Sept. 16, 1947. A. J. HIGGINS 2,427,603

TOGGLE CLAMP FOR DEMOUNTABLE FREIGHT COMPARTMENTS

Filed April 18, 1946

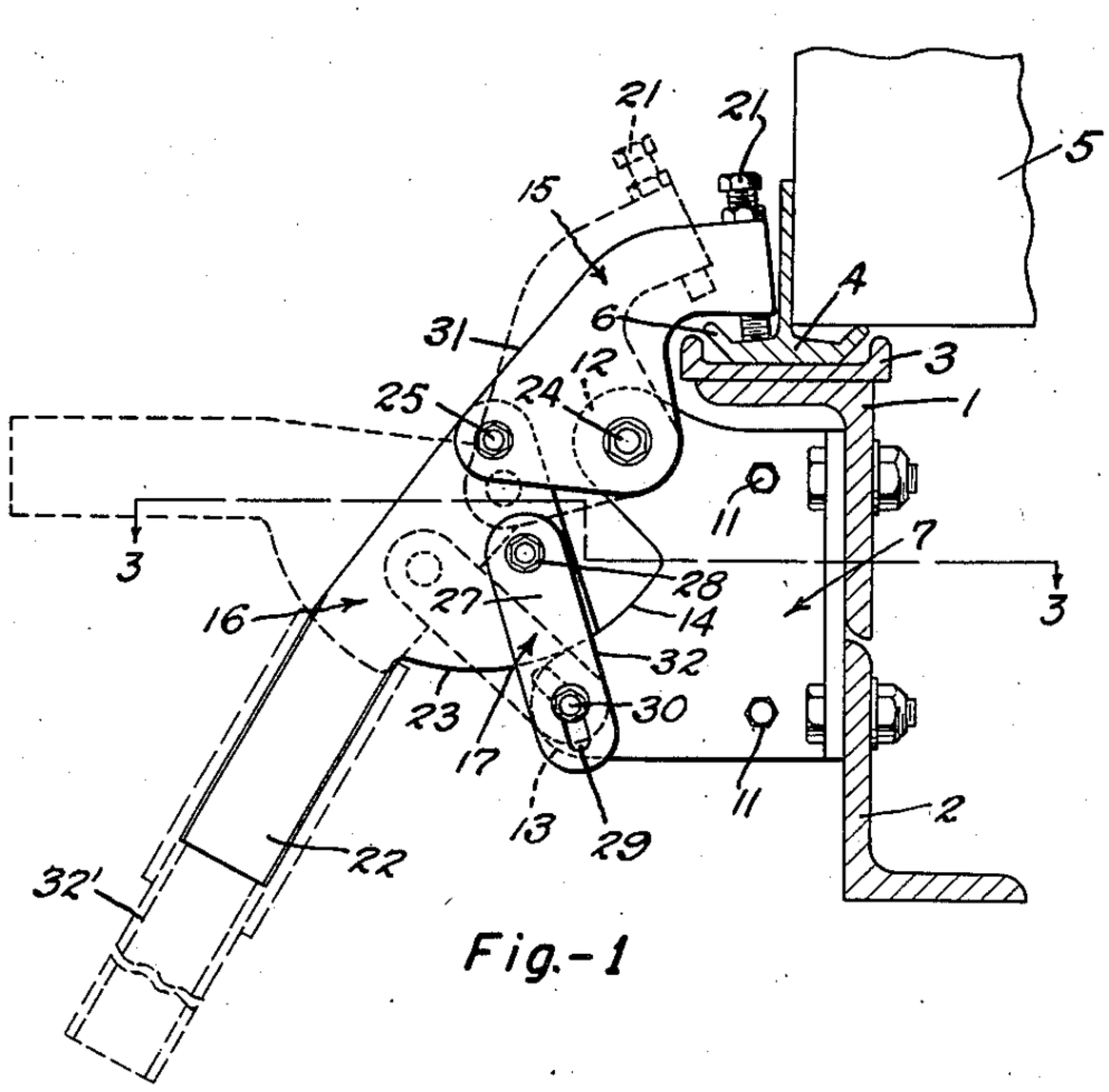

Fig.-1

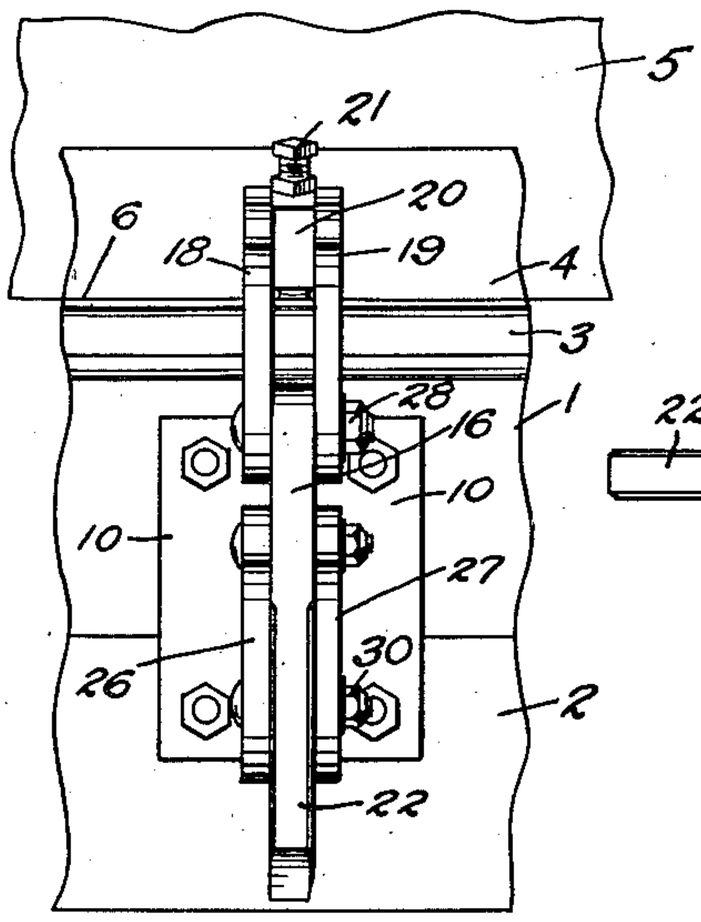

Fig.-2

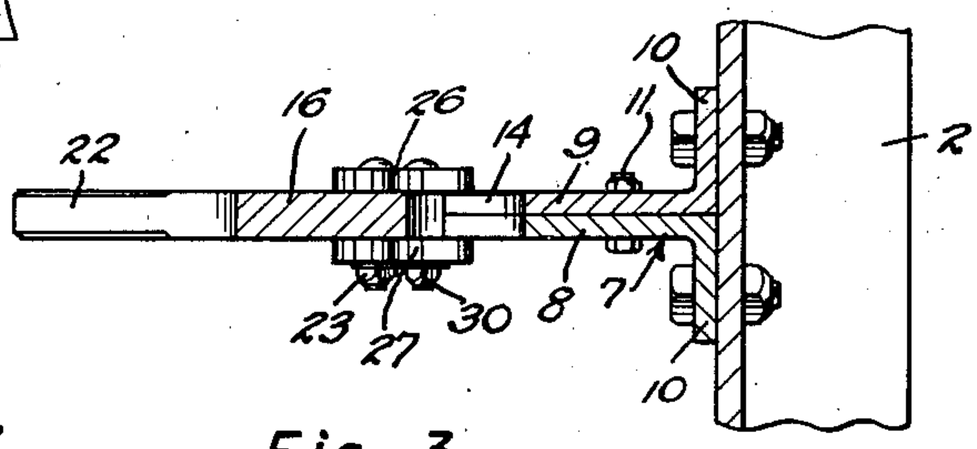

Fig.-3

Inventor

A. J. Higgins

By Mason Fenwick & Lawrence

Attorneys

Patented Sept. 16, 1947

2,427,603

UNITED STATES PATENT OFFICE

2,427,603

TOGGLE CLAMP FOR DEMOUNTABLE FREIGHT COMPARTMENTS

Andrew J. Higgins, New Orleans, La., assignor to Higgins, Incorporated, New Orleans, La., a corporation of Louisiana

Application April 18, 1946, Serial No. 663,212

5 Claims. (Cl. 296—35)

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This invention relates to a clamp for securing a demountable freight compartment to a transportation vehicle, but it is not necessarily limited to such use. The invention is particularly adapted to be employed in a freight transfer system in which freight is stored in removable compartments which are handled as a unit and transferred from a truck to a flatcar or to a ship. Each of these transportation vehicles may be equipped with supporting members for receiving the compartment, and the compartment being equipped with rails adapted to rest on the supporting members. The clamp of the present invention may be fixed either to the supporting member or to the rail member, and cooperate with the other for holding the freight compartment tightly in place.

One of the objects of the present invention is to provide a clamp that shall open wide so as to be completely out of the path of movement of the compartment when the latter is being loaded upon the supporting members, thereby avoiding damage to the clamp.

Another object of the invention is to provide a clamp in which the final tightening movement is produced by the action of a cam, the major closing movement being produced by the approach to rectilinear relation, of three normally angularly displaced pivotal connections.

Still another object of the invention is the provision of a clamp which when in clamped position is frictionally retained by the load, aided by gravity.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawings which accompany and form a part of the folowing specification, and throughout the several figures of which the same reference characters have been employed to denote identical parts:

Figure 1 is a veritcal section through a chassis frame, showing the clamp of the present invention in closed position in full lines and in released, but not fully open position in broken lines;

Figure 2 is an end view;

Figure 3 is a section taken on line 3—3 of Figure 1.

Referring now in detail to the drawings, the angles 1 and 2 form, with other elements not shown, one of the longitudinal frame members of a truck chassis.

On top of the angle 1 a longitudinal channel 3 is fixed, forming a support for the bottom rail 4 which is attached to the demountable freight

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compartment 5. It is to be understood, of course, that the members 1, 2 and 3 are duplicated on opposite sides of the chassis, and that there is a rail 4 at both sides of the compartment 5. The rail 4 has a clamp engaged flange 6.

The clamp mechanism comprises a bracket support 7, which in the illustrative embodiment comprises a pair of similar contacting plates 8 and 9, having outturned flanges 10 at the base, bolted to the chassis frame. The plates are suitably secured together as by the nuts and bolts 11. The bracket 7 has upper and lower ears 12 and 13, respectively, for pivot connections, defining between them a circular cam surface 14 on the intervening edge of the plate.

The clamp consists of three normally movable members, the clamping jaw 15, the handle operated actuator 16, and the link 17.

The clamping jaw comprises a pair of similar congruently arranged plates 18 and 19, spaced to embrace the ear 12, and pivoted thereto at the lower inner end. The upper ends of the plates 18 and 19 are spaced by a filler-piece 20, having a threaded bore receiving an adjusting screw 21, which directly engages the rail of the freight compartment. This adjusting screw may remain set for a period of repeated use until wear of the parts makes it necessary to readjust it.

The actuator 16 is a single plate, more or less sector shaped, having its apex fitting between the lower outer ends of the plates 18 and 19, pivoted thereto at 25, and having a handle extension 22, extending radially. The lower edge 23 of the actuator 16 is a circular cam having the same curvature as the cam surface 14, but slightly eccentric thereto, the eccentricity being in such direction that when the actuator is rocked in a counterclockwise direction its curved edge 23 gradually wedges against the cam surface 14. The major component of this wedging force acts upward against the pivot 25, rocking the clamping jaw 15 in clockwise direction, and applying powerful clamping pressure through the screw 21. The clamp is irreversible, that is, when the actuator is in wedge engagement with the bracket 7, all components of the turning force through the pivot 25 when upward pressure is applied to the screw 21, meet the curved edge 23 and corresponding cam surface 14 at an angle so close to perpendicular as to have negligible tendency to release the wedging engagement of the parts. Ordinarily, the clamp will be vertically positioned, as shown, so that the weight of the handle 23 holds the actuator in locked position relative to the bracket support 7.

The link 17 consists of two similar members 26 and 27, arranged on opposite sides of the actuator, and pivoted thereto at 28 on a common axis. The opposite ends of said link members have congruent slots 29, which slidably surround a pin 30, projecting from both sides of the ear 13. The purpose of the link 17 is two-fold. It provides a fulcrum about which the actuator 16 turns when the handle is lifted to open the clamp, and it guides the actuator in its camming movement upon the cam surface 14.

The part played by the link 17 in the opening movement of the clamp may be understood by reference to the full line position of the parts shown in Figure 1, which shows the clamp in closed position. Since the clamp is in a vertical plane, gravity causes the link 17 to hang with the major part of the slots 29 below the pin 28. As the handle 22 is moved upward in a clockwise direction, the curved edge 23 of the actuator 16 will slide downward relative to the cam surface 14, releasing the wedging action between the parts, and loosening the hold of the screw 21 upon the rail 4 of the compartment, but it will have no effect in opening the clamp. During the initial upward movement of the handle 22, the pivot 28 is rotated in an upward arc, lifting the link 17, but until the lost motion in the slots below the pin 30 is taken up so that the lower ends of the slots bear against the pin, the opening of the clamp does not commence.

When the upward arcuate movement of the pivot 28 becomes limited by the link 17, then said pivot becomes a fulcrum about which the actuator rocks when the handle is moved further in an upward direction. This movement brings the pivot 25 downward and opens the clamp. At the same time, it rocks the link 17 in a counterclockwise direction sufficiently to let the outer side 31 of the clamping jaw 15 lie adjacent and substantially parallel to the inner side 32 of the link 17, in which position of parts the clamping end of the clamping jaw 15 is wide open and quite a distance from the rail 14.

When the handle is moved downward to close the clamp, the first effect is to permit the link 17 to move downward until the top of the slot 29 engages the pin 30. This establishes the pivot 28 as a fulcrum, about which the actuator swings in a counterclockwise direction. The length of the link 17 from the top of the slot to the pin 28 is such as to hold the leading end of the cam edge 23 of the actuator clear of the cam surface 14 when said curved edge approaches said cam surface.

A handle extension 32' is provided, for increasing the leverage, which handle is removable to discourage tampering.

While I have in the above description disclosed what I believe to be a preferred and practical embodiment of the invention, it will be understood by those skilled in the art that the specific details of construction and arrangement of parts is by way of example and not to be construed as limiting the invention.

What I claim as my invention is:

1. Toggle clamp comprising a support, a clamping jaw in the form of a bell crank pivoted at an intermediate point to the upper part of said support, a sector shaped actuator having a pivotal connection at its apical portion with the lower extremity of said clamping jaw, and having a downwardly convex cam edge opposite said apical portion progressively wedgingly engaging a similarly curved cam surface slightly eccentric thereto, on said support, as said actuator is swung toward said support, for forcing said pivotal connection upward and closing the opposite end of said clamping jaw against the object to be clamped, and a link pivotally connected to said actuator below its pivotal connection with said clamping jaw, and to the lower part of said support, affording a swinging fulcrum for said actuator in opening and closing said clamping jaw, and guiding the movement of the convex edge of said actuator in approaching the cam surface of said support.

2. Toggle clamp as claimed in claim 1, including a handle extending radially from said actuator adjacent the outer end of said convex cam edge, constituting a weight for holding said actuator and support in frictionally locked position.

3. Toggle clamp as claimed in claim 1, said link having a longitudinal slot in its pivotal connection with said support providing lost motion in said pivotal connection which causes said link to float in the initial opening movement and initial closing movement of said clamp.

4. Toggle clamp as claimed in claim 1, including a handle extending radially from said actuator adjacent the outer end of said convex cam edge, constituting a weight for holding said actuator and support in their frictionally locked position, and a removable handle extension.

5. Toggle clamp comprising a support, a clamping jaw in the form of a bell crank comprising a pair of congruent spaced plates having a filler-piece between their upper ends and an adjusting screw threaded through said filler-piece, said plates embracing an upper part of said support and being pivoted at an intermediate point thereto, a sector shaped actuator having its apical portion embraced by the lower ends of said plates and having a pivotal connection therewith, said actuator having a downwardly convex cam edge opposite said apical portion progressively wedgingly engaging a similar curved cam surface slightly eccentric thereto, on said support, as said actuator is swung toward said support, for forcing said pivotal connection upward and closing the opposite end of said clamping jaw against the object to be clamped, and a link comprising a pair of congruent members embracing said actuator and the lower part of said support, respectively at their opposite ends, being connected to said actuator at a point between its pivotal connection with said clamping jaw and its convex cam edge, and being pivotally connected, with longitudinal lost motion, to said support, there being a handle on said actuator at the outer end of its convex cam edge, functioning by its weight to hold said actuator and support in their frictionally locked position.

ANDREW J. HIGGINS.

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