United States Patent [19]

Alten

[11] **3,883,917**

[45] **May 20, 1975**

[54] **BRIDGE FOR RAMPS**

[76] Inventor: **Kurt Alten,** Ringstr. 14, 3015 Wenningsen, Germany

[22] Filed: **Nov. 16, 1973**

[21] Appl. No.: **416,391**

[30] **Foreign Application Priority Data**

Nov. 20, 1972 Germany 2256802

[52] **U.S. Cl.** **14/71**

[51] **Int. Cl.** **B65g 11/00**

[58] **Field of Search** 14/71, 72

[56] **References Cited**

UNITED STATES PATENTS

3,235,896	2/1966	Riggs	14/71
3,327,335	6/1967	Beckwith	14/71
3,411,168	11/1968	Hecker	14/71
3,460,175	8/1969	Beckwith	14/71
3,662,416	5/1972	Brooks	14/71

Primary Examiner—Nile C. Byers, Jr.

Attorney, Agent, or Firm—Walter Becker

[57] **ABSTRACT**

A ramp having a bridge structure pivotally connected thereto for transferring a load onto and from the ramp and including a bridge plate having one end hinged to the ramp for selectively pivoting the bridge plate from a substantially vertical or rest position to an at least approximately horizontal or use position while tension spring means have one end connected to the ramp and the other end to the free end of a lever which is pivotable about an axis substantially parallel to the pivot axis of the bridge plate but is spaced from this last mentioned pivot axis. The free end of the lever carries a roller which engages and is adapted to roll on a cam surface of a cam connected to the bridge plate. The tension spring means varies its length when the roller moves on the cam surface during the pivoting of the bridge plate from its rest position to its use position and is shortest in its rest position.

5 Claims, 2 Drawing Figures

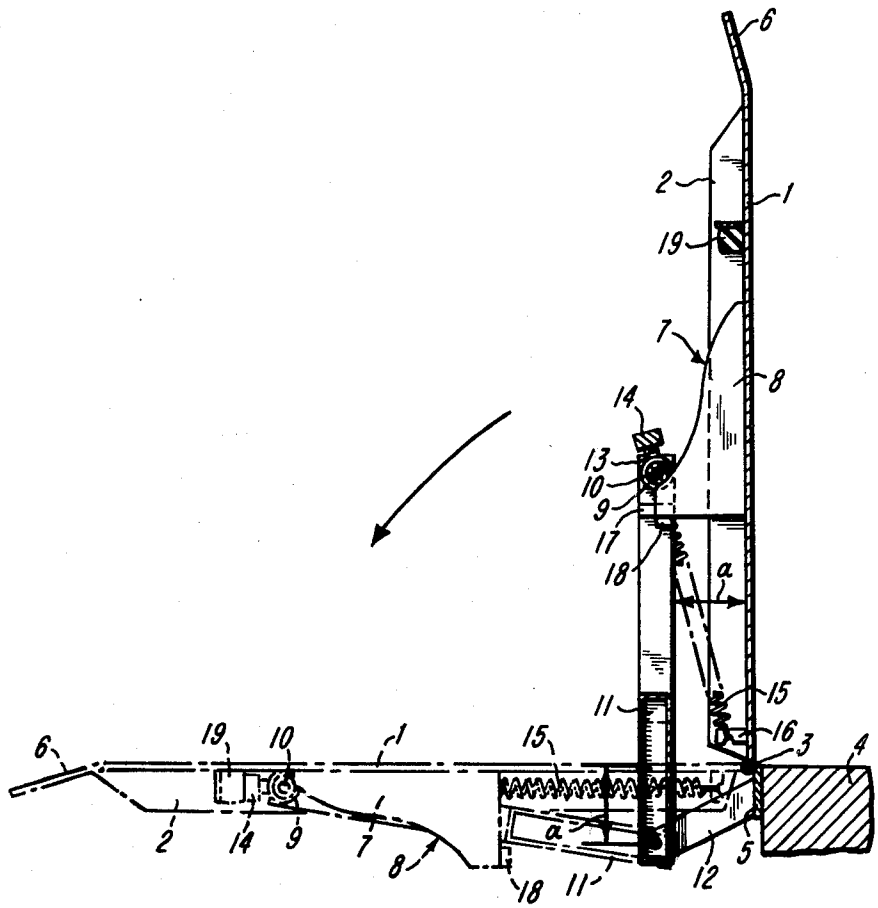
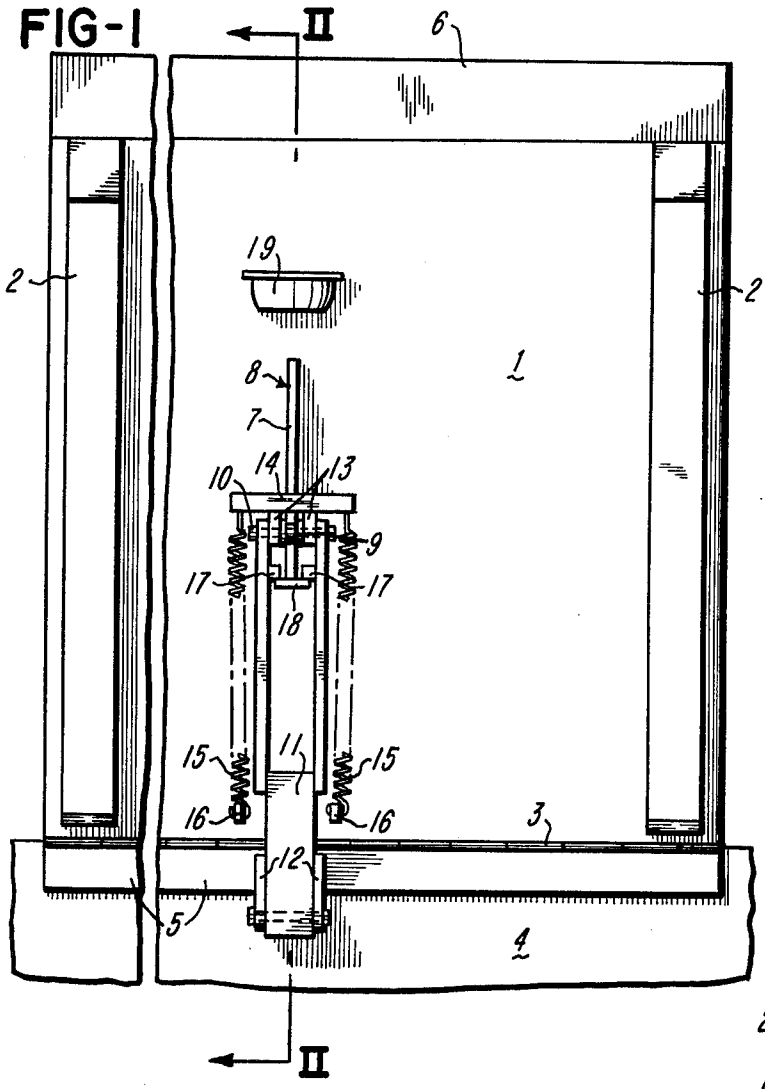


FIG-1


II
6
19
2
2
1
8
7
14
13
10
9
17
17
18
15
11
15
16
16
3
12
5
4
II

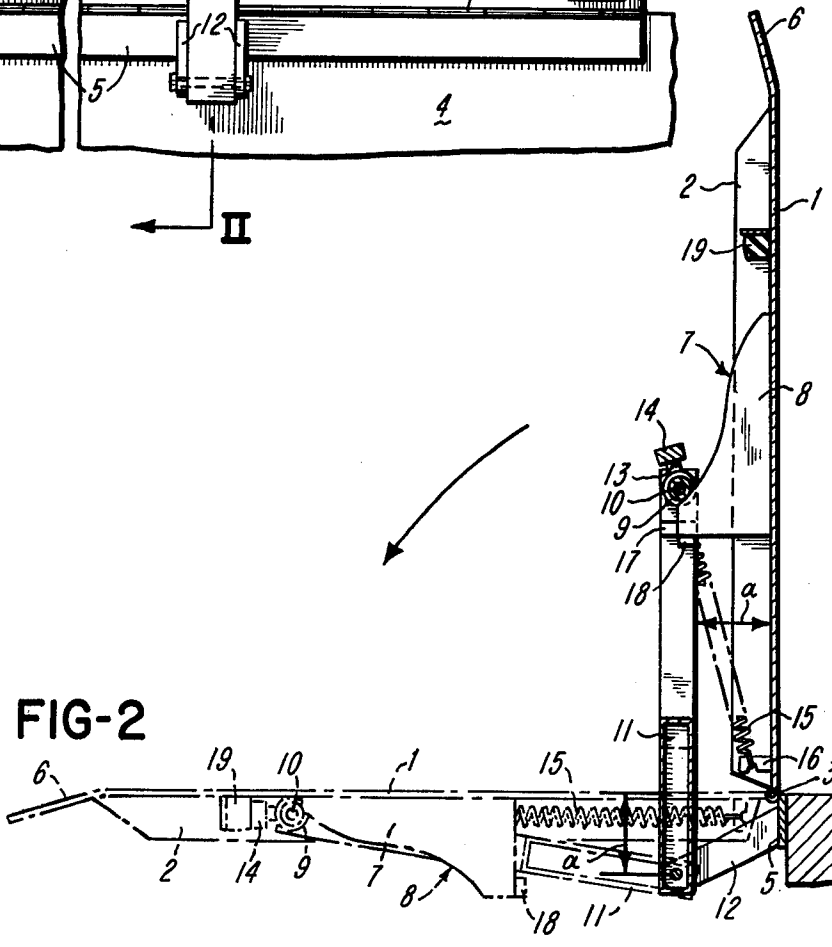

6
2
1
19
7
8
14
13
10
9
17
18
a
15
11
16
3
4
5
12

FIG-2

6
19
10
1
15
2
14
9
7
8
a
18
11
12
5

BRIDGE FOR RAMPS

The present invention relates to a bridge for ramps with a bridge plate which is pivotally arranged at the rear end of the ramp and which is movable from its substantially vertical rest position against the effect of a spring-loaded lever pivotable about a vertical axis, into its substantially horizontal position of use while the free lever end engages the bridge plate by means of a cam disc.

Bridges of this type are known according to which the spring acting upon the lever is a torsion spring which extends approximately over the width of the bridge and is located within the region of the linkage area of the bridge plate. In view of the relatively large deviating travel which the torsion spring has to perform, the torsion spring has a length corresponding to the width of the bridge. Therefore, also the lever which is loaded by the effect of the torsion spring has to engage a bridge rim or has to be built in at said bridge rim.

It is an object of the present invention so to design a bridge of the above mentioned type that the mounting of the above referred to lever may be effected at any desired area of the bridge plate and may preferably be centrally arranged so that the bridge plate may be subjected to stresses in a more favorable manner.

It is another object of the present invention to provide a bridge as set forth in the preceding paragraph in which the spring will be greatly simplified while permitting a greater spring stroke.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 illustrates a bridge linked to a marginal area of a ramp and occupying its rest position, the bridge of FIG. 1 being shown as viewed from below.

FIG. 2 represents a section taken along the line II—II of FIG. 1.

The bridge for ramps according to the present invention, which is provided with a bridge plate that is pivotally arranged at the rear end of the ramp and which is movable from its approximately vertical rest position against the effect of a spring-loaded lever pivotable about a horizontal axis, into a substantially horizontal position of use while the free lever end engages the bridge plate by means of a cam path and while the spring acting upon the lever relaxes when pivoting the bridge plate upwardly, is characterized primarily in that the spring acting upon the lever is a tension spring which has one end within the region of the free lever end and has its other end within the region of the pivot axis of the bridge plate.

In this way, in comparison to the employment of torsion springs, there is realized not only a considerable advantage in building up the bridge in view of the mounting of the spring centrally below the bridge plate but also a support of the bridge plate is possible which results in operating forces being uniform over the entire pivot range of the bridge plate.

Referring now to the drawing in detail, the bridge plate **1**, which may be reinforced by longitudinally extending hollow beams **2**, is by hinge means **3** pivotally connected to the rim portion of the ramp **4**. A flatiron **5** which supports the hinge means **3** may be fixedly connected to the ramp **4** or if desired may also be longitudinally displaceable on the ramp **4**. The drawing shows

the bridge in its vertical rest position. When the bridge is in its operative position or position of use, the bridge plate **1** rests by means of its front portion **6** on the vehicle or the like.

Centrally below the bridge plate **1** there is arranged a cam **7** which is formed by a flatiron **8** extending vertically with regard to the bridge plate **1** and in the longitudinal direction of the latter.

The cam **7** guides a roller **9** with a central circumferential groove having a width corresponding to the thickness of the flatiron **8**. This roller is mounted on a bolt **10** the ends of which are connected to the free end of a lever **11** having its front portion forked. The lower end of this lever **11** is pivotally journalled on arms **12** which are fixedly connected to the flatiron **5**. The pivot axis of lever **11** extends parallel to the axis of the hinge means **3**.

Pivotally mounted on the bolt **10** and, more specifically, at both sides of the roller **9** are two protrusions **13** of a traverse **14**. The ends of said traverse are engaged by tension springs **15** which are suspended in hooks **16** and which are located closely above the hinge means **3** on the bridge plate **1**.

When the bridge occupies its rest position shown in the drawing, the two tension springs **15** are preloaded. In order that this position can be maintained, the protrusions **17** of the lever **11** catch behind a transverse member **18** of the flatiron **8**. However, if desired, the rest position of the bridge may also be secured by other detachable arresting means.

If the bridge plate **1** is to be pivoted downwardly into its position of action, the bridge plate must be prevented from shock-like impacting. To this end, the bridge plate **1** rests during the pivoting movement in downward direction on the roller **9** or the free end of the lever **11** which in its turn can be pivoted downwardly only while tensioning the tension springs **15**. During the pivoting movement of the bridge plate **1**, the roller **9** moves on the cam **7** forwardly in the direction toward the front end **6** of the bridge. If desired, the traverse **14** may be caught by an elastic abutment **19**.

After the bridge has been used, the bridge plate **1** is manually pivoted upwardly. This is possible without any difficulties, i.e., while only using small forces, because the tension springs **15** will be preloaded when the bridge plate is lowered. Due to the above mentioned lever arrangement in cooperation with the springs **15** and due to the illustrated S-shaped configuration of the path of cam **7**, the goal will be realized that when pivoting the bridge upwardly, the necessary force will be uniform over the entire pivot range. The two springs **15** are so dimensioned that the required force will be low.

Experience has shown that the S-shaped path of cam **7** will be particularly favorable when this path in the first portion (approximately the first half) is concave and in the second or last portion is convex. Such an arrangement will with the changing lever angle and the respective angle of attack of the tension springs **15** lead to the desired effect. The lever length corresponds in this connection approximately to half the length of the bridge plate, and the tension springs **15** will in the rest position of the bridge define together with the then vertical lever **11** an angle of approximately from **12** to **18°**. Moreover, in the rest position of the bridge, the distance of the lever **11** from the bridge plate corresponds to approximately the distance a (hinge means - lower pivot area).

It is, of course, to be understood that the present invention is, by no means, limited to the specific showing in the drawing but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. In combination with a ramp, a bridge structure pivotally connected to said ramp for transferring a load over said bridge structure onto and from said ramp, said bridge structure including: a bridge plate, hinge means hingedly connecting one end portion of said bridge plate to said ramp for selectively pivoting said bridge plate about the axis of said hinge means from a substantially vertical rest position to an at least approximately horizontal position of use and vice versa, tension lever means pivotally supported by said ramp for pivoting about an axis substantially parallel to the axis of said hinge means and located in spaced relationship thereto, spring means having one end thereof anchored within the region of said axis of said hinge means and having the other end anchored within the region of the free end of said lever means, and cam means connected to said bridge plate and having a cam surface supporting said free end of said lever means, said spring means continuously urging said free end of said lever means toward said cam surface and having its shortest extension when said bridge plate occupies its substantially vertical rest position, that end of said tension spring means which is within the region of the axis of said hinge means being connected to said bridge plate, the length of said lever means approximately being equal to half the length of said bridge plate, said lever means in its substantially vertical rest position being spaced from said bridge plate by a distance approximately equalling the distance between the horizontal plane through the axis of said hinge means and the pivot axis of said lever means, said cam surface having an S-shaped contour and that portion of said cam surface which in the substantially vertical rest position of said bridge plate is closest to said roller means being concave whereas the other portion of said cam surface has a convex surface, said concave and said convex portions of said cam surface merging with each other at about the central region of said cam surface, and in said substantially vertical rest position of said bridge plate said roller means engaging and exerting pressure upon said convex portion of said cam surface.

2. A bridge structure in combination according to claim 1, which includes shaft means supported by said free end of said lever means, roller means supported by said shaft means and engaging said cam surface, and holding means pivotally supported by said shaft means and having that end of said spring means connected thereto which is anchored within the region of said free end of said lever means.

3. A bridge structure in combination according to claim 1, in which said free end of said lever means is fork-shaped and carries said shaft means, and in which said holding means includes a traverse having one end of said spring means connected thereto and also having extension means respectively located on opposite sides of said roller means while pivotally resting on said shaft means.

4. A bridge structure in combination according to claim 1, in which the plane of symmetry of said lever means coincides at least approximately with the longitudinal plane of symmetry of said bridge plate, and in which said lever means is arranged on that side of said bridge plate which when the latter is in its position of use represents the bottom side.

5. A bridge structure in combination according to claim 1, in which in the substantially vertical rest position of said bridge plate said tension spring means defines with said lever means an angle of approximately from 12° to 18°.

* * * * *