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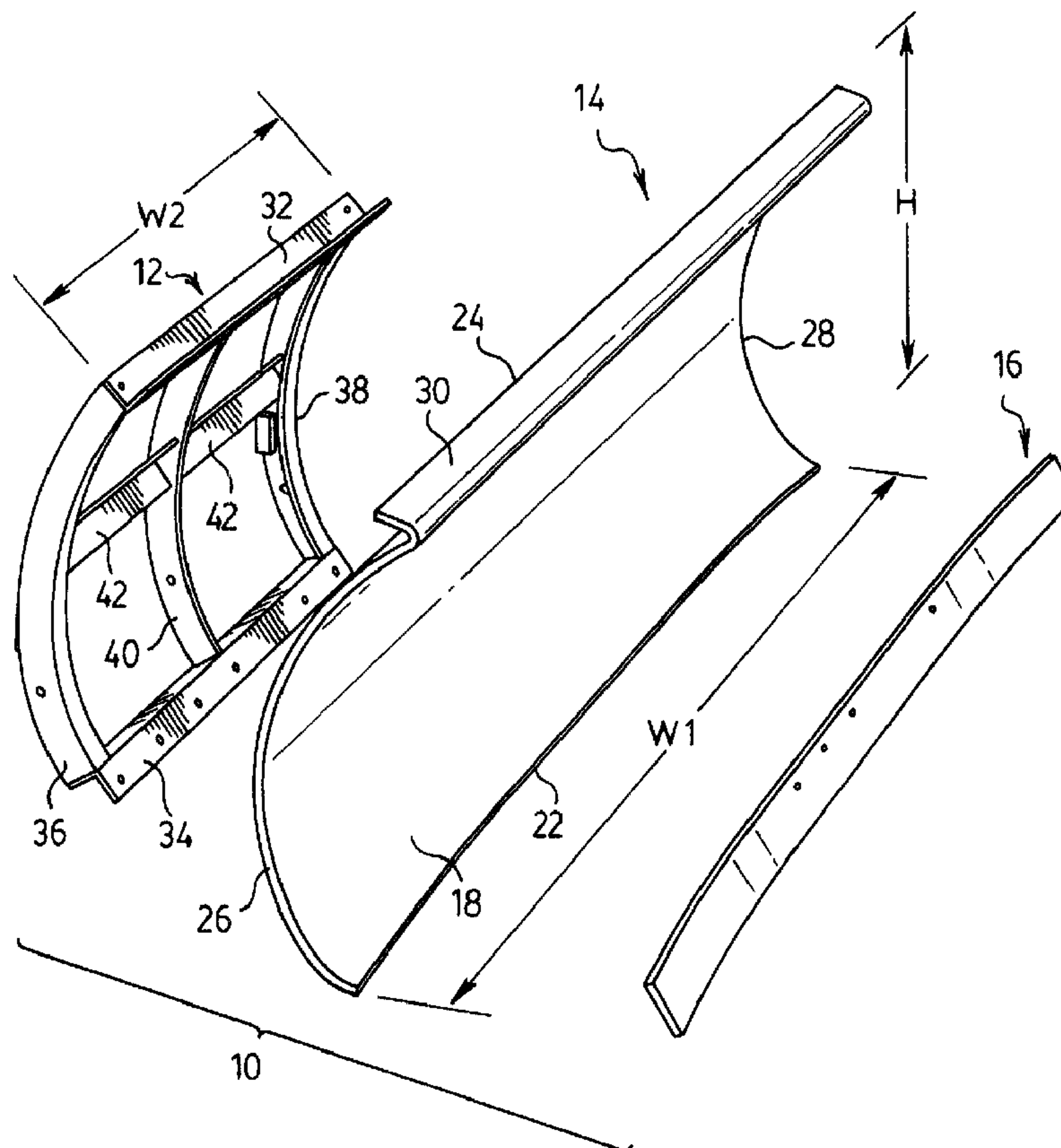
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(54) Title: SNOWPLOW



(57) Abrégé/Abstract:

A snowplow in which a snow blade has a central portion and two resilient portions on either end thereof and in which each end portion including a resilient mouldboard and a resilient scraper blade as a combination is resiliently deflectable for deflection together forwardly relative to the central portion.



ABSTRACT

A snowplow in which a snow blade has a central portion and two resilient portions on either end thereof and in which each end portion including a resilient mouldboard and a resilient scraper blade as a combination is resiliently deflectable for deflection together forwardly relative to the central portion.

Title

SNOWPLOW

Scope of the Invention

[0001] This invention relates to a snowplow and, more particularly, to a snowplow adapted to be resiliently deflectable.

Background of the Invention

[0002] Snowplows are well known to push snow in front of a vehicle as, for example, in the manner of the lightweight snowplow illustrated in the present inventor's U.S. Patent 5,778,567, issued July 14, 1998.

[0003] The present inventor has appreciated a disadvantage with known snowplows in that if a snowplow and, particularly, a one end portion of the snowplow is forced into a relatively immovable obstacle, the snowplow is often permanently deformed, so damaged that the snowplow must be replaced.

Summary of the Invention

[0004] To at least partially overcome the disadvantages of previously known snowplows, the present invention provides a snowplow whose end portions are resiliently deflectable for deflection forwardly or rearwardly.

[0005] One object of the present invention is to provide a lightweight resilient snowplow.

[0006] Another object is to provide a snowplow which when one end portion of the snowplow may be engaged with a relatively immovable obstacle, permits deflection of the end portion of the snowplow.

[0007] Another object is to provide a composite snowplow including a flexible deformable plow board and a scraper element both of which are together deflectable, at least rearwardly.

[0008] Accordingly, in one aspect, the present invention provides a snowplow comprising:

an elongate planar scraper blade,
a generally rectangular planar mouldboard, and
a central support structure,

[0009] the mouldboard having a front surface, a rear surface, a lower edge, an upper edge, a right end edge and a left end edge, with each edge spanning between the front surface and the rear surface,

[0010] the mouldboard having a height measured between the lower edge and the upper edge and a width measured between the right end edge and the left end edge,

[0011] the mouldboard having a central portion between a right end portion and a left end portion,

[0012] the right end portion extending from the central portion to the right end edge,

[0013] the left end portion extending from the central portion to the left end edge,

[0014] the central support structure secured to the rear surface of the mouldboard over the central portion between the right end portion and the left end portion,

[0015] the scraper blade mounted to the mouldboard proximate the lower edge and extending across the entire width of the mouldboard,

[0016] the combination of the scraper blade over the right end portion of the mouldboard and the right end portion of the mouldboard being resiliently deflectable for deflection together forwardly and/or rearwardly relative the central portion, and

[0017] the combination of scraper blade over the left end portion of the mouldboard left and the end portion of the mouldboard the being resiliently deflectable for deflection together forwardly and/or rearwardly relative the central portion.

Brief Description of the Drawings

[0018] Further aspects and advantages of the present invention will become apparent from the following description taken together with the accompanying drawings in which:

- [0019] Figure 1 is an exploded pictorial view of a snowplow in accordance of a first embodiment with the present invention;
- [0020] Figure 2 is a front pictorial view of the assembled snowplow of Figure 1;
- [0021] Figure 3 is a rear pictorial view of the snowplow of Figure 2;
- [0022] Figure 4 is a side view of the snowplow of Figure 2;
- [0023] Figure 5 is a bottom view of the snowplow of Figure 2;
- [0024] Figure 6 is a front view of the snowplow of Figure 2;
- [0025] Figure 7 is a rear view of the snowplow of Figure 2;
- [0026] Figure 8 is a bottom view of the snowplow similar to that shown in Figure 5, however, showing one end of the snowplow as deflected rearwardly;
- [0027] Figure 9 is a bottom view of the snowplow similar to that shown in Figure 5, however, showing one end of the snowplow as deflected forwardly;
- [0028] Figure 10 is an exploded pictorial view of a snowplow in accordance with the second embodiment of the present invention; and
- [0029] Figure 11 is a pictorial view of the assembled snowplow of Figure 10.

Detailed Description of the Drawings

[0030] Reference is made first to Figures 1 to 3 which show an exploded and two assembled views respectively, a snowplow 10 in accordance with the present invention as comprising three separate elements, namely, a central mounting plate or support structure 12, a plowboard or mouldboard 14 and a scraper blade 16.

[0031] The mouldboard 14 has a front surface 18, a rear surface 20, a lower edge 22, an upper edge 24, a right end edge 26 and a left end edge 28, with each of the edges 22, 24, 26 and 28 spanning between the front surface 18 and the rear surface 20. The mouldboard is indicated as having a height H measured between the lower edge 22 and an upper edge 24 and a width W1 measured between the right end edge 26 and the left end edge 28.

[0032] The scraper blade 16 is shown as a thin elongate member which is adapted to be secured proximate the lower edge 22 of the mouldboard 14 and to extend across the

entire width W1 of the mouldboard. As is known, the scraper blade 16 is mounted to the mouldboard 14 so as to protrude downwardly as best seen in side view in Figure 4 beyond the lower edge 22 of the mouldboard so as to contact and engage a surface such as a roadway or driveway along which the snowplow is to be moved.

[0033] The mouldboard 14 is effectively rectangular in shape and, in the preferred embodiment, is formed from a rectangular sheet of material of uniform thickness to have the shape as shown, that is, to be generally C-shaped in side view as seen in Figure 4 having a forward surface 18 which is concave as directed forwardly. The mouldboard 14 has a top return flange 30 which is bent to extend rearwardly for the purposes of increasing the strength and resiliency of the mouldboard 14 proximate its upper edge 24. The upper edge 24 and the top return flange 30 extend in a straight line.

[0034] The mounting plate or support structure 12 as shown in the embodiment of Figure 1 is a framework of rigid frame members of which an outer peripheral frame is formed by L-shaped angle members comprising top frame member 32, bottom frame member 34, right side frame member 36 and left side frame member 38. These are joined by an intermediate upright frame member 40 and intermediate horizontal frame members 42. The frame members are secured together to provide a relatively rigid rear support structure 12.

[0035] The forwardmost surfaces of the frame members are disposed in a curved plane which corresponds to a plane in which the rear surface 20 of the mouldboard 14 lies. In this regard, as seen in side view, the frame members present a concave C-shape forwardly and, as seen in top view, are preferably generally straight.

[0036] The support structure 12 has a width indicated as W2 which is less than the width W1 of the mouldboard 14.

[0037] The support structure 12 is mounted to the rear of the mouldboard 14 centrally of the mouldboard 14 and, preferably, relatively precisely centered on the width of the mouldboard 14.

[0038] As best seen, for example, in Figure 7, the snowplow 10 and its mouldboard 14 has a central portion generally indicated 44 forward of the support structure 12. The

mouldboard has a right end portion 46 extending from the central portion 44 to the right end edge 26. The mouldboard 14 has a left end portion 48 extending from the central portion 44 to the left end edge 28.

[0039] As best seen in the bottom view in Figure 5, the lower edge 22 of the mouldboard 14 is generally straight over the central portion 44 and parallel to the upper edge 24, however, the lower edge 22 over each of the right end portion 46 and the left end portion 48 angles slightly forwardly from the central portion towards each respective end. As seen in Figure 6, preferably, the lower edge of the scraper blade 16 is straight over the central portion 44 and angles or curves slightly upwardly over each of the respective right end portion 46 and left end portion 48 from the center portion to its respective end edge.

[0040] The support structure 12 is adapted to be used as a mounting structure to mount the snowplow 10 as to a vehicle and the like using conventional mounting arrangements.

[0041] Reference is made to Figure 8 which shows the snowplow 10 in a bottom view similar to that shown in Figure 5, however, under a condition in which, in use, the snowplow 10 has been urged forwardly in the direction indicated by arrow 52 into a relatively immovable object 50. As a result of the forces urging the snowplow 10 in a forward direction, with contact of the object 50, the snowplow 10 has been deflected and, in this regard, the right end portion 46 is shown as having been deflected rearwardly from its normal undeflected condition as shown in Figure 5 to a deflected condition as shown in Figure 8. As seen in Figure 8, the combination of the scraper blade 16 over the right end portion 46 and the right end portion 46 of the mouldboard 14 are, as a combination, resiliently deflectable for deflection rearwardly relative to the central portion 44.

[0042] Reference is made to Figure 9 which is similar to Figure 8, however, indicates a condition in which the snowplow 10 has been moved rearwardly in the direction of arrow 54 into a relatively immovable object 56. As shown in Figure 9, the combination of the scraper blade 16 over the left end portion 48 of the mouldboard and the left end

portion 48 of the mouldboard 14 are together deflected forwardly relative to the central portion 44.

[0043] The materials comprising the mouldboard 14 and the support structure 12 are to be selected to permit for reasonable deflection of each of the right end portion 46 and the left end portion 48 as in the manner schematically illustrated in Figures 8 and 9 such that the left and right end portions 46 and 48 will be resilient and deflectable to an extent to prevent or substantially resist permanent deflection to the snowplow 10 under reasonable impacts which may be experienced in use of the snowplow. It will be appreciated, that on a vehicle urging the snowplow 10 forwardly, on one of the end portions of the snowplow 10 impacting some object as illustrated in Figure 8, or meeting some higher than normal resistance to movement forwardly, relatively substantial deflection of one of the end portions of the snowplow will result without permanent deformation of the snowplow 10. Under some impact conditions, a deflection laterally of the vehicle to one side may result as to permit the vehicle with the snowplow to pass the object to one side thereof. Alternatively, the impact and deflection of the snowplow 10 may stop the movement of the vehicle forwardly in a dampened manner. Alternatively, after impact, deflection of the snowplow 10 may provide adequate time for a user to brake or otherwise stop the movement of the vehicle forwardly.

[0044] Forward or rearward deflection of the right end portion 46 or the rear end portion 48 including not only the mouldboard 14 but also the scraper blade 16 can, for example, be of assistance as when a snowplow may be moved such that one of its ends just catches on, for example, the side wall of a building with the forward or rearward deflection of the snowplow 10 at its left or right end portion deflectively and thereby reducing the extent to which the snowplow extends to that end and, thus, possibly by deflecting moving the right end edge 26 or left end edge 28 towards the center portion sufficiently to permit the snowplow 10 to pass along one side of the building.

[0045] Reference is made to Figures 10 and 11 which show a second embodiment of a snowplow 10 in accordance with the present invention. The second embodiment is

similar to the first embodiment and similar reference numerals are used to refer to equivalent elements.

[0046] In the second embodiment, the mouldboard 14 comprises a simple rectangular sheet of material. The support structure 12 also comprises a sheet of material which is pre-formed to have a fixed C-shape as seen in side cross-section.

[0047] The scraper blade 16 is shown as comprising three portions, a center portion 60 and two side portions 62 and 64. The scraper blade side portions 62 and 64 are pre-formed to have a curvature which curves forwardly. The center portion 60 may be different than the side portions as to have increased strength and rigidity, that is, to be, if desired, less resilient. With the end portions 60 and 62 of the scraper blade having a curved configuration as shown, when they may be applied to the mouldboard 14, the net result is that the mouldboard 14 has its end portions which curve forwardly as illustrated in Figure 11.

[0048] As with the first embodiment, the composite structure of the snowplow of Figures 10 and 11 is relatively rigid through a center portion 44 of the snowplow, however, the right and left end portions 46 and 48 of the snowplow, comprising in combination the scraper blade 16 and mouldboard 14, each are resilient and adapted to resiliently deform forwardly and/or rearwardly.

[0049] Figures 10 and 11 show elongate end edge blades 86 and 88 which are secured adjacent the end edges 26 and 28 towards reinforcing the mouldboard 14 and assisting in transferring impact forces over to mouldboard 14 and to and from the scraper blade 16.

[0050] In the second embodiment illustrated in Figures 10 and 11, in any vertical cross-section through the snowplow 10, the greatest resistance to forward and rearward deformation is provided where the scraper blade 16 overlies the mouldboard 14. When the snowplow 10 as shown in Figure 11 may be deflected as, for example, rearwardly or forwardly, it may deflect throughout its entire height to increase or decrease the forward curvature of the composite scraper blade 16 and mouldboard 14.

[0051] In the context of the first embodiment of Figures 1 to 9, the deflection of the, for example, right end portion 46 will, to some extent, be determined by the relative

resiliency of the right end portion 46 throughout its vertical cross-section. For example, where the snowplow 10 comprises the composite of the scraper blade 16 and the mouldboard 14, it will have a certain first relative resiliency. Where the snowplow 10 is merely the mouldboard 14 as, for example, in the curved section between the scraper blade 16 and the top return flange 30, it will have a second relative resiliency. Where the snowplow 10 comprises merely the mouldboard 14 proximate the upper edge 22 and including the top return flange 30, the mouldboard 14 may have a third relative resiliency. The first, second and relative resiliencies may be selected to be equal or different to develop different deflection characteristics for the snowplow.

[0052] Figures 7 and 8 show for convenience of illustration a condition in which the snowplow 10 is shown to be deflected uniformly throughout its entire height about any vertical axis. Such uniform deflection is not necessary. Such uniform deflection is notionally indicated by a dotted line 72 in Figure 6 indicating a notional axes about which as seen in Figure 8, the right end portion 46 is deflected uniformly throughout any vertical cross-section.

[0053] With deflection notionally about the dotted line indicated as 72, deflection is substantially about a notional vertical axis of deflection, that is, for example, with the top return flange 30 flexing rearwardly to a similar extent that the scraper blade 16 may deflect and this could be occasioned by reason of the relative flexibility of the top return flange 30 being comparable to that of the combination of the scraper blade 16 and the lower edge 22 of the mouldboard in combination and, as well, by the C-shape in side view cross-section of the mouldboard 14 having a comparable resistance to deflection.

[0054] A curved dotted line indicated as 74 in Figure 6 is other such notional axes about which the lowermost portion of the right end portion may be deflected with for deflection about line 74, the greatest of deflection occurring at the junction of the rear surface 20 and the right end edge 26 and with deflection effectively decreasing as a function of an increase in the sum of the distance of any point on the snowplow from the lower edge 22 and the distance of the point from the right end edge 26.

[0055] The mouldboard 14 preferably comprises a unitary sheet of resiliently deformable material. Preferably, it is a unitary sheet of plastic material, more preferably, selected from ultra-high molecular weight plastic materials.

[0056] Preferred ultra-high molecular weight plastic sheets for use with the present invention have a modulus of elasticity at 73°F of at least 8,000 pounds and a tensile strength elasticity at 73°F of at least 4,500 pounds. It is preferred that the mouldboard 14 comprise a single sheet of plastic material, however, may comprise a laminate of various materials such as plastic sheeting and metal sheeting.

[0057] The scraper blade 16 preferably is formed from one or more sheets of resilient material such as resilient metal sheet.

[0058] The support structure 12 as shown, for example, in Figure 1 is preferably formed from lightweight steel or aluminum angle iron.

[0059] The mouldboard, scraper blade and support structure may be secured together by various methods including adhesive bonding and the use of mechanical fasteners such as rivets and bolts.

[0060] In accordance with a preferred embodiment of the present invention, a snowplow has a width in the range of six to eight feet with the width of the center portion being two to four feet and the width of each end portion 46 or 48 being in the range of one and a half to three feet, more preferably, in the range of two to three feet. Preferably, the mouldboard 14 at the junction of the lower edge 22 and the right or left edge is capable of being deflected rearwardly a distance in the range of about 10% to 100% of the width of the end portion. For example, for a snowplow 10 having a width of eight feet and the width of each end portion being two and a half feet, it is desired that the junction of the lower edge 22 and the right or left edge be capable of being resiliently deflectable about $\frac{5}{8}$ of a foot or, more preferably, $\frac{5}{4}$ of a foot without permanent deformation.

[0061] The width of the right end portion 46 is indicated as W3 on Figure 5.

[0062] The width of the left end portion 48 is indicated as W4 on Figure 5.

[0063] The snowplow 10 of the present invention in preferred embodiments is adapted for light plowing duties as, for example, to be routed to domestic vehicles such as vans, suburban utility vehicles, pickup trucks and the like, as for use by a homeowner to plow driveways.

[0064] The snowplow is preferably to be designed to deflect under loads to an extent that plowing of typical snow falls is not significantly impaired. Rearward flexing of the end portions 46 and 48 which results in spilling of snow to one side is not necessarily disadvantageous when large volumes of snow are being pushed, and repeated passage of the snowplow to incrementally move large snow falls can be advantageous.

[0065] The snowplow may be designed to meet certain loads applied as, for example, to particular points on the end portions, having regard to the use to which the snowplow is intended.

[0066] The snowplow 10 is preferably configured to absorb the forces of impact or resistance by acting in the manner of a deformable spring and the preferred design of the snowplow permits forces to be distributed as widely as possible over the component element so as to minimize localization of impact forces on any one point.

[0067] While the invention has been described with reference to preferred embodiments, the invention is not so limited. Many modifications and variations will now occur to a person skilled in the art. For a definition of the invention, reference is made to the appended claims.

WHAT IS CLAIMED IS:

1. A snowplow for mounting to the front end of a vehicle, the snowplow comprising:

a curved mouldboard of unitary construction fabricated from a resilient, deflectable material; the mouldboard having a concave front face adapted to bear against and plow snow when the snowplow is in use, an opposed rear face, a right side portion, a left side portion and a central portion disposed between the right side and left side portions; the right and left side portions and the central portion being integrally formed with each other;

a mounting plate fixed to the rear face of the moldboard, the mounting plate supporting the central portion of the mouldboard and constraining the central portion of the mouldboard from substantial deflection; and

a scraper blade fabricated from a resilient, deflectable material; the scraper blade being attached to extend along the right side, left side and central portions of the mouldboard below the lowermost edge of the mouldboard; the scraper blade having a right side portion, a left side portion and a central portion disposed between the right side and left side portions of the scraper blade;

each of the right side and left side portions of the mouldboard and the scraper blade being resiliently deflectable forwardly or rearwardly relative to the central portion of the mouldboard.

2. The snowplow of claim 1 wherein the moldboard has a generally rectangular footprint.

3. The snowplow of claim 1 wherein the mouldboard has a width measuring between six feet and eight feet.

4. The snowplow of claim 3 wherein:

the central portion of the mouldboard has a first width;

the left side portion of the mouldboard has a second width; and

the right side portion of the mouldboard has a third width;

wherein the first width is greater than each of the second and third widths.

5. The snowplow of claim 4 wherein the second width is equal to the third width.
6. The snowplow of claim 5 wherein the each of the second and third widths measures between one and half feet and three feet.
7. The snowplow of claim 4 wherein the first width measures between two feet and four feet.
8. The snowplow of claim 4 wherein each of the right side and left side portions of the mouldboard have outer lateral edges; the outer lateral edges of the right side and the left side portions of the mouldboard capable of forwardly or rearwardly deflecting a distance D relative to the central portion of the mouldboard; the distance D measuring in the range of about 10% to 100% of the second width.
9. The snowplow of claim 1 wherein:

the central portion of the mouldboard has a first width; and

the support structure has a second width;

the second width measures less than the first width.
10. The snowplow of claim 1 wherein the mouldboard is fabricated from a single sheet of plastic material.
11. The snowplow of claim 1 wherein the mouldboard is fabricated from a laminate of plastic and metal sheeting.
12. The snowplow of claim 1 wherein the mouldboard has an upper edge and a lower edge, the upper edge having a return flange bent to extend rearward and away from the front face of the mouldboard.
13. The snowplow of claim 1 wherein:

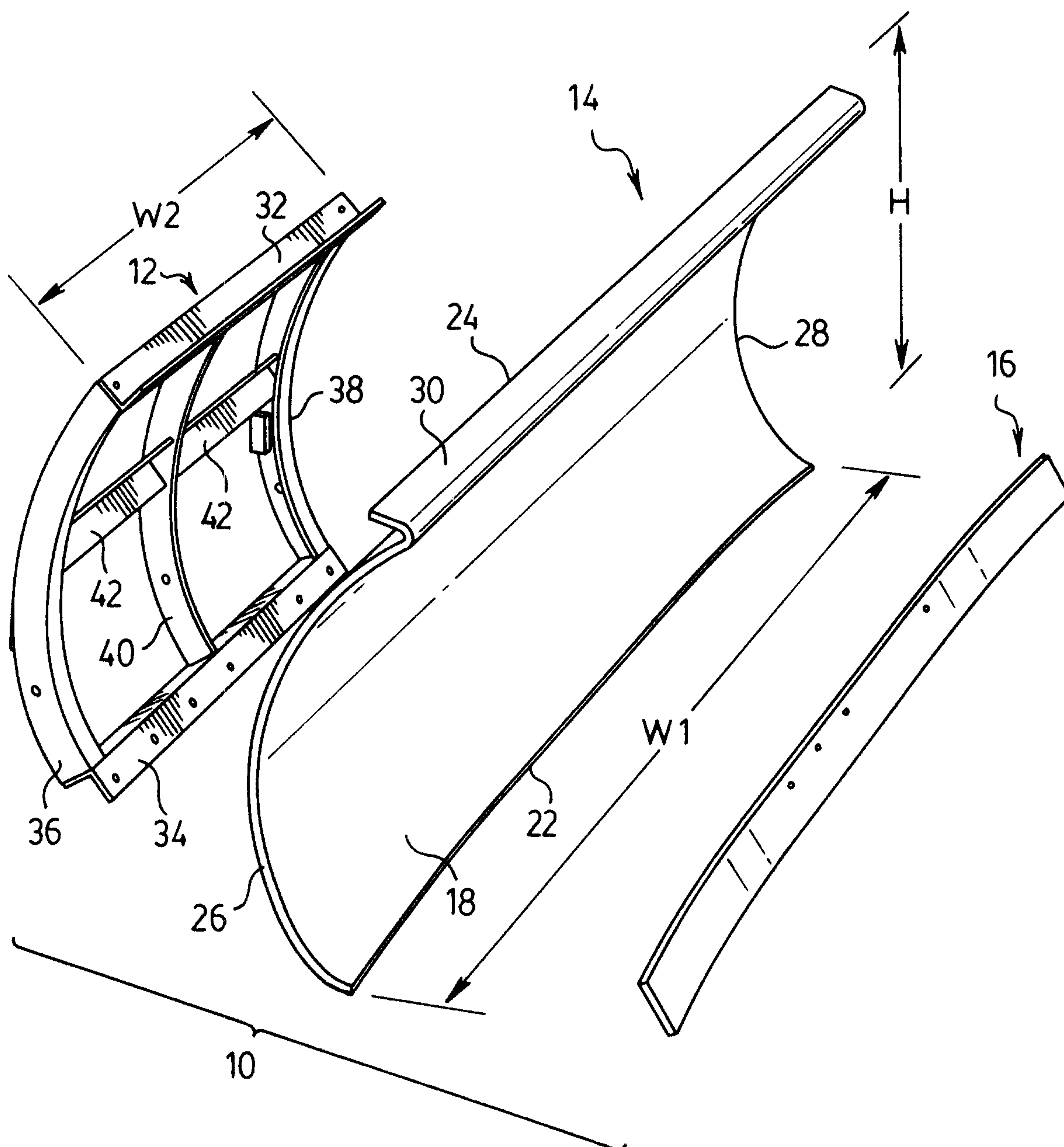
the mouldboard has an upper edge and a lower edge;

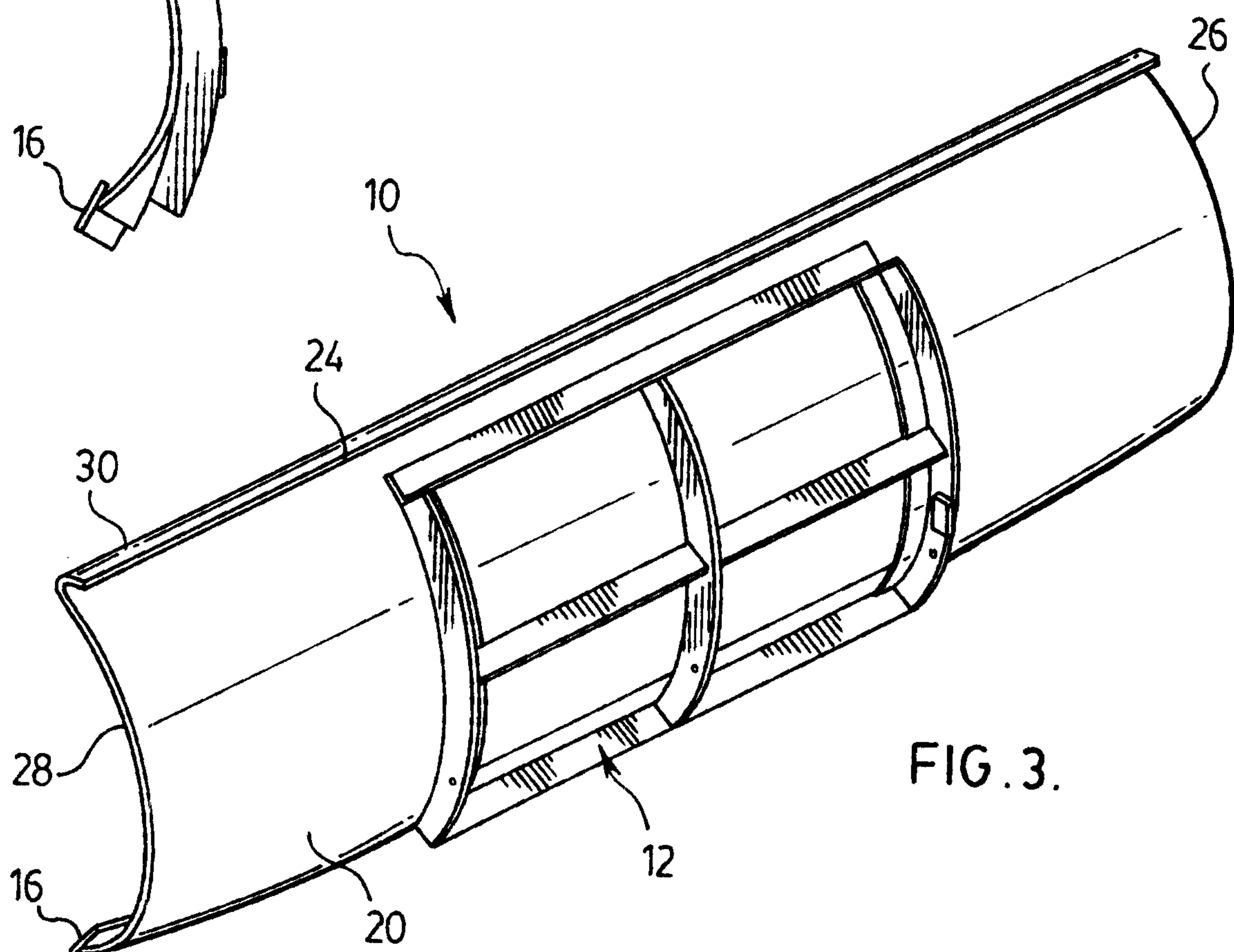
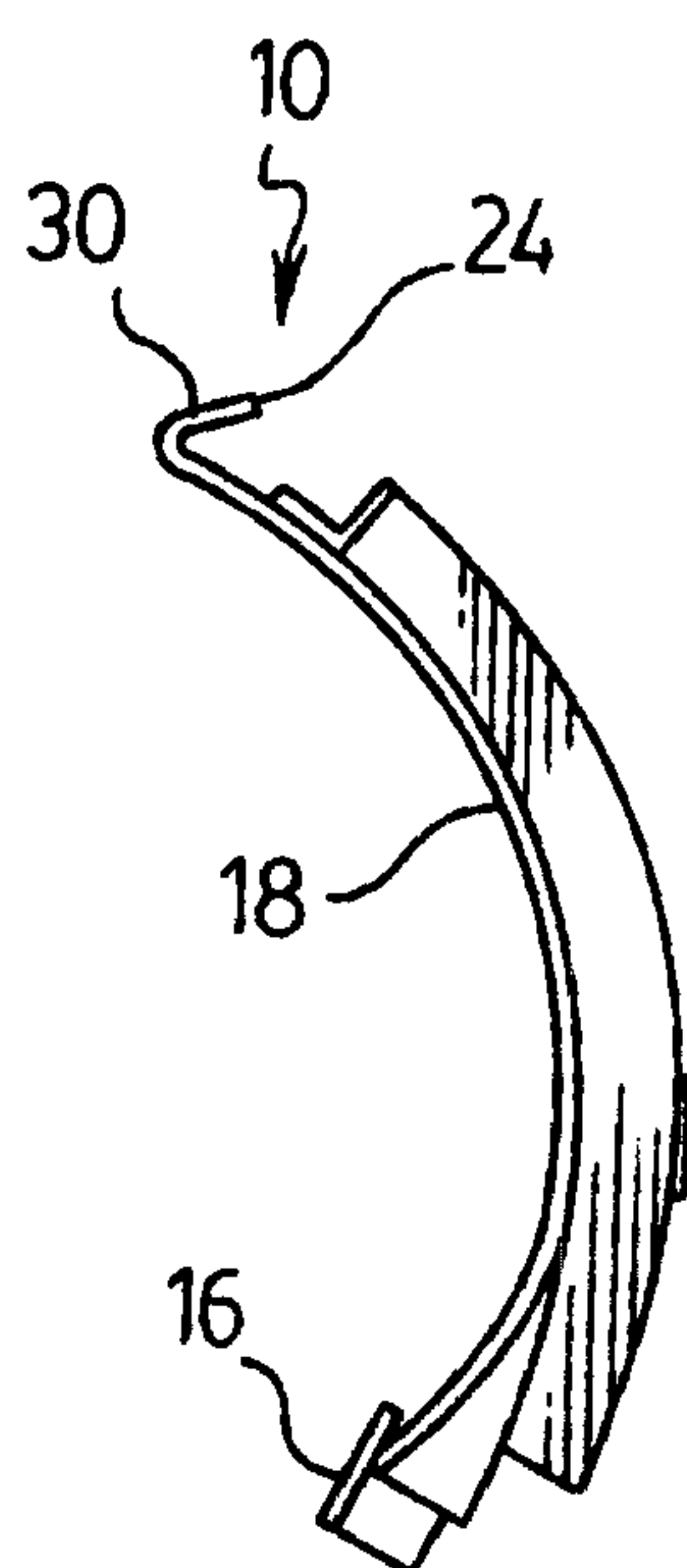
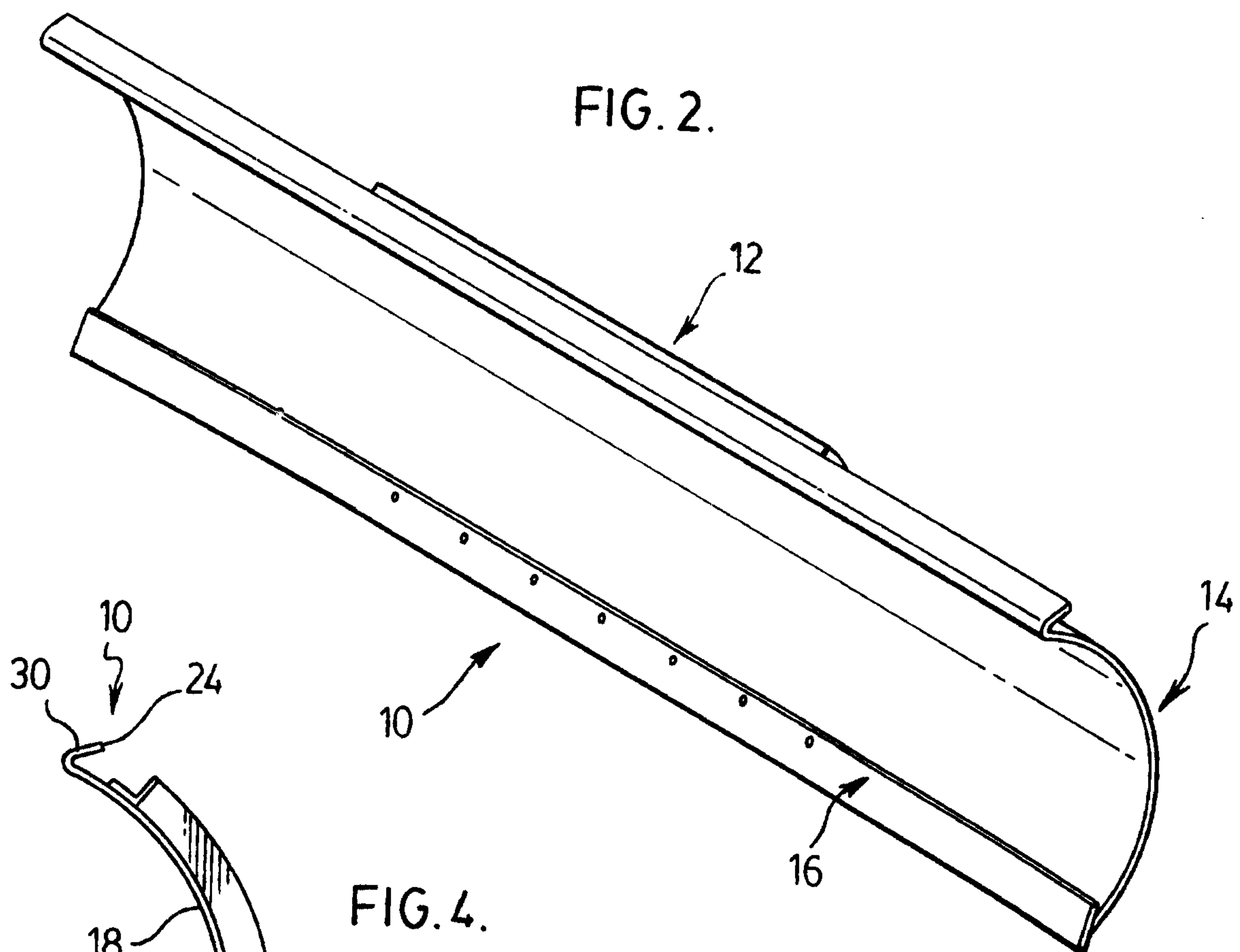
each of the right side and left side portions of the mouldboard have outer lateral edges;

the resiliency of the moldboard is greatest at the juncture of the outer lateral edge of the right side portion of the mouldboard and the lower edge of the mouldboard.

14. The snowplow of claim 1 wherein each of the right side and left side portions of the scraper blade are angled upwardly relative to the central portion of the scraper blade.

FIG. 1.





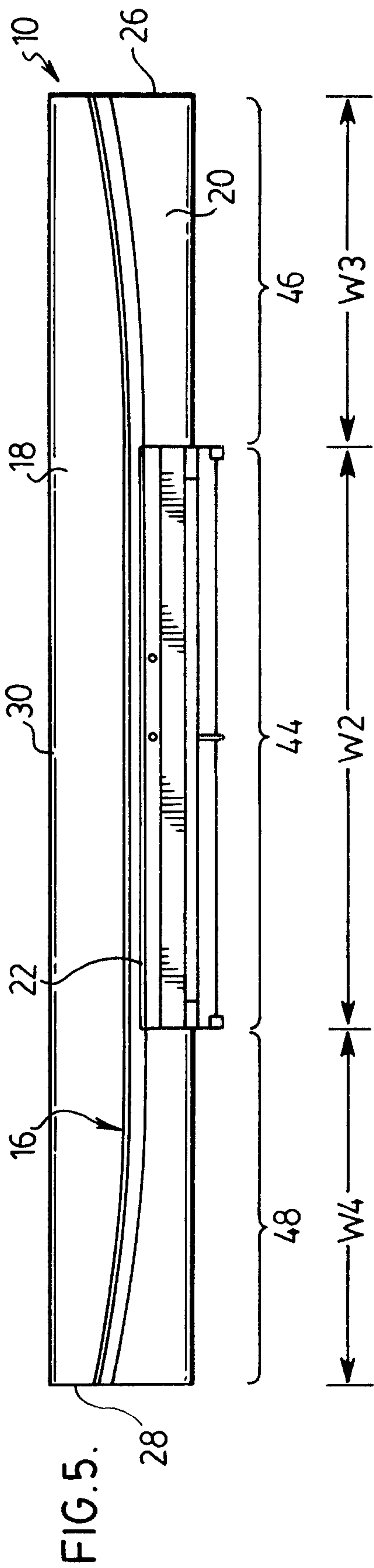
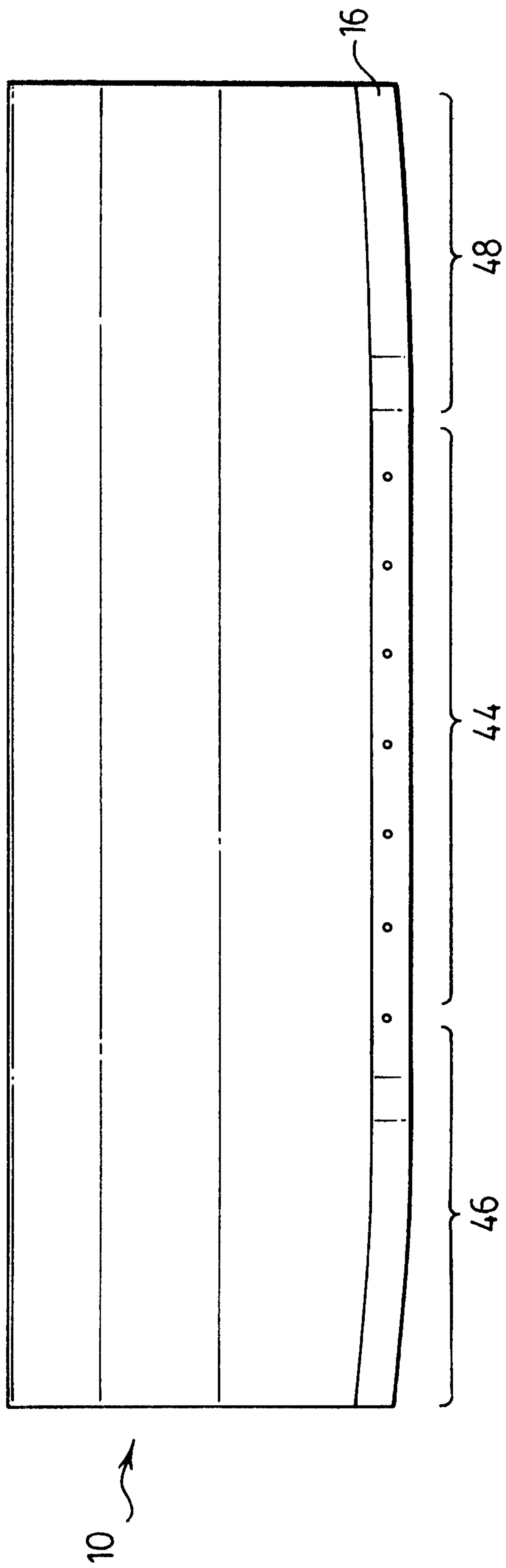


FIG. 6.



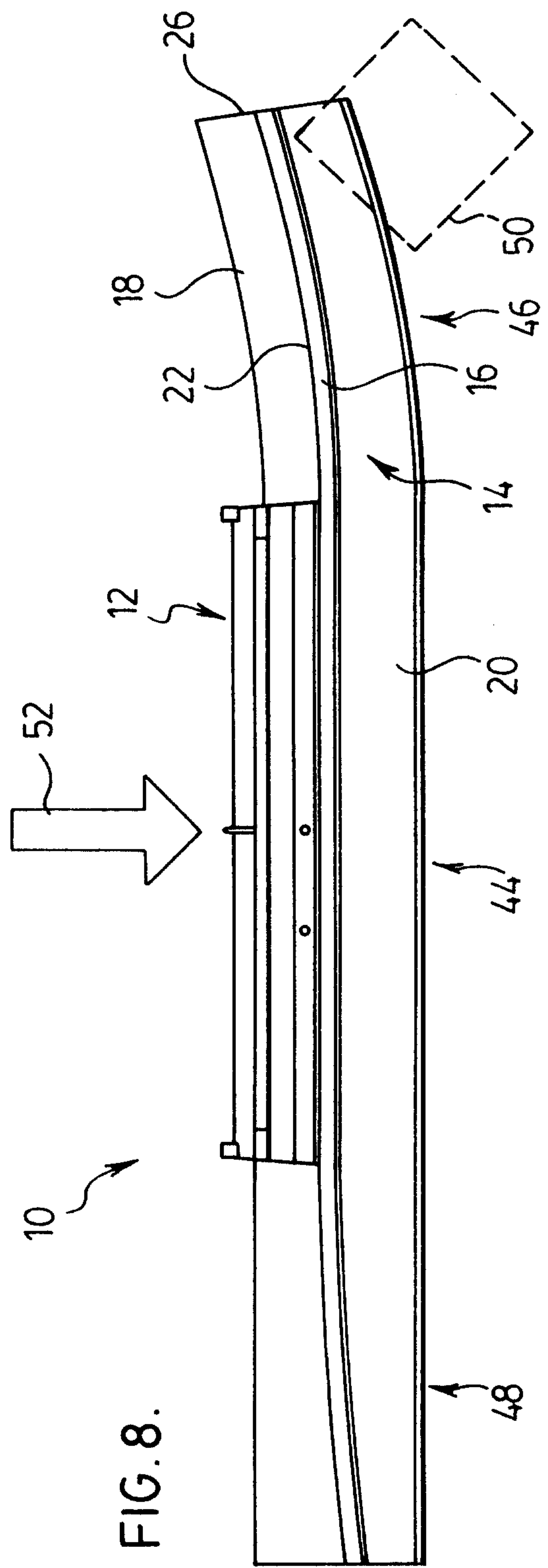
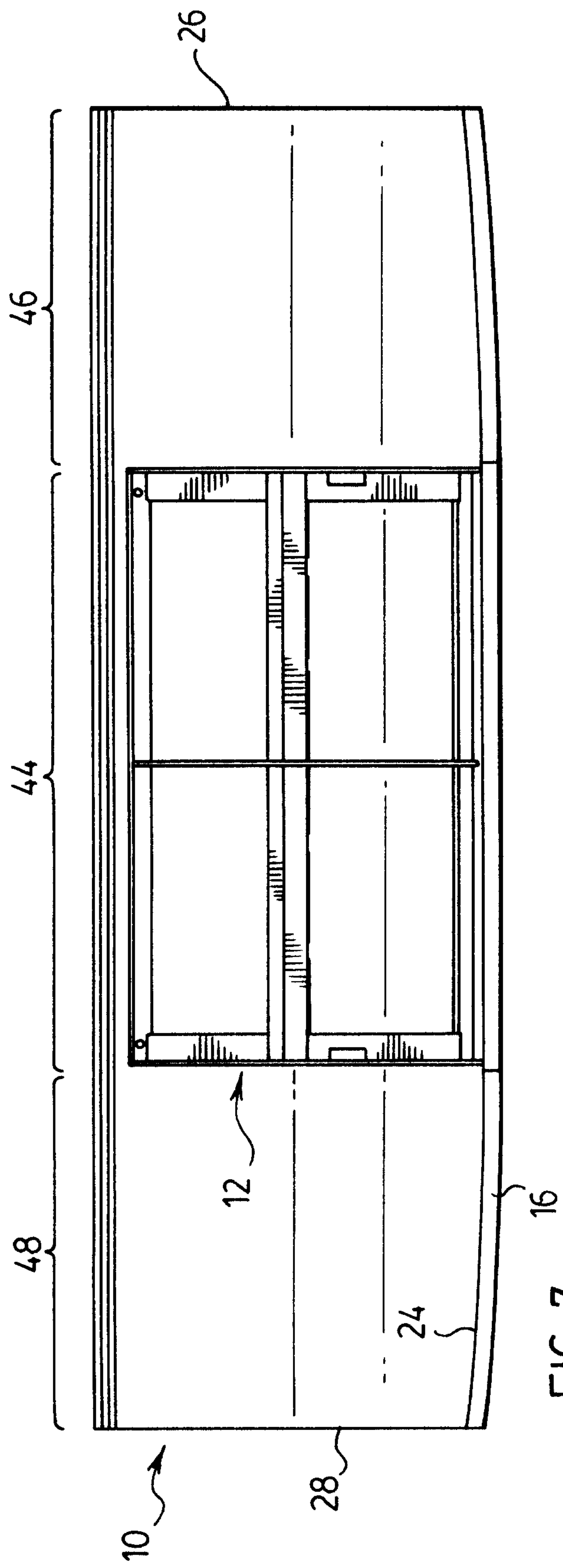


FIG. 9.

