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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :		(11) International Publication Number: WO 90/07168
G08B 1/00	A1	(43) International Publication Date: 28 June 1990 (28.06.90)

(21) International Application Number: PCT/US89/05779

(22) International Filing Date: 14 December 1989 (14.12.89)

(30) Priority data:
284,127 14 December 1988 (14.12.88) US
429,857 31 October 1989 (31.10.89) US

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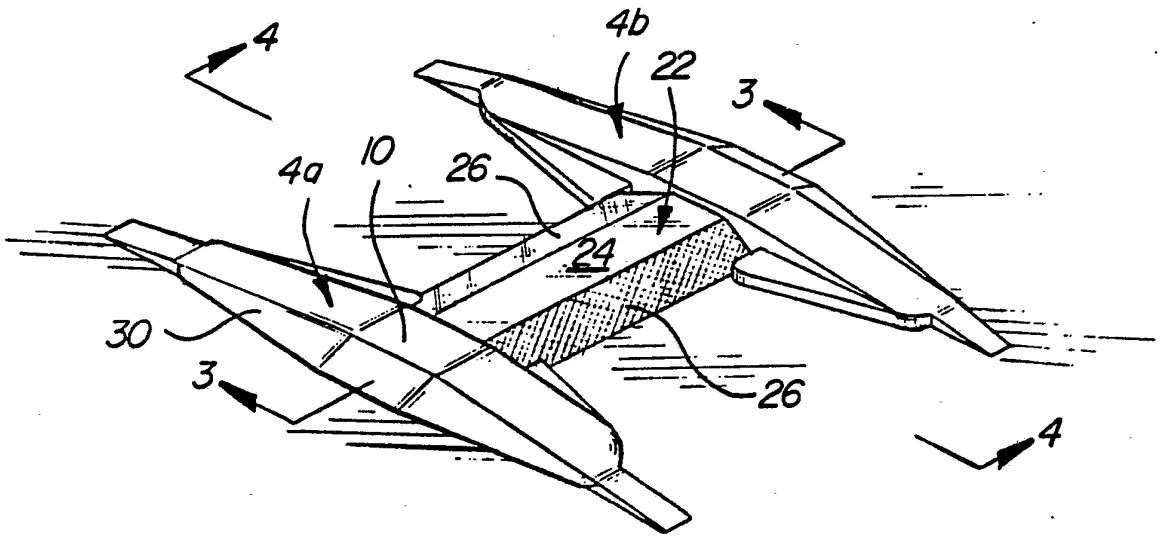
(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), LU (European patent), NL (European patent), SE (European patent).

Published
With international search report.

(54) Title: SNOWPLOWABLE GUARD MEMBERS FOR ROADWAY SIGNAL REFLECTORS



(57) Abstract

A snowplowable guard member (4) having a ramp section (6) with a depending keel (8). The ramp section (6) includes a raised mid-portion (10) with inclined ramps (12) extending downwardly to the pavement surface (S) in opposite directions. The guard member's locating means (18) engages a reflective signal (24) and an outwardly, downwardly inclined side member (30). The guard members (4) are mounted in spaced, parallel relationship with keels (8) located in slots in the pavement (S). The reflective pavement marker (24) mounts between two guard members (4). The guard member's locating means (18) engages the signal (24) between the raised mid-portion (10). The pavement marker's height above the pavement surface(s) is less than the guard member's raised mid-portions (10). Thus, the snowplowable blades are guided over the ramp without contacting the signal (24).

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SNOWPLOWABLE GUARD MEMBERS FOR ROADWAY SIGNAL REFLECTORS

TECHNICAL FIELD

This invention relates generally to pavement markers and is particularly concerned with snowplowable pavement markers including reflective signal devices protected by snowplow ramps for guiding snowplow blades over the signal device without damaging it.

BACKGROUND ART

United States Patent Nos. 3,587,416 ('416) and 4,195,945 ('945) disclose examples of snowplowable pavement markers each consisting of a metal base member formed with snowplow ramps for guiding snowplow blades over a reflective signal device received between the ramps. Some of the problems associated with snowplowable pavement markers are discussed in these two patents. A particular problem is that of reducing the height of the ramps above the pavement to a minimum to reduce the impact of snowplow blades on the ramps. The reflective signal device must have a minimum height in order to perform its reflective function.

The reflective signal devices disclosed in the '416 and '945 patents are of the cube corner reflex reflector-type, as disclosed in expired U.S. Patent Nos. 3,332,327 and 3,409,344, for example. This type of signal device has an array of cube corner reflective elements formed on the inner surface of each reflective face of the signal device. The reflective power depends on the surface area of the reflective face, and hence that of the array of cube corner reflectors.

In the '416 patent, the signal device is supported on a horizontal support surface that extends between the ramps and has a flat bottom surface which, as shown in the patent, is supported on the top of the pavement. The metal base member of the '945 patent has a horizontal support surface with a curved bottom surface that can be received in a complementary recess cut out of the pavement surface by the pavement cutting apparatus disclosed in the '945 patent. By cutting a curved recess in the pavement for receiving the complementarily curved bottom surface of the support member, the lower portion of the reflective face of the signal device is lowered to the level of the pavement surface when the base member is installed. If the base member is improperly

installed, or is installed on an asphalt surface or the like, it may become pressed deeper into the roadway through use. As a result, the lower rows of reflective elements will be disposed below the pavement surface and thus rendered wholly or partially optically ineffective. This reduces the reflectivity, and hence, the effectiveness, of the signal device.

DISCLOSURE OF THE INVENTION

A snowplowable pavement marker according to the present invention includes a pair of separate guard members, each having a snowplow ramp section with a depending keel. The keel of each guard member is received in one of two parallel slots formed in the pavement. A reflective signal device is mounted on the pavement surface between the two guard members. Each of the guard members is formed with locating means for positioning the signal device on the pavement surface between raised mid-portions of the guard members. The height of the signal device above the pavement surface is less than the height of the raised mid-portions of the guard members. The guard members are formed with oppositely extending ramps that are inclined from the mid-

portions downwardly to the pavement surface. Snowplow blades are guided over the raised mid-portions of the guard members without engaging the signal device.

The signal device is supported directly on the pavement surface, which is undisturbed between the guide members. The height of the signal device does not have to accommodate the thickness of a support member such as that shown in the '416 and '945 patent. Since the two guard members are unconnected with each other, the two can accommodate signal devices of different lengths. By increasing the length of the signal device between the two guard rails, the height of the signal device can be lowered while maintaining the same surface area of its reflective face.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a snowplowable pavement marker assembly according to the preferred form of the invention installed on a roadway;

Figure 2 is a perspective view of one of the guard members;

Figure 3 is a sectional view taken on lines 3-3 of Figure 1;

Figure 4 is a sectional view taken on lines 4-4 of Figure 1;

Figure 5 is a perspective view, similar to Figure 1, of a second embodiment of slowplowable pavement marker assembly according to the invention installed on a roadway;

Figures 6 and 7 are a perspective view of a third form of guard member similar to the guard member of Figure 2 except that the top surface extends continuously to the distal end portions of the guard member; and

Figure 8 and 9 are perspective views of still another form of guard member which are the type shown installed in the roadway in Figure 5.

DESCRIPTION OF THE BEST MODE OF CARRYING OUT THE INVENTION

In Figure 2, reference numeral 4 collectively designates a guard member which is illustrated in the form of an integral metal casting. The guard member 4 has a snowplow ramp section indicated generally by reference numeral 6 and a depending keel portion 8.

The ramp section 6 includes a raised mid-portion 10 with a pair of inclined ramps 12 extending in opposite direction from opposite ends of the mid-portion 10.

The ramp section 6 has a vertical, inner side wall 16. A pair of triangular locating members 18 project from the inner side wall 16. The locating members 18 have opposed locating edges 20 that function to position and locate a signal device between two of the guard members in the manner described below.

The keel 8 has a curved bottom edge 21 interrupted by a series of notches 23. A pair of holes 25 are formed in the keel and are spaced along its length. The opposite end portions of the keel 8 project beyond the ends of the ramps 12, and each has an upper edge 27 that is inclined downwardly at an acute angle with respect to the ramp 12 (see particularly Figure 4).

The ramp section 6 is formed with outer inclined side wall portions 30 and 32 extending from the outer edges of the ramps 12 and mid-portion 10, respectively. The bottom

surface of the side wall portions 30 and 32 lies in the same plane as the bottom surfaces of the locating members 18 and inner side wall 16 as shown particularly in Figure 3.

A transverse axis X-X and fore and aft axis Y-Y are shown in phantom lines in Figure 2. The guard member 10 is symmetrical with respect to the transverse axis X-X. Consequently, each can be used interchangeably in an opposed left hand or right hand relationship with respect to another identical guard member.

Figures 1-3 illustrate a snowplowable pavement marker assembly (made up of two of the guard members and a reflective signal device) installed on a paved roadway R. A pair of longitudinally extending pavement slots t are formed in the pavement surface S. Each of the slots t receives one of the keels 8 of a guard member 4. In Figures 1, 3 and 4, the two separate guard members are indicated collectively by reference numerals 4a and 4b. The bottom surfaces of the inner side wall 16, locating members 18, and outer side wall members 30 and 32 engage the surface S of the roadway R. The slots t are filled with an adhesive material 35 which may be of an epoxy resin, or the like. The epoxy resin fills the

openings 25 formed in the keels 8 to provide a mechanical interlock between the keels and the resin. The notches 23 also provide a mechanical interlock between the resin and the keels 8. The downwardly inclined upper surfaces 27 of the end portions 24 of the keel project into the slots t and are covered with the epoxy resin up to the level of the roadway surface S.

Mounted on the pavement surface S between the guard members 4a and 4b is a signal device indicated collectively by reference numeral 22. The signal device has a top surface 24 and a pair of reflective faces 26 extending downwardly and outwardly from opposite edges of the top surface 24. The signal device 22 may be of the type disclosed in U.S. Patent Nos. 3,332,327; 3,409,344; 3,587,416 and 4,195,945. This type of signal device has an array of cube corner reflectors on the inner surface of the reflective faces 26. The invention is not, however, specifically limited to signal devices having cube corner reflective elements.

As illustrated in Figures 1, 3 and 4, the signal device 22 has its opposite ends received between the edges opposed locating edges 20 of the locating members 18. The

signal device 22 is adhesively secured to the pavement surface S in a conventional manner. The height of the top surface 24 above the pavement surface S is less than that of the height of the raised mid-portion 10 above the pavement surface S.

In some instances, it is necessary to limit the height of the pavement marker above the surface to less than 0.50 inches to meet certain state and federal regulations. An advantage of the utilization of the two separate guard members in the pavement marker assembly is that the length of the signal device 22 along the transverse axis X-X can be varied. Increasing the length permits a reduction in the height of the top surface 24 above the pavement surface S while maintaining the same surface area of the reflective faces 26.

Figures 5 illustrates a snowplowable pavement marker assembly (made up of two of the guard members and a reflective signal device) installed on a paved roadway. In Figures 6 and 7, two separate guard members are indicated collectively by reference numerals 104a and 104b. The guard member 104a and 104b each have a snowplow ramp section 106

and a depending keel section 108. The bottom surfaces of the inner side wall 116, locating members 118, and outer side wall members 130 and 132 engage the surface of the roadway. The top surface 112 of the ramp section is continuous, in the same plane, to the lower, distal ends.

Mounted on the pavement surface between the guard members 104a and 104b is a signal device indicated collectively by reference numeral 122. The signal device has a top surface 124 and a pair of reflective faces 126 extending downwardly and outwardly from opposite edges of the top surface 124. The signal device 122 may be of the type disclosed in U.S. Patent Nos. 3,332,327; 3,409,344; 3,587,416 and 4,195,945.

As illustrated in Figure 5, the signal device 122 has its opposite ends received between the opposed locating edges 120 of the locating members 118. The height of the top surface 124 above the pavement surface is less than that of the height of the raised mid-portion 110 above the pavement surface.

The guard members 204a and 204b of Figures 8 and 9 are identical to Figure 6 and 7 except the locating members 218 are in the form of semi-circular lugs and ears.

Specific forms of the invention are illustrated in the accompanying drawings and described in the foregoing specification. However, it should be understood that the invention is not limited to the exact construction shown. Alternatives in the construction, configuration and arrangement of the components, all falling within the scope and spirit of the invention, will be apparent to those skilled in the art.

CLAIMS

1. In combination with a paved roadway surface having a pair of laterally spaced, parallel slots formed therein;

a pair of guard members each having a snowplow ramp section with a depending keel received in a respective one of the pavement slots;

said ramp section including a raised mid-portion with a pair of downwardly inclined ramps extending in opposite directions from the mid-portion to the pavement surface;

signal device locating means projecting laterally from said ramp section, said locating means having a bottom surface engaged with the pavement surface with the locating means of each guard member being in opposed relationship with the other; and

a reflective signal device mounted on the pavement surface between said guard members, each said locating means engaging opposite ends of the signal device to position the signal device between the raised mid-portions of the two guard members, the height of said signal device above the

pavement surface being less than that of said raised mid-portions so that snowplow blades can ride over said ramps without engaging the signal device.

2. A combination as claimed in claim 1 wherein each of said keels has end portions projecting beyond the lower ends of said ramp, said end portions having a top surface that extends downwardly at an acute angle with respect to said ramps.

3. A combination as claimed in either of claims 1 or 2 including an adhesive material filling each of said pavement slots, and a plurality of spaced holes in said keel that are filled with adhesive material to provide a mechanical interlock.

4. A combination as claimed in claims 1, 2 or 3 wherein said ramp section has an inner vertical side wall and said locating members project inwardly therefrom with spaced, opposed end edges for engaging said signal device.

5. A combination as claimed in claim 4 wherein said ramp section includes outer wall portions extending outwardly and downwardly from the outer edges of said ramps and said mid-portion;

said outer side wall portions each having a bottom surface seated on the pavement surface.

6. A snowplow guard member for pavement markers, said guard member including a ramp section with a depending keel, both extending parallel to each other and to a fore and aft axis;

said ramp section including a raised mid-portion and a pair of ramps extending in opposite directions therefrom, said ramp being inclined at an acute angle downwardly and outwardly from opposite ends of said mid-portion;

said keel having end portions projecting beyond the distal ends of said ramp, each of said keel end portions having a top surface extending outwardly from the ends of one said ramps and extending downwardly and outwardly from said distal ends at an acute angle with respect to said ramp;

said ramp having a vertical inner side wall, and a pair of spaced signal device locating members projecting inwardly from said inner wall.

7. A guard member as claimed in claim 6 further including outer side wall portions projecting downwardly and outwardly from the outer edges from said ramps and said mid-portion, said outer wall portion having a bottom surface lying in the same plane as the bottom surface of said locating member.

8. A guard member as claimed in claim 7 wherein said keel has a curved bottom edge with a series of notches formed therein.

9. A guard member as claimed in claim 8 further including at least a pair of holes spaced along the length of the keel.

10. A snowplowable pavement marker kit comprising a pair of identical guard members and a reflective signal device having a top surface and a pair of reflective faces depending therefrom an acute angle;

each of said guard members having a ramp section and a depending keel, said ramp section having a raised mid-portion with a pair of ramps projecting from opposite ends of the mid-portion and extending outwardly and downwardly therefrom at an acute angle;

said keel having opposite end portions, each projecting outwardly from the distal end of the adjacent ramp, said end portion having a top surface that projects downwardly at an acute angle from the distal end of the ramp;

said ramp section having an inner wall and a pair of signal device locating members projecting from said inner wall for engaging said signal device adjacent its opposite end to locate the signal device between the raised mid-portion of the ramp sections when the guard members are installed in the pavement.

FIG. 1

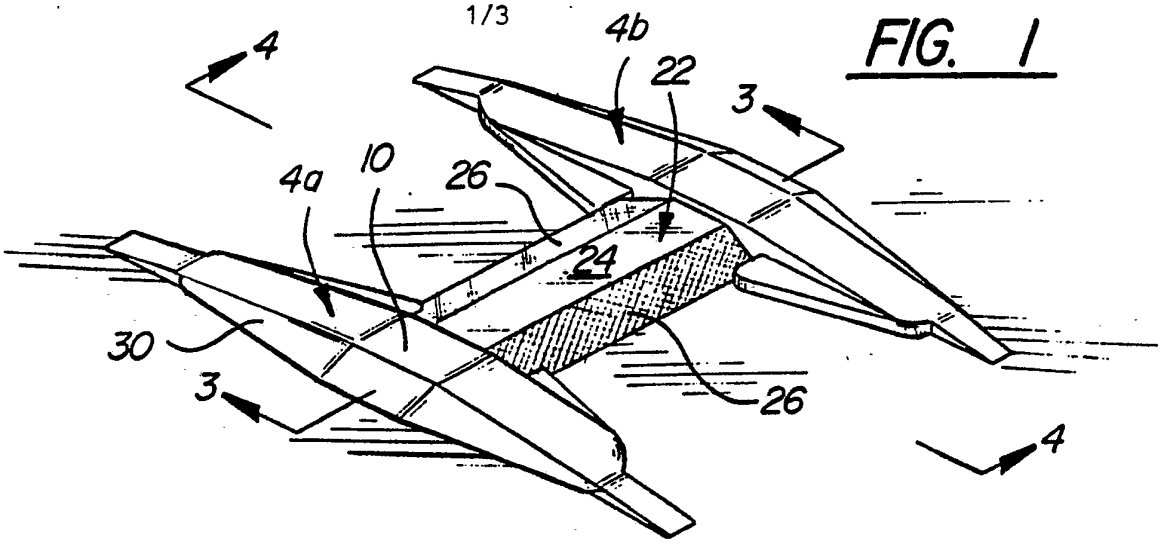


FIG. 2

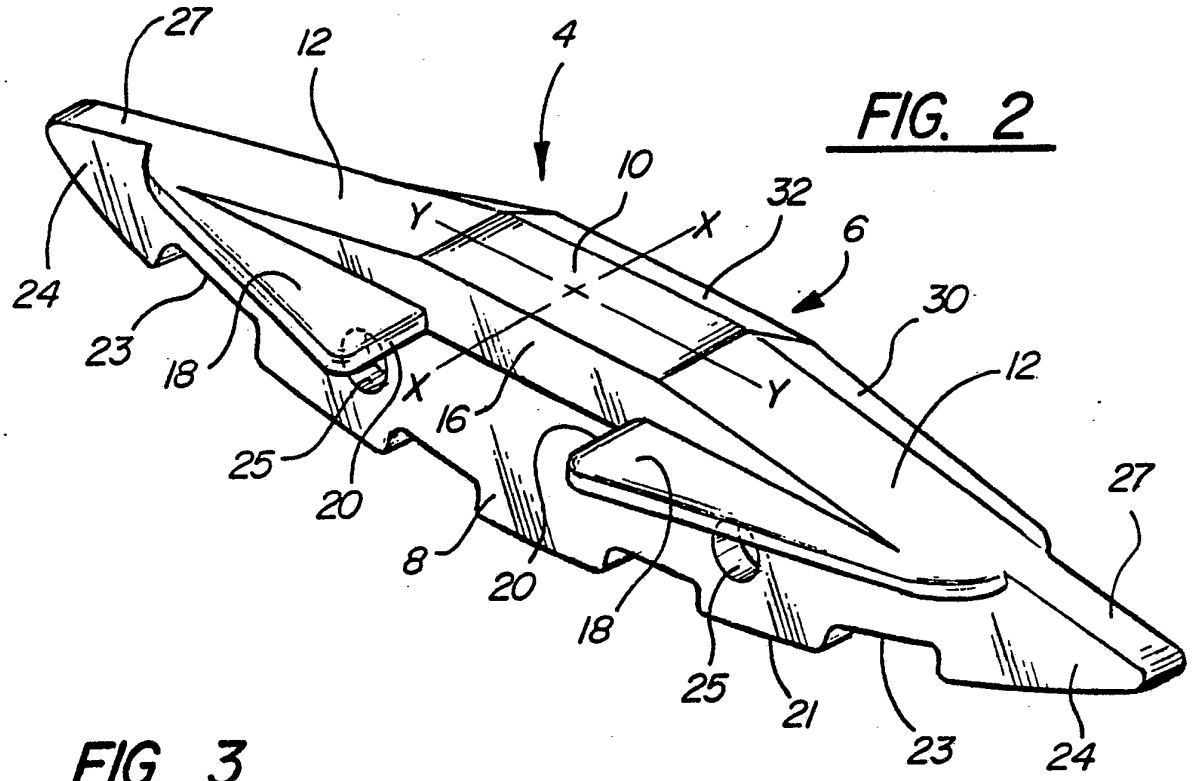
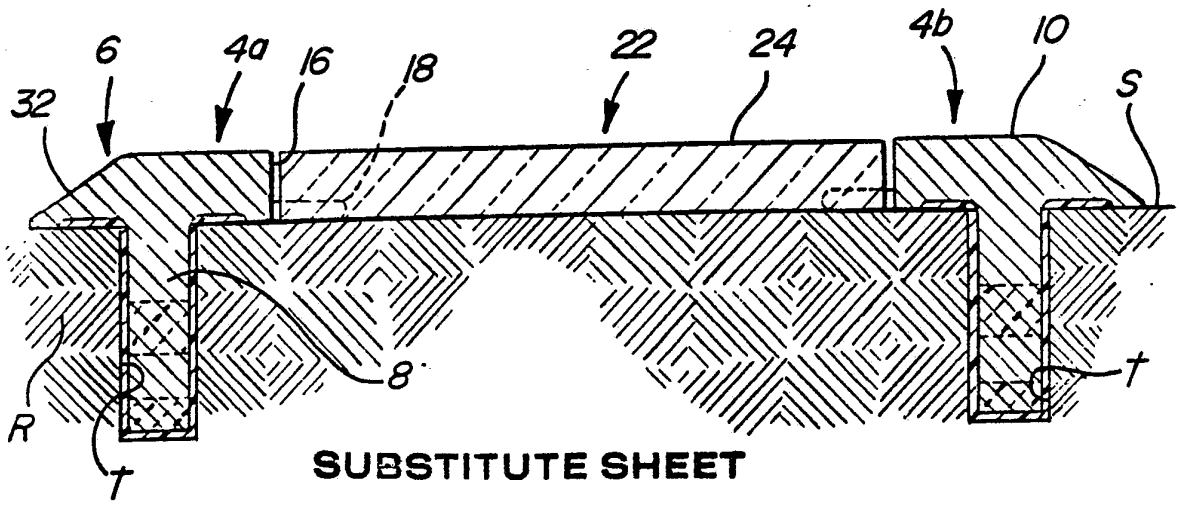


FIG. 3



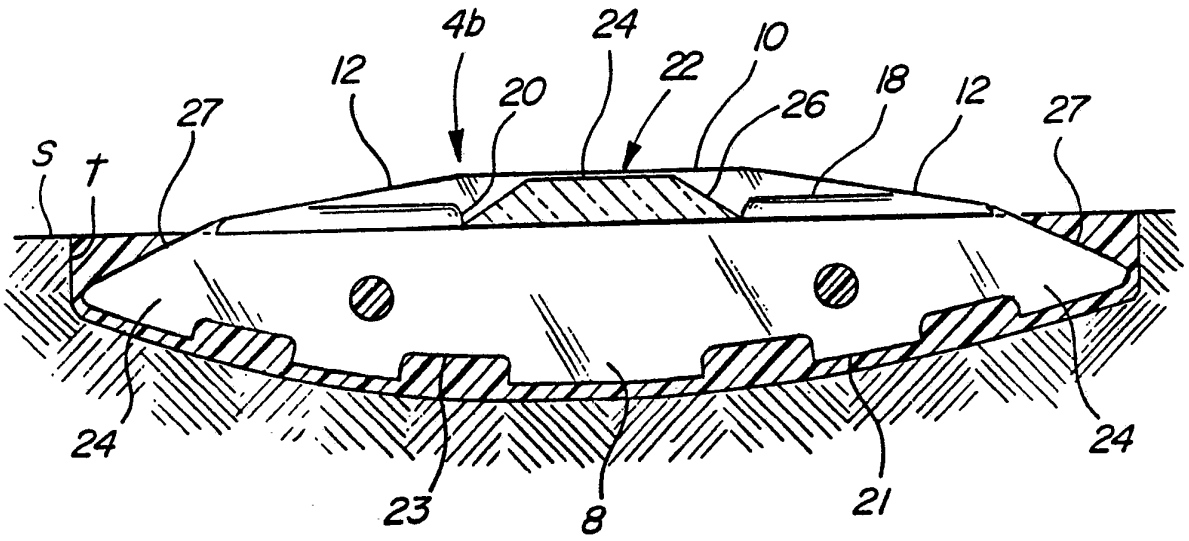


FIG. 4

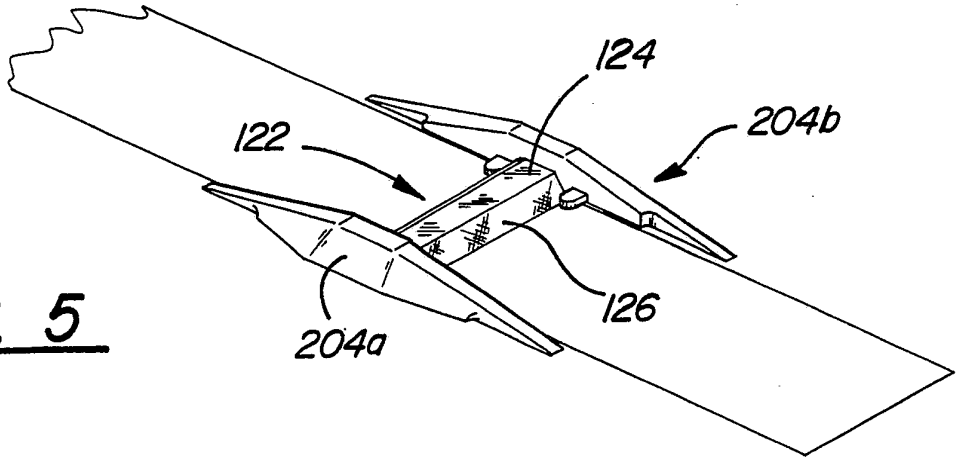


FIG. 5

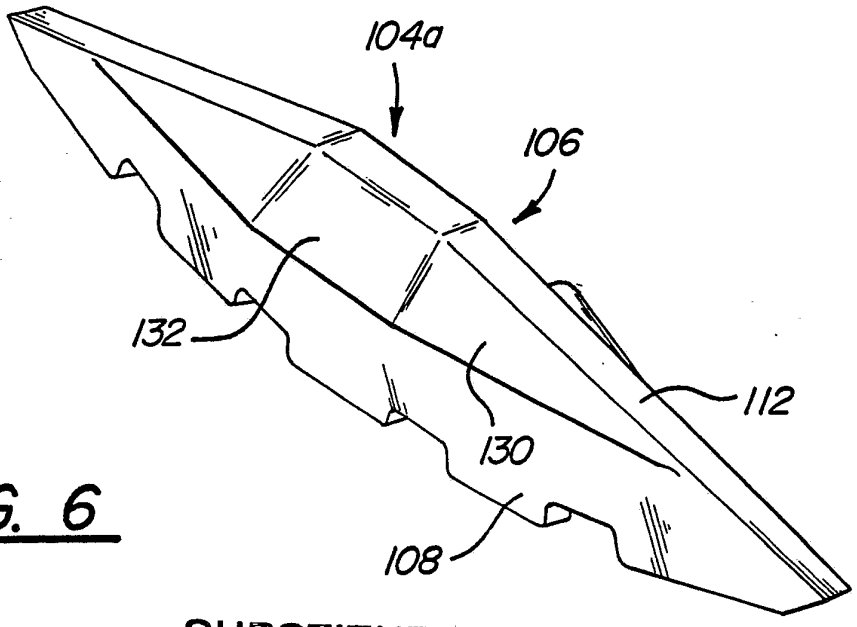


FIG. 6

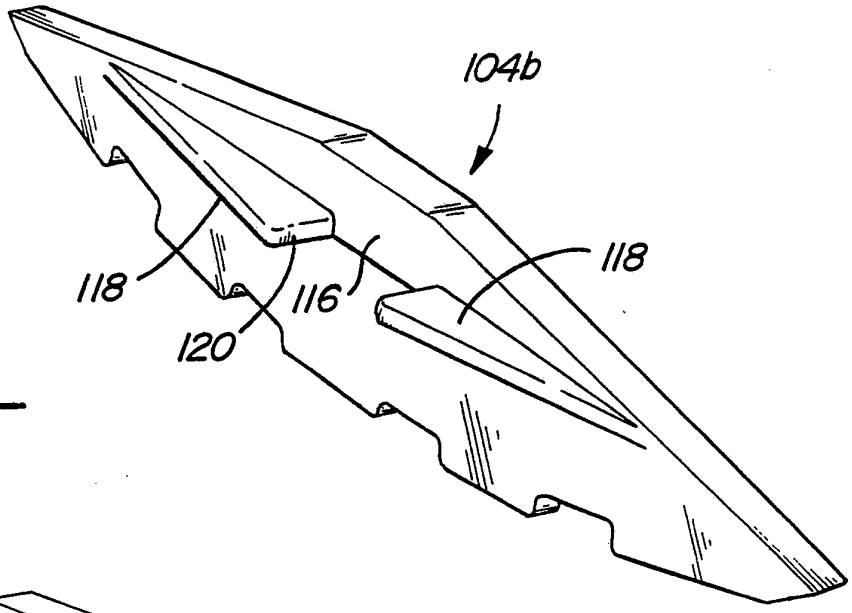


FIG. 7

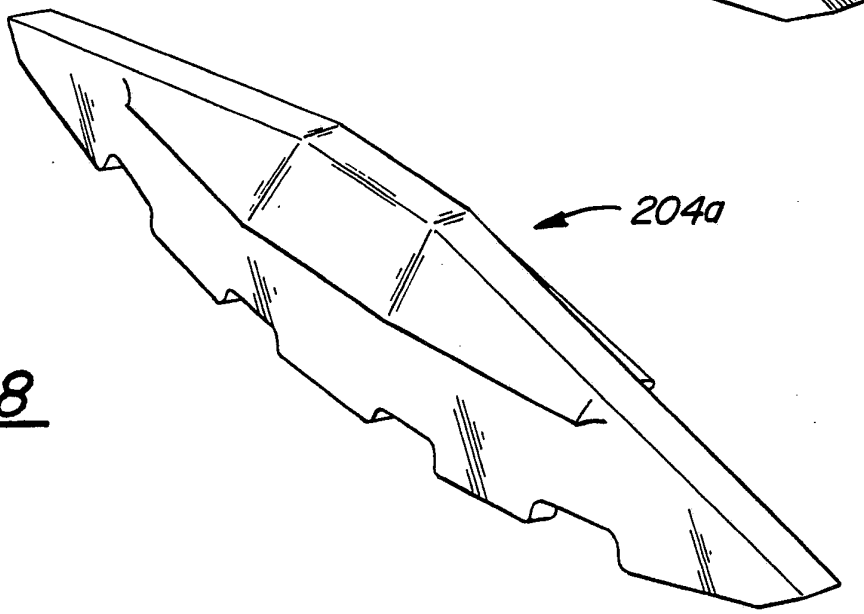


FIG. 8

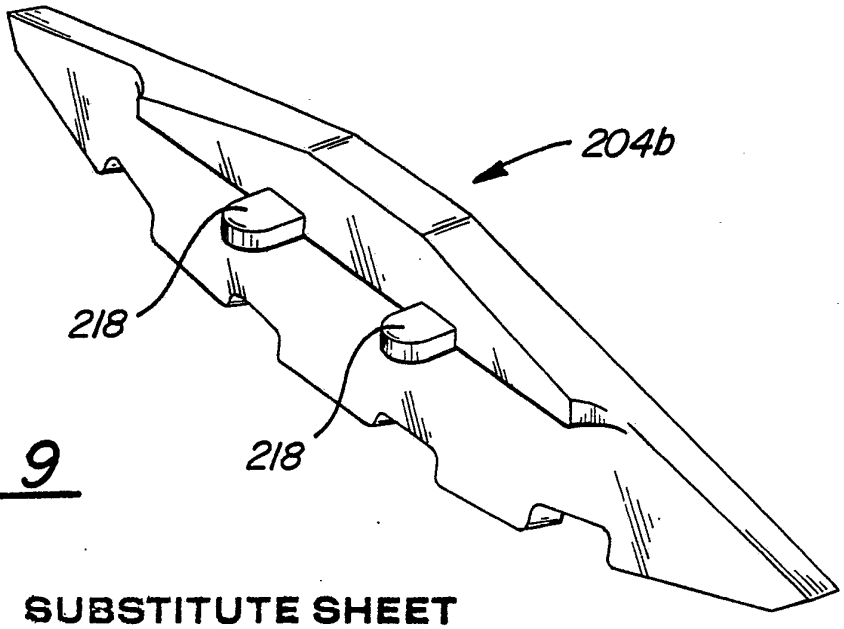


FIG. 9

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US89/05779

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC(5) G08B 1/00
U.S. Cl. 404/14

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
U.S. Cl.	404/12, 14, 15, 16

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	US, A, 3,485,148 HEENAN 23 December 1969	1-10
A	US, A, 4,208,090 HEENAN 17 June 1980	1-10
A	US, A, 4,428,320 OPLT ET AL. 31 January 1984	1-10
A	US, A, 4,557,624 WALKER 10 December 1985	1-10
A	US, A, 4,624,601 QUITTNER 25 November 1986	1-10

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"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
16 February 1990	13 MAR 1990
International Searching Authority	**Signature of Authorized Officer**
ISA/US	Gay Ann Spahn

Form PCT/ISA/210 (second sheet) (Rev.11-87)