

Dec. 21, 1937.

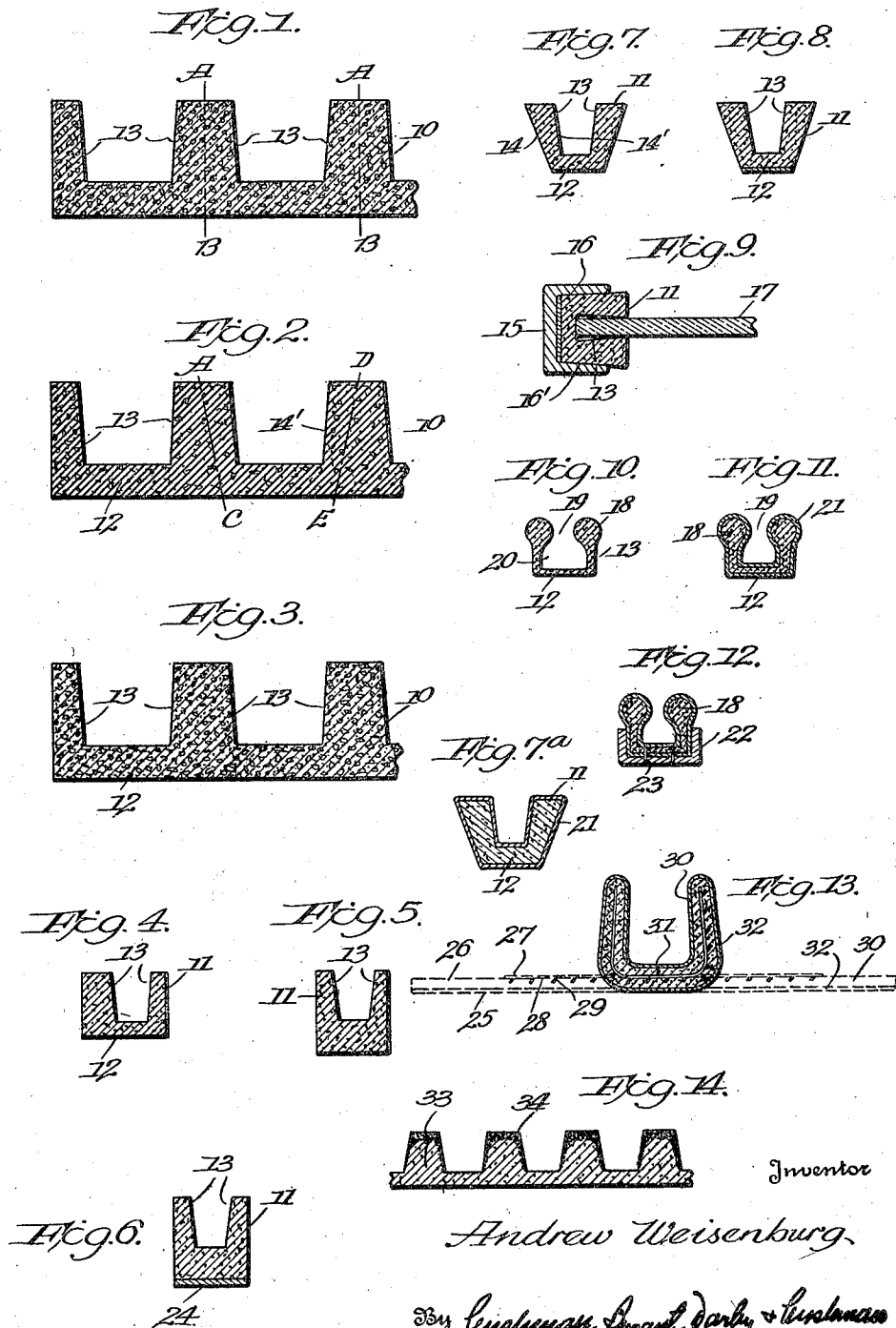
A. WEISENBURG

2,102,658

WINDOW CHANNEL

Filed March 24, 1933

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 15.

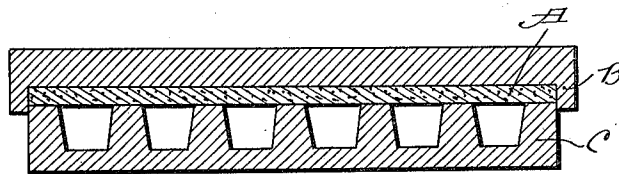


Fig. 16.

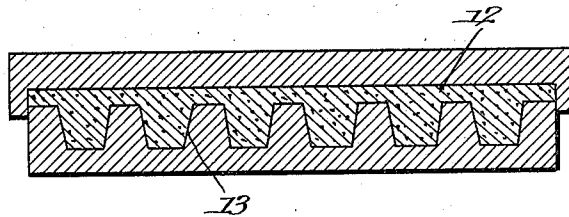
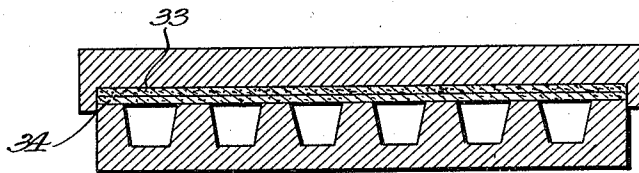


Fig. 17.



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UNITED STATES PATENT OFFICE

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WINDOW CHANNEL

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8 Claims. (Cl. 296—44.5)

This invention relates to channels for sashes and window frames and comprises an expanded, vulcanized product comprised essentially of comminuted cork and cellular rubber.

It is particularly useful in connection with vehicles such as automobiles, railroad cars and aircraft.

Conventional channels present numerous objections in that no dependence can be placed upon their resilience or flexible properties and they do not have a fixed frictional quality.

The channel of the present invention is permanently flexible and resilient, has a definite frictional characteristic and does not warp or curl when exposed to water and moisture nor will it deteriorate when exposed to the elements.

A further object of the invention is to provide a channel material in which these properties are more pronounced in the side walls or contact gripping portion of the channel and wherein the base has similar properties, but is more dense and substantial to cushion the sliding sash and maintain it in true, and also that it may be attached to a supporting frame by any of the numerous devices or means now employed without further modification.

The channel will at all times firmly and resiliently grip the window sash or glass to cushion the same and overcome rattling or any effects due to looseness of the sash fitting, and at the same time, is sufficiently rigid and permanent to assure that the sash or glass will always be in true.

The present channel also provides a seal in that it is substantially impermeable to air and is watertight.

Another object of the invention is to produce a channel provided with a decorative and/or protective color incorporated in or applied to the channel to accord with a particular color scheme.

A further object of the invention is to provide a channel of laminated form wherein the layers are comprised in a base and a facing integrally united as by vulcanization, and respectively of materials having different properties or the same properties, but to a varying extent.

Another object of the invention is to produce the channel material by a method which is economical and rapid and by which the resultant product, i. e., the channel strips are uniform.

This material comprises a retiform structure having as its principal body materials comminuted cork and cellular rubber. That is a network and preferably a close network of expanded and vulcanized material having each of the major

components substantially cellular, and which will be formed into channels of desired contour. The product is characterized by having the optimum inherent properties of the body members available and in fact the rubber and cork cooperate to produce an effect which is the maximum resultant of the combination of their several qualities.

The cork particles are of a size to retain their cellular-nature, and the mass is expanded and the rubber rendered cellular in situ and vulcanized, preferably in substantially the final production form of the channel, i. e., in the mold.

The rubber substantially encases the cork particles, and is adherent to the faces thereof. Cork particles constitute a body material as distinguished from a filler, and the rubber, the cellular walls of which are united to the cork particle faces, acts to (1) bond the cork particles forming a cork and rubber network, and (2) resiliently and permanently fix or position the particles in spaced relation preventing compacting thereof.

The product is permanently flexible and resistant to creasing and bending strains without cracking, elastic, tough, pressure resistant and impervious to water and gases, has an optimum of resilience, i. e., a continuously maintained maximum compression and rebound, and the particle faces are fixed in position although permitted to have a compensatory movement and comprise a substantial portion of the surface area. Also, the channels made from the material are free from any tendency to curl and do not warp or lose their shape, when wetted and subsequently dried. In other words, they will remain permanently flat and are not objectionably affected by conditions of temperature and moisture.

The channel is produced preferably by a method of molding wherein (a) sheet channel products of the required shape and size will be formed which will subsequently be cut into strips, and (b) individual channel strips will be produced.

The method is carried out with nice control of the ratio of cork and rubber and regulation of the chemical action whereby the cellular character of the rubber and of the expanded material is determined. In connection with the latter, the method provides for expanding the material and rendering the rubber cellular by means of a gas forming or blowing agent and in situ, that is in the form of the final channel product (sheet or strip) and substantially immediately thereafter vulcanizing the mass, all operations taking place in the mold.

In carrying out the method of the invention, the mixture of cork and rubber and chemical constituents, i. e., accelerators and blowing and vulcanizing agents and/or plasticizers and softening agents, are first prepared in the form of a partially set or partially vulcanized plastic mass. This plastic mass is calendered into sheets of required thickness and the sheets placed in a mold (as in Figures 15 to 17). When subjected to heat, the sheet is expanded to fill the mold and is formed into the desired channel shape. The expanded and channel formed sheet is immediately subjected to vulcanization. That is to say, the sheet is shaped into channel form, being (1) expanded simultaneously with the step of rendering the rubber cellular and fills the mold (2) immediately vulcanized in the mold. There is no tendency for the cells of the channel to collapse because of the immediate vulcanization after it is expanded and it is obtained in its blown or expanded shaped condition. Control of the ratio of cork and rubber, and of the blowing and vulcanization enable uniform channel products to be obtained.

Referring to the drawings:

Figure 1 shows a section of the sheet channel product before severing into individual channels, and as prepared by a molding operation. The volume percentage of cork and rubber in the composition is substantially one to one.

Figure 2 is a view similar to Figure 1 in which the cork is the dominant body material by volume, which is the preferred product.

Figure 3 is a view similar to Figure 1 in which the rubber is the dominant material.

Figures 4, 5 and 6 illustrate respectively several forms of the channel shown in Figures 1, 2 and 3.

Figures 7 and 8 illustrate respectively other forms of the channel.

Figure 7a is a view of the channel shown in Figures 7 and 8 provided with a facing.

Figure 9 is a view showing the channel of Figures 7 and 8 in position in the sash groove and engaging a window glass.

Figures 10, 11 and 12 are views respectively of further modifications of the invention.

Figure 13 is an illustration of a still further form of channel.

Figure 14 is an illustration of a still further or laminated form of channel, and

Figures 15 to 17 illustrate the manner in which the channel material is molded and formed.

The channel material is prepared preferably in the form of sheets 10 as illustrated in Figures 1, 2 and 3. These sheets will be formed in the mold as shown in Figures 15 to 17 and severed to produce channel strips 11 as shown in Figures 4 to 14. In other words, one method of procedure is to form sheets of the channel material of suitable length and cut the same into strips having a contour of the final product.

A further procedure is to form individual channel strips having the contour of Figures 4 to 14.

The plastic mixture is preferably first calendered into sheets A of suitable thickness, and as shown in Figure 15 placed in a separate mold B—C and thereafter subjected to the molding operation whereby the partially vulcanized mass is molded to the form shown in Figures 1 to 14.

In the molding operation, the sheet is (1) blown to produce a porous or expanded channel material as well as to render the rubber cellular and fill the mold, and (2) the expanded structure is vulcanized and set substantially immediately to

final form in the mold. This is shown in Figure 16.

Referring to Figure 15, I prefer to mold the sheeted partially vulcanized or semi-plastic material since in the molding operation there is obtained a base 12 which is of greater density than the sides 13 of the channel. That is to say, the resiliency, i. e., compressibility and rebound, of the side walls is somewhat greater than that of the base, the latter being in the form of a closer network whereby it may (1) sustain the wear of the sash riding in the channels and keep the position of the sash true, and (2) be attached to the supporting frame by any of the numerous devices now in use without fear in either case of objectionably wearing or disrupting the channel.

Referring to Figure 1 the close network or expanded, vulcanized structure contains equal percentages of comminuted cork and cellular rubber by volume. In Figure 2 the cork percentage by volume predominates and in Figure 3 the volume percentage of rubber predominates.

The final product in all cases is characterized by having a surface area composed of the faces of the cork particles and the cellular or porous rubber. While the rubber and cork, and plasticizers or softeners present will permit the sash to slide, the presence of the cork faces constituting a substantial portion of the area of the channel and the cellular rubber, will always present a substantially fixed and regulatable frictional quality. This latter factor is highly important in a channel structure and obviates the use of felt or cloth coverings.

It is to be observed that the two body members, namely, the cork and cellular rubber are characterized by different coefficients of resilience, i. e., compression and rebound, and in the present material the two body members cooperate to produce a maximum of resiliency and flexibility.

That is to say, the respective properties of the cork and cellular rubber are each available to the optimum degree and in the expanded vulcanized structure, the resultant of their properties is permanently available in the channel.

Referring to Figures 1, 2 and 3, the sheets 10 as formed in the mold B—C are cut along the line A—B, whereby a channel material having one side thicker than the other and than the bottom is produced as shown in Figure 4, or a channel having the sides of equal thickness and the bottom of greater thickness than the sides is produced as shown in Figure 5. The internal and external side wall surfaces are substantially vertical, the internal wall surfaces in some cases being slightly inclined to facilitate removal from the mold.

The sheet material shown in Figures 1, 2 and 3 is also cut along lines inclined to the horizontal, such as the lines A—C and the line D—E to produce channel strips having the contour shown in Figures 7 and 8. In this connection, individual strips of the channel material of the shape shown in Figures 4 to 14 will be molded, or an integral sheet of contiguous channels, such as shown and described in connection with Figures 1, 2 and 3 will be produced, wherein the mold grooves conform to the desired shape or inclination of the surfaces of the channels.

As shown in Figures 7 and 8 the external side surfaces 14 are inclined to the horizontal while the internal side surfaces 14' of the channel preferably have only such inclination as is required to remove the material from the mold.

In Figure 9 I have shown the channel of Fig-

ures 7 and 8 positioned in a sash groove 15 having substantially right-angle or slightly inclined internal walls 16. It will be noted that, when the channel material shown in Figures 7 and 8 is positioned in such groove, the entrant portion of the channel opening is reduced and the face edge portions of the channel are resiliently directed towards each other so that the glass 17 is firmly gripped. The inner portion of the channel will have very slight engagement with the adjacent surfaces of the glass as shown at 18' so that the channel will usually engage the movable sash or glass at the opposite ends of the channel. That is to say, the glass will slide over the bottom of the channel and between the adjacent face edge or resilient gripping contact portions of the channel.

In Figure 10 the molded channel is provided with relatively thin bottom and side walls while the face edge portions 18 are enlarged. The entrant opening portion of the channel is reduced as at 19 while internally the channel is enlarged as at 20. Preferably, the face edge portions or enlargements are in the form of tubes or solid rolls as shown. In some cases, I adhesively or otherwise unite a layer of fabric, such as felt to the channel, to form (a) a protective layer for the exposed portion of the channel, i. e., that portion which receives the glass; or (b) an overall covering and reinforcement for the channel. This cloth or felt facing is indicated at 21 and may be united to the channel by any suitable waterproof adhesive or glue. A similar partial or overall covering 21 will, in some cases, be likewise applied to the channels shown in Figures 4 to 14, as in Figure 7a.

In Figure 12 the channel shown in Figure 10 with or without the partial or overall cloth or felt liner 21 is provided with a suitable backing or reinforcement in the form of a substantially U-shaped preferably flexible and resilient strip 22. This strip may be of rubber, paper or fabric and may be rigid or semi-rigid, but is preferably of rubber or a rubber composition. The backing 22 overlies the bottom of the channel and the external side walls for a substantial portion of their length, usually extending midway thereof. The supporting backing 22 will be adhesively united with the adjacent surface of the channel 10 or to the cloth surface 21, or it will be united by a line or lines of stitching 23. In some cases, it will be vulcanized to the channel in the molding of the individual strip channel. The backing 22 will likewise be applied to the channels shown in Figures 4 to 14.

Referring to Figures 6 and 8, I have shown the channel as provided with a reinforcing backing of cloth, paper or metal 24 which in some cases is desirable for uniting the channel to the supporting frame. By representation this layer 24 may also comprise a suitable waterproof adhesive. The use of the reinforcing or adhesive layer is not essential, since the base material is substantial and can be united to the frame by the usual devices for that purpose, without difficulty. I will use it when required with each of the channels illustrated in the drawings and this is likewise true of the partial or overall fabric facing 21 and reinforcement 22.

In Figure 13 I have illustrated a further form of channel material wherein the numeral 25 illustrates a blank, layer or strip of fabric such as felt or cloth. Adhesively united to said fabric is a blank, layer or strip 26 of a suitable thickness of the channel material. Fixed to said layer

of channel material is a thin layer of sheet metal, such as steel, aluminum, or copper 27 which is flexible and resilient. This metal layer is provided over its surface with a multiplicity of struck-up projections 28 which are resilient and narrow, and the struck-up metal produces corresponding openings or perforations 29 in the sheet. The sheet 27 is applied to the composite material by pressure so as to embed the projections within the channel material layer as shown in dotted lines forming a three-ply blank or strip. As shown, the metal layer 27 is of substantially less width than the layers 25, 26 and is preferably positioned midway thereof. The composite structure comprising superposed united layers of cloth, channel material and metal are folded or bent so that the metal will have the contour shown in Figure 13, i. e., substantially U-form, and the free edge extended portions 30 of the composite material 25, 26 are folded around the metal core and united as shown at 31. In this manner, the channel will have a facing of cloth or other suitable fabric, an internal U-shaped core of flexible resilient metal, and an intermediate layer of the flexible and resilient cork and rubber material enclosing and united to the core, and united to and enclosed by the facing. If desired, the free edge portions 30 may have a suitable layer of adhesive applied to their exposed surfaces as at 32 or the metal insert provided with prongs on opposite sides so as to unite the channel material layer to the adjacent surface of the perforated metal layer. This channel may be any desired shape and while I have shown it as having the walls inclined to produce a reduced entrant channel opening, I also construct it to have the contour of the channels shown in Figures 4 to 6. The metal core may be made of plane metal and the unobstructed surfaces adhesively united to the cork and rubber layer.

Referring to Figures 14 and 17, the channel is in the form of a laminated structure composed of a facing layer 34 and a base layer 33 preferably vulcanized together. This channel is formed from a laminated sheet having a facing layer 34 composed of the expanded vulcanized structure described, but predominantly of rubber or entirely of rubber, and a coarser base layer 33 preferably of the cork and rubber structure wherein the comminuted cork predominates.

The sheets are calendered together and placed in the mold as in Figure 17, and the channel formed in the mold as shown in Figure 16, to produce the final expanded vulcanized channel by the molding operation as heretofore described.

There is produced a channel, the exposed side walls and bottom of which have a thin layer or veneer of the facing material 34 vulcanized to the adjacent surface of the coarse base layer 33 and a top face similarly vulcanized to the adjacent face of the base material and relatively thicker. This variance in the gauge of the facing is due to the molding, i. e., expansion and vulcanizing operations.

The relative composition and thickness of the respective layer 33, 34 may be varied, but it is preferable to have the facing layer of soft rubber, cellular rubber, or expanded cork rubber structure as herein described in which the cellular rubber predominates, and the base layer of relatively coarser expanded structure as herein described, that is composed of a major amount of cork by volume.

The resilience of the respective layers will thus be varied and the facing layer may have incor-

porated therein or applied to its surface as a coating, a suitable protective or ornamental composition or coloring.

It will be observed that in forming the laminated structure, the combining of the facing and base by vulcanization takes place in the mold, i. e., during the vulcanizing step, preceding which the layer materials are simultaneously blown or expanded.

With each of the channel structures herein described, the plastic mass may have incorporated therein means to impart a definite color or appearance, and the same selection is made where a fabric facing is used to accord with a desired color scheme. Also each of the channel structures will in some cases carry a suitable decorative, flexible and/or protective coating 36 preferably one which is water, oil and temperature resistant or not affected by exposure to the elements.

In carrying out the molding operation, the sheet material is placed in the mold as shown in Figures 15 and 17. This causes the material of the sheet between the mold top and the ridge faces of the mold, i. e., the bases of the channels to be confined relative to the material of the sheet which bridges the mold grooves. Therefore, in the blowing operation, these latter intermediate portions are expanded and fill the mold grooves as shown in Figure 16.

A channel product is therefore formed as illustrated in Figures 1, 2 and 3, and 14 having the bases of greater density than the sides of the channel.

As shown, the blowing and vulcanization take place in the mold. However, in some cases, the channel sheet or strip may be formed to shape from a sheet, strip, or plastic mass and in a suitable mold, and thereafter blown and vulcanized. By the practice described, however, not only is collapsing of the expanded structure and rubber cells prevented, but a smooth finished product is obtained.

I claim:

1. A flexible and resilient channel comprising an expanded body of comminuted cork and rubber and having its base of greater density than the channel walls.

2. A flexible and resilient channel comprising an expanded body of comminuted cork and vulcanized cellular rubber and having its base of greater density than the channel walls.

3. A flexible and resilient channel comprising an expanded body of comminuted cork and rubber and a channel strip secured to the channel and substantially enclosing the bottom and portions of the external side wall surfaces thereof.

4. A channel having a metal core, an enclosing layer of expanded cork and rubber, and a facing layer of fabric, said metal core being provided over its surface with a multiplicity of struck-up projections.

5. A flexible and resilient channel comprising superimposed and vulcanized laminations of expanded cork and rubber, one layer consisting of a predominating amount of cork and the other layer consisting of a predominating amount of rubber.

6. A channel having a metal core, an enclosing layer of expanded cork and rubber composition and a facing layer of fabric continuous with the exposed surface of the channel, said metal core being provided over its surface with a multiplicity of projections struck-up on one side thereof and embedded in said enclosing layer.

7. A flexible and resilient channel comprising an expanded body of comminuted cork and rubber, said channel having its base of greater density than the side walls of the channel and the latter having a greater compressibility and rebound than the base.

8. A flexible and resilient window, channel comprising an expanded network of comminuted cork and rubber, the base having a closer network than the side walls of the channel.

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