United States Patent [19]

Koch

[11] **3,866,773**

[45] **Feb. 18, 1975**

[54] **METHOD OF FENDING COLLISIONS**

[75] Inventor: **Terry David Koch,** Telford, Pa.

[73] Assignee: **Inno-Cept Corporation,** Ambler, Pa.

[22] Filed: **Oct. 16, 1972**

[21] Appl. No.: **297,949**

[52] **U.S. Cl.**..... **214/152,** 29/148.3, 37/DIG. 12, 172/801, 180/82 R, 214/85, 280/2, 280/150 F, 293/1, 293/62

[51] **Int. Cl.**..... **B60p 3/06,** B60r 19/02, B61f 19/04

[58] **Field of Search** ..... 172/801; 214/85, 152; 280/2, 150 R, 150 B, 150 F; 293/1, 62; 29/148.3; 37/DIG. 12; 180/82 R

[56] **References Cited**

UNITED STATES PATENTS

617,101	1/1899	Kelly	293/62
1,588,736	6/1926	Hornquist	293/62
2,002,832	5/1935	Robinson	293/62
2,443,611	6/1948	Ferguson	214/85
2,530,866	11/1950	Evans et al.	280/2 X
2,784,508	3/1957	Risk	172/801

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—Howard Beltran
Attorney, Agent, or Firm—James Albert Drobile

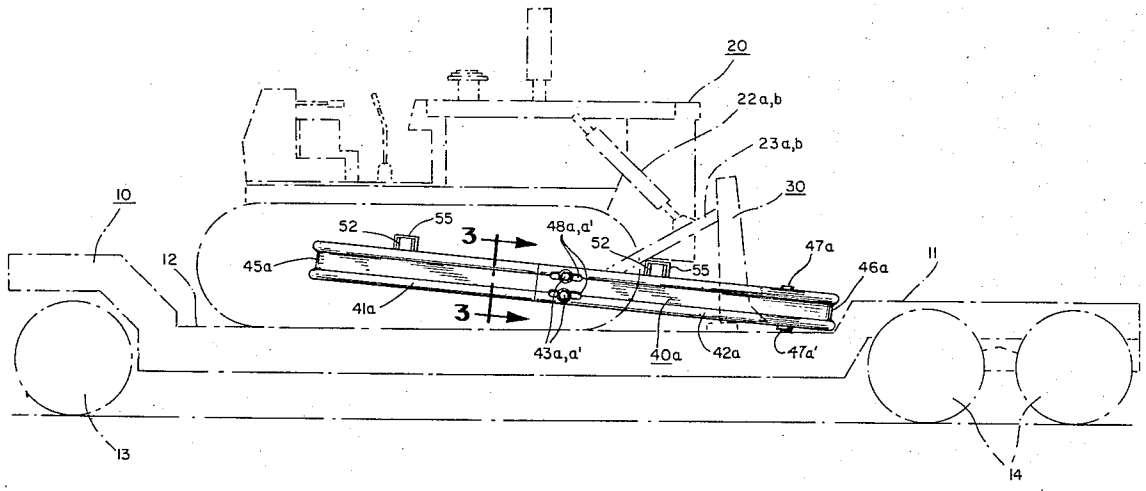
[57] **ABSTRACT**

Herein are disclosed a method and a device for substantially reducing or eliminating the risk of serious or fatal injury to motorists from a collision of a motor vehicle with a large bulldozer in transit upon the bed of an open trailer on a highway.

The method of the invention consists of equipping the bulldozer, during its transportation on the bed of the trailer, with a traffic protective device which prevents another motor vehicle, upon collision with the bulldozer-transporting trailer, from impinging directly against protrusions such as the protruding edge of the blade of said bulldozer.

The traffic protective device of the invention comprises a pair of longitudinally-extended, rigid guard members, each of which is mounted generally adjacent and parallel to the exterior side of one of the two opposing blade-lifting arm members pivotally connecting the blade with the main chassis of the bulldozer. The guard members are of such length and configuration that each extends inwardly at one end to partially enclose at least a portion of the adjacent vertical edge of the blade, and inwardly at the other end to partially enclose the extremity of the adjacent blade-lifting arm member. Each of the guard members preferably is removably mounted to the adjacent blade-lifting arm member through a plurality of separable connecting means.

4 Claims, 7 Drawing Figures



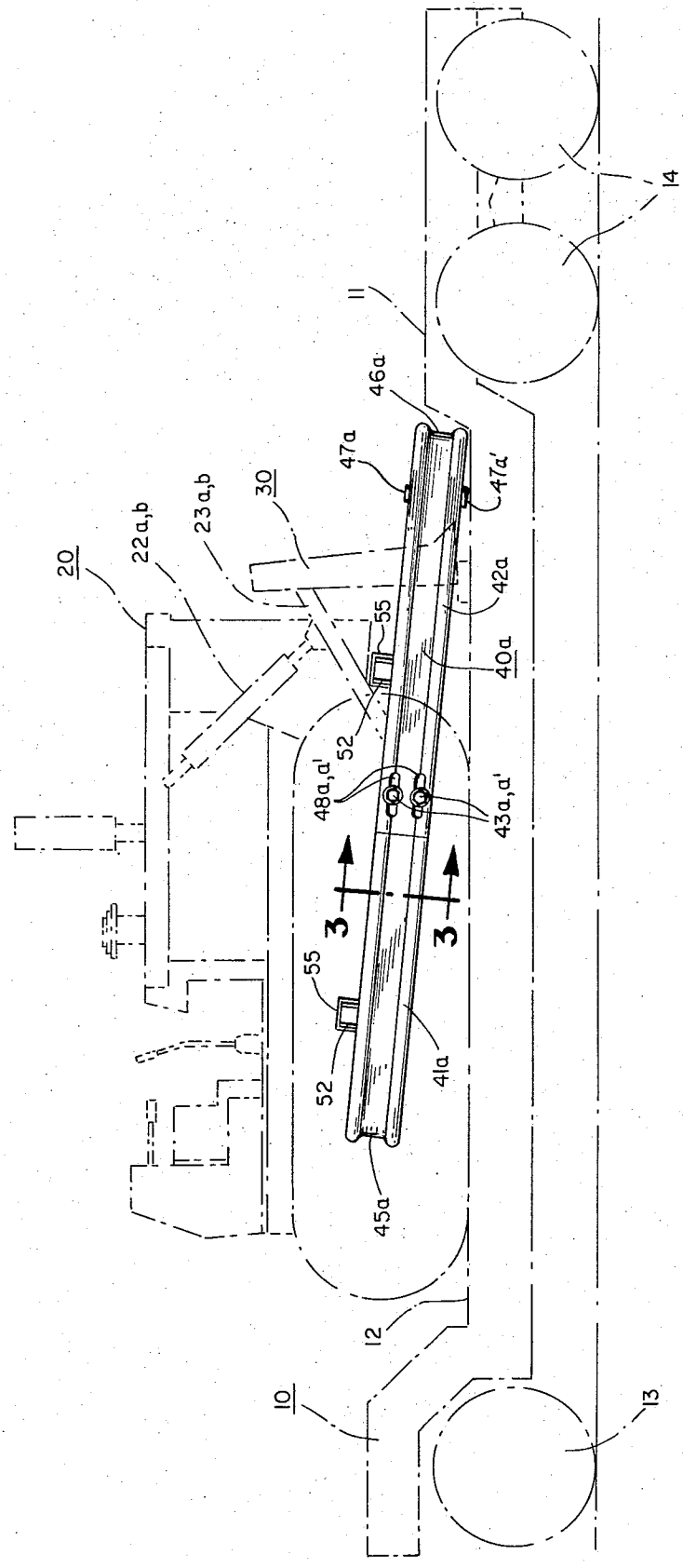

14
11
46a
47a
47a'
30
23a,b
22a,b
20
42a
55
40a
52
48a,a'
43a,a'
3
3
55
52
41a
45a
12
10
13

Fig. 1

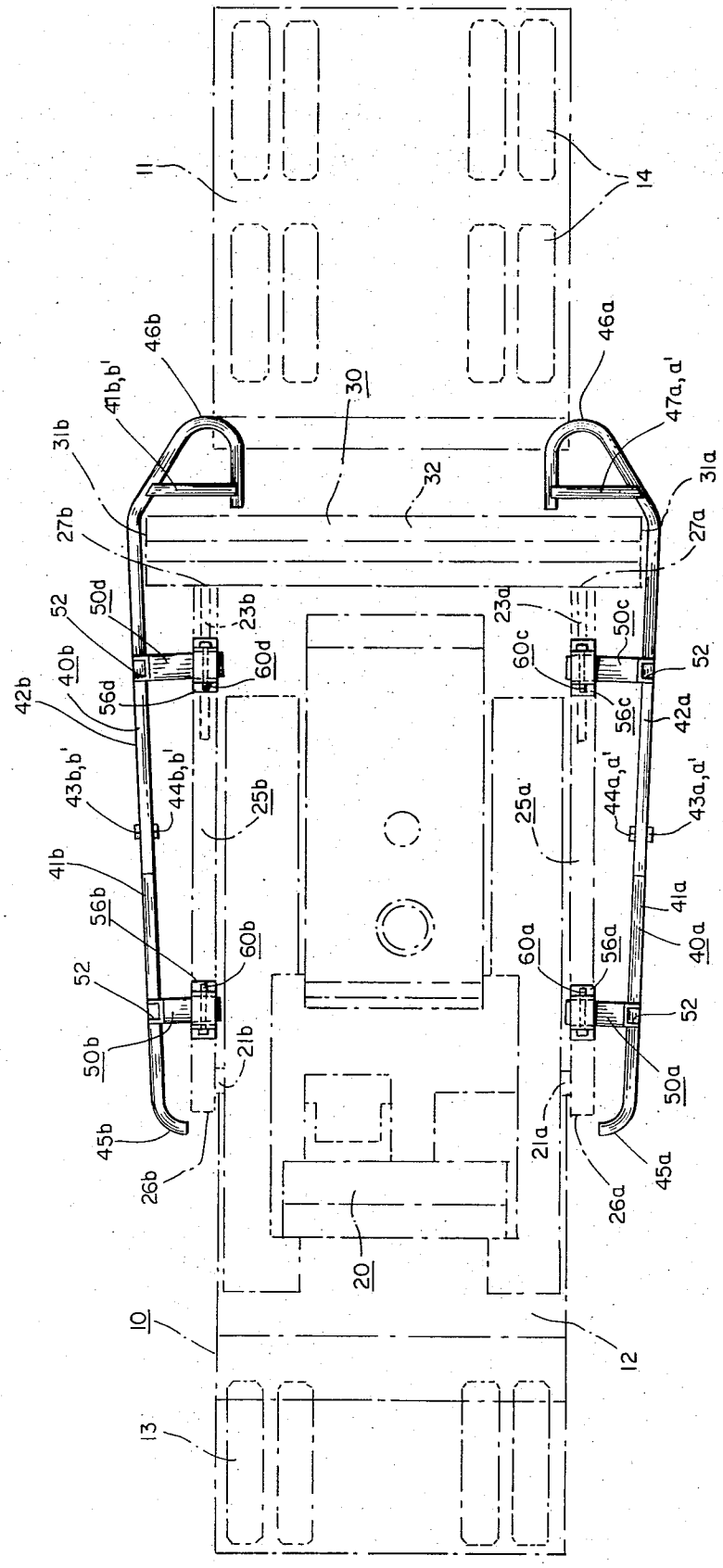

11
14
46b
46a
41b,b'
47a,a'
30
31b
32
31a
27b
27a
52
50d
23b
23a
50c
40b
60d
60c
52
42b
56d
56c
42a
43b,b'
44b,b'
25b
25a
44a,a'
43a,a'
41b
56b
41a
60b
60a
56a
40a
52
52
50b
21b
50a
45b
21a
45a
26b
26a
20
10
12
13

Fig. 2

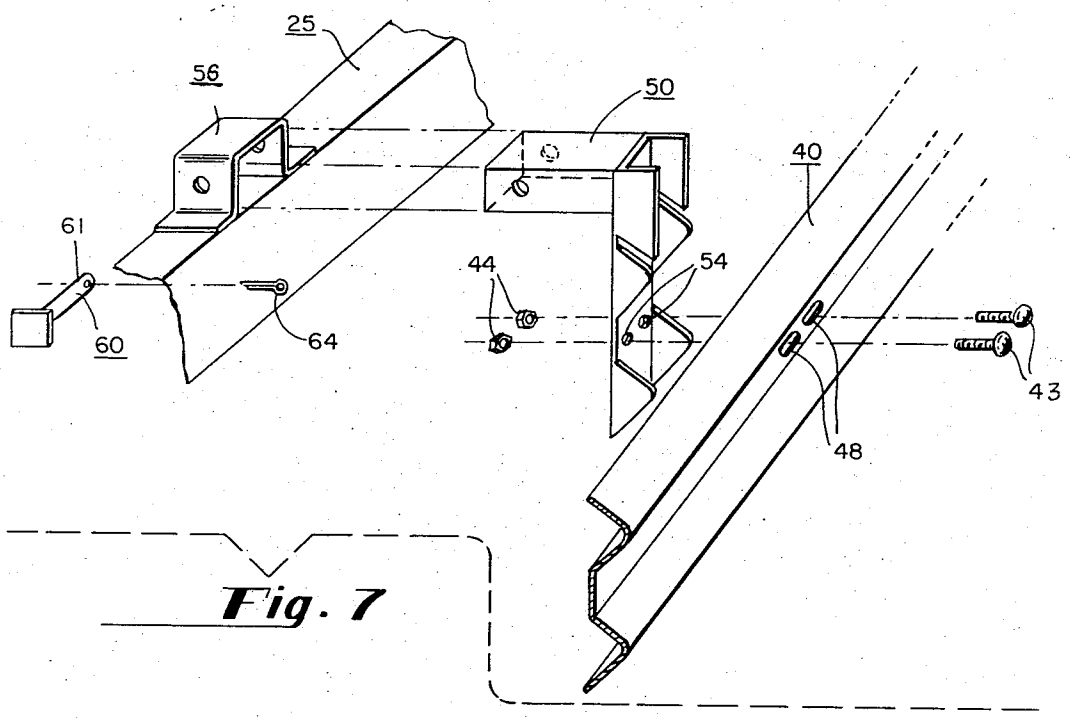
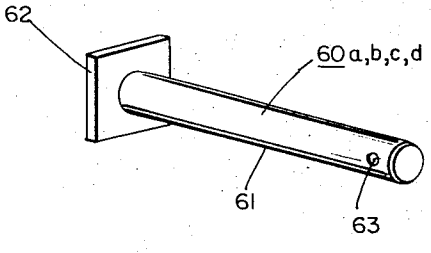


Fig. 7

Fig. 6



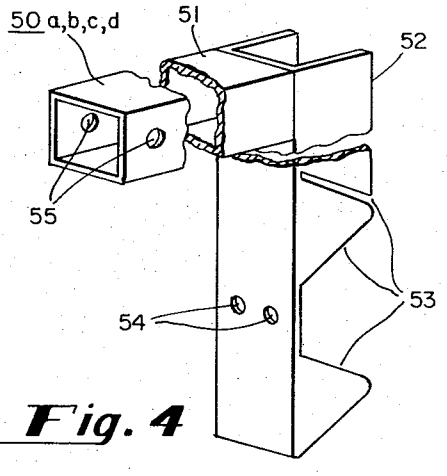


Fig. 4

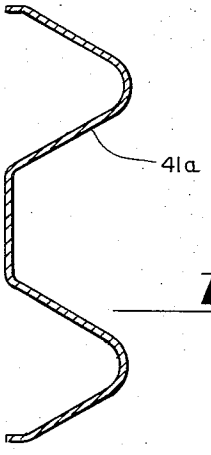


Fig. 3

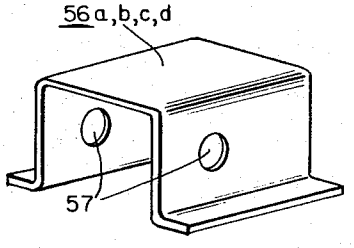


Fig. 5

METHOD OF FENDING COLLISIONS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the transportation of large earth-moving equipment, such as a bulldozer having a very wide blade of, say, ten feet or more, upon an open-sided trailer from one location to another via roadways. More particularly, the invention is directed to a protective device and method for preventing the serious or possibly fatal injuries which otherwise might be sustained by a motorist in a collision with a bulldozer-transporting trailer on the highway.

2. Description of the Prior Art

In construction projects it is common to utilize large earth-moving equipment, such as a bulldozer with a wide blade, to excavate, level or otherwise temporarily or permanently change the contour of the ground at the construction site. When needed, such a bulldozer typically is brought to the construction site by being transported over the highways upon a suitable vehicle, such as an open-sided, low-bed trailer, rather than under its own motive power.

The transportation upon such a trailer of a bulldozer having a blade width significantly in excess of the width of the trailer poses a risk of injury to the occupants of motor vehicles traversing the same roadway. Thus, there is a history of serious and sometimes fatal accidents involving the collision of a motor vehicle with the protruding edges of the bulldozer blade. The risk of fatality in such accidents is heightened by the dangerous configuration and orientation of the blade.

The obvious risks, and the history of serious accidents, incidental to the transportation of a large bulldozer on an open-sided trailer, have prompted some governmental agencies to establish stringent regulations governing such transportation, and to impose very substantial penalties for the violation of those regulations. For example, in some states it is mandatory, before a bulldozer having a blade in excess of a specified width, e.g., over ten feet, can be transported, that a permit be obtained and that the blade actually be removed in transit. This requirement that the blade be removed during transit and, consequently, that it be reassembled with the bulldozer at the job site, necessarily introduces very substantial additional costs which ultimately must be borne by the person on whose behalf the bulldozer is utilized. Thus, not only does the removal of the blade before transit necessitate added time, special equipment and additional manpower, but similar requirements are also involved at the construction site. Furthermore, the special equipment and additional personnel needed to position the blade properly with respect to the bulldozer chassis usually must be transported along with the bulldozer to accomplish the reassembly at the job site.

The above-mentioned precautions and regulations pertaining to the transport of a large bulldozer over the roadways, while clearly necessary for the safety of other motorists, do represent added costs which could be eliminated in the interests of economy if a safe method were available for the highway transportation of large bulldozers with blade intact. It is a primary object of this invention to provide a method and a device for the safe highway transportation of large bulldozers on trailers without the necessity of removing the bulldozer blades.

SUMMARY OF THE INVENTION

In accordance with the method of the present invention, a so-called large bulldozer (i.e., one having a blade whose width significantly exceeds that of the conventional trailer, e.g., a blade width of ten feet or more) is equipped for transit on the trailer with a specific protective device which eliminates or substantially reduces the risk that serious injuries will result from a collision of another motor vehicle with the bulldozer-transporting trailer.

The protective device of the invention is a bumper, fender or deflector, and comprises a pair of longitudinally-extended and very rigid guard members, each of which is of a length and configuration such that, when mounted on the side of the bulldozer in the appropriate position, it is adapted to at least partially enclose, and shield from direct impingement, dangerous protrusions such as the vertical edge of the bulldozer blade. Typically, the guard members are appropriately mounted, in opposing manner, generally parallel and adjacent to the blade-lifting arm members which pivotally connect the bulldozer blade with the main portion of the bulldozer chassis. When so positioned, one end of each guard member typically extends inwardly to enclose at least a portion of the adjacent vertical edge of the bulldozer blade, thus preventing another motor vehicle from impinging directly upon that blade edge in a collision. Experience has shown that it is just such an impingement which has been responsible for the serious and sometimes fatal injuries resulting from a collision on the highway between the bulldozer-carrying trailer and another motor vehicle. The other end of each guard member is extended inwardly to enclose at least a portion of the other extremity of the adjacent lifting member. In this manner, all dangerous side protrusions of the bulldozer in transit are shielded from direct impingement.

In the case of large bulldozers of more or less conventional design, i.e., those having two large, opposing and generally horizontal blade-lifting arm members, the guard members conveniently and preferably are mounted, in opposing manner, to the respectively-adjacent blade-lifting arm member. Preferably, too, the guard members are mounted in a removable manner, through the use of one or more separable connecting means of suitable design. Also, in a preferred embodiment of the invention, each guard member is constructed in sections and in such a manner that its overall length is adjustable, so as to be accommodatable to a variety of bulldozer sizes and makes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of a typical large bulldozer in transit on a low-bed trailer, illustrating the practice of a preferred embodiment of the present invention.

FIG. 2 is a plan view of the composite structure of FIG. 1.

FIG. 3 is a view, along line 3—3 in FIG. 1, of a section through a preferred embodiment of the guard member of the invention.

FIG. 4 is a view in perspective of a hanger block constituting an element of a preferred embodiment of the connecting means useful for removably attaching the guard members of the invention to a bulldozer.

FIG. 5 is a view in perspective of a receiving block constituting another element of the preferred connecting means referred to with respect to FIG. 4.

FIG. 6 is a view in perspective of a holding pin, constituting still another element of the preferred connecting means referred to with respect to FIGS. 4 and 5.

FIG. 7 is an exploded assembly view showing the manner in which are assembled the guard members, the hanger blocks, the receiving blocks and the holding pins constituting the preferred embodiment of the invention illustrated in FIGS. 1 through 6.

DETAILED DESCRIPTION OF THE INVENTION (INCLUDING PREFERRED EMBODIMENT)

The practice of the present invention typically involves the transport of a large bulldozer on an open-sided highway trailer. FIGS. 1 and 2 illustrate the conventional manner and equipment by which such a bulldozer is transported over a roadway, FIG. 1 being a side view elevation, and FIG. 2 being a plan view, of an outline comprising a conventional trailer **10** on which is positioned a large, conventional bulldozer **20** equipped with a preferred embodiment of the protective device of the present invention.

As shown in FIGS. 1 and 2, conventional trailer **10** comprises chassis **11**, with depressed "low-bed" section **12**, supported on a plurality of forward wheels **13** and rearward wheels **14**. Bulldozer **20** is positioned on the low-bed section **12** of trailer **10**. Bulldozer **20** is of the conventional configuration, comprising a main chassis portion with blade **30** pivotally connected to such chassis through opposing blade-lifting arm members **25***a* and **25***b* and respective opposing pivot means **21***a* and **21***b*, the latter being respectively located near extremities **26***a* and **26***b* of blade-lifting arm members **25***a* and **25***b*. Blade **30** is connected to arm members **25***a* and **25***b* at their respective other extremities, **27***a* and **27***b*. Raising and lowering of blade **30** is accomplished by conventional means, such as through opposing hydraulic cylinders **22***a* and **22***b* connected between the chassis of bulldozer **20** and, illustratively, corresponding reinforcing struts **23***a* and **23***b* joining blade **30** and blade-lifting arm members **25***a* and **25***b*. Blade **30** comprises face **32** and vertically oriented ends **31***a* and **31***b*.

In accordance with the practice of the present invention, the risk of serious injury to motorists resulting from collision of another motor vehicle with the bulldozer while in transit on the trailer is substantially reduced or eliminated by equipping the bulldozer with the preferred protective device illustrated in FIGS. 1 and 2.

In FIG. 2, the protective device is shown as comprising opposing guard members **40***a* and **40***b*, which are mounted to blade-lifting arm members **25***a* and **25***b* of bulldozer **20**. Guard members **40***a* and **40***b* are constructed of a rigid material, such as steel, and are of such cross-section and thickness as to impart great strength and resistance to deflection. Conveniently, guard members **40***a* and **40***b* can be formed by conventional techniques, from available stock shapes, such as steel pipe of the requisite dimensions. FIG. 3 illustrates a preferred cross-sectional configuration for the guard members of the present invention. Other suitable configurations can be employed. The rearward ends **45***a* and **45***b* of guard members **40***a* and **40***b* are curved inwardly to enclose at least a portion of the rearward extremities **26***a* and **26***b* of arm members **25***a* and **25***b*. The forward ends **46***a* and **46***b* of guard members **40***a* and **40***b* are curved inwardly to enclose at least a portion of the adjacent ends **31***a* and **31***b*, and the face **32**, of blade **30**. Forward ends **46***a* and **46***b* of guard members **40***a* and **40***b* preferably also are reinforced top and bottom by struts **47***a*, *a'* and **47***b*, *b'* for additional strength and protection.

Preferably, guard members **40***a* and **40***b* are each fabricated in at least two sections, e.g., sections **41***a* and **42***a* of guard member **40***a*, and sections **41***b* and **42***b* of guard member **40***b*, as shown in FIG. 2. These sections preferably are joined midway of guard members **40***a* and **40***b*, as by a plurality of bolts **43***a*, *a'* and **43***b*, *b'* and of nuts **44***a*, *a'* and **44***b*, *b'*, through elongated slots **48***a*, *a'* (FIG. 1) and **48***b*, *b'* (not shown), in such sections. By fabricating and assembling the guard members in this fashion, flexibility is provided so that an individual guard member can be accommodated to a range of bulldozer sizes and dimensions. In addition, fabrication of the guard members in two or more sections also permits of the assembly of those sections without special equipment or additional manpower such as usually would be required in order to handle a guard member of unitary construction. However, while fabrication of the guard members in sections is preferred, it should be understood that a guard member of unitary construction is suitable for use in the practice of the present invention.

The purpose of the protective device, and particularly of the guard members, of this invention is to substantially reduce or eliminate the fatalities or serious injuries which otherwise could result from a collision between another motor vehicle and certain protruding parts of a bulldozer when being transported on a trailer in the conventional manner and without removal of its blade over a roadway. The greatest danger of such fatalities or injuries normally is posed by protrusions such as the edges of the bulldozer blade and the blade-lifting arm members, particularly the abrupt extremities of those arm members at their respective points of connection with the bulldozer chassis. Accordingly, it is the purpose of this invention, and a requirement of its practice, that the guard members be positioned in relationship to those protrusions so as to shield and deflect a colliding motor vehicle from direct impingement upon any of such protrusions and, particularly, upon either the edge of the bulldozer blade or any protruding part of the blade-lifting arm members of the bulldozer. Thus, it is satisfactory in the practice of the present invention for the guard members to be mounted to any part of the bulldozer provided that they are disposed and maintained in a position relative to the blade edges and the blade-lifting arm members of the bulldozer suitable to the accomplishment of the intended purpose. In practice, it has been found preferable and convenient for each of the guard members to be mounted on its adjacent blade-lifting arm member through suitable connecting means. It also has been found preferable to so mount the guard members in a removable manner, through separable connecting means. A preferred embodiment of the latter type of connecting means is illustrated in FIGS. 4 through 7.

FIG. 4 illustrates one element of a preferred embodiment of separable connecting means useful in practicing the invention, viz., a hanger block which is adapted, on one side, for separable attachment to a guard mem-

ber, and, on the opposite side, for removable insertion into a second element of the preferred connecting means, viz., a receiving block, to be discussed hereinafter. In FIG. **4**, hanger block **50** is illustrated as being fabricated from a strong rigid material such as quarter-inch wall thickness steel structural tubing of rectangular cross-section. Hanger block **50** consists of a horizontal portion **51** which preferably is permanently connected, as by welding, to a vertical portion **52**, both portions being fabricated from the indicated material. Horizontal portion **51** is adapted for removable insertion into a receiving block (not shown), and for retention in said receiving block by means of a pin (not shown) inserted through opposing holes in said receiving block and through opposing holes **55** in horizontal portion **51**. As noted above, vertical portion **52** of hanger block **50** is conveniently fabricated from the same structural tubing shape as is horizontal portion **51**. However, all of the outer side of vertical portion **52** has been removed, and, in addition, both of the opposing sides of said tubing which adjoin the side so removed have been modified, as at **53**, to accommodate and mate with the rear face of a guard member **40**. This modification is shown as having been performed to lower portion of vertical portion **52**, with the upper portion of vertical portion **52** being unmodified except insofar as the removal of its outer side. The over-all height of vertical portion **52** of hanger block **50** is determined by the dimensions and configuration of the bulldozer, and particularly by the orientation of the blade-lifting arm members and blade of the bulldozer, so that the guard member is positioned and maintained relative to the blade and the adjacent blade-lifting arm member to afford the greatest protection against direct impingement upon those protrusions by another motor vehicle. Thus, the upper portion of vertical portion **52** can be made longer or shorter in order to accomplish the desired positioning of the guard member in relation to the adjacent blade-lifting arm member and the blade of the bulldozer. As will be described later, holes **54** in the vertical portion of hanger block **50** are provided as one means for effecting the attachment of the guard member to hanger block **50**.

FIG. **5** illustrates the receiving block referred to above as another element of one preferred embodiment of the separable connecting means useful in the practice of this invention. Thus, in FIG. **5**, receiving block **56** is shown as adapted by horizontal flanges to be fastened by suitable means, such as by welding or bolting, to the blade-lifting arm member of the bulldozer, and to receive the horizontal portion **51** of hanger block **50**, illustrated in FIG. **4**. Upon insertion of horizontal portion **51** of hanger block **50** into the opening of receiving block **56**, this cooperative relationship can be maintained for as long as desired by means of pin **60** (not shown) inserted through coaxial holes **57** in receiving block **56**, and through coaxial holes **55** in hanger block **50**. Pin **60** is illustrated in FIG. **6**, and consists of square head portion **62** and elongated cylindrical body portion **61**. Body portion **61** is provided near its outer extremity with hole **63**, for use in connection with conventional means such as a cotter pin **64** (not shown) to prevent the accidental withdrawal of pin **60**. Through the use of pin **60** and cotter pin **64**, hanger block **50** and receiving block **56** can be maintained in cooperating relationship in order to position and maintain guard member **40** properly with respect to the bulldozer blade and the adjacent blade-lifting arm member. On removal of cotter pin **64** and pin **60**, hanger block **50** can be removed from receiving block **56** so as to permit removal of guard member **40** from its protective position.

FIG. **7** illustrates the manner in which the guard member **40** is removably attached to blade-lifting arm member **25** of a bulldozer through the use of separable connecting means comprising hanger block **50**, receiving block **56**, pin **60** and cotter pin **64** in accordance with a preferred embodiment of the invention. As also shown in FIG. **7**, guard member **40** is removably attached to hanger block **50** through the use of bolts **43** inserted through elongated holes **48** in guard member **40**, and through holes **54** in hanger block **50**, for locking engagement with nuts **44**. Alternatively, guard member **40** can be attached permanently to hanger block **50** by welding, riveting or the like. As shown in FIGS. **1** and **2**, the connecting means illustrated in FIG. **7** are provided in duplicate. However, if necessary and desirable, a guard member may be attached to the adjacent side arm member through the use of more than two such connecting means.

In accordance with the practice of the method of the present invention, the traffic protecting device of the invention is mounted on a large bulldozer during transit. During transportation of a bulldozer equipped with the protective device of the invention, serious and possibly fatal injuries resulting from a collision of another motor vehicle with one or more protrusions of the bulldozer are avoided through the functioning of the protective device as a means to deflect and prevent the motor vehicle from harmful direct impingement upon such protrusions. After arrival at the construction site, the protective device is removed before the construction work begins. As noted before, no special equipment is required and no additional manpower is needed. Upon completion of the construction work, the bulldozer can be transported back to its storage site, again equipped with the protective device of this invention.

As noted hereinabove, a primary purpose and advantage of this invention is the elimination of the necessity for removal of the blade of a large bulldozer during transit of that bulldozer on a trailer in a conventional manner and over roadways traversed by the public. The elimination of such necessity (which is a legal requirement in some states) for removal of the bulldozer blade during transport obviously achieves a consequent saving in the costs incidental to providing a bulldozer at a job site. The suitability and acceptability of the method and device of the present invention, for accomplishing its purpose of permitting the transportation of a bulldozer on a trailer and over public highways without removal of the blade, has been confirmed by at least one state regulatory agency.

While the traffic protecting method and device of the present invention has been described in detail with reference to a particular and preferred embodiment, it is apparent that the disclosed embodiment can be modified in many ways through the use of substantially equivalent structures and means without departing from the broad concept of the present invention. It is therefore to be clearly understood that all such modifications in structures and means are contemplated and intended as falling within the scope of the present invention.

The invention claimed is:

1. Method for reducing the risk of injury to motorists from a collision with a large bulldozer in transist on an open-sided vehicle, said method consisting of separably attaching to said bulldozer a traffic protective device comprising a pair of longitudinally-extended rigid guard members each of which is separably attached to said bulldozer in a position generally parallel and adjacent to the exterior side of a blade-lifting arm member of said bulldozer, and each of which is adapted in length and configuration, when attached in the aforesaid position, at one of its ends to partially shield at least a portion of the adjacent vertical edge of said blade member of said bulldozer and at its other end at least to partially shield the adjacent extremity of said blade-lifting arm member, thereby to deflect another vehicle colliding with said open-sided vehicle away from said vertical edge.

2. Method according to claim 1 which includes attaching each said guard member on the adjacent blade-lifting arm member through a plurality of separable connecting means.

3. Method for transporting on an open-sided vehicle a bulldozer having a generally transverse blade member of a width sufficient to cause said blade member to extend beyond a side of said open-sided vehicle, so as to reduce the risk of injury to motorists from a collision with said bulldozer in transit, said method consisting of:

A. separably attaching to said bulldozer a traffic protective device comprising a pair of longitudinally-extended rigid guard members each of which is separably attached to said bulldozer in a position generally parallel and adjacent to the exterior side of a blade-lifting arm member of said bulldozer, and each of which is adapted in length and configuration, when attached in the aforesaid position, at one of its ends to partially shield at least a portion of the adjacent vertical edge of said blade member of said bulldozer and at its other end at least to partially shield the adjacent extremity of said blade-lifting arm member, thereby to deflect another vehicle colliding with said open-sided vehicle away from said vertical edge;

B. loading said bulldozer having said protective device on an open-sided vehicle with the longitudinal axis of said open-sided vehicle where said protective device is adjacent a side of said open-sided vehicle; and

C. transporting said bulldozer.

4. Method according to claim 3 which includes attaching each said guard member on the adjacent blade-lifting arm member through a plurality of separable connecting means.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,866,773

DATED : February 18, 1975

INVENTOR(S) : Terry David Koch

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

Column 8, line 18, after "longitudinal", insert --axis of said bulldozer generally parallel to the longitudinal--.

Column 8, line 22, after "bulldozer" and before the ".", insert --having said protective device, on said open-sided vehicle--.

Signed and sealed this 15th day of April 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks