July 21, 1942. R. J. BUSH 2,290,842

WINDOW CHANNELING

Filed Dec. 1, 1939 2 Sheets-Sheet 1

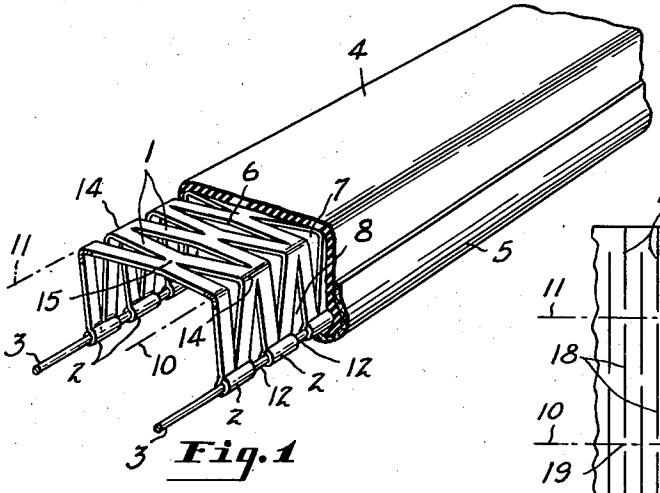


Fig. 1

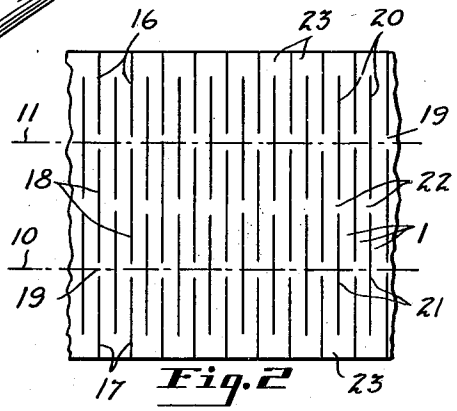


Fig. 2

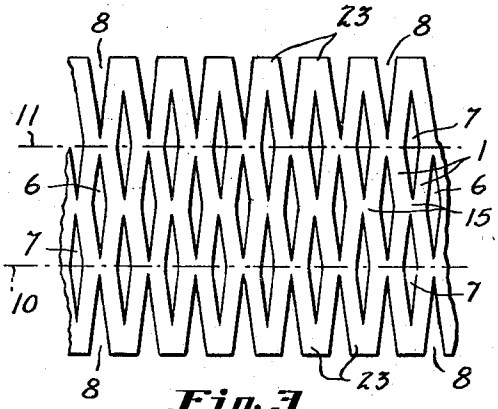


Fig. 3

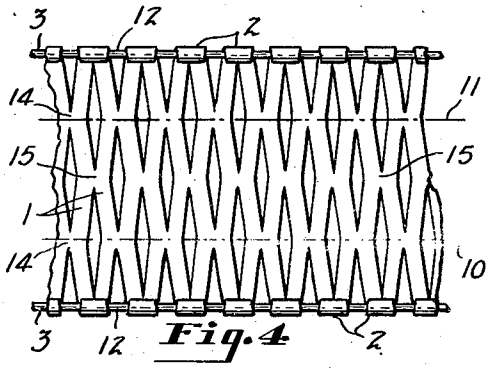


Fig. 4

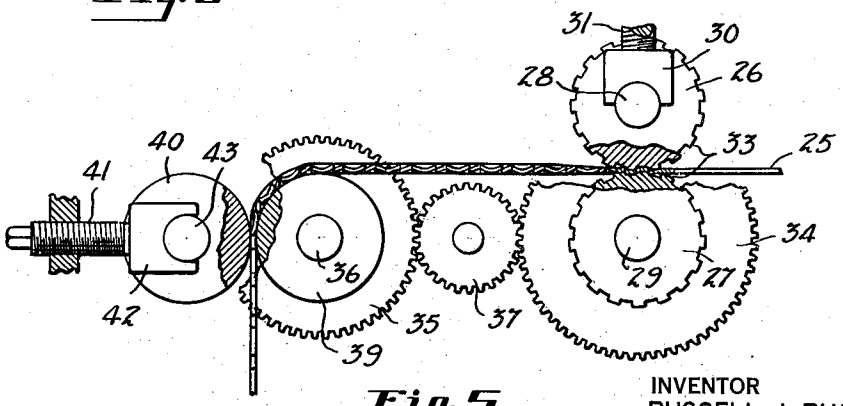


Fig. 5

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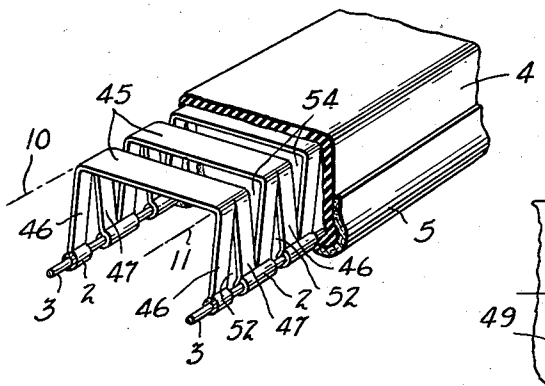


Fig. 6

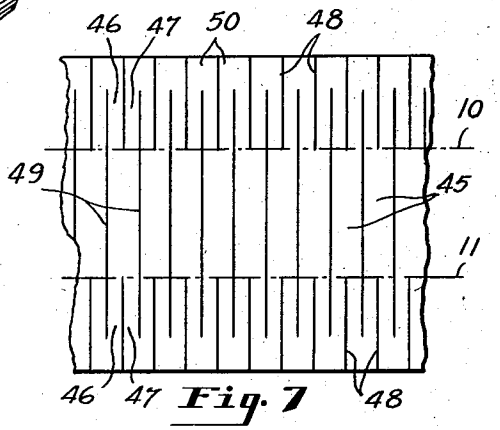


Fig. 7

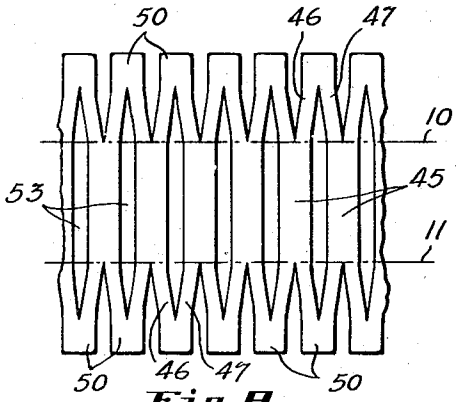


Fig. 8

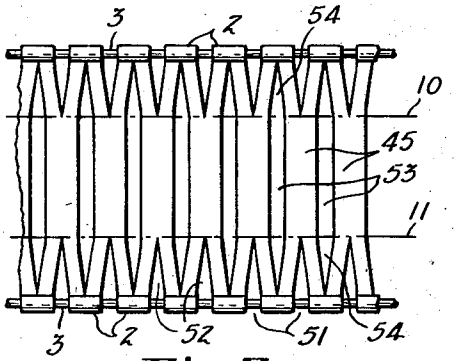


Fig. 9

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2,290,842

WINDOW CHANNELING

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Application December 1, 1939, Serial No. 307,080

10 Claims. (Cl. 296—44.5)

This invention relates to window channeling and the like, and more particularly to an improved metal core for use in such channeling and to the method of its manufacture.

It is an object of the invention to provide a sheet metal channel core having increased strength and rigidity and which may easily be bent or deformed in adapting the window channeling to the contours of a window. More specifically, the invention aims to provide a metal core for channels in which the elements are so arranged that upon bending of the core the transversely extending elements are subjected to bending stresses.

Another object is to provide a core having transverse metal straps which are initially subjected to bending stresses during manufacture of the core of the character produced therein when the completed channel is bent around a curved window edge or opening.

Another object of the invention is to provide a window channel relatively simple in design and construction and inexpensive to manufacture. Other objects and advantages, such as improvements in the strength of the device and improvements in its method of manufacture, will become apparent from the following detailed description, in which like parts throughout the several views are indicated by the same numerals of reference.

Figure 1 is a perspective view, partly in section and with part of the cushioning material removed, showing a window channel embodying the principles of the present invention;

Fig. 2 is a fragmentary detail showing the manner in which the sheet metal is slit or perforated in forming my improved channel core;

Fig. 3 is a fragmentary detail showing the appearance of my channel core after the sheet metal strip has been slit and expanded;

Fig. 4 is a fragmentary detail similar to Fig. 3 showing the core strip with the edges thereof wrapped or folded around the reinforcing wires to form beads;

Fig. 5 is a diagrammatic illustration, partly in section and with parts broken away, showing apparatus suitable for use in making the perforated core strip of the present invention;

Fig. 6 is a perspective view, partly in section and with part of the cushioning material removed, showing a window channel having a core of modified construction and embodying the principles of the present invention;

Fig. 7 is a fragmentary detail showing the manner in which a flat strip of sheet metal is slit to make the core shown in Fig. 6;

Fig. 8 is a fragmentary detail showing the strip of the modified construction in expanded form; and

Fig. 9 is a fragmentary detail showing the strip of Fig. 8 after the beads have been formed around the reinforcing wires.

As shown in Fig. 1, the completed channel comprises a metal core having a series of straps 1 which extend transversely across the width of the channel, including the spaced sides and bottom thereof, and terminate at their ends in generally tubular shaped discontinuous beads 2 which receive a pair of approximately parallel longitudinally extending bead reinforcing wires 3. The core, including the beads and wires, is enclosed in a suitable cushioning material 4, such as rubber or the like, by passing the core through a tubing machine or between formed mill rolls or through a calender, according to well known practice. Desirably, a fabric reinforcing strip or strips 5 may be placed over the rubber to protect and reinforce the same. The rubber body 4 is disposed on both the inside and outside of the channel and is interlocked with the core through openings 6, 7, and 8 in the latter. The openings 6 and 7 are approximately diamond shaped, while the openings 8 are substantially triangular or V-shaped, the wide ends of the openings or slots 8 being adjacent the bead wires 3. Diamond shaped openings or slots 6 are disposed across the width of the channel core bottom, extending approximately from bending line 10 to bending line 11 of the channel. The diamond shaped slots or openings 7 extend through the side walls of the channel core between the triangular openings 8 and through the core bottom between the ends of the openings 6. The widest parts of the slots 7 are in the region of the bends 10 and 11.

Preferably, the bead wires 3 have a sliding fit in the tubular beads 2 so as to permit the latter to move longitudinally on the bead wires when the channel core is bent in adapting the same to the contours of a window. Also, spaces 12 between adjacent beads permit the movement of the beads toward and away from one another on the wires.

Each of the relatively short tubular beads 2 is integral with a plurality of the straps 1. In the embodiment illustrated, two straps are joined at their ends and are integral with a bead on each of the bead wires. The straps of each pair which are connected at their ends to common beads diverge from one another over the side walls of the channel core and at the bends 10 and 11 are connected at 14 to corresponding por-

tions of the next adjacent pairs of straps. Across the bottom of the channel the straps of each pair converge toward one another and are secured together at the center of the core by an integral connection 15. In this manner each strap is connected to adjacent straps at spaced points across the channel and alternately to straps on opposite sides so that when the channel is deformed in bending the same around window contours, the individual straps may be deformed laterally in the plane of the original strip to accommodate the greater radius of curvature imposed upon either the bead or the back of the channel relative to the other.

The core is preferably formed of a relatively thin strip of sheet metal such as that illustrated in Fig. 2. A series of staggered perforations or slits are formed across the width of the strip to partially sever the same. Perforations or slits 16 of one group extend inwardly in parallel relation to one another from one edge thereof to adjacent, but short of, the bending line 11, while slits or perforations 17 extend inwardly in parallel relation to one another from the opposite edge of the strip to adjacent the bend line 10. In alignment with the slits 16 and 17 and disposed in the central portion of the strips are parallel slits 18 which extend to adjacent, but short of, the bend lines 10 and 11, thus leaving lands or unsevered portions 19 separating the ends of the slits 18 from the inner ends of the slits 16 and 17. The lands or connections 19 (which become the connections 14 when the strip is bent to channel form) constitute the portions of the strip unsevered by the perforations or slits and serve to retain the continuity of the strip.

Between the perforations 16 and 18, along one side of the strip, is a group of parallel perforations 20, and along the opposite side of the strip, between the perforations or slits 17 and 18, is a group of parallel perforations 21 which are aligned with the perforations 20 but separated therefrom at their inner end by lands or connecting portions 22 which later become the connections 15. The slits or perforations 20 and 21 do not extend through the marginal edges of the strip, thus leaving tab portions 23 which, when rolled or otherwise formed into cylindrical shape, become the tubular beads 2.

After formations of the slits 16, 17, 18, 20 and 21, the strip is elongated by stretching or otherwise so as to expand the same and bend the straps laterally to form the transverse slots or openings 6, 7 and 8, in place of the perforations or slits. In this expanding operation the edges of the slits 16, 17, 18, 20 and 21 move away from one another and the straps 1 are subjected to increased stress adjacent the connections 19 and 22.

Normally, elongation of the slitted strip when the same is not confined results in a twisting or bending of the individual straps. It is desirable, therefore, that suitable means be provided during the elongation of the strip to prevent such twisting of the bands so as to restrict their deformation to lateral bending, as shown in Fig. 3, or to reshape the strip after elongation to flatten the same. Hence, as an alternative to restraining the strip against objectionable deformation during expansion of the same, I propose to pass the expanded strip through suitable apparatus for flattening the individual straps so as to shape them to approximately the form shown in Fig. 3.

The expanded strip with the individual straps 1 thereof flattened and bent laterally in the plane of the original strip is passed through a suitable apparatus (not shown) which bends the tabs 23 around the bead wires 3, the latter being advanced or moved simultaneously with the strip and at the same speed. In this manner the composite beads 2 are formed in parallel relation to one another along opposite edges of the core. Thereafter the core is covered with the cushioning material 4 and the reinforcing fabric 5, if desired, and bent along the lines 10 and 11 to form the desired U-shaped channel.

In Fig. 5 is illustrated in diagrammatic form a suitable apparatus for forming a thin sheet metal strip to provide a strip such as that shown in Fig. 3. A plain strip 25 of thin flexible sheet metal is advanced between a pair of driven cutting and forming rolls 26 and 27 rotatably mounted on suitable shafts 28 and 29 carried in journals of a suitable supporting structure, not shown. Pressure may be applied to the axle or shaft 28 of the top roll 26 by means of a block 30 or the like acting under the influence of a screw 31 so as to force the faces of the rolls together. Suitable cutting or perforating teeth 33 are formed on the faces of the rolls 26 and 27 and cooperatively pierce the strip 25 to form therein the desired slits, heretofore described, as the strip passes between the rolls.

Suitable means, not shown, is provided for driving the shaft 29. This shaft, in addition to actuating the roll 27 carried thereby and the roll 26 interlocked with the roll 27, has secured thereon a gear 34 which drives by means of an intermediate gear 37 a gear 35 secured on a shaft 36. Slitted strip material emerging from between the rolls 26 and 27 is carried over a cylindrical roll or drum 39 secured on the shaft 36 and driven thereby in synchronous relation to, but at a slightly greater surface speed than, the slitted rolls 26 and 27. The strip is held against the drum 39 by means of a pressure roll 40 acted on by a screw 41 bearing against journal block 42 which supports shaft 43 of the pressure roll. The increased or greater speed of the rolls 39 and 40 relative to the slitting rolls 26 and 27 stretches or expands the slitted strip so as to form the diamond shaped and tapering transverse slots 6, 7 and 8, previously mentioned. As the expanded strip passes over the drum 39 and between the drum and the pressure roll 40, it is flattened so as to straighten the bends or kinks formed in the straps during the expanding process.

In first passing the expanded strip in a curved path over the drum 39, the latter smoothes the individual straps 1 of the expanded strip, tending to flatten the twisted straps against the surface of the drum so that when pressed between the drum and the pressure roller the straps are flattened rather than crushed or otherwise objectionably deformed.

After coming from between the smoothing rolls 39 and 40 the strip is approximately in the shape or condition illustrated in Fig. 3. Thereafter the tabs 23 are folded or rolled over the bead wires 3 to form the reinforcing beads shown in Fig. 1. The composite core may be then passed through a tubing machine or similar device for applying the rubber covering or cushion material 4, after which the reinforcing and protective fabric cover 5 may be applied. Preferably, the composite core is passed through the tuber or rubber coating machine in flat shape prior to be-

ing bent along the lines 10 and 11. In such case the assembled strip is passed through a forming machine which progressively folds the same along the bend lines 10 and 11 to form the channel shaped device illustrated in Fig. 1. If desired, however, the composite core such as shown in Fig. 4 may be first passed through the forming machine to bend it into channel shape and then passed through the tuber or rubber coating machine to apply the cushion rubber 4.

There are numerous advantages inherent in a structure of this character. In the expanding and pressing process the straps 1 are subjected to lateral deformation in the plane of the original flat strip. This deformation results in increased stress adjacent the connecting portions 14 and 15. When bending the channel around a window contour the straps are subjected to increased stress adjacent the connecting portions 14 and 15, which yield so that the core may accommodate itself to the particular curve being fitted. This bending of the core also effects further lateral deformation or bending of the straps 1 in the plane of the original metal strip from which the core is made.

When finally shaped to the desired contour, a channel incorporating a core of the character disclosed herein exhibits increased resistance to deformation which would return it to original straight shape. Therefore, the present invention provides a channeling core which tends to retain its formed shape and has increased rigidity and strength. In this connection it is to be noted that the portions of the straps which form the side walls of the core are diagonally disposed with respect to one another. It is recognized that this type of structural element is of greater strength than parallel structural elements which tend to shift laterally. Similarly, the portions of the straps which form the bottom of the core are diagonally disposed with respect to one another and at their adjacent points are connected together so as to resist shifting of the straps relative to one another.

In Figs. 6 through 9 is illustrated a modification of the invention in which the transverse straps of the core have relatively wide portions 45 disposed across the bottom of the channel and relatively narrow portions 46 and 47 disposed in the side walls of the channel. The strap portions 46 and 47 are integral with the strap portions 45, being formed into the latter at or adjacent the bends 10 and 11 and diverging from one another toward the bead wires 3. Thus each of the relatively narrow strap portions 47 which is integral with one of the wide strap portions 45 extends diagonally toward the narrow strap portion 46 which is integral with the next adjacent wide strap portion 45. The tubular beads 2 are formed on the ends of the narrow strap portions 46 and 47 which extend from adjacent wide strap portions 45. In this manner the successive wide strap portions of the channel core are connected to one another through the relatively short beads 2.

The manner of slitting a continuous strip of thin sheet metal to form the core illustrated in Fig. 6 is shown in Fig. 7. Short slits 48 are formed in the edges of the strip in spaced parallel relation to one another. These slits extend inwardly from the edges of the strip substantially to the bend lines 10 and 11. Transverse slits 49 are formed across the strip intermediate the slits 48 and extend substantially from side to side of the strip but not through the marginal edges thereof, thus providing tabs 50 between the slits 48 which are later formed in to the tubular beads 2.

The slitting of the continuous strip may be carried out as previously described in connection with Fig. 5 and when the strip is expanded and flattened it takes substantially the appearance illustrated in Fig. 8. In this figure the portions of the strip separated from one another by the slits 49 have moved apart and when the core is bent will form the relatively wide portions 45 of the transverse straps. The elongation of the strip has caused a lateral deformation of the portions of the strip between the slits 48 and the ends of the slits 49. These deformed portions of the strip have been offset substantially in the plane of the original strip and when the core is bent to channel form constitute the relatively narrow strap portions 46 and 47.

In Fig. 9 the expanded strip is shown with the tabs 50 rolled about the bead wires 3 to form the longitudinally spaced tubular beads 2. Spaces 51 between the successive beads are continuous with substantially triangular slots 52 which extend from the beads to the bend lines 10 and 11. Slots 53 between the relatively wide portions 45 of the transverse straps have tapered ends 54 which extend from approximately the bend lines 10 and 11 to adjacent the beads 2 and when the core is bent to its final form are disposed in the side walls of the channel.

This embodiment of the invention has greater flexibility than the embodiment previously described since the transverse straps are separated from one another substantially from side to side of the channel core from bead to bead. Accordingly, this form of the invention provides a window channel of increased flexibility that can be bent around relatively sharp curves without objectionable deformation to the core. The divergent leg portions 46 and 47 of the transverse straps resist a movement of the straps in a longitudinal direction which might result in collapse of the channel. For this reason a core of the character described is of greater strength than cores which do not have the combination of relatively wide strap portions with divergent leg portions disposed in the side walls of the channel.

Window channels formed with cores made according to the principles of this invention have improved characteristics of strength and durability and may be made more economically than cores which require portions of the cheap metal strip to be removed since the cores of the present invention are made without waste of metal and the elements of the transverse straps are so disposed as to reinforce the core against undesirable deformation.

The principles of the present invention may be utilized in various ways, numerous modifications and alterations being contemplated, substitution of parts and changes in construction being resorted to as desired, it being understood that the embodiments shown in the drawings and described above are given merely for purposes of explanation and illustration without intending to limit the scope of the claims to the specific details disclosed.

What I claim is:

1. A core for window channel comprising sheet metal straps extending across the width of the core and each strap connected to one of the adjacent straps at spaced points, beads on the ends of the straps, and reinforcing wires threaded through the beads, the beads on each wire being relatively short and separated from one another to permit

relative movement thereof on the wire in bending the core and adapting the same to a window opening.

2. A flexible window channel comprising a metal core and a covering of cushioning material for the core, said core being of substantially U shape and having a series of strap portions disposed in side by side relationship, each strap portion including a relatively wide portion in the bottom of the channel and a pair of divergent narrow portions in each side wall of the channel.

3. A core for a flexible window guide comprising U shaped metal straps disposed in side by side relation to form a channel structure having bottom and side walls, each strap including a relatively wide portion in the channel bottom and a pair of divergent relatively narrow portions in one of the side walls.

4. A core for a flexible window guide comprising a sheet metal channel having bottom and side walls, a plurality of transverse slots in the channel metal to form transverse straps in pairs, each pair of straps having both their ends formed into integral tubular beads disposed along the edges of the side walls, and the beads of successive strap pairs being separated from one another to form a discontinuous bead along the edge of each side wall.

5. A core for a flexible window guide comprising a sheet metal channel having bottom and side walls, slits in the channel to form narrow transverse straps in pairs, the ends of the straps of each pair being integral and formed into tubular beads disposed along the edges of the side walls, the beads of each pair being spaced from the adjacent beads, reinforcing wires extending through and connecting the beads, and integral connections joining adjacent pairs of straps in the plane of the base.

6. A flexible window channel comprising a thin metal core bent along its length to form base and side portions, and a covering of cushioning material for the core, said core including a series of transverse straps angularly disposed with respect to one another and integrally connected in pairs at the juncture of the base and side portions.

7. A flexible window channel comprising a thin metal core having parallel bends along its length to form base and side portions, and a covering of cushioning material for the core, said core including a series of transverse straps each of which is formed with a plurality of bends in its plane and is integrally connected to one of the adjacent straps at the bends.

8. A flexible window channel comprising a thin metal core having parallel bends along its length to form base and side portions, and a covering of cushioning material for the core, said core including a series of transverse straps and open slits between the straps to receive the cushioning material in interlocking relation, some of the slits extending through the side portions only to the bends and others of the slits extending through the bends continuously across the base and at least one of the side portions.

9. A flexible window channel comprising a thin metal core and a covering of cushioning material, said core including a series of transversely extending straps each of which is integrally connected at a plurality of points to the adjacent straps, the points of connection to one of the adjacent straps being spaced along the length of the strap from the connection to the other adjacent strap so that in bending the channel to a window contour each of the straps is bent laterally in its plane at several points along its length.

10. A core for a flexible window guide comprising a channel of thin sheet metal having side and bottom portions, said core being formed with elongated transverse slots having pointed ends, some of said slots extending continuously across the bottom portion of the channel and at least one of the side portions, and others of said slots extending across substantially the entire width of the side portions and disposed wholly within the side portions.

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