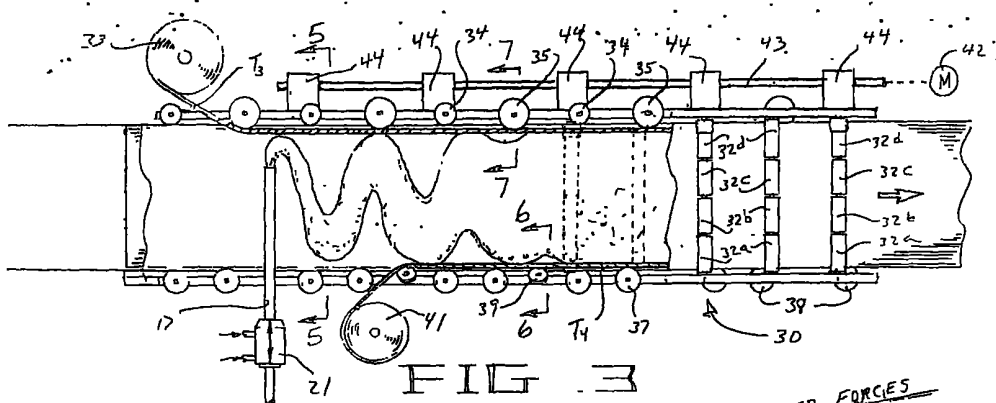


FIG. 3

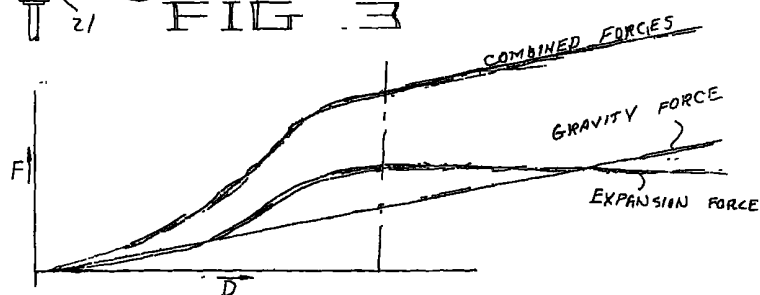


FIG. 4

Sept. 10, 1974

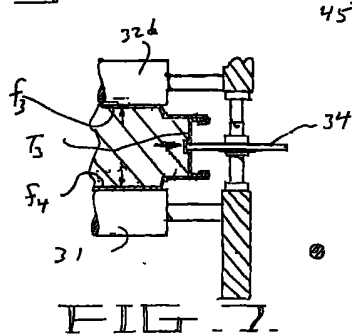
W. E. LOWERY ET AL.

3,834,967

Filed April 30, 1971

APPARATUS FOR FORMING FOAMED PANELS

4 Sheets-Sheet 5



Sept. 10, 1974

W. E. LOWERY ET AL

3,834,967

Filed April 30, 1971

APPARATUS FOR FORMING FOAMED PANELS

4 Sheets-Sheet 4

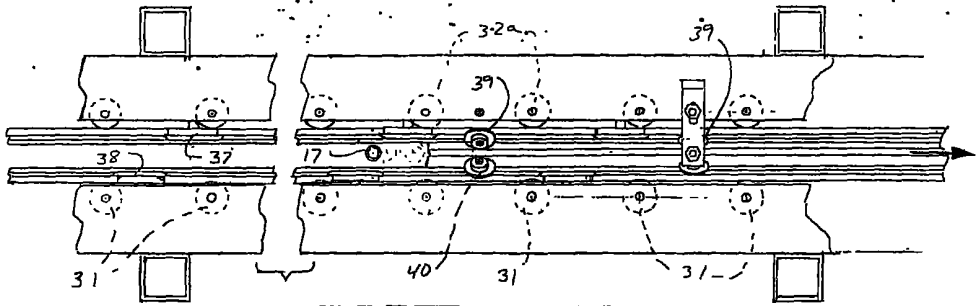


FIG. 8

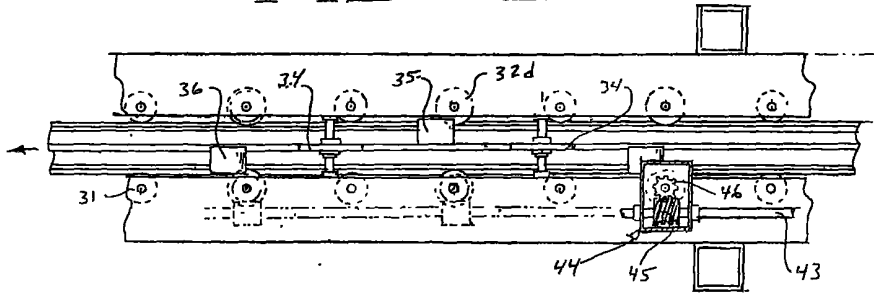


FIG. 9

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3,834,967

APPARATUS FOR FORMING FOAMED PANELS
William E. Lowery, Orinda, and Roger G. Jennings, Oak-
land, Calif., assignors to Control Building Systems, Inc.
Filed Apr. 30, 1971, Ser. No. 145,255
Int. Cl. B29b 5/04

U.S. Cl. 156-356

16 Claims

ABSTRACT OF THE DISCLOSURE

A continuous method for forming laminated panels, especially those having a foamed core of urethane, wherein a pair of panel facings are fed horizontally and in a relatively straight line while supported in spaced relation, one of said panels being driven and the other panel facing being connected to and correspondingly moved by the first, a settable mixture of foaming components being dispensed between said facings in a zig-zag pattern, and apparatus for carrying out the method to produce panels having a substantially uniform cell structure and minimum density gradients and being relatively free of voids.

This invention relates to continuous processes for manufacturing laminated panel structures and especially those panels having a core made with a settable mixture of foaming components to produce urethane foam.

In brief, the present invention essentially provides for the continuous dispensing or depositing of a settable mixture, preferably urethane foaming components, between two panel facings which are supported relative to each other as they pass through a foam dispensing station. The settable mixture is deposited between the facings in a zig-zag pattern by means of a reciprocating probe attached to a conventional mixing head.

The two facings are interconnected, preferably in advance of the foam dispensing station, and as one facing is moved, the other facing is pulled along while being maintained in a relatively fixed, parallel relationship to the first. This condition is maintained both during the time the foam is deposited and while curing takes place to avoid any relative movement between the two facings as may rupture the cell structure, particularly at the critical interface of foam and facing. It has been found that such cell ruptures, which result in a weak adhesive bond, cause delamination if subjected to repeated thermal expansion and contraction as commonly experienced under normal exposure conditions. The use of particular methods and apparatus which allow the foaming ingredients to be dispensed in a zig-zag pattern between facings are also important features of this invention and contribute to the manufacture of panels having a substantially uniform cell structure, minimum density gradients and relative freedom from voids and/or air entrapments.

Accordingly, a principal object of the present invention is to provide a continuous process for forming a laminated panel having a central core formed with a foamed settable mixture, such as urethane producing mixtures, and which produce panels having substantially uniform cell structure, minimum density gradients and relative freedom from voids.

Another object is to provide methods and apparatus for forming a laminated panel having a central core of foamed components and which produce a strong adhesive bond between the foamed product and the panel facings.

A further object of this invention is to provide methods and apparatus of the kind described for: advancing a pair of panel facings while maintaining the facings in juxtaposed relation; inserting foaming ingredients between facings from one side, then sealing the one side with a flexible vinyl tape.

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A further object is to provide methods and apparatus for continuously forming and moving a laminated panel and by means of which an exponentially greater driving force is developed as the foaming components expand.

A still further object of the invention is to provide methods and apparatus of the kind described including means for sensing the pressure upon the facings induced by the foaming ingredients and then controlling the amount of material dispensed between the facings per lineal unit of panel formed to maintain or control overall density.

Other objects of this invention will become apparent in view of the following detailed description.

In the drawings forming a part of this application and in which like parts are identified by like reference numerals.

FIG. 1 is a plan lay-out of a preferred method and apparatus for practicing this invention;

FIG. 2 is a vertical transverse section through one form of processing conveyor which might be used in connection with this invention;

FIG. 3 is a plan view of a second embodiment of this invention for making foamed panels;

FIG. 4 is a force diagram illustrating the beneficial effects derived with the apparatus of FIG. 3;

FIG. 5 is a vertical section taken on lines 5-5 of FIG. 3;

FIGS. 6 and 7 are partial vertical sections taken on lines 6-6 and 7-7, respectively, of FIG. 3; and

FIGS. 8 and 9 are left and right side views and a partial section as viewed on lines 8-8 and 9-9 of FIG. 5.

Referring to FIG. 1 in particular, there is diagrammatically illustrated a process wherein a pair of panel facings f_1 and f_2 are fed in from the left on a load and feed conveyor 10. This conveyor may comprise a pair of conventional upper and lower roller conveyors which are substantially horizontal and extend one above the other in parallel spaced relationship. The pair of panels may be fed manually or by gravity along conveyor 10 onto a second conveyor means 11 which also supports the panels in parallel spaced relation. This conveyor means, however, provides means for moving the upper panel facing horizontally and linearly at a predetermined rate of speed and the second panel facing is moved by the first.

Referring to FIG. 2, one embodiment of conveyor means 11 comprises a pair of drive rollers 12 that are synchronously driven by an overhead drive shaft 13. Rollers 12 engage the opposite sides of a center rib 14 forming a part of upper panel facing f_1 . A bead 14a on top of rib 14 is initially supported upon wheels 12 and thereby in turn supports the entire upper panel facing as it is first received onto conveyor means 11. The lower panel facing f_2 is supported by rollers 15 of a conventional roller conveyor.

Soon after upper and lower panel facings are received upon conveyor means 11, one longitudinal side of each facing is joined by a transparent side tape T. A conventional tape applicator 16 is provided for this purpose. The initial taping together of the two longitudinal edges of upper and lower panel facings not only serves to close the one side but also serves to interconnect or join the facings so that the lower facing f_2 will be pulled along by upper facing f_1 . Thus, both facings will move together and at the same rate of speed during the foamfilling process. This, it has been found, is an important and necessary step. If otherwise, and should the panel facings move at different rates of speed, a weak adhesive bond results.

The foam filling process commences soon after a suitable length of tape has been applied by applicator 16 as will ensure positive and corresponding movement of the facings.

A second tape applicator 16a is mounted directly in back of or downstream relative to a dispensing probe 17. Accordingly, as soon as the settable foaming mixture has been inserted or dispensed between the upper and lower panel facings, the longitudinal edges nearest to the probe are sealed together by a second transparent tape T₂. Thereafter, the foaming ingredients will expand both vertically and laterally until all space is filled. This condition is readily determined by mere inspection of the side edges of the panel which are sealed by the transparent tape.

The foam dispensing and injection operation is accomplished by reciprocating probe 17 transversely relative to the direction of panel movement. In the apparatus shown, foam forming ingredients are stored in tanks 18 and 19 which are fed to a mixing head 21 that connects with probe 17. A hydraulic cylinder 20 is provided for reciprocating the mixing head 21 and probe 17; and limit switches (not shown) are disposed in the path of a control arm to reverse the direction of hydraulic cylinder operation, thereby providing continuous and cyclical reciprocation. Flexible connections 18a and 19a connect tanks 18 and 19, respectively, with mixing head 21, thereby allowing the mixing head and probe 17 to be reciprocated while the supply tanks remain relatively fixed.

The rate at which settable foaming mixture is dispensed from mixing head 21 is regulated from a control panel 22, and in a preferred embodiment, the setting of the control panel is determined by the foam pressure against one of the transparent tapes. A pressure sensing device 23 positioned to engage the panel after the foaming mixture will have expanded may also be used to adjust the setting on the control panel.

Referring to FIG. 2, conveyor means 11 also comprises a series of upper pressure rollers 24 and side pressure rollers 25. Upper rollers 24 limit the vertical expansion of the foaming ingredients and assure good contact at the interface between the settable mixture and the panel facings. Rollers 25 similarly contain the foaming mixture along the sides and provide added strength and backing for the continuous transparent tapes. The disposition and use of rollers 24 and 25 should allow processing of the panels along the conveyor 11 until such time that the mixture of foaming ingredients has taken a positive set. The completed panel structure may thereafter be continuously fed into a take-off conveyor 26 which is of conventional design. If desired, a flying saw (not shown) or other cut-off means may be utilized and incorporated into the system for cutting the panels to selected lengths.

Referring to FIGS. 3-9, there is shown a second embodiment of this invention in methods and apparatus for moving a laminated panel structure as it is formed between first and second sets of rollers. More particularly, conveyor 30 (which corresponds to the conveyor 11 of the first embodiment) comprises a first set of supportive rollers 31 arranged horizontally in substantially straight line and a second set of upper limiting rollers 32a, 32b, 32c and 32d. Each upper roller is rotatably mounted at predetermined distances above rollers 31, the axis of each upper roller being oriented so that the bottom surfaces thereof contact the upper contoured surface of the facing f₁ when said facing is raised under the pressure of the foaming settable mixture introduced between facings f₂ and f₄.

A plastic strip of vinyl tape T₂ which may be inserted between the facings in advance of conveyor 30 or supplied on a tape reel 33, as shown is engaged with the longitudinal edges of facings f₂ and f₄ at a station ahead of a dispensing probe 17. The interconnection of facings provided by tape T₂ may be used as the interconnection for moving or pulling one facing (in this instance facing f₂) as the other facing f₄ is advanced by supportive rollers 31. However, it is contemplated that the lead ends of facings f₂ and f₄ may also be connected by a common spacer bar which serves as the front end closure of the panel structure. In any event, and after the first few feet of panel have been formed and the foamed settable mixture

has set, facing f₂ will be pulled along by tape T₂ as well as the fully cured mixture of foaming components.

Referring to FIG. 7, a plurality of guide wheels 34 positioned intermediate rollers 31 and 32d engage a groove formed in the tape T₂. It will be seen that wheels 34 provide backing to prevent a collapse and unwanted deformation of tape T₂ while the foaming ingredients expand into pressure contact therewith.

As facings f₂ and f₄ are introduced between lower supportive rollers 31 and upper confining rollers 32a-32d, they are fed into parallel alignment and maintained in alignment by rollers 35 and 36 and a pair of spacing wheels 37 and 38. Referring to FIG. 5, rollers 35 and 36 laterally contact the edges of facings f₂ and f₄ respectively, while spacing wheels 37 and 38 also maintain the opposite longitudinal edges of facings f₂ and f₄ in vertical spaced relationship. This allows probe 17 to be inserted between the facings for dispensing the settable mixture in a zig-zag pattern as shown in FIG. 3. Thereafter, a second tape T₂ is introduced between the left-hand edges of facings f₂ and f₄ as viewed in FIGS. 5 and 6, by means of a pair of guide wheels 39 and 40. Tape T₂ may be supplied from a tape roll 41.

As indicated above, panel facings f₂ and f₄ are moved directly and indirectly by the supportive rollers 31 which are synchronously driven by a motor 42 from a drive shaft 43 and through one of a plurality of gear boxes 44. Each gear box essentially comprises and contains a worm 45 mounted to drive shaft 43 and engaged by a gear 46 coaxially mounted to a roller 31 through a bearing mount 47.

The above described conveyor apparatus is of particular value since the moving force imparted to the laminated panel structure being processed is attributable in part to the expansion forces of the foaming settable mixture rather than gravity forces alone. This may be an important factor since small interruptions of movement, delays or even a change in rate of movement may disrupt the lamination process and result in weak bonding.

The combined presence of both expansion forces and gravity forces is best illustrated in FIG. 4 from which it will be apparent that these forces complement one another and produce a combined force effect, increasing the frictional drive force which may be imparted to the lower panel facing f₄ by each roller 31. Thus, a uniform rate of movement is assured since minor slippage on one or several rollers 31 will have little overall effect on the total drive force available.

Although a preferred form of the invention is illustrated and described, various modifications and changes may be resorted to without departing from the spirit of the invention or the scope of the appended claims and each of such modifications and changes is contemplated.

What is claimed is:

1. Apparatus of the kind described for the continuous manufacture of foamed laminated panel structures having a pair of panel facings, comprising: roller means for horizontally supporting a pair of panel facings in predetermined vertically spaced relationship; means for horizontally moving the panel facings in a relatively straight line while maintaining the facings in vertically spaced relationship including a plurality of drive rollers engageable with one facing, and means interconnecting the pair of facings whereby movement of said one facing imparts a corresponding and simultaneous movement to the other facing; and means including a reciprocating dispensing probe for inserting a settable mixture of foaming ingredients laterally between a pair of facings from one side thereof, the rate at which the settable mixture is dispensed, the rate of reciprocation of said probe and the rate of movement of the panel facings being regulated, adjusted or controlled to ensure a complete filling of the space between panel facings.

2. The apparatus of claim 1, said means interconnecting the lateral edges of said pair of facings comprising a

transparent tape applied between the parallel longitudinal edges on one side of said pair of facings in advance of said dispensing probe.

3. The apparatus of claim 1, and further comprising means for applying said transparent tape as said pair of facings are moved.

4. The apparatus of claim 1, and further comprising means for applying transparent tape between longitudinal edges on the opposite side of said panel facings after dispensing the settable mixture between facings.

5. The apparatus of claim 4, and further comprising means for maintaining the transparent tapes in position intermediate the longitudinal edges of said panel facings while said facings are moved and until the settable mixture has substantially set.

6. The apparatus of claim 4, and further comprising a pressure sensing device for measuring the pressure applied to one of said tapes, and means responsive to said pressure sensing device for varying the amount of settable mixture dispensed between facings per unit length of panel formed.

7. The apparatus of claim 1, said supporting means comprising first and second sets of rollers, each set arranged substantially horizontal and parallel to the other set at a fixed predetermined distance.

8. The apparatus of claim 7, said first set of rollers being supportive of said panel structures as they are formed, the rollers of said first set being synchronously driven from a common power source.

9. The apparatus of claim 8, and further comprising a drive shaft extending longitudinally of said first set of rollers, and gearing means interconnecting said first set of rollers with said drive shaft.

10. Apparatus of the kind described for the continuous manufacture of foamed laminated panel structures having a pair of panel facings, comprising: roller means for horizontally supporting a pair of panel facings in predetermined vertically spaced relationship; means for moving the panel facings in a relatively straight line while maintaining the facings in vertically spaced relationship including a first set of supportive drive rollers engageable with the lowermost facing; means for synchronously rotating said supportive drive rollers; a second set of rollers arranged substantially parallel to and at a fixed predetermined distance above said first set of rollers; and means including a reciprocating dispensing probe for inserting a settable mixture of foaming ingredients between a pair of facings supported between said first and second set of rollers; the rate at which the settable mixture is dispensed, the rate of reciprocation of said probe and the rate of movement of said panel facings being regulated, adjusted or controlled to ensure complete pressure filling of the space between panel facings.

11. The apparatus of claim 10, said means for synchronously rotating said supportive drive rollers comprising a drive shaft extending longitudinally of said first set of rollers, and gearing means interconnecting said first set of rollers with said drive shaft.

12. The apparatus of claim 10, and further comprising means for inserting a pair of tapes along and between the longitudinal edges of a pair of supported facings, and means for retaining the tapes in position while the settable mixture foams into pressure contact therewith.

13. The apparatus of claim 12, said means for inserting one of said tapes comprising a plurality of roller guides positioned intermediate said first and second sets of rollers downline of said dispensing probe, each roller guide comprising a pair of wheels arranged in converging relation and engageable with the rib of a tape for positioning and supporting said tape while the settable mixture foams into pressure contact therewith.

14. Apparatus of the kind described for the continuous manufacture of foamed laminated panel structures having a pair of panel facings, comprising: roller means including a pair of upper and lower horizontal roller conveyors for supporting and maintaining a pair of panel facings in predetermined vertically spaced and substantially parallel relationship; means for moving the panel facings along and between said upper and lower roller conveyors; and a horizontally reciprocating dispensing probe for inserting a settable mixture of foaming ingredients between the pair of facings from one side of said roller conveyors, the rate at which the settable mixture is dispensed, the rate of reciprocation of said probe and the rate of movement of said panel facings being regulated, adjusted or controlled to insure complete filling movement to the pair of facings.

15. The apparatus of claim 14, and further comprising first and second means for applying a side seal along the longitudinal edges on both sides of said panel facings, respectively, to retain the settable mixture therebetween, the side seals imparting a corresponding and simultaneous movement to the pair of facings.

16. The apparatus of claim 14, and further comprising means for inserting side retainer strips between longitudinal adjacent edges on both sides of said panel facings, at least one side retainer strip being inserted downstream relative to the horizontally reciprocating dispensing probe, each retainer strip at least partially supporting the uppermost panel facing from the lower panel facing while the mixture of foaming ingredients expands to pressure-fill the space between panel facings and side retainer strips.

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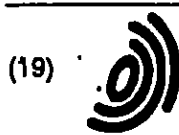
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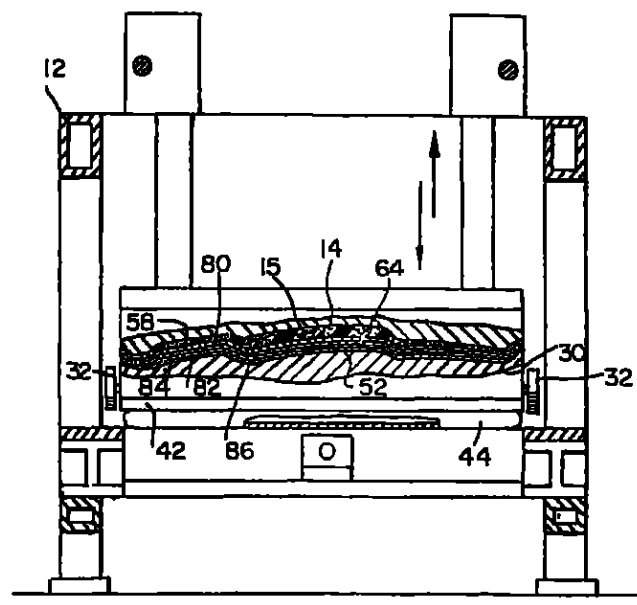
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(54) Headliner assembly and method of manufacture

(57) A headliner assembly and method of manufacture for lining a passenger compartment ceiling of a motor vehicle comprising a headliner cover (50) having an exterior surface presenting a major exterior appearance of the headliner assembly and an opposite interior surface, and a body of foamed material (64) adhered to the

opposite interior surface of the headliner cover (50) and having central portions thereof with a greater thickness than peripheral portions thereof, the body of foamed material (64) being of generally constant density throughout its extent including the central and peripheral portions thereof

Fig. 5.



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Description

This invention relates to a headliner assembly for a motor vehicle and a method of manufacturing the same.

Motor vehicle headliner assemblies are also known as motor vehicle ceiling liners and are used to line the ceiling or underside of the roof of a motor vehicle. The headliner assembly typically comprises a fabric or vinyl outer layer that presents the major exterior appearance of the vehicle ceiling, a soft, flexible foam intermediate layer of a relatively thin configuration, a layer of impermeate urethane film laminate disposed on a surface of the soft foam intermediate layer opposite the outer layer, and a thick, rigid polyurethane foam layer formed on the impermeate film as the innermost layer of the headliner assembly.

In conventional practice, the innermost polyurethane layer is formed from a preformed slab of polyurethane foam of uniform thickness. The slab is attached to the layer of impermeate urethane film laminate, either by suitable adhesive or by curing the slab together with the film laminate in a die-mold. The slab is cured and pressed in the mold to shape the entire combination of layers into the configuration desirable for the headliner assembly. The slab that is utilized is either one of two thicknesses. More specifically, in some instances, a relatively thin thickness is used which is generally equal to the thickness that is desired and essential to the periphery of the headliner for securing the periphery to the ceiling of the vehicle body, for example, by appropriate trim molding. This construction presents a most favorable weight and materials saving characteristic in that this thin amount of material that is used on the periphery is also used in the center. This configuration, however, suffers from the disadvantage that the center portion is relatively thin and does not present a desirable acoustical effect for the headliner assembly. In other instances, a much thicker slab is used that provides a much more desirable acoustic effect in the center of the headliner. However, because the periphery of the headliner cannot be this thick, the slab must be compressed along the periphery to enable it to be secured to the ceiling of the vehicle body. This means that the periphery has much more material than is desired or than is presented in the instance in which a thinner slab is used.

In effect, each of the prior art headliners of different thicknesses suffers from different disadvantages. That is, where a thin foam slab is used so that a desirable material quantity is expended, the acoustic characteristics suffers. On the other hand, where a thick foam slab is used so as to provide desirable acoustic characteristics, an excessive amount of material needs to be used along the periphery of the headliner assembly.

It is thus an object of the present invention, at least in preferred embodiments thereof, to provide a method of manufacturing a headliner assembly that obtains the advantages of both prior art arrangements while elimi-

nating the disadvantage. This object is achieved by providing a method for forming a motor vehicle headliner assembly having peripheral portions with a relatively smaller thickness than central portions comprising the steps of providing a headliner cover having an exterior surface which is to present the major exterior appearance of the headliner assembly and an opposite interior surface, mounting the headliner cover on a vacuum mold so that the exterior surface is facing a shaping mold surface of the vacuum mold having a shape corresponding with the desired major exterior surface shape of the headliner cover and so that the interior surface is facing away from the mold surface, applying a vacuum to the vacuum mold so as to draw the exterior surface of the headliner cover into conformity with the shaping mold surface of the vacuum mold, providing a foamable material directly to different areas on the opposite surface of the headliner cover such that a greater amount of foamable material per unit area will generally be applied to central portions of the opposite surface of the headliner cover relative to the amount of foamable material per unit area applied to peripheral portions of the opposite surface of the headliner cover, the foamable material being applied to the different areas in amounts generally commensurate with a desired thickness of the headliner assembly at the different areas, expanding the foamable material at a generally constant rate throughout so that the foamable material has a generally constant density throughout, and curing the foamable material and adhering the foamable material to the headliner cover so as to provide a body of foamed material constituting an inner layer of the headliner assembly.

It is also an object of the present invention, at least in preferred embodiments thereof, to provide a headliner assembly which has superior acoustical characteristics while utilizing less foam material than what is possible in convention techniques. In accordance with this object, the present invention provides a headliner assembly for lining a passenger compartment ceiling of a motor vehicle comprising a headliner cover having an exterior surface presenting a major exterior appearance of the headliner assembly and an opposite interior surface, and a body of foamed material adhered to the opposite interior surface of the headliner cover and having central portions thereof with a greater thickness than peripheral portions thereof, the body of foamed material being of generally constant density throughout its extent including the central and peripheral portions thereof.

The technology utilized in accordance with the present invention is to be contrasted with the somewhat similar foam-in-place technology utilized in forming seat cushions. For example, in U S Patent No. 5,273,698 there is disclosed a molding method for a seat in which the volume of the foamable material placed in the mold is concentrated in a relatively thick volume as distinguished from the spread-out thin volume that applies to the headliner assembly of the present invention. Con-

sequently, in the thicker volume situation, it is possible to vent the mold, and the foamable material is placed in the mold by a flowable nozzle rather than by a spray nozzle. After the thick foamable material is placed in the lower mold, the upper mold is closed almost immediately, and there are venting provisions in the upper mold which will allow the foamable material to free-rise while in the mold and to be subsequently cured. This cannot be done when manufacturing a headliner assembly because of the need to discharge the gases which are created over such a vast surface area. Consequently, the conventional techniques for manufacturing a headliner assembly do not foam-in-place but rather utilize the slab technique.

In the present invention, by spraying the foamable material over the entire surface of the laminate which receives the foamable material and by allowing the foamable material to free-rise before it is closed into the mold, the problems associated with discharging gases is avoided. The problem with gas discharge is further avoided in the present invention by providing a headliner cover which comprises a decorative layer having a surface constituting a major exterior appearance of the headliner assembly and an opposite surface, a first layer of polyurethane foam adhered to the opposite surface of a decorative layer, an impermeate film barrier adhered to a first layer of polyurethane foam on a side of a first layer of polyurethane foam opposite a decorative layer, and a second layer of polyurethane foam adhered to an impermeate film barrier on a side of said impermeate film barrier opposite a first layer of polyurethane foam.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawing in which:-

FIGURE 1 is a schematic side view showing a molding apparatus utilized in manufacturing the headliner assembly in accordance with an embodiment of the present invention.

FIGURE 2 is a partial schematic side view, partly in section, showing the start position of the molding apparatus utilized in manufacturing the headliner assembly in accordance with the embodiment of the present invention.

FIGURE 3 is an overhead schematic view of the portion of the molding apparatus shown in FIGURE 2.

FIGURE 4 is a schematic side view showing the molding apparatus of the present invention with the upper and lower mold assemblies disposed in cooperating relation for molding a headliner assembly.

FIGURE 5 is a transverse sectional view taken through the line 5-5 in FIGURE 4 of the molding apparatus in accordance with the present invention.

FIGURE 6 is a partial sectional view taken through the thickness of the headliner assembly, and showing the different layers of the headliner assembly in accordance with the embodiment of the present invention.

FIGURE 7 is a perspective view of a headliner construction comprising two headliner assemblies manu-

factured in accordance with the embodiment of the present invention.

FIGURE 1 is a schematic side view showing a molding apparatus 10 utilized in manufacturing the headliner assembly in accordance with an embodiment of the present invention. The molding apparatus 10 comprises a steel frame 12, which mounts an upper mold assembly 14 for vertical movement. The upper mold assembly 14 has a lower mold surface 15, which is shaped in conformance with the desired uppermost configuration for the headliner assembly. The vertical movement of the upper mold assembly 14 can be accomplished in any conventional fashion. In the present embodiment, the upper mold assembly is provided with a plurality of rack columns 16, which cooperate with the plurality of pinion drivers contained within pinion housings 18. The pinions are driven by a servo drive rod 20, which is rotated by a motor 22. A fixed encoder 24 is capable of determining the relative position of the upper mold assembly 14 at all times.

The mold apparatus 10 further includes a fixed track 28, which extends through frame 12, beneath the upper mold assembly 14. A lower mold assembly 30 is mounted for movement on track 12 by bearing or wheel members 32. The lower mold assembly 30 is driven along track 28 in any suitable fashion. In FIGURE 1, the lower mold assembly 30 is shown in its start position. The molding apparatus 10 can optionally be provided with a second lower mold assembly 46. The first lower mold assembly 30 and second lower mold assembly 46 can be alternately moved under the upper mold assembly 14 to cooperate therewith during a molding operation. In such fashion, the lower mold assembly not being used can be set up for the next molding operation. Mounted on the frame 12 above the lower mold assembly 30 in the start position is a pair of spray heads 40 mounted for transverse movement with respect to the lower mold assembly 30 and track 28. These spray heads 40 are connected with a source of foamable material such as foamable polyurethane liquid. Plural spray heads 40 are provided in order to reduce the amount of time required to apply the foamable material during the manufacturing process.

Disposed beneath the upper mold assembly 14 is a steel platen 42, which rests upon a plurality of tubular airbags 44 extending transversely with respect to track 28. In FIGURE 1, the airbags 44 are shown in a deflated condition.

In FIGURE 1, the first step of the molding operation in accordance with the present invention is shown. More specifically, a headliner cover 50 is placed over and laid to rest upon a mold surface 52 of the lower mold assembly 30. The cover 50 comprises a fiberglass mat 58 and a separate cloth member 60. The fiberglass mat 58 is placed upon the cloth member 60 after the cloth member is placed on mold surface 52. The positioning of the fiberglass mat 58 and cloth member 60 is preferably done manually, but the present invention contemplates that

an automated placement of this headliner cover can be accomplished. After placement of the headliner cover 50 on the mold surface 52, a vacuum is applied by the lower mold assembly 30 so as to draw the bottom surface of the headliner cover 50 into conformity with the mold surface 52.

In FIGURE 2, it is shown that the lower mold assembly 30 contains a plurality of vacuum ports 54 extending therethrough to the mold surface 52, and a common vacuum channel 56 connecting such vacuum ports 54 with a vacuum system (not shown). It can be appreciated that the fiberglass mat 58 can be applied over the cloth member 60 either before or after the vacuum is applied via vacuum ports 54 to the bottom surface of the headliner cover 50. In the preferred embodiment, the vacuum is applied to the cloth member 60 before the fiberglass mat 58 is placed thereover.

Turning now to FIGURE 2, the next step of the method in accordance with the principles of the present invention is shown. More specifically, it can be seen that spray heads 40 apply a spray of foamable material, preferably in the form of a polyurethane foam spray 62 to form a polyurethane foam layer 64 on the headliner cover 50. Preferably, the polyurethane spray 62 is applied with a diameter of approximately 18 inches as it is sprayed upon the fiberglass mat 58 of the headliner cover 50. As indicated by the single arrow in FIGURE 2, the lower mold assembly 30 is translated along track 28 as the polyurethane spray 62 is being applied.

As shown in FIGURE 3, the spray heads 40 are fixed on a mounting assembly 66, which is mounted for movement on a track assembly 68 fixed to frame 12 and suspended above the lower mold assembly 30. The track assembly 68 suspends the spray head mounting assembly 66 above the lower mold assembly 30 in the instance in which the mold assembly 30 is in the start position as seen in FIGURE 1. The track assembly 68 includes a pair of parallel track members 70 extending in transverse, substantially perpendicular relation with respect to the track 28 therebeneath. A pair of spray head mounting members 72, which form part of carriage assembly 66, are each slidably mounted on a respective track member 70, for example, by an appropriate bearing arrangement. The carriage assembly 66 further includes a connecting assembly 74, which connects the mounting members 72 to one another, and which includes a nut element 76. The nut element 76 has internal threads which cooperate with external threads of a screw member 78 mounted for rotation on the track assembly 68 and extending in parallel relation between track members 70. The screw member 78 is turned at one end by bi-directional electric motor 80 to effect transverse movement of the carriage assembly on track assembly 68. The opposite end of the screw member 78 is mounted in a bearing 69 or equivalent structure.

The bi-directional motor 80 is adapted to alternately rotate the screw mechanism 78 in opposite directions to effectuate back and forth movement of the carriage as-

sembly 66 along the track assembly 68. The direction and speed of electric motor 80 is a function of electrical signals input thereto by a computer (not shown). The computer controls the electrical input to the motor 80 in accordance with the desired foaming thickness of the headliner assembly at different locations. Basically, because the central portions of the headliner are to be made thicker than peripheral portions, the motor 80 moves the carriage assembly slower as the spray heads 40 traverse the center of the headliner assembly than when the carriage reaches the peripheral portions so that more foam will be applied to the center of the headliner assembly than at the periphery.

In the preferred embodiment, the amount of polyurethane spray 62 and the longitudinal speed of the lower mold assembly 30 are constant during application of the polyurethane spray 62, while the speed of the spray heads 40 is controlled. It can be appreciated, however, that a contemplated modification of the present invention is to provide a carriage assembly 66 that moves back and forth at a constant speed, while the amount of polyurethane spray ejected by heads 40 and/or the speed and direction of the lower mold assembly 30 are computer controlled in accordance with the desired thickness of foam to be applied. The sole requirement for providing the foamable polyurethane spray 62 is that it is applied directly to different areas on the headliner cover such that a greater amount of foamable material per unit area will be generally applied to central portions of the headliner cover relative to the amount of foamable material per unit area applied to the peripheral portions of the headliner cover, and that the foamable polyurethane spray 62 be applied to areas of the headliner cover 50 in amounts generally commensurate with the desired thickness of the headliner assembly at such areas.

After the appropriate amount of polyurethane spray 62 is provided to form polyurethane foam layer 64, the polyurethane foam layer 64 is permitted to free-rise, without being confined within a mold, and expand at a generally constant rate throughout so that the foamable material has a generally constant density throughout. The lower mold assembly 30 will then continue its movement along track 28 until it is disposed beneath the upper mold assembly 14 and above the platen 42. At this time, as shown in FIGURE 4, the upper mold assembly 14 will be lowered upon actuation of motor 22 until mold surface 15 comes to rest upon the polyurethane foam layer 64.

Subsequently, the airbags 44 are pressurized to lift platen 42 evenly. The platen engages the underside of the lower mold assembly 30 and lifts it upwardly with respect to the track 28 so that the headliner assembly will be compressed and shaped between mold surfaces 15 and 52 as the foamable material cures at the appropriate temperature and pressure. As shown in FIGURE 5, the mold surfaces 15 and 52 have a shape conforming to the desired shape of the finished headliner assembly.

as depicted in FIGURE 7. During this curing process, the fiberglass mat 58 is adhered by virtue of the foam material to the headliner cloth member 60. Thus, the entire headliner assembly is integrally formed. During the curing of the foamable material, the foamable material is permitted to expand evenly throughout so that the cured foam layer will have a constant density throughout.

After the curing process, the upper mold assembly 14 is raised and airbags 44 are deflated so that the lower mold assembly 30 returns to the track 28. The lower mold assembly 30 will then be moved back to its starting position, and the headliner assembly can be removed from the mold surface 52.

As can be appreciated from FIGURES 3, 5, and 6, the headliner cover 50 preferably comprises five different layers of material. In the broadest aspects of the invention, however, the headliner cover 50 can be formed from any number of layers (as few as one), so long as it presents an exterior surface that can be used to form major exterior appearance of the headliner assembly.

The uppermost layer of the headliner cover 50 comprises the aforementioned fiberglass mat 58. The fiberglass mat 58 is provided as the uppermost layer of the headliner cover and provides rigidity and strength to the entire completed headliner assembly. By changing the percentage of fiberglass mat to foam, it is possible to alter the strength, hardness, and/or density of the assembly. This can also be done by changing the water content of the polyurethane spray 62. As a result, the entire assembly can be an engineered composite relative to part requirements.

Additionally, it can be appreciated from the figures that the headliner cloth member 60 comprises four layers, including, in order from the uppermost layer to the lowermost layer, an upper, thin layer of polyurethane foam 80, a polyethylene film barrier 82, an intermediate layer of polyurethane foam 84, and a decorative material layer 86 such as fabric or vinyl. The purpose and function of each of these layers will now be described.

The decorative layer 86 provides the exterior surface which can be seen from the interior of the vehicle, and is most preferably made from a perforate fabric or cloth that is soft to the touch. The polyurethane foam layer 84 is relatively thin and pliant, and provides the main cushioning for the headliner cloth member 60. The polyethylene film barrier 82 is substantially impermeate, and thus prevents passage of air through the headliner cloth member 60 when the vacuum is applied thereto after it is laid upon mold surface 52. In addition, the film barrier 82 has a great affinity for polyurethane foam so that the foam layers thereabove and therebelow adhere readily thereto. The uppermost layer of the headliner cloth member 60 comprises a thin, pliant polyurethane foam layer 80. The main purpose of this layer is to advantageously reduce air bubbles which may form in the polyurethane foam layer 64 during expansion thereof. More specifically, after the polyurethane spray 62 is ap-

plied, the polyurethane foam layer 64 gives off reaction gases as a by-product of the expansion process. These gases have a tendency to form bubbles in the polyurethane foam layer 64, especially in the thicker areas. To reduce the amount of air bubbles created, the polyurethane foam layer 80 is provided to function as a sponge-like material, which permits gases to be absorbed through the fiberglass mat layer 58 and dissipated within layer 80. Thus, the amount of air bubbles is greatly reduced, and a smooth upper surface is formed.

Shown in FIGURE 7 is a completed headliner construction 90. It can be appreciated that this assembly 90 actually constitutes a pair of front headliner assemblies 92. More specifically, a vehicle ceiling headliner preferably comprises a front headliner assembly, which is generally disposed over the driver and passenger seats and extends partially rearwardly into the vehicle. The vehicle headliner also includes a separate rear headliner assembly, which is typically twice the size of the front headliner, and extends throughout the rest of the vehicle ceiling. Separate headliner assemblies are provided for ease of installation into the vehicle. In FIGURE 7, two front headliner assemblies 92 are shown. These headliner assemblies are formed in the same molding operation, and are subsequently cut along score line 94. It can thus be appreciated that two or more headliner assemblies can be manufactured in a single molding operation for economies of manufacture.

In accordance with one feature, the headliner assembly further comprises an opening disposed in said central portions of said body of foamed material adapted to receive a vehicle ceiling dome light.

It will be realized that the foregoing preferred specific embodiment has been shown and described for the purpose of example and is subject to change without departure from the principles of the invention. This invention includes all modifications encompassed within the scope of the following claims, which are to be read as being included within the disclosure of the description of this application.

It is to be appreciated that where features of the invention are set out herein with regard to a method according to the invention, such features may also be provided with regard to apparatus according to the invention, and vice versa.

Claims

1. A method for forming a motor vehicle headliner assembly having peripheral portions with a relatively smaller thickness than central portions, comprising the steps of

providing a headliner cover (50) having an exterior surface which is to present the major exterior appearance of the headliner assembly and an opposite interior surface,

- mounting the headliner cover (50) on a vacuum mold (10, 30, 14) so that the exterior surface is facing a shaping mold surface (52) of the vacuum mold having a shape corresponding with the desired major exterior surface shape of the headliner cover (50) and so that the interior surface is facing away from the mold surface (52), applying a vacuum to the vacuum mold so as to draw the exterior surface of the headliner cover (50) into conformity with the shaping mold surface (52) of the vacuum mold, providing a foamable material (62) directly to different areas on the opposite surface of said headliner cover (50) such that a greater amount of foamable material (62) per unit area will generally be applied to central portions of the opposite surface of said headliner cover (50) relative to the amount of foamable material (62) per unit area applied to peripheral portions of the opposite surface of said headliner cover (50), said foamable material being applied to said different areas in amounts generally commensurate with a desired thickness of the headliner assembly at said different areas, expanding the foamable material (62) at a generally constant rate throughout so that said foamable material has a generally constant density throughout; and curing the foamable material and adhering the foamable material (62) to the headliner cover (50) so as to provide a body of foamed material (64) constituting an inner layer of said headliner assembly
2. A method according to claim 1, wherein said headliner cover (50) comprises a perforate material presenting the exterior surface which is to form the major exterior appearance of the headliner assembly, and an imperforate film (82) disposed on a side of said perforate material opposite said surface forming the major exterior appearance of the headliner assembly, and wherein during the step of applying the vacuum to the vacuum mold the imperforate film (82) prevents passage of air through the headliner cover (50)
3. A method according to claim 2, wherein the headliner cover (50) further comprises a fiberglass material (58) forming the opposite interior surface of said headliner cover (50) upon which said foamable material (62) is provided to, and wherein said mounting of the headliner cover (50) includes first mounting the perforate material and imperforate film (82) adhered thereto as a unit on the vacuum mold (30), and then mounting said fiberglass material (58) over the perforate material and imperforate film (82) before said foamable material (62) is provided in said providing step

4. A method according to any preceding claim, wherein said step of providing the foamable material (62) is accomplished by moving a foam applicator assembly (40, 72, 74, 76) across the opposite interior surface of said headliner cover while said foam applicator assembly sprays the foamable material directly onto the different areas on the opposite interior surface in amounts commensurate with the desired thickness of the headliner assembly at said different areas
5. A method according to claim 4, wherein the vacuum mold (10) comprises a horizontally movable lower mold portion (30) providing the shaping mold surface (52) and a vertically movable upper mold portion (14) providing a cooperating mold surface (15), said method further comprising the steps of

moving the lower mold portion (30) horizontally in a direction transverse to the direction in which said foam applicator assembly (40, 72, 74, 76) moves across the opposite interior surface of the headliner cover (50) while said foam applicator assembly sprays the foamable material (62) onto the opposite interior surface of the headliner cover, and vertically moving the upper mold portion (14) into cooperative relation with said lower mold portion (30) so that said shaping mold surface of the lower mold portion and the cooperating mold surface apply pressure to the headliner cover (50) and foamable material (62) disposed between said mold surfaces so as to form the headliner assembly into a shape defined by said mold surfaces

6. A headliner assembly for lining a passenger compartment ceiling of a motor vehicle comprising
- a headliner cover (50) having an exterior surface presenting a major exterior appearance of the headliner assembly and an opposite interior surface, and
- a body of foamed material (64) adhered to the opposite interior surface of said headliner cover (50) and having central portions thereof with a greater thickness than peripheral portions thereof, said body of foamed material (64) being of generally constant density throughout its extent including said central and peripheral portions thereof
7. A headliner assembly according to claim 6, wherein said headliner cover comprises a perforate material (86) presenting the exterior surface which is to form the major exterior appearance of the headliner assembly, and an imperforate film (82) disposed on a side of the perforate material (86) opposite said ex-

terior surface forming the major exterior appearance of the headliner assembly.

8. A headliner assembly according to claim 7, wherein the headliner cover (50) further comprises a fiberglass material (58) forming the opposite interior surface of said headliner cover (50) and forming an interface with said foamed material (64) 5
9. A headliner assembly according to claim 6, 7 or 8, further comprising an opening disposed in said central portions of said body of foamed material adapted to receive a vehicle ceiling dome light 10
10. A headliner assembly according to claim 6, wherein said headliner cover (50) comprises 15
 - a decorative layer (86) having a surface constituting said major exterior appearance of the headliner assembly and an opposite surface, 20
 - a first layer (84) of polyurethane foam adhered to the opposite surface of said decorative layer; an impermeate film barrier (82) adhered to said first layer (84) of polyurethane foam on a side of said first layer of polyurethane foam opposite 25
 - said decorative layer (86); and
 - a second layer (80) of polyurethane foam adhered to said impermeate film barrier (82) on a side of said impermeate film barrier (82) opposite said first layer (84) of polyurethane foam 30
11. A headliner assembly according to claim 10, wherein said impermeate film barrier (82) comprises polyethylene 35
12. A headliner assembly according to claim 11, wherein said headliner cover further comprises a fiberglass material (58) disposed between said second layer (80) of polyurethane foam and said body of foamed material (64) 40
13. A headliner assembly according to claim 12, wherein said decorative layer (86) comprises a perforate cloth material. 45
14. A headliner assembly according to claim 12, wherein said decorative layer (86) comprises vinyl. 50

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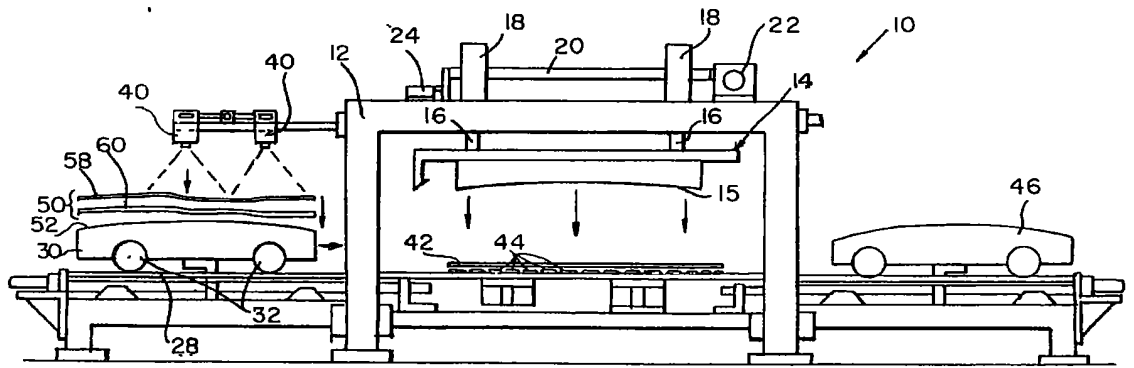


Fig. 1.

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Fig.2.

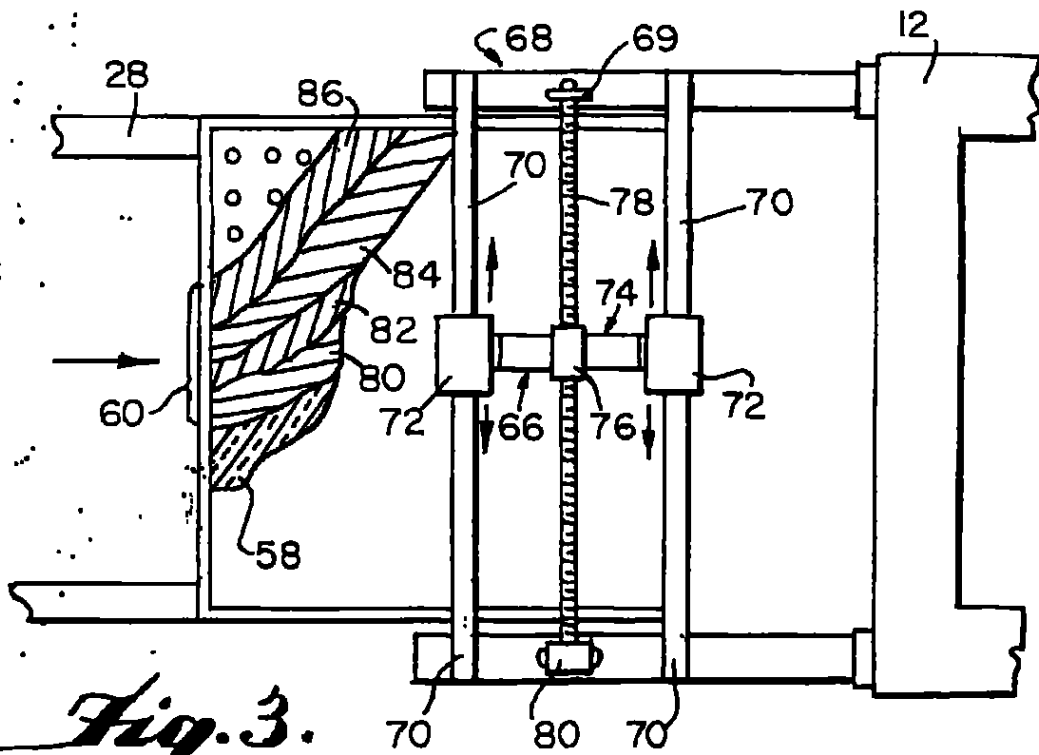
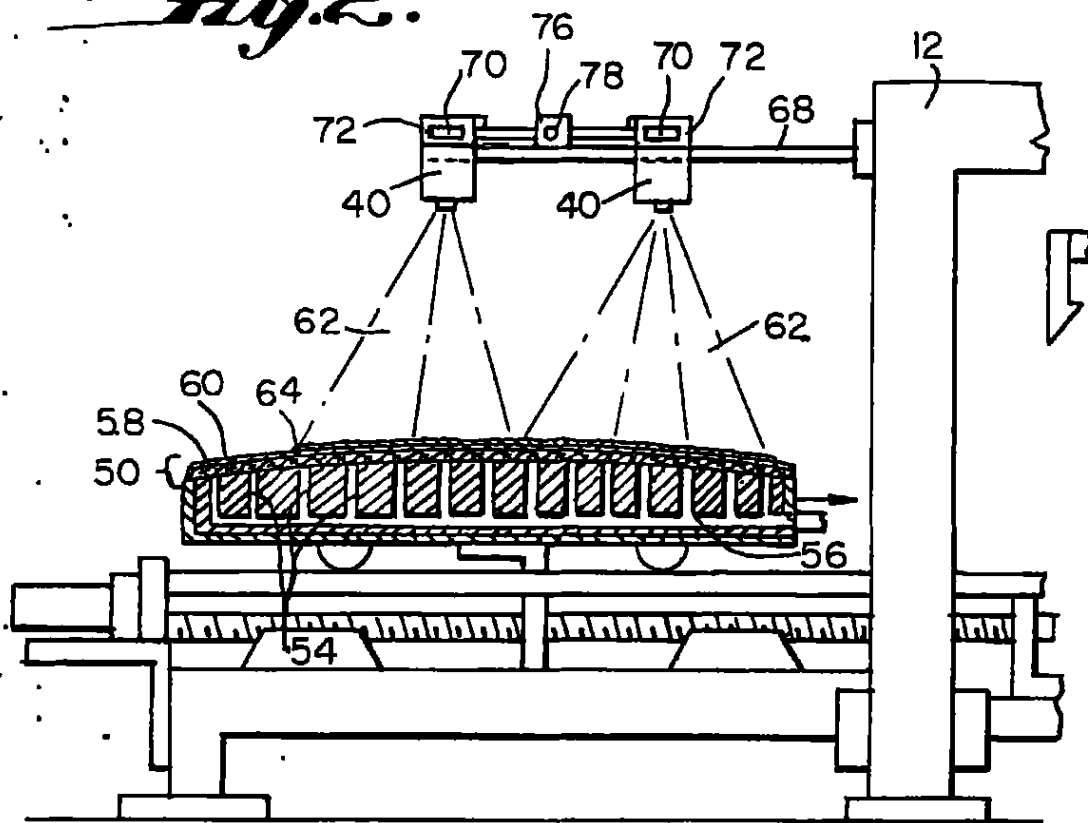


Fig.3.

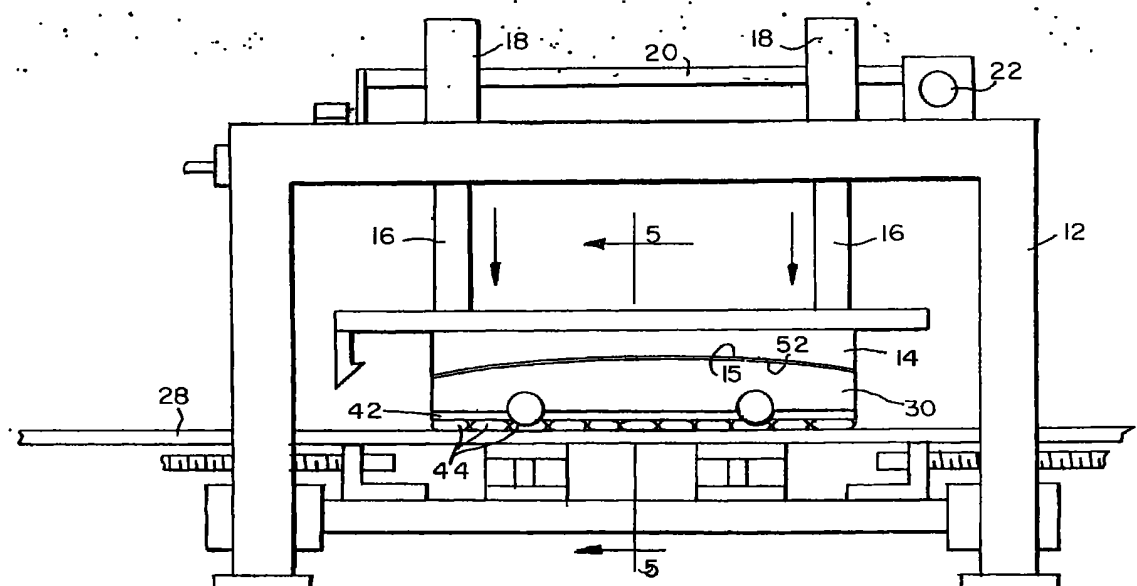
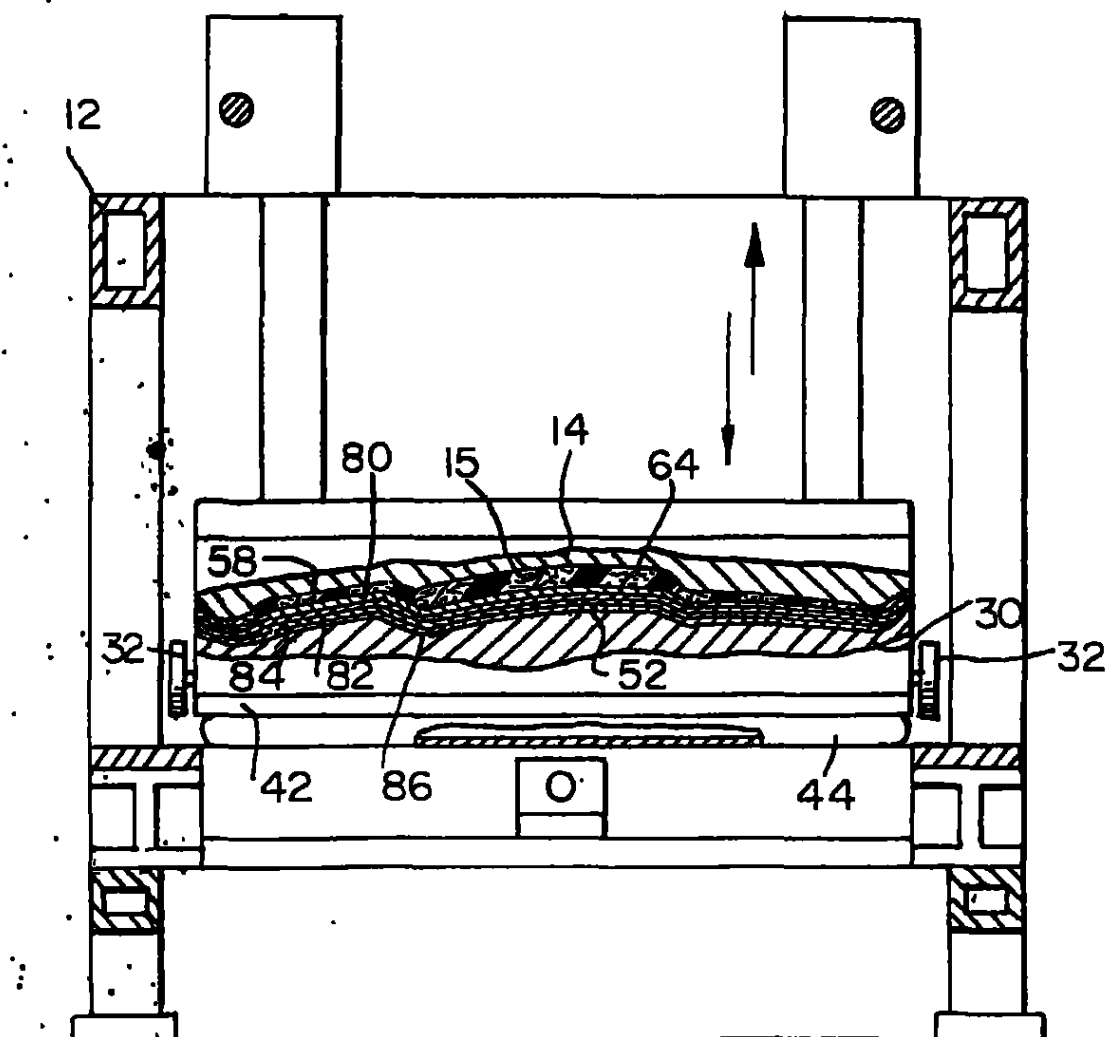


Fig. 4.

Fig. 5.



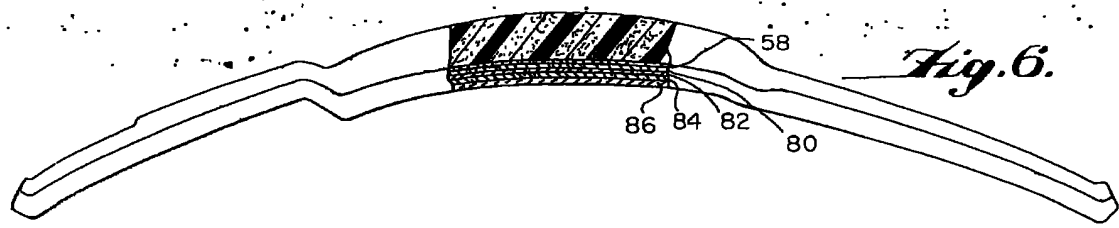


Fig. 6.

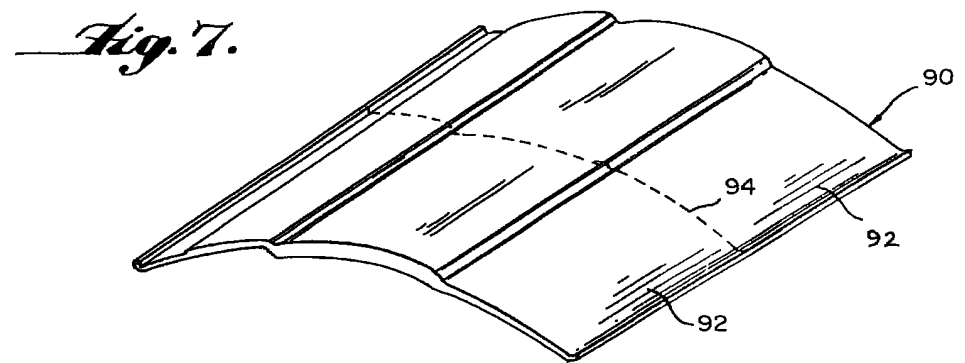


Fig. 7.

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UNITED STATES PATENT OFFICE

2,541,639

ELECTRIC PREHEATER FOR HAIR CURLERS

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Application February 7, 1947, Serial No. 727,188

4 Claims. (Cl. 219—24)

1

This invention relates to a method and apparatus for waving hair on the human head. More particularly, the invention pertains to that type of method and apparatus which is shown and described in United States Letters Patent Re. No. 21,994 for Method of Hair Waving, dated January 8, 1942 and United States Letters Patent No. 2,108,984 for Electric Circuit for Hair Waving Machine, dated February 22, 1938, both said patents having been issued to Gottfried Freudenberger and Alfred Edmund Reimers and assigned to the assignee of the instant application.

It is an object of this invention to provide a method and apparatus of the character described which constitute a general improvement over those of the aforementioned patents.

It is a more particular object of this invention to provide an apparatus of the character described which comprises far fewer parts than those illustrated in said patents.

It is a further object of the present invention to provide a method and apparatus of the character described which are easier to use and which give more accurate results than those of said patents.

It is an additional object of the present invention to provide an apparatus of the character described which is so constructed that an operator is not likely to burn her hands thereon.

In the machine illustrated in said patents, heat storage curler heaters are mounted on heating rods whose temperatures are raised electrically, e. g. by resistance heating. The temperatures of the heating rods are controlled by remote thermostatic means which are independently heated by auxiliary electric resistances approximately duplicating temperature conditions of the heater rods. The circuits are such that, when the remote thermostatic means are raised to a certain temperature, energy to the heating rods is cut off, the heating rods being at the desired temperature. Subsequently, when the remote thermostatic means cool down enough, energy will be restored to the heating rods. Thus the heating rods fluctuate between predetermined high and low temperature limits in a desired range, being controlled by a corresponding fluctuation in the temperatures of the thermostatic means.

Although such apparatus has performed satisfactorily in the field, it is relatively expensive to manufacture, due to its many parts and complex electrical circuit. In addition, it has a certain disadvantage, to wit: If a heat storage curler heater is disengaged from a heating rod and subsequently replaced, the temperature of the auxi-

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lary resistance no longer corresponds to or reflects the condition of the heating rod so that, in practice, once a set of heaters has been used, it is customary to permit the associated heating rod to cool off before re-employing the same. This is done to restore the heating rod and the auxiliary resistance to a state approximating starting conditions.

It was also noticed that, where a remote thermostatic means was employed, the temperature of the heating rods could not be controlled any closer than about 80° F. at around 700° F.

It is a more specific object of the present invention to provide an apparatus which does away with the above conditions, that is, which uses few control parts and a simple electrical circuit, which allows heating rods to be re-used without cooling off after the heat storage heaters have been removed therefrom, and which holds the temperature of the heating rods much closer to the desired temperature than heretofore.

Another difficulty experienced with the apparatus of the aforesaid patents is that the heat radiated from the heating rods and curler heaters impinges upon the handles or finger pieces of adjacent heaters making the same so hot that at times they can not be comfortably handled.

It is, accordingly, a further object of the present invention to provide a machine so constructed that each heating rod and its associated heater is prevented from radiating heat to adjacent sets of heating rods and heaters.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists of the features of construction, combinations of elements and arrangement of parts which will be exemplified in the devices hereinafter described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings, in which is shown one of the various possible embodiments of this invention,

Fig. 1 is a perspective view of a hair waving apparatus constructed in accordance with the invention;

Fig. 2 is an enlarged sectional view therethrough, taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken substantially along the line 3—3 of Fig. 2, and

Figs. 4, 5 and 6 are sectional views taken substantially along the lines 4—4, 5—5 and 6—6, respectively, of Fig. 3.

Referring now in detail to the drawings, 10

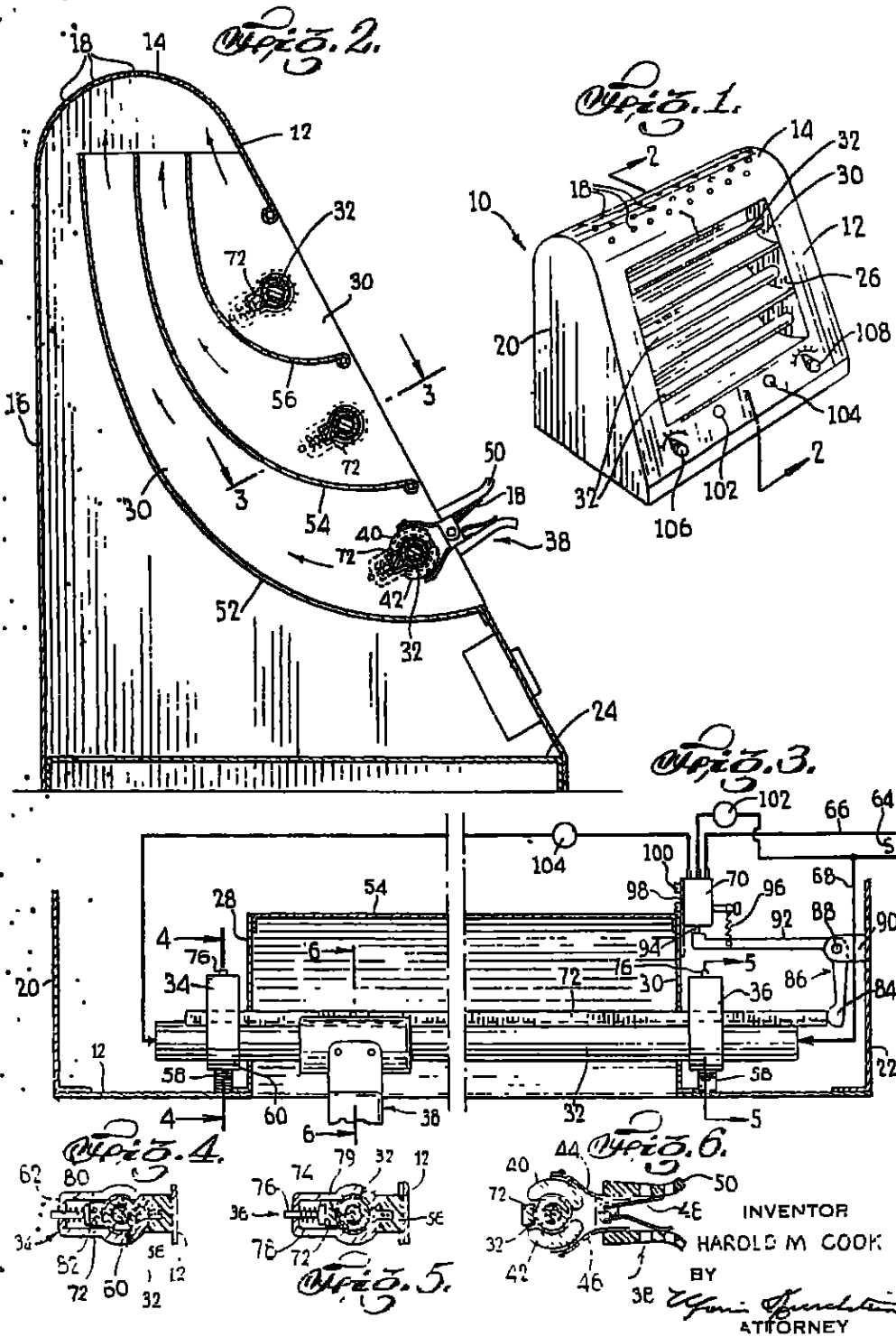
Feb. 13, 1951

H. M. COOK

2,541,639

ELECTRIC PREHEATER FOR HAIR CURLERS

Filed Feb. 7, 1947



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indicates a machine embodying the invention and commonly known in the trade as "preheater machine." Said machine comprises a cabinet including an inclined front wall 12, a curved top wall 14 and a rear wall 16 all optionally constructed from a single piece of sheet metal. The top wall has several through openings 18 provided therein so that it can act as a grille. Side walls 20, 22 are suitably secured, as by spot welding, to the front, top and rear walls. If desired, the bottom of the cabinet may be closed by a base plate 24.

The front wall has a large opening 26 from whose side edges plates 28, 30 extend rearwardly into the interior of the cabinet. Said front wall serves as the support for a plurality of cylindrical heating rods 32 extending through the plates 28, 30 and bridging the space therebetween. For the sake of appearance, the heating rods are arranged parallel to one another and to the base of the cabinet, and in addition are spaced approximately the same distance in back of the front wall. The heating rods are supported from the front wall by brackets 34, 36 of a special construction hereinafter described in detail, and said rods are adapted to have clamped thereon a plurality of heat storage curler heaters 38 of conventional construction. These latter, by way of example, comprise two curved heat storage jaws 40, 42 riveted to arms 44, 46 which are pivotally secured together. A spring 48 biases the jaws toward one another. Finger pieces 50 are riveted to the arms 44, 46.

Each of the heating rods has disposed beneath and in back of it a curved plate 52, 54, 56 the forward edge of which is in approximately the plane of front wall 12 and the rear edge of which is located a short distance beneath the top wall 14. Said plates turn through an angle of about 90° between these two walls of the cabinet and form separate passageways each of which runs from the opening 12 to the grille past a single heating rod. The edges of the curved plates 52, 54, 56 may be connected to the side plates 28, 30 to provide fully closed chimneys each of which comprises one of the foregoing passageways and houses a heating rod near its open lower end. Said chimneys act to intercept heat radiated from the heating rods and which would normally strike the finger pieces of heaters on adjacent heating rods. The chimneys also serve to induce the flow of a stream of air past the heating rods and heaters. This air, coming as it does from the room, is relatively cool and will tend to hold down the temperature of the finger pieces so that the same may at all times be handled with comfort.

The brackets 34, 36 which support the heating rods 32 comprise straps bolted to blocks 58 of insulating material on the front wall 12. Said straps each include an internally concave, segmentally circular portion 60 of proper diameter to slidably receive the heating rods. It will be understood that the shape of these portions 60 is controlled by the cross-section of the ends of the heating rods the same being of such outline as to freely receive said ends. The ends of the portion 60 run into the legs of a U-shaped part 62.

The heating rods derive electric energy from a suitable source 64 of power supplied through lead lines 66 etc. Pursuant to a feature of the present invention, one of these lead lines, as for example, the lead line 66, is interrupted by a series connected switch 70 which may be of the

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momentary snap acting type such as are sold under the trade names Micro switch or Mu switch. Thermostatic means directly responsive to the temperature of the heating rod is employed to govern the operation of said switch in such manner that, when the heating rod is below a predetermined temperature, the circuit to said rod remains closed as long as the machine is in operation and, when the heating rod is above another predetermined temperature, the switch will open.

Said thermostatic means consists of an elongated bar 72 which, in the illustrated example, is of metal. The bar is in physical contact with the heating rod and, as a matter of fact, may have one face thereof concavely grooved so as to maintain contact with the rod over an extensive area. The two ends of the bar are received between the legs of the U-shaped portions 62 of both brackets 34, 36 so that the bar is situated in a definite position which insures contact of the bar and heating rod.

Means also may be included to press the bar against the rod. Said means constitutes spring loaded pressure pads carried by each of the brackets and pressing the bar 72 against the heating rod. Each pad is in the form of a small metal disc 74 bearing against the back side of the bar 72, said disc being integrally secured to one end of a pin 76, slidably mounted in the base of the U-shaped portion 62. A small compression spring 78 encircling the pin is caught between the base of the U-shaped portion 62 and the disc 74 whereby to press the disc up against the bar 72 and the bar, in turn, against the heating rod. The rod 32 may be restrained against axial movement by a boss 79 on the bar fitted into a depression in the rod.

The bar 72 is employed as a thermally sensitive member by fixing one end thereof against movement and arranging the position of the other end to control the operation of the momentary switch 70. Accordingly, one of the discs, as for instance, the disc in the bracket 34, has a projection 80 on the face opposite that from which the pin 76 extends. Said projection is received in a recess 82 on the back surface of the rod 72. The opposite end of said bar butts against an arm 84 of a bell crank lever 86 rotatively mounted in the cabinet 10 by means of a pin 88 and bracket 90. The other arm 92 of said bell crank lever bears against the actuating finger 94 of the switch 70. Said switch is of the normally open type but is kept closed, when the machine is idle, by a tension spring 96 which presses the arm 92 against the finger 94 strongly enough to close the switch contacts.

The switch 70 is secured in the cabinet in some suitable manner. For instance, it may be mounted on a metal strip 98 which is secured to the plate 30. The mounting of said switch or of the bracket 90 is adjustable in order that the temperature at which the switch is operated may be varied. As illustrated, the mounting for the switch is made adjustable, the strip 98 having slots therein extending in a direction toward and away from the bar 72, and the switch being fixed to the strip by screws 100.

In operation, when power is turned on the rod 32 will heat up and the temperature of the bar 72 will be substantially the same as that of the rod inasmuch as it is in extensive contact therewith. As the temperature of the bar rises, the position of its fixed end in the bracket 34 will remain unchanged. However, the far end there-

of adjacent the bracket 36 will move away from the fixed end due to expansion of the metal. This causes the bell crank lever to rotate in a counter-clockwise direction against the action of the spring 86. The position of the switch 70 is so adjusted that when the rod 32 reaches a certain desired temperature, say 700° F., said switch is in such condition that it will just have opened. Under these circumstances, power will be cut off to the rod and the bar 72 will contract. The arm 84 of the bell crank lever now will follow the rod under the influence of the spring 96 and the arm 92 of said lever will depress the actuating finger 94. When the temperature of the bar has dropped a relatively slight amount, for instance, 30° or less, the arm 92 will have moved sufficiently to operate the switch 70 and close its contacts thus re-energizing the rod. This cycle continues until the storage heaters are removed from the rod. If, now, fresh heaters are placed on the rod, the temperature of the rod will rapidly drop, but as soon as this occurs the bar 72 will likewise experience a loss of heat, and its temperature will fall causing the switch 70 to close and to remain closed until such time as the rod, the bar and the heaters on the rod have attained the proper temperature.

It is pointed out that the momentary switch 70 includes its own means for spring loading the same to idle position as is customary in the art. That is to say, said switch includes a resilient member which biases the two switch contacts apart. This member also biases the actuating finger to its outermost position, and thus the preheater need include no additional means for linking together said actuating finger and the arm 92 of the bell crank lever. The snap action of the switch minimizes sparking when the contacts open.

Although momentary switches, and particularly these of the snap action type, such as is exemplified by a Micro-Switch, are very sensitive and operate upon tiny movements of the actuating finger so that they can control the temperature of the rod 32 very closely, this sensitivity may be enhanced simply by making the switch actuating arm 92 longer than the rod actuated arm 84. With such construction it is extremely simple to keep the temperature of the rod within a 30° F. range at a temperature of about 700° F.

A single thermostat such as described may be used to govern the operation of all three heating rods, this being the form herein illustrated. However, it is also within the scope of the invention to provide a direct contact thermostat for each of the rods.

In the instant case only the central rod has a thermostat. However, the upper and lower rods also have bars 72 substantially identical with the bar on said center rod in order that the heat storage capacity of the upper and lower rods will be substantially the same as the heat storage capacity of the central rod. It is pointed out that all said bars are slender enough to permit the heaters to be clamped on the rods.

The machine may include the usual adjuncts employed with preheaters. Thus, two lights 102, 104 can be provided on the front of the panel. One of these lights, e. g. the light 102, is green and is energized through auxiliary normally closed switch contacts when the main contacts of the switch 70 which control the heating circuit are open. The other light 104 is red. This light is energized when the heating circuit is in operation. Thus, when the red light is lit it

serves as a signal to inform the operator that the machine is in operation but that the rods are not at proper temperature. When the green light is lit the operator knows that the clamps can be removed and applied to person's hair.

The front wall 12 also has mounted thereon two elapsed time clocks 106, 108. One of these clocks, for instance the clock 106, controls a switch (not shown) in the power leads 66, 68. Cocking the clock 106 closes said switch and passage of the predetermined period of time opens said switch. This prevents the machine from operating over too long a period and makes certain that the operator does not leave the machine running when not actually in use. The other elapsed time clock 108 rings a bell after a predetermined period to inform the operator that the heaters have been left long enough on a head of hair.

It will thus be seen that there is provided a machine which accomplishes the several objects of the invention and is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limited sense.

Having thus described the invention, there is claimed as new and desired to be secured by Letters Patent:

1. An electrical apparatus for preheating heat storage curler heaters to be used for permanently waving hair on the human head, said apparatus comprising at least one heating element on which the heaters are adapted to be clamped, said heaters being so constructed that the edges thereof are spaced apart when clamped on the heating element, means to support said element, an electric heating means within said element, an electric supply circuit connected to said heating means, an electric switch in the supply circuit, an elongated thermally expansible member separate from and slenderer than said element and exposed to the ambient air, means to mount said member in back of said element and in direct contact therewith substantially over their full lengths, means to hold a portion of said member adjacent an end thereof against axial movement, said member being slender enough to be disposed between the jaws of the heaters clamped on the heating element, and a means kinematically interconnected said elongated member adjacent its other end to said switch in such fashion that said switch is opened by said member when said element exceeds a predetermined temperature and is closed by said member when said element is below a certain temperature.

2. An electrical apparatus as set forth in claim 1 wherein means is provided to resiliently press said elongated member against said element at a plurality of spaced points.

3. An electrical apparatus as set forth in claim 2 wherein the electric switch is a momentary switch.

4. An electrical apparatus as set forth in claim 3 wherein the kinematic interconnecting means includes a motion-amplifying means.

HAROLD M. COOK.

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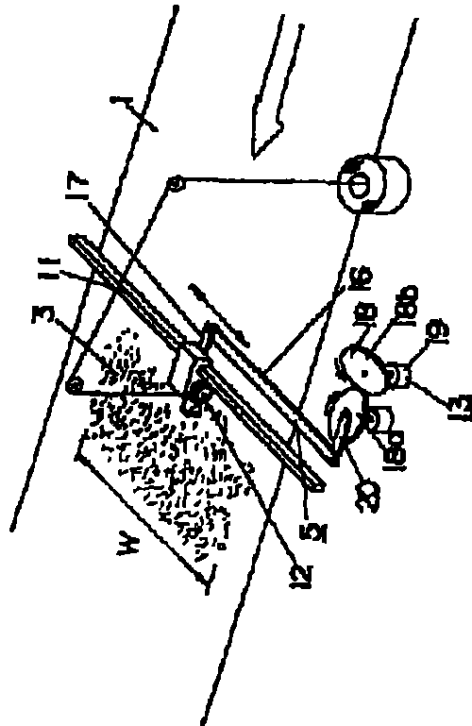
APPLICATION DATE : 28-12-90
APPLICATION NUMBER : 02409063

APPLICANT : DAIDO STEEL SHEET CORP;

INVENTOR : MIYAZAKI MASAO;

INT. CL. : B29C 39/16 B05B 13/04 B32B 31/06
E04C 2/02

TITLE : METHOD AND DEVICE FOR
MANUFACTURING HEAT INSULATING
PANEL



ABSTRACT : PURPOSE: To provide a manufacture and manufacturing device of a heat insulating panel where it can spread a mineral fiber uniformly between metallic hoop materials and is free from scattering also to the circumference.

CONSTITUTION: A mineral fiber 3 is spread by a spreader 5 which reciprocates in the direction meeting at right angles with a conveying direction of a metallic hoop material 1 and a moving speed of the spreader 5 is made higher than that of the central part of a widthwise direction of the metallic hoop material 1 at both side end parts. Therefore, the mineral fiber 3 can be spread uniformly between the metallic hoop materials 1 which are in the course of conveyance of the mineral fiber 3 and moreover the mineral fiber 3 is not scattered to the circumference.

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E 0 4 C 2/02		7904-2E		

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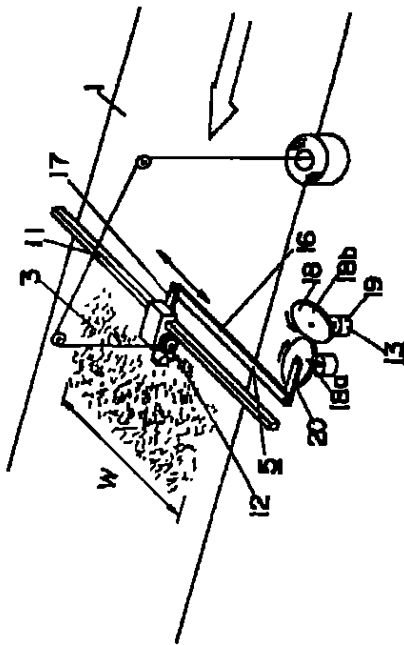
(21) 出願番号	特願平2-409063	(71) 出願人	000207438 大同銅板株式会社 兵庫県尼崎市杭瀬南新町3丁目2番1号
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(54) 【発明の名称】 断熱パネルの製造方法及び製造装置

(57) 【要約】

【目的】 無機質繊維を金属フープ材間に均一に散布でき、しかも周辺への飛散もない断熱パネルの製造方法及び製造装置を提供することにある。

【構成】 無機質繊維3を金属フープ材1の搬送方向と直交する方向に往復する散布装置5により散布すると共に散布装置5の移動速度を金属フープ材1の幅方向の中央部よりも両側端部において大きくするので、無機質繊維3を搬送中の金属フープ材1間に均一に散布でき、しかも無機質繊維3が周辺に飛散することがないものである。



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【特許請求の範囲】

【請求項1】 上下で相対向させて一対の金属フープ材を連続的に供給すると共に金属フープ材間に発泡性樹脂材料と無機質繊維を充填させて金属フープ材間に無機質繊維が混入された断熱材層を形成させる断熱パネルの製造方法において、無機質繊維を金属フープ材の搬送方向と直交する方向に往復動する散布装置により散布すると共に散布装置の移動速度を金属フープ材の幅方向の中央部よりも両側端部において大きくすることを特徴とする断熱パネルの製造方法。

【請求項2】 上下で相対向させて一対の金属フープ材を連続的に供給する供給手段と金属フープ材間に発泡性樹脂材料を注入する注入装置と金属フープ材間に無機質繊維を散布する散布装置と発泡性樹脂材料を加熱発泡させて金属フープ材間に無機質繊維が混入された断熱材層を形成するダブルコンベアとダブルコンベアにより成形された断熱長尺板材を所定寸法に切断する切断装置とを具備している断熱パネルの製造装置であって、散布装置を金属フープ材の搬送方向と直交する方向に架け渡されたガイドにスライド自在に取付けられた無機質繊維の粉砕機と粉砕機を往復動自在に駆動してその移動速度を金属フープ材の幅方向の中央部よりも両側端部において大きくなるようにする駆動手段とから構成したことを特徴とする断熱パネルの製造装置。

【請求項3】 散布装置を金属フープ材の搬送方向と直交する方向に架け渡されたガイドに粉砕機をスライド自在に取付け、粉砕機にリンクの一端を回転自在に連結すると共にリンクの他端を一対の非円形歯車とモータとからなる駆動手段の従動側歯車に連結されたアームに回転自在に連結して粉砕機の移動速度を金属フープ材の幅方向の中央部よりも端部において大きくなるように構成したことを特徴とする請求項2記載の断熱パネルの製造装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、二枚の金属フープ材間に無機質繊維が混入された断熱材層が充填されている断熱パネルの製造方法及び製造装置に関する。

【0002】

【従来の技術】 従来より、この種断熱パネルはガラス繊維のような無機質繊維3がマット状、紐状あるいは紐状の繊維を所定寸法に切断したものが混入されている。無機質繊維3を所定寸法に切断したものを混入する方法としては、図6及び図7に示すようにダブルコンベア8と発泡性樹脂材料2の注入装置7との間で丸又は矩形の筒体24をガイドとしてブロアー25により切断した無機質繊維3を吹き飛ばしていた。この時無機質繊維3の散布範囲を広げるためモータ26とリンク体27を介して筒体24を揺動させていた。

【0003】

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【発明が解決しようとする課題】 従来にあっては切断された無機質繊維3を空気で吹き飛ばすために筒体24の近くと遠方では散布量に大きなばらつきがあった。又、切断した無機質繊維3（例えば25m/m長）を筒体24を通して散布するため、筒体24内での無機質繊維3の詰まりが生じて、混入不良による不良品が発生してしまっていた。

【0004】 更に、無機質繊維3の太さが直径数ミクロンと小さい場合には無機質繊維3がブロアー25により周辺に飛散してしまい環境を悪化させるという問題があった。本発明は上記事情に鑑みてなされたものであり、その目的とするところは、無機質繊維を金属フープ材間に均一に散布でき、しかも周辺への飛散もない断熱パネルの製造方法及び製造装置を提供することにある。

【0005】

【課題を解決するための手段】 本発明の製造方法は、上下で相対向させて一対の金属フープ材1を連続的に供給すると共に金属フープ材1間に発泡性樹脂材料2と無機質繊維3を充填させて金属フープ材1間に無機質繊維3が混入された断熱材層4を形成させる断熱パネルの製造方法において、無機質繊維3を金属フープ材1の搬送方向と直交する方向に往復動する散布装置5により散布すると共に散布装置5の移動速度を金属フープ材1の幅方向の中央部よりも両側端部において大きくすることを特徴とするものであり、本発明の製造装置は、上下で相対向させて一対の金属フープ材1を連続的に供給する供給手段6と金属フープ材1間に発泡性樹脂材料2を注入する注入装置7と金属フープ材1間に無機質繊維3を散布する散布装置5と発泡性樹脂材料2を加熱発泡させて金属フープ材1間に無機質繊維3が混入された断熱材層4を形成するダブルコンベア8とダブルコンベア8により成形された断熱長尺板材9を所定寸法に切断する切断装置10とを具備している断熱パネルの製造装置であって、散布装置5を金属フープ材1の搬送方向と直交する方向に架け渡されたガイド11にスライド自在に取付けられた無機質繊維の粉砕機12と粉砕機12を往復動自在に駆動してその移動速度を金属フープ材1の幅方向の中央部よりも両側端部において大きくなるようにする駆動手段13とから構成したものであり、これらの構成により上記課題が解決されたものである。

【0006】

【作用】 無機質繊維3を金属フープ材1の搬送方向と直交する方向に往復動する散布装置5により散布すると共に散布装置5の移動速度を金属フープ材1の幅方向の中央部よりも両側端部において大きくするので、無機質繊維3を搬送中の金属フープ材1間に均一に散布でき、しかも無機質繊維3が周辺に飛散することがないものである。

【0007】

【実施例】 金属フープ材1としては、亜鉛鉄板、アルミ

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ニウム板、亜鉛めっき銅板、アルミニウム亜鉛合金めっき銅板、ステンレス銅板、チタン銅板とかこれら金属板に一般の塗料で着色したものとか、塩ビ樹脂、アクリルフィルム、フッ素樹脂などを被覆したものが採用される。

【0008】金属フープ材1はそれぞれ供給手段6であるベイオフリールに巻き取られている。供給手段6により金属フープ材1が成形機14に供給され、両端部が屈曲成形される。この後、金属フープ材1は予熱室15で20〜50℃に予熱され、この後、金属フープ材1間に散布装置5からガラス繊維のような無機質繊維3が散布され、次いで注入装置7によりポリオール、イソシアネート、触媒、発泡剤などが配合された硬質ウレタンフォームやイソシアヌレートフォーム、フェノールフォームのような発泡性樹脂材料2が注入される。散布装置5は、図3及び図4に詳細に示すように金属フープ材1の搬送方向と直交する方向に架け渡されたガイド11に粉砕機12がスライド自在に取付けられ、この粉砕機12にリンク16の一端を連結バー17を介して回転自在に連結され、リンク16の他端が一對の非円形歯車18とモータ19とからなる駆動手段13の従動側歯車18aに連結されたアーム20に回転自在に連結されて構成されたものである。非円形歯車18としては楕円系二葉歯車とか楕円歯車などを挙げることができる。駆動側歯車18bがモータ19により回転駆動されて粉砕機12がアーム20、リンク16及び連結バー17を介して金属フープ材1の搬送方向と直交する方向に往復動されるが、この場合、粉砕機1の移動速度は金属フープ材1の幅方向の中央部よりも両側端部において大きくなり、従って、無機質繊維3が重複して散布される金属フープ材1の両側端部での粉砕機12により粉砕された無機質繊維3の散布量が抑制され、全体として均一に散布されるものである。例えば、金属フープ材1の搬送速度が10m/分に対して、粉砕機12のトラバース速度は30m/分で実施される。尚、金属フープ材1の搬送方向で散布装置5を注入装置7よりも後方に位置させれば、無機質繊維3の飛散がより確実に防止される。又、アーム20の長さを替えることにより粉砕機12のストローク幅Wを変更させることができる。この後、金属フープ材1がダブルコンベア8間で移動する間に発泡性樹脂材料2が発泡して金属フープ材1間に無機質繊維3が混入された断熱材層4が形成され、断熱長尺板材9が得られるのである。ダブルコンベア8は上下に配置した風筒ダクト（図示しない）により加温され、これにより金属フープ材1が加熱され、発泡性樹脂材料2が発泡する。この場合、金属フープ材1は20〜70℃の範囲内で加熱されることになる。ダブルコンベア8の同側には図2に示す

ようにサイドシールコンベア21が設置され、アルミニウム箔紙、アルミニウム箔、プラスチックフィルム等のフィルムEPT、発泡ネオプレンゴム等のパッキンなどのサイドシール22により金属フープ材1の両側面を押さえて、発泡性樹脂材料2が漏れないようにされる。

【0009】このようにして成形された断熱長尺板材4は徐冷され、バンドソーのような切断装置10により所定寸法に切断されて図5に示すような断熱パネルAが製造されるのである。この断熱パネルAはローラコンベア23により順次搬送され所定の場所に積載される。

【0010】

【発明の効果】本発明にあっては、無機質繊維を金属フープ材の搬送方向と直交する方向に往復動する散布装置により散布すると共に散布装置の移動速度を金属フープ材の幅方向の中央部よりも両側端部において大きくするので、無機質繊維を搬送中の金属フープ材間に均一に散布でき、しかも無機質繊維が周辺に飛散することがないものである。

【図面の簡単な説明】

【図1】本発明の一実施例を示す概略側面図である。

【図2】同上の概略平面図である。

【図3】同上の要部拡大斜視図である。

【図4】同上の要部拡大斜視図である。

【図5】同上により製造された断熱パネルの一例を示す断面図である。

【図6】従来例を示す斜視図である。

【図7】従来例を示す斜視図である。

【符号の説明】

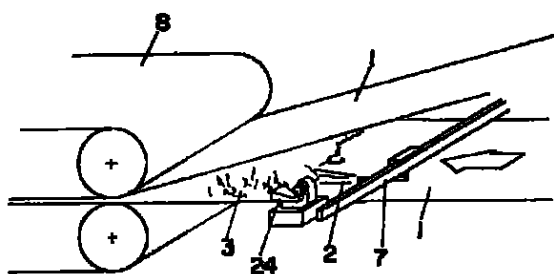
- A 断熱パネル
- 1 金属フープ材
- 2 発泡性樹脂材料
- 3 無機質繊維
- 4 断熱材層
- 5 散布装置
- 6 供給手段
- 7 注入装置
- 8 ダブルコンベア
- 9 断熱長尺板材
- 10 切断装置
- 11 ガイド
- 12 粉砕機
- 13 駆動手段
- 16 リンク
- 18 非円形歯車
- 19 モータ
- 20 アーム

H11

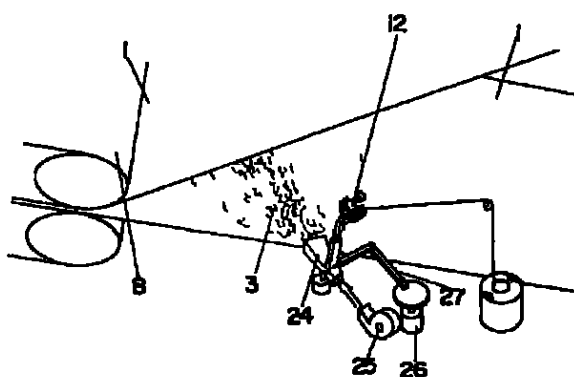
(5)

特開平4-250009

【圖6】



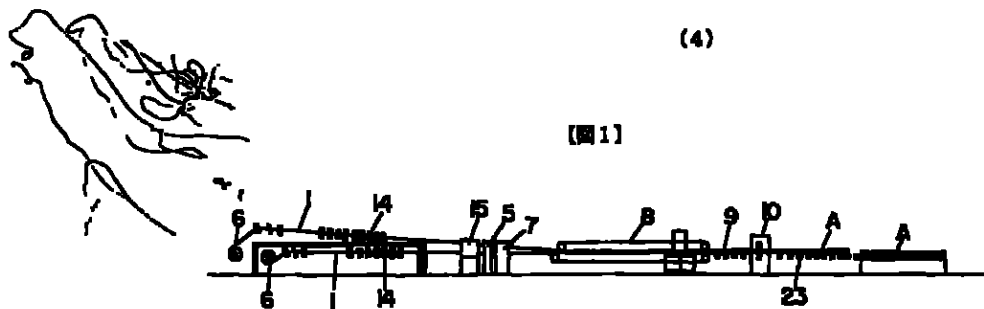
【圖7】



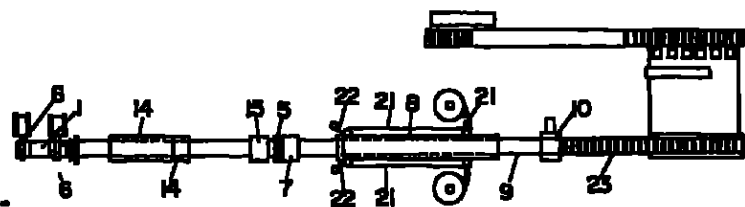
(4)

特開平4-250009

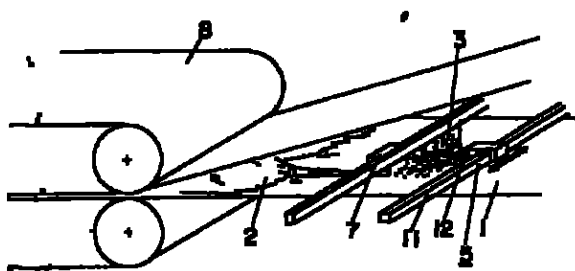
【圖1】



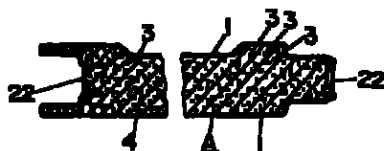
【圖2】



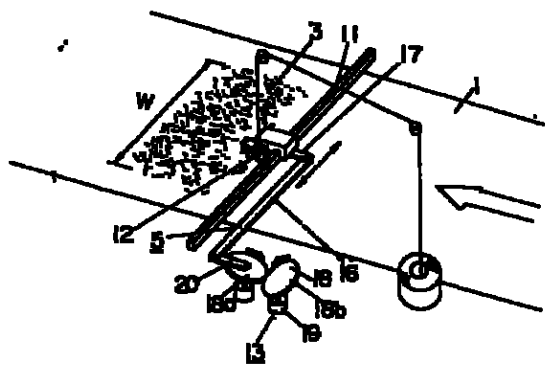
【圖3】



【圖5】



【圖4】



9.482

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TRADUCCIÓN OFICIAL DEL ITALIANO AL ESPAÑOL

PODER DE METECNO S.p.A. a DILIA MARIA RODRÍGUEZ D'ALEMAN Y
CLAUDIA LUCIA CARO RAMÍREZ.

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Tel: (571) 6350813. Fax: (571)6350824 E-mail: clarkemodet@clarkemodet.com.co.
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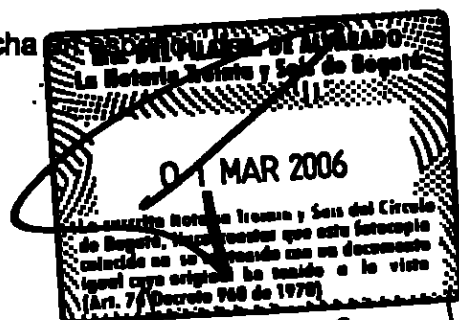
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Sandra Cardona Mejia
SANDRA PATRICIA CARDONA MEJIA
TRADUCTORA E INTERPRETE OFICIAL
RESOLUCION No. 0368 M:JUSTICIA 1997

LA MEJA
FE 103
NOTARIA 1997

117

Parte superior derecha escrito a mano 6807 AP

"APOSTILLE"

(Convención de la Haya del 5 de octubre de 1961)

1 PAIS ITALIA

El presente acto público

2 ha sido firmado por M C ilegible

3 en calidad de Notario en Milán

4 Tiene el sello /timbre de Sello notarial

5 En MILÁN 6 El 25 de junio de 2003

7 Por La oficina del Ministerio Publico

8 Con el numero 6807 AP

9 Sello /timbre sello de Estado

10 Firma EL FISCAL SUSTITUTO DE LA REPUBLICA

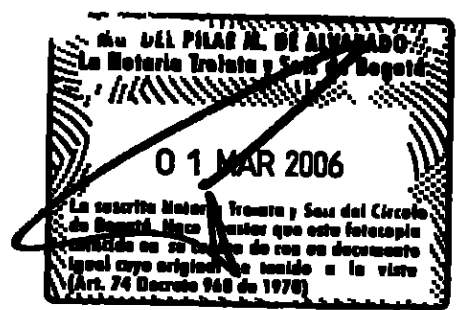
Doctora Ada Rizzi

Firma ilegible

Sello circular de la Fiscalía de la Republica -- Tribunal Ordinario de Milán

FIN DEL DOCUMENTO

Sandra Patricia Padrona Mejia
SANDRA PATRICIA PADRONA MEJIA
TRADUCTORA E INTERPRETE OFICIAL
RESOLUCION No 0338 MINJUSTICIA 1997



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RESPONSABILIDAD DEL TEXTO

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7001 50. A 10-22
NACIONALES
AUG.

Cia. DEL PHAR M. DE ALVARADO
La Oficina Tronista y Sols de Bogotá

01 MAR 2006

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COLOMBIA

Camera 11 n° 93-43, Of. 404 Bogotá Colombia Tel: (57 1) 6350813 Fax: (57 1) 6350824 Email:clarkmodetclarkmodet.com.co

PODER

Yo (nosotros), abajo firmante(s) Ing.Maurizio Morandi

en mi (nuestro) carácter de representante(s) legales de

METECNO S.p.A.

una sociedad organizada y existente de acuerdo con las leyes de
Italy

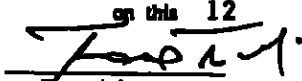
y en actual cumplimiento de su objeto social, con domicilio en
Tribiano (Milano) - Via per Cassino 19

por el presente instrumento confiero (conferimos) poder especial a favor de **DILIA MARIA RODRIGUEZ D'ALEMAN**, con Cédula de Ciudadanía No. 41.654.882 de Bogotá, y tp. 20824 y **CLAUDIA LUCIA CARO RAMIREZ**, con Cédula de Ciudadanía No. 40.017.374 de Tunja, y tp. 36448, con domicilio en Bogotá, Colombia, para que actuando en su orden en nombre del (de la) otorgante le (la) representen ante cualquier entidad, autoridad y/o persona, especialmente ante las del orden Administrativo, Contencioso Administrativo, Judicial, Tribunales de Arbitramento y/o cualquier otro en lo referente a los siguientes asuntos:

- 1) Solicitar, tramitar, obtener y/o registrar cualquiera de las modalidades de Propiedad Industrial, tales como: patentes de invención, modelos de utilidad; diseños industriales, variedades vegetales; marcas, lemas, nombres y señas comerciales y denominaciones de origen; así como sus renovaciones, prórrogas, transferencias, cambios de nombre y/o domicilio, contratos y licencias.
- 2) Solicitar, tramitar, obtener y/o registrar derechos de autor, en cualquiera de sus presentaciones así como la protección de secretos industriales y know-how.
- 3) Solicitar, tramitar, obtener y/o registrar registros sanitarios, permisos y/o licencias de funcionamiento; así como sus renovaciones o prórrogas, transferencias, cambios de nombre y/o domicilio, contratos y licencias.
- 4) Ejercer acciones de oposición, observación, reclamos, reconsideración, reposición, apelación, cancelación administrativa o judicial, nulidad, protección al consumidor, concesión de licencias, protección de secretos industriales y demás acciones y recursos relacionados con derechos derivados de los asuntos arriba indicados y en contra de la competencia desleal, acciones derivadas de la obtención o explotación de licencias, acciones de indemnización de perjuicios. También podrá(n) intervenir en juicios civiles, comerciales, penales, contencioso-administrativos, tutelas y de policía; en acciones o juicios promovidos por el (la) mandante o en contra el (ella).
- 5) Registrar nombres de dominio ante la entidad competente.
- 6) En el ejercicio de este mandato los mandatarios arriba mencionados quedan facultados para: conciliar, cancelar, transigir, comprometer en árbitros, desistír, recibir y tomar posesión de la cosa objeto de litigio y renunciar o desistír a derechos concedidos o en curso de concesión, admitir los hechos del proceso.
- 7) Ratificar o no la agencia oficiosa.
- 8) Así mismo faculto (facultamos) a los mencionados apoderados para recibir notificaciones y designar apoderados judiciales o extrajudiciales, sustituir el presente poder y revocar las sustituciones que hicieren.

Dado y firmado en **Milano**

a los 12 días de **giugno** 2003


Firma / signature

POWER OF ATTORNEY

I (we), the undersigned **Ing.Maurizio Morandi**

legal representative(s) of

METECNO SPA

an organization existing under the laws of

Italy

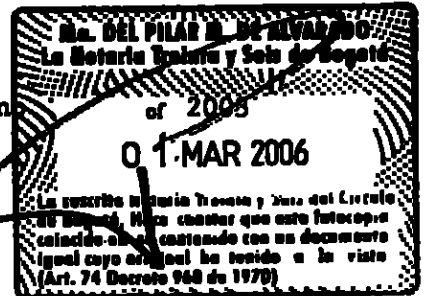
and in present execution of its business activity, domiciled at
Tribiano (Milano) - Via per Cassino 19

do hereby grant **POWER OF ATTORNEY** to **DILIA MARIA RODRIGUEZ D'ALEMAN**, Identification card No. 41.654.882 of Bogotá, and tp. 20824 and **CLAUDIA LUCIA CARO RAMIREZ**, tp. 36448, Identification card No. 40.017.374 of Tunja, residing in Bogotá, Colombia, to act in the order of their appointment in behalf of grantor before any entity, authority and/or natural or juridical person, specially before those Administrative, Administrative-Contentious, Judicial, arbitration courts, and/or any other, in all matters concerning the following:

- 1) To apply, process, obtain and/or register any of the modalities of Industrial Property, such as: Patents of Invention, Utility Models; Designs, plant varieties; Marks, Slogans, Trade Names and emblems and appellations of Origin; as well as their renewals, assignments, changes of name and/or domicile, agreements and licenses.
- 2) To apply, process, obtain and/or register copyrights of any kind as well as protection of industrial secrets or know-how.
- 3) To apply, process, obtain and/or register sanitary registrations, operating authorizations and/or licenses; as well as their renewals or assignments, changes of name and/or domicile, agreements and licenses.
- 4) To bring actions of opposition, observations, claims, reconsideration, appeal or legal remedies, cancellations, nullity, protection to the consumer, granting of licenses, protection of trade secrets and other actions related with rights derived from the above-mentioned matters and against the unfair competition, actions resulting from the obtaining or exploitation of licenses, recovering damages actions. They can also intervene or participate in Civil, Commercial, Criminal or Contentious-Administrative Trials; the actions for writ mandamus, police actions; in actions, lawsuits or litigations instituted by the grantor or against him.
- 5) To register domain names before the competent entity.
- 6) To the effect of this mandate the above-named proxy are empowered to: conciliate, cancel, settle, submit to arbitration, withdraw and to receive and take possession of the litigation related objet and waive or renounce the rights granted or in process of granting, admit the facts of the case.
- 7) To ratify or not the officious agency.
- 8) I (we) hereby appoint the afore mentioned attorneys with powers to receive notifications and to designate judicial and extrajudicial attorneys, substitute this Power of Attorney and to revoke such substitutions.

Granted and signed at **Milano**

on this 12 day of **giugno**



PROCURA

Il sottoscritto Ing. Maurizio Morandi

Legale rappresentante della Società "METECNO S.p.A."

Una organizzazione esistente sotto le leggi di Italia

Domiciliata a Tribiano (MI), Via per Cassino n. 19

conferisce a

di agire in ordine dei loro interessi davanti a qualsiasi entità autorità e/o persone fisiche o giuridiche specialmente prima di quelle amministrative corti arbitrali e/o qualsiasi altro in tutti passi riguardanti quanto segue:

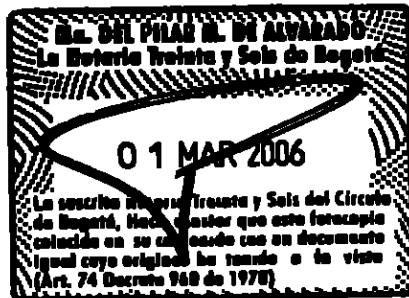
- 1) potranno depositare ottenere e registrare qualsiasi modalità alla Proprietà Industriale, così come: Brevetti d'Invenzione, Modelli di Utilità, Design, varietà vegetali, Marchi alogari, nomi commerciali e denominazioni di origine, così come, loro rinnovi, cessioni, cambi di nome e/o domicilio, contratti e licenze.
- 2) Depositare e ottenere diritti d'autore di ogni tipo e la protezione di segreti industriali o
- 3) depositare procedere e ottenere e/o registrare registrazioni sanitarie, permessi e o licenze, così come, loro rinnovi o cessioni, cambi di nome e/o domicilio, contratti e licenze.
- 4) Prendere azioni di opposizione, osservazioni, reclami, posizioni d'appello, appelli, cancellazione amministrativa o nullità, protezione al consumatore, concessione di licenze, protezione di segreto industriale e tutte le azioni riguardanti i diritti derivanti di quanto sopra menzionato Essi possono intervenire o partecipare a giudizi civili, commerciali, penali contenzioni amministrativi tutela di politica o giudizi promossi per il mandante o conto di esso.
- 5) Registrare nomi di dominio alle entità competenti.
- 6) Per effetto di questo mandato i rappresentanti hanno facoltà di, conciliare, cancellare, transigere, arbitrare, abbandonare e ricevere e prendere possesso di reclami riguardanti il caso e rinunciare o desistere a diritti concesso o in corso di concessione relativi al fatto del caso
- 7) Per rettificare o no le notifiche ufficiali.

Io qui dichiaro che il sopra menzionato rappresentante con i poteri di ricevere notifiche, e designare rappresentanti giudiziali o extragiudiziali, sostituire in tutto o in parte la presente procura e procedere alla sua revoca.

Firmato a

Questo giorno di del

Firma



CERTIFICADO NOTARIAL

(Cuando el solicitante es SOCIEDAD)

(Powers of attorney granted in: El Salvador, Estados Unidos, México y Venezuela)

A los 12 días del mes de giugno de 2003, el Notario que suscribe DA FE de que:

1. MAURIZIO TORANDI
(nombre de la persona que firma el poder)

mayor de edad y domiciliado TORINO - VIA
LABREUSCHINI 12 firmó de su puño
y letra el documento que antecede.

2. Conoce al (a la) otorgante y que este (a) está legalmente capacitado para el otorgamiento.

3. El otorgante ha firmado el referido documento en su carácter de Presidente

de la persona jurídica METECNO S.p.A.

4. La citada persona jurídica con sede en Tribiano (MI)
Via per Cassino n°19 está legalmente
constituida, que tiene actualmente

existencia legal y que el acto para el cual se ha otorgado este poder está comprendido entre los que constituyen su objeto social.

5. El otorgante tiene efectivamente la representación que ostenta, que esta es legítima y que está facultado para otorgar este poder.

6. Las anteriores certificaciones de los puntos 3, 4 y 5, me constan porque he tenido a la vista los documentos auténticos.

Notario Público

NOTA: A continuación de lo anterior, el Cónsul de Colombia debe autenticar la firma del Notario Público.

CERTIFICADO NOTARIAL (Cuando el solicitante es INDIVIDUO)

A los días del mes de de el Notario que suscribe DA FE de que:

(nombre de la persona que firma el poder)

mayor de edad y domiciliado en firmó en su presencia

el documento que antecede, conoce al otorgante y que este está legalmente capacitado para el otorgamiento.

Notario Público

NOTA: A continuación de lo anterior, el Cónsul de Colombia debe autenticar la firma del Notario Público.

Para todos los demás países el Señor Cónsul de Colombia o ante quien se otorgue, debe expedir una certificación dejando constancia 1) de la existencia legal de la sociedad, 2) de que esta ejerce actualmente su objeto social, y 3) de que la persona o personas que otorgan el poder están facultadas para hacerlo, dejando constancia así mismo de que tuvo a la vista las pruebas que acrediten tales circunstancias.

LEGALIZACIÓN POR EL CONSUL DE COLOMBIA
O POR APOSTILLA

NOTARIAL CERTIFICATE

(When the applicant is a CORPORATION)

(Powers of attorney granted in: El Salvador, Mexico, U.S.A. and Venezuela)

This day of the undersigned Notary CERTIFIES that:

1. (name of the person who signs the power of attorney)

of legal age and domiciled in the foregoing document.

2. The grantor is to him personally known and that he/she has legal capacity to execute the document.

3. The grantor has executed the foregoing document in his capacity of

of the juridical person

4. The mentioned juridical person with place of business in is duly organized, has actual legal existence and that the purposes for which the power of attorney is granted are within the scope of its corporate purposes.

5. The grantor has in fact the referred quality and that his/her representation is legal and that he/she is empowered to grant this power of attorney.

6. I have based the above certifications 3, 4 and 5, on the authentic documents which for such purpose were exhibited to me.

Notary Public

NOTA: Then the Colombian Consul must legalize the signature of the Notary Public.

NOTARIAL CERTIFICATE (When the applicant is an INDIVIDUALS)

On this day of the undersigned Notary CERTIFIES that:

1. (name of the person who signs the Power of Attorney)

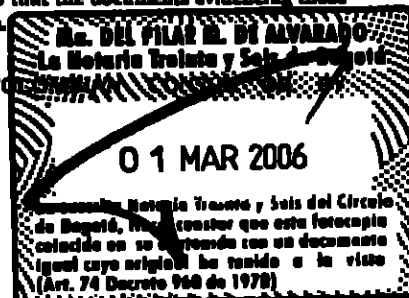
of legal age and domiciled at signed in his presence the foregoing document, the grantor is to him personally known and that he/she has legal capacity to execute the document.

Notary Public

NOTA: Then the Colombian Consul must legalize the signature of the Notary Public.

For all other countries the Colombian Consul or before who it is granted must issue a certification stating 1) the legal existence of the corporation, 2) that the corporate purposes are actually being accomplished, 3) that the person or persons who grant this Power of Attorney are empowered to do it. The Consul will certify also that the documents evidencing these circumstances were exhibited to him.

LEGALIZATION BY THE CONSUL OF COLOMBIA
OR APOSTILLE.



**CERTIFICAZIONE NOTARILE
PER SOCIETÀ**

Il del mese di

....., il sottoscritto Notaio Pubblico

DICHIARA IN FEDE

1. Che
.....
firmò il documento di procura precedente.
2. Che conosco chi conferisce questa procura e che quest'ultimo possiede le funzioni legali per il rilascio del documento menzionato.
3. Che chi conferisce ha sottoscritto la procura in qualità di
.....
della persona Giuridica
.....
4. Che la persona giuridica
.....
con sede in
.....
.....
È legalmente costituita, che ha esistenza legale attuale e che l'atto per il quale si è concessa la procura è compreso tra quelli che costituiscono il suo oggetto sociale.
5. Che chi conferisce è effettivamente rappresentante come sostiene.

Notaio Pubblico

**CERTIFICACION NOTARIAL
PARA SOCIEDADES**

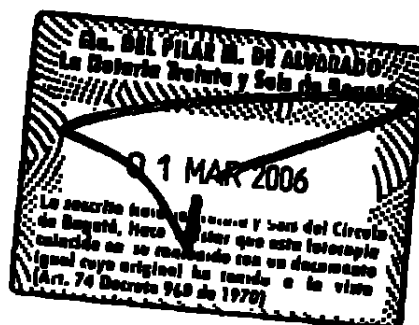
A los dias del mes de

....., el suscrito Notario Público

DA FE

1. Que
.....
firmó el documento de Poder que antecede.
2. Que conozco al otorgante y que éste tiene capacidad legal para el otorgamiento del documento de Poder.
3. Que el otorgante ha suscrito el referido Poder en su carácter de
.....
de la persona jurídica
.....
4. Que la persona jurídica
.....
con sede en
.....
.....
está legalmente constituida, que tiene existencia legal actual y que el acto para el cual se ha otorgado el poder está comprendido entre los que constituyen su objeto social.
5. Que el otorgante tiene efectivamente la representación que ostenta, y que ésta es legítima.

Notario Público



6807 Af. 120

(Convention de la Haje du 5 octobre 1961)

1. Paese

ITALIA

Il presente

2. è stato sottoscritto

3. a

4. è stato

U. C. P. *[Signature]*
Notario *[Signature]*

[Signature] *[Signature]*
Attore *[Signature]*

5. a FIANCO

6. Il

7. dell'ufficio del pubblico ministero

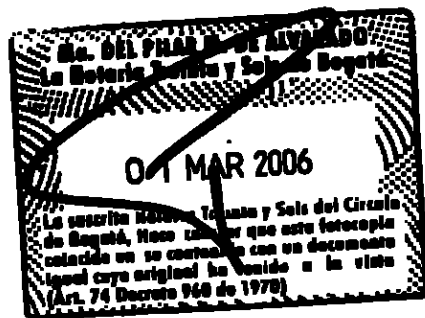
8. sotto il numero

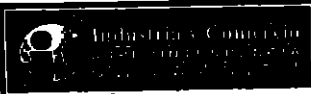
6807 Af.

[Signature] *[Signature]*

[Signature]

Il Sost. Procuratore della Repubblica
(Dott.ssa Ida Rizzi)





FORMATO DE DIGITALIZACION
RELACION DE ANEXOS



Expediente No		No de Folio
Item	No de unidades	
1	CD	
2	DVD	
3	REVISTA	
4	LIBRO	
5	PERIODICO	
6	DISQUETES	
7	SOBRE DE MANILA	1
8	SOBRE BLANCO TAMAÑO CARTA	
9	SOBRE BLANCO TAMAÑO OFICIO	
10	OTROS:	

Observaciones:
Sobre con arte final



Industria y Comercio
SUPERINTENDENCIA

Delegatura de Propiedad Industrial
División de Nuevas Creaciones

REQUISITOS NECESARIOS PARA PRESENTACIÓN Y AGILIZACIÓN DEL
TRAMITE

PCT

PATENTE DE INVENCION ()	MODELO DE UTILIDAD ()	USUARIO ()	RADICADOR ()
-Indicación de que se solicita la concesión de una patente.	()	()	(X)
-Datos de identificación del solicitante o de la persona que se presenta la solicitud.	()	()	(X)
-Descripción de la invención.	()	()	(X)
-Dibujos de ser estos pertinentes.	()	()	(X)
-Comprobante de Pago de las tasas establecidas.	()	()	(X)
COMPLETA (X)	INCOMPLETA ()	()	()

DISEÑO INDUSTRIAL ()

-Indicación de que se solicita el registro de Diseño Industrial.	()	()
-Datos de identificación del solicitante o de la persona que se presenta la solicitud.	()	()
-Representación gráfica y fotográfica del Diseño Industrial o muestra del Material que incorpora el diseño.	()	()
-Comprobante de Pago de las tasas establecidas.	()	()
COMPLETA ()	INCOMPLETA ()	()

ESQUEMA DE TRAZADO ()

-Indicación de que se solicita el registro de Diseño Industrial.	()	()
-Datos de identificación del solicitante o de la persona que se presenta la solicitud.	()	()
-Representación gráfica del Esquema Trazado.	()	()
-Comprobante de Pago de las tasas establecidas.	()	()
COMPLETA ()	INCOMPLETA ()	()

Firma Responsable:

Fecha:

123

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá,
2020

Doctor(a)
RODRIGUEZ DILIA MARIA
Apoderado(a) y/o Representante de
METECNO SPA

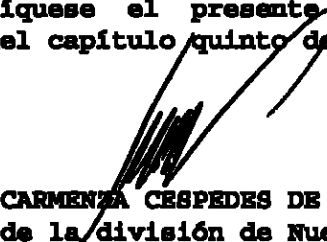
REFERENCIA	Radicación No.	6 20503
	Solicitud internacional	IT2003/000577
	Fecha inicio fase nacional	01/03/2006
	Trámite	11
	Evento	378
	Actuación	430
	Oficio No.	4613

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Unica No.10 de 2001.


ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de fecha 28 ABR. 2006
adpall

P. 262