

July 26, 1927.

F. HETZELBERGER

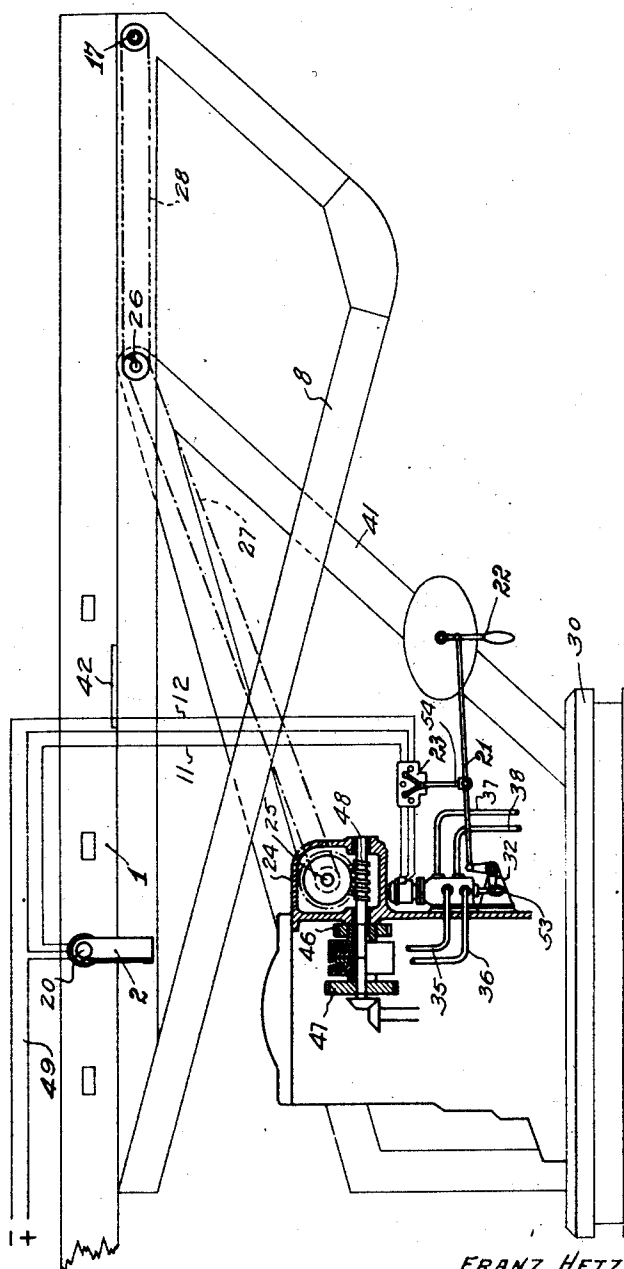
1,637,191

AUTOMATIC CONTROL FOR VEHICLE SUPERSTRUCTURES

Filed Aug. 29, 1925

3 Sheets-Sheet 1

Fig. 1



Inventor:

FRANZ HETZELBERGER

By

Bones & McNamee
Attorneys

July 26, 1927.

F. HETZELBERGER

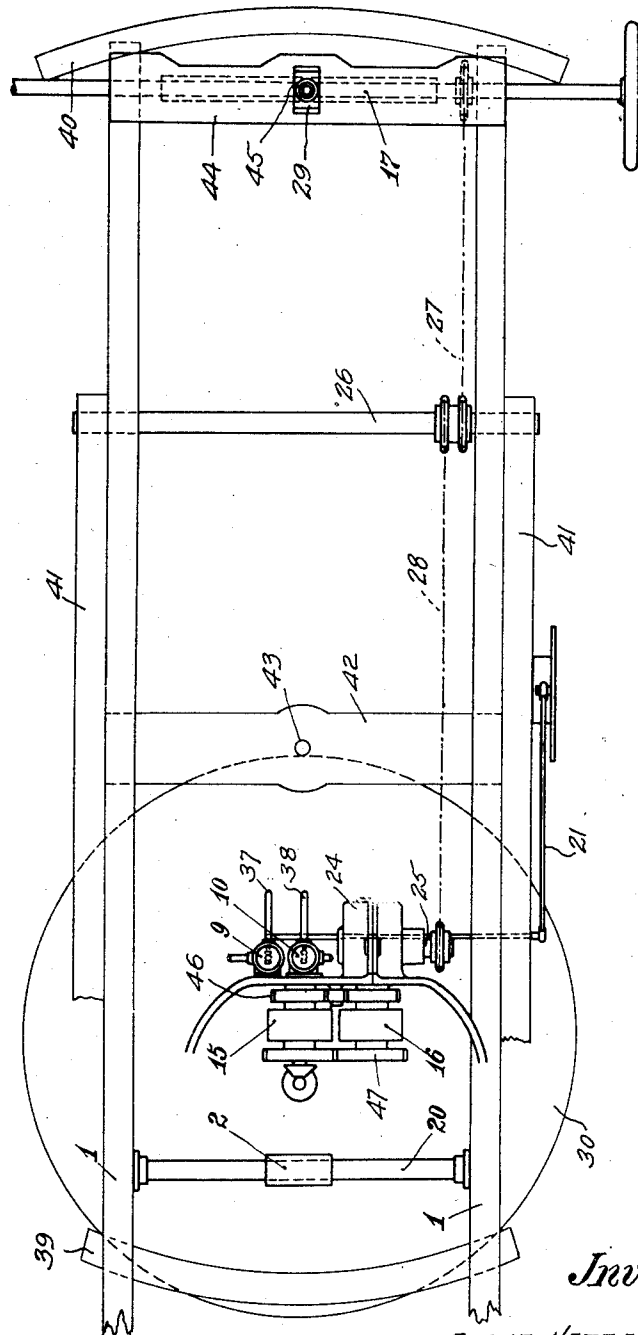
1,637,191

AUTOMATIC CONTROL FOR VEHICLE SUPERSTRUCTURES

Filed Aug. 29, 1925

3 Sheets-Sheet 2

Fig. 2



Inventor:

FRANZ HETZELBERGER

By

Braun & Schenk
Attorneys

July 26, 1927.

F. HETZELBERGER

1,637,191

AUTOMATIC CONTROL FOR VEHICLE SUPERSTRUCTURES

Filed Aug. 29. 1925

3 Sheets-Sheet 3

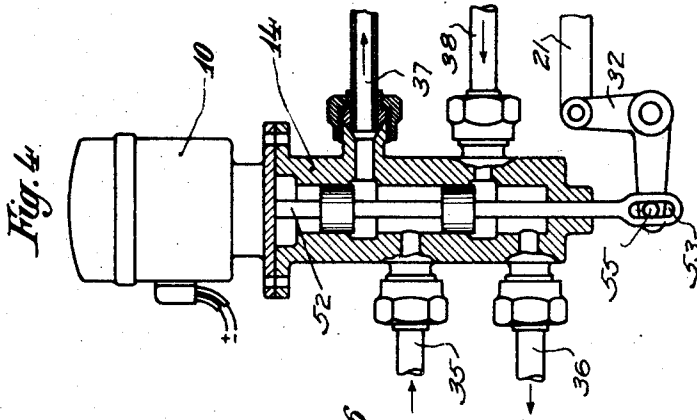


Fig. 4.

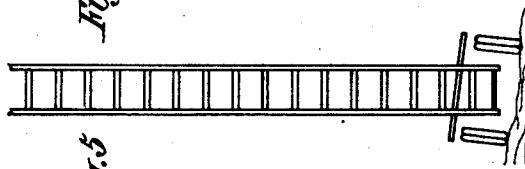


Fig. 6

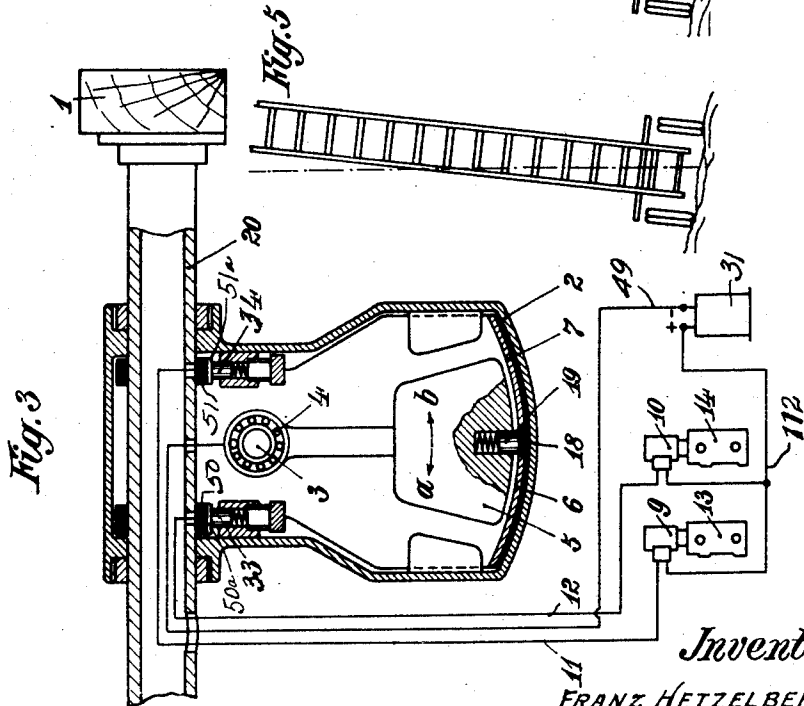


Fig. 3

Inventor:
FRANZ HETZELBERGER
By
Brosius Volkmann
Attorneys

UNITED STATES PATENT OFFICE.

FRANZ HETZELBERGER, OF ULM-ON-THE-DONAU, GERMANY, ASSIGNOR TO C. D. MAGIRUS, AKTIENGESSELLSCHAFT, OF DONAU, GERMANY, A CORPORATION OF GERMANY.

AUTOMATIC CONTROL FOR VEHICLE SUPERSTRUCTURES.

Application filed August 29, 1925, Serial No. 53,444, and in Germany June 3, 1925.

In practice it is frequently necessary to adjust bearing surfaces which carry superstructures and the like on vehicles, in a vertical and horizontal direction in order to compensate for inequalities of the ground or the unsteady position of the understructures. This is for instance the case in superstructures used on ships, such as turrets, signal masts, search lights and wireless poles or in other devices on vehicles. Such arrangements are also used by fire brigades for rotatable, inclinable and telescopic escapes. For these purposes constructions are known in which the control of the mechanical drive for the horizontal adjustment is effected automatically by means of a pendulum or plummet. Such controls have however the drawback that they act slowly in the case of small oscillations of the superstructure, and thereby cause the superstructure to behave erratically. These mechanically operated controls further offer almost unsurmountable difficulties when the member actuating the control, is at a great distance from the source of power. The difficulties in the transmission of the mechanical control movements become still greater when the superstructure must take part in other movements than those of the vertical and horizontal adjustment, as, for instance, in the case of travelling, "rising," telescopic and rotatable fire ladders.

The present invention overcomes these difficulties by the provision of an electric control comprising a pendulum carried by the ladder or other member to be controlled. The movements of the pendulum with respect to the ladder cause electric circuits to be opened and closed, thus controlling the adjusting mechanism. Thus it is possible to position the pendulum at any desired point on the ladder, and the control is made more sensitive and its action more immediate.

For convenience, the invention is described and shown as applied to an extensible fire ladder mounted on a truck of any appropriate design, and adapted, when erected, to rotate about a vertical axis, but the invention may be applied to the numerous other structures mentioned above, and I therefore intend the term "ladder," as used in the appended claims, to be construed to cover such

similar structures as the turrets, signal masts, search lights and wireless towers of ships. In the accompanying drawings,

Figure 1 is a side elevation, partly in section, of a device embodying my invention.

Figure 2 a plan view of the same.

Figure 3 shows the control member in section, with a diagram of connections,

Figure 4 shows a valve electromagnetically operated by the control member and controlling the pressure medium of the reversing gear of the driving device, and

Figures 5 and 6 show respectively two positions of a fire ladder before and after adjustment on sloping ground.

In the drawings, the revolving turret 30 is mounted on the ladder truck in the known manner, and carries a truss 41 having a rod 26 upon which a frame 8 is pivotally mounted. The ladder is carried by frame 8, being pivoted thereto by pin 43 extending through plate 42 which is attached to the longitudinal members 1 of the ladder. Arcs 39 and 40 form bearing surfaces for the ladder. It will thus be seen that the turret may rotate with respect to the truck and that the ladder may rotate with respect to the turret.

At the rear end of frame 8 a threaded shaft 17 is journaled, and a nut 29 is mounted on the shaft. A shank 45 is formed on the nut and is adapted to engage plate 44 which is attached to the ladder. Thus the ladder may be rotated on frame 8 by turning shaft 17, causing nut 29 to travel longitudinally of the shaft and moving the rear end of the ladder in the desired direction.

Shaft 17 is driven by chains 27 and 28 which connect it with shaft 25 mounted in the gear case 24. The ladder is raised to the erect position by rotating it about rod 26 in the known manner by suitable mechanism (not shown).

The mechanism of gear cases 15 and 16 is essentially the same as that shown in the United States patent to Mayer, #1,528,448, granted Mar. 3, 1925, and comprises a pair of friction clutches operated by fluid pressure, such as oil supplied by a suitable pump, whereby worm gear 48 may be driven in either direction according to whether valve 13 or 14 is opened. Thus if valve 13 is opened, gear 48 will be driven through the

medium of gear 46 (rather than gear 47), in such direction that the ladder will be rotated in its own plane in a clockwise direction as viewed from above.

A pair of solenoids 9 and 10 are mounted on gear case 24, the cores of the solenoids forming the stems of valves 13 and 14. Ducts 37 and 38 connect valves 13 and 14 with an oil pump of suitable design, and ducts 35 and 36 lead from the valves 13 to gear cases 15 and 16. A lead 112 connects solenoids 9 and 10 to a battery 31 or other source of current. Lead 11 connects solenoid 9 to a contact plate 51^a on the spindle 20, while lead 12 connects solenoid 10 to a similar contact plate 50^a. A pendulum case 2 is pivotally suspended from spindle 20 on the ladder. Lead 49 connects battery 31 to a spindle 3 mounted within the case and to a pendulum 5 suspended from spindle 3 by bearing 4. The pendulum has a yielding contact pin 19 at its lower surface. Conducting plates 6 and 7 are mounted in the case, being insulated therefrom and from each other by insulation 18. Plates 6 and 7 are connected to yielding contacts 33 and 34 adapted to contact with contact plates 50^a and 51^a when not insulated therefrom by insulating arcs 50 and 51, which are fixed to spindle 20 in such position that when the inclination of the ladder from the vertical exceeds 45° the rotation of case 2 will cause the insulating arcs to contact with contacts 33 and 34 to thereby prevent flow of current through either circuit.

The operation of the device is as follows: Assuming that the ladder truck stands on sloping ground, the ladder upon being erected assumes a laterally inclined position as shown in Fig. 5. Pendulum 5 contacts with plate 6, closing the circuit through solenoid 10, and causing it to raise its core 52 to the position shown in Fig. 4, thus admitting oil under pressure to gear case 16, and causing shaft 46 to drive worm gear 48, shaft 25, chain 27, shaft 26, chain 28 and shaft 17 in the proper direction to move the ladder toward the upright position. When this position is reached, pin 19 contacts with insulation 18, thereby opening the circuit and arresting the further rotation of the ladder.

If it is desired to adjust the ladder manually, the structure shown in Fig. 1 is used. Valve stem 52 has a slotted end 53 which is engaged by pin 55 of bell crank 32. Rod 21 is connected to bell crank 32 and to hand lever 22 which is pivoted to truss 41. An arm 54 extends from rod 21 to the switch 23. By reason of the play of pin 55 in slot 53 the hand lever must move through a certain distance from its zero position before it will begin to move stem 52, and in so moving will cause arm 54 to open switch 23, thus rendering the automatic control inoperative.

Having now particularly described and

ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An electrical control for ladders, comprising a contact carried by the ladder, a second contact pendulously suspended from said ladder adjacent said first mentioned contact, an electric circuit adapted to be closed by the contacting of said contacts, means for rotating the ladder and means actuated by the current in said circuit for controlling the operation of said rotating means.

2. An electrical control for a ladder, comprising a contact member suspended for rotation about an axis parallel to the plane of the ladder, a second contact member suspended from said ladder for rotation about an axis perpendicular to said first-mentioned axis, and adapted to move into and out of contact with said first mentioned contact member, an electric circuit adapted to be closed by the contacting of said contact members, means for rotating the ladder and means actuated by the current in said circuit for controlling the operation of said rotating means.

3. In a mechanical ladder, a support, a frame rotatably mounted thereon, a ladder pivoted to said frame for rotation in its own plane, means for imparting such rotation to the ladder, and an electrical control for said rotating means, said control comprising a pendulum suspended from said ladder and adapted to close an electric circuit when the ladder is in a laterally inclined position.

4. A device of the class described comprising a support, a frame mounted thereon for rotation about a horizontal axis, a member pivoted to said frame for rotation thereon, means for so rotating said member, means for rotating said frame to thereby erect said member, and a pendulum attached to said member and adapted to close an electric circuit when the said member is in a laterally inclined position, said electric circuit being connected to said rotating means.

5. A device of the class described comprising a ladder mounted for rotation in its own plane, a motor operatively connected to said ladder to impart such rotation to the ladder, a pendulum suspended from the ladder and an electrical and mechanical connection between said pendulum and said motor, said connection being operative, upon lateral inclination of the ladder, to cause said motor to rotate the ladder to bring it to the upright position.

6. A device of the class described, comprising a frame, a ladder rotatably mounted thereon, a motor operatively connected to said ladder to rotate it, a pendulum suspended from said ladder and electrical control means actuated by said pendulum to cause said motor to rotate said ladder.

7. A device of the class described, com-

prising a frame, a ladder rotatably mounted thereon, a shaft operatively connected to said ladder and adapted to rotate it in one direction, a second shaft similarly connected and adapted to rotate the ladder in the opposite direction, a pendulum suspended from said ladder, and connecting means between said pendulum and said shafts, whereby lateral inclination of the ladder causes the pendulum to close an electric circuit to thereby cause one of said shafts to rotate the ladder.

8. An electrical control for a ladder comprising a member suspended from said ladder for rotation about a fixed axis, a contact plate carried by said suspended member, a contact pin carried by said suspended member adjacent said plate and adapted to rotate about an axis perpendicular to said first mentioned axis, an electric circuit adapted to be closed by contact between said plate and said pin, means for rotating the ladder and means actuated by the current in said circuit for controlling the operation of said rotating means.

9. An electrical control for a ladder comprising a member suspended from said ladder for rotation about an axis fixed with relation to said ladder, a pair of contact

plates spaced from each other and fixed to said suspended member, a bearing carried by said suspended member, a contact pin suspended from said bearing and adapted to selectively contact with said plates, electric circuits adapted to be closed by the contact of said pin with said plates, means for rotating the ladder and means actuated by the current in said circuits for controlling the operation of said rotating means.

10. An electrical control for a ladder comprising a casing rotatably suspended from said ladder, a pair of contact plates mounted in said casing, a strip of insulation between said plates, a bearing in said casing, a contact pin suspended from said bearing and adapted to selectively contact with said plates and said strip of insulation, electric circuits adapted to be closed by the contact of said pin with said plates, and opened by the contact of said pin with said strip of insulation, electromagnets in said circuits, means for rotating the ladder, and means actuated by said electromagnets for controlling the operation of said rotating means.

In testimony whereof I affix my signature.

FRANZ HETZELBERGER.