UNITED STATES PATENT OFFICE.

LORENZO L. STIMPSON, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO FREDERIC CUNNINGHAM, OF SAME PLACE.

TROLLEY AND SWITCH FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 554,350, dated February 11, 1896.

Application filed May 2, 1890. Serial No. 350,402. (No model.)

To all whom it may concern:

Be it known that I, LORENZO L. STIMPSON, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Trolley and Switching Device for Electric Railways, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention is designed for a system of overhead conductors; and it consists of a trolley and switch and arrangement of the wires, such that the contact shall be perfect, and at switches the trolley will automatically follow the wire in the direction taken by the car. The normal position of the trolley and the point of contact is in a vertical line through the center of the car, held there by a spiral spring in the upper portion of the trolley-pole, which lengthens it till the wheels strike the wire, and by a cord or tow-line running from the upper end of the trolley-pole to the forward end of the car.

Figure 1 is a side elevation of the device in position on a car. Fig. 2 is an end view of same. Fig. 3 is a plan of the switch and trolley-wires. Fig. 4 is a plan of the switch on larger scale, also showing the trolley in the position taken when passing the switch, the upper arm and wheels being inclined from a vertical plane. Fig. 5 is an end view of same, the switch being in section on line *x* of Fig. 4 and the upper arm of the trolley-pole being partly in section.

In Fig. 1 *a* represents the trolley-wire, varying heights being indicated by dotted lines.

b b' b² represent the three wheels of trolley-truck; *c*, the tow-line extending from the upper end of the trolley-pole to the forward end of the car, being taut from pulling or towing the truck along the wire as the car moves, and *c'* extending to the rear end and being slack. This will be reversed when the car moves in the opposite direction.

The trolley-pole consists of an upper arm surrounded by a spiral spring *d*, a hinge *e*, with the axis in a vertical plane through the car longitudinally, the lower arm, *f*, set in a horizontal shaft *g*, supported transversely upon the roof of the car by the bearings *h*, which permit the pole to move forward or backward, as indicated by dotted lines.

Fig. 2 illustrates the normal position of the upper arm of the trolley-pole, being in a vertical line, also by dotted lines the vibrations about the hinge, so as to follow the wire to the right or left, as $b^3 b^4$. It also shows stays *i i*, extending from the upper end of the lower arm to the ends of the shaft, to strengthen against side-thrusts, also the coil-springs *j j* placed upon the ends of the shaft and tending to bring the pole to a vertical position.

Fig. 3 illustrates a branching and a curved track, with the arrangement of trolley-wires and switch to correspond. The double lines *k k' k²* indicate the rails, the single lines *a a' a²* the trolley-wires projected upon the same plane, and the broken lines show the center between the rails or the line of the tracks. The switch *l* is placed in the angle of the branching wires.

It will be observed that the trolley-wire and the broken lines coincide, except at switches and upon curves. From the point *m*, where the tracks diverge, the trolley-wire extends midway between the lines of the tracks nearly to the frog in the track, thence diverging, one wire returning to the line of the track on the right at *n* and the other following the track to the left. Upon curves the wire lies outside the line of the track, supported at points *o o*.

With a trolley-pole as described it is obvious that the lower arm (being always in a vertical longitudinal plane through the center of the car) will follow the broken lines; also that the upper end of the upper arm, being free to move laterally, will follow the trolley-wire. If now the car is passing from *k* to *k'*, or switching to the right, when at *p*, opposite the switch, the trolley-arm will be inclined to the left, and likewise when switching to the left the arm will incline to the right and take the position shown in Figs. 4 and 5.

The switch *l* is substantially a flat piece of metal having three points and an internal angle adapted to be secured to the wires throughout the two sides opposite the angle, being in horizontal position and flush with the bottom of the wires. (Shown in Fig. 4 and in section, Fig. 5.) The trolley-wheel being mounted upon the arm and in the same

whereby the trolley-wheel, in following the wire will deflect the upper arm of the trolley-pole outwardly and change the plane of the trolley-wheel, bringing the tread somewhat upon the side of the wire and somewhat within the angle of the wire at points of suspension, thus making the passage more uniform and the tendency to jump the wire less, as shown and described.

6. A trolley-switch for overhead electrical conductors consisting of a flat plate of metal having three points and one internal angle, or V, and the point opposite the V, adapted to be placed within the angle of the branching wires to which the sides are joined throughout thus uniting the other two points to the wires respectively, and having the bottom a flat surface in a horizontal plane through the lower side of the wires, and the switch of sufficient size to bring the point of the V away from each wire a distance greater than the depth of the groove of a trolley-wheel to be used thereon, whereby a trolley-wheel in trailing the switch, if in a plane at too small an angle with the perpendicular, to bring the lower side of the groove to a horizontal plane, will nevertheless pass smoothly over the switch, the lower flange gradually mounting the side of the V till it passes onto the lower side of the switch before reaching the opposite side of the V, as shown and described.

7. In an overhead system of electrical railways, the combination of a main and branching track, a car movable thereon, a trolley supported on said car normally in a vertical line through the center thereof, having a jointed trolley-pole, the lower arm thereof deflectable in the vertical longitudinal plane, and the upper arm deflectable laterally as respects said plane, tow-lines extending from the top of the trolley-pole to the ends of the car, a trolley-wheel having a groove of nearly ninety degrees in cross-section, a main trolley-wire suspended above the tracks in a vertical plane through a line midway between the lines of the tracks from the point of branching of the tracks to a point beyond, a sufficient distance to deflect the trolley as much as is desired by the following of the trolley-wheel upon the wire away from the line of the track; a branch trolley-wire connected at said point, and a three-pointed switch, as shown and described placed within the angle of the wires, whereby the passing in either direction upon either track, the trolley is deflected toward the switch, bringing the lower side of the groove approximately to a horizontal position so that it will pass beneath the switch and the opposite or branch wire, the upper flange being approximately perpendicular and pressing against the side of the wire, and the trolley will automatically follow the wire in the direction taken by the car, all constructed and arranged as set forth and described.

8. A trolley-pole sustained approximately in a vertical line by cords or tow-lines extending from the top thereof to the ends of the car on which it is placed.

9. The combination of a car, a trolley-pole mounted thereon, capable of expanding lengthwise by suitable moving parts and actuating-springs, a trolley-wheel mounted thereon, and tow-lines extending from the top of the pole, to the ends of the car, sustaining it approximately in a vertical position.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 17th day of April, A. D. 1890.

LORENZO L. STIMPSON.

Witnesses:

WILLIAM E. ROGERS,

THOMAS NICHOLAS ENGLAND.

(No Model.) 3 Sheets—Sheet 1.

F. F. JACKSON.

DEVICE FOR AUTOMATICALLY CONTROLLING CLOSING HATCHWAY OR OTHER DOORS.

No. 554,517. Patented Feb. 11, 1896.

Fig. 1.

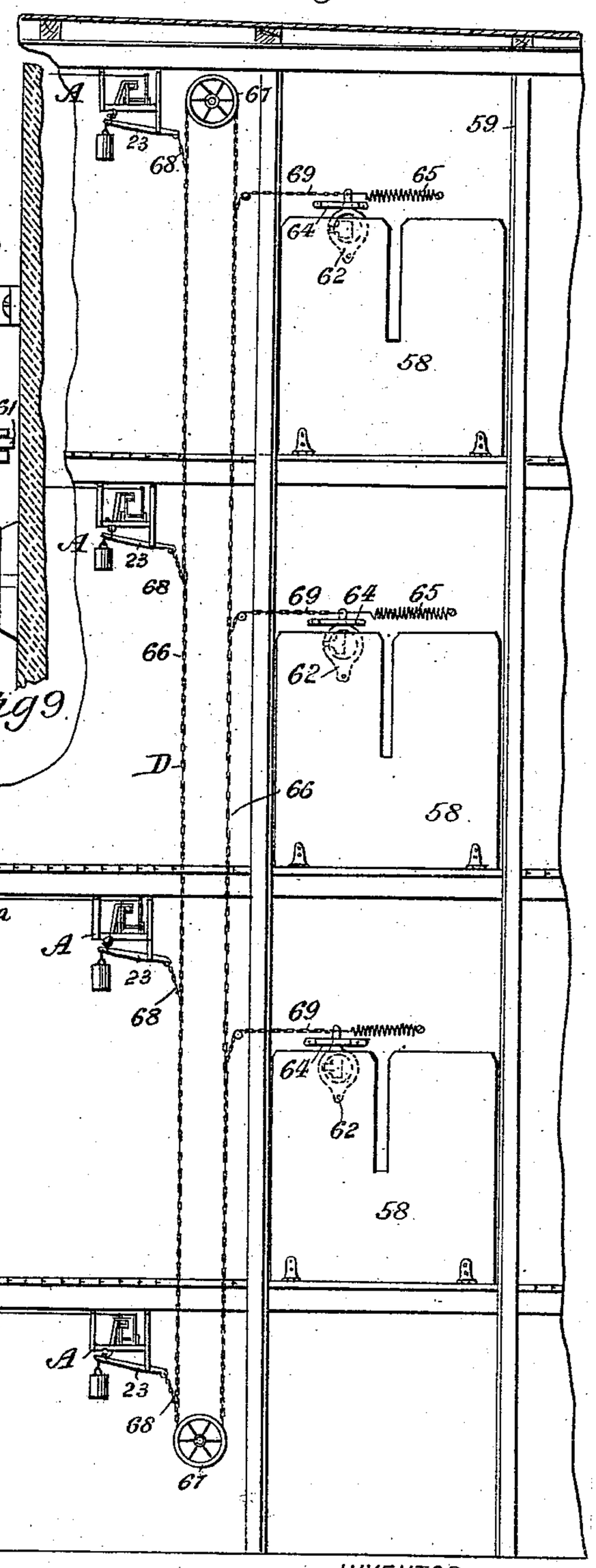

Fig. 8.

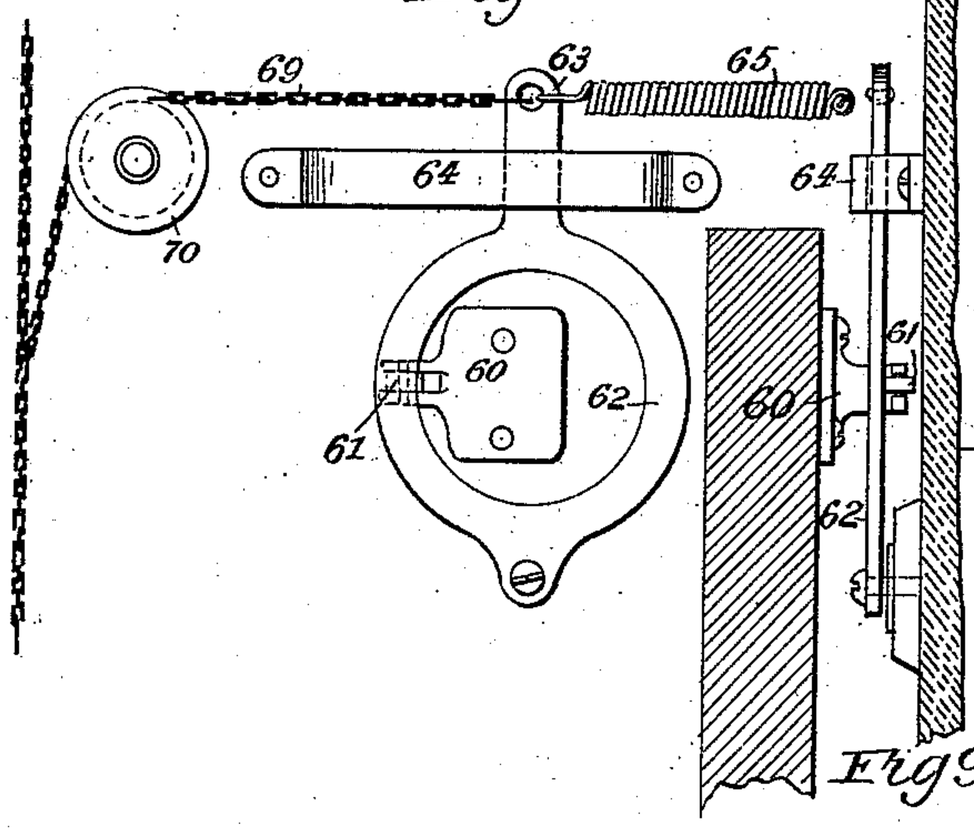

Fig 9.

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Fig 2.

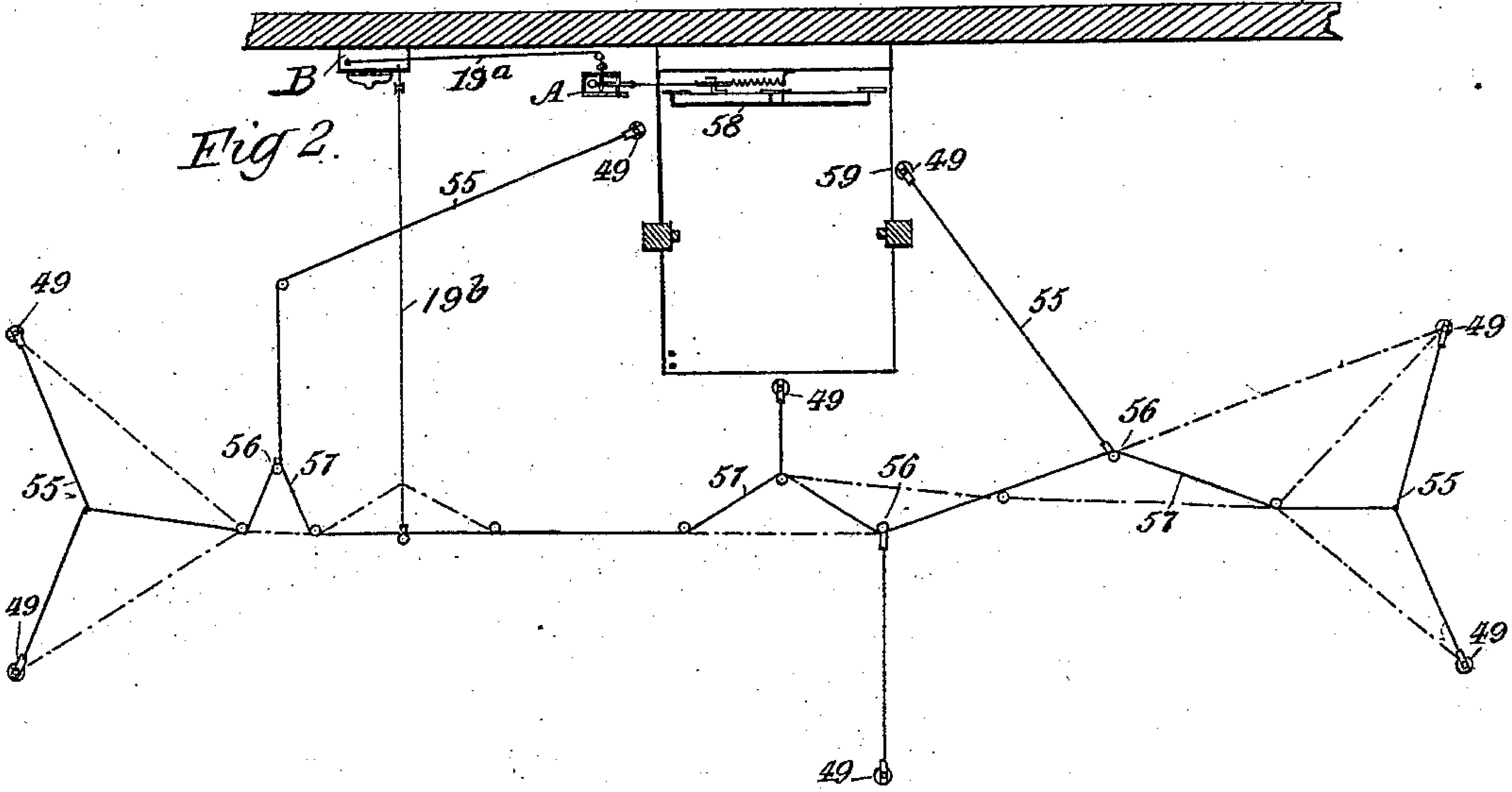

Fig 3.

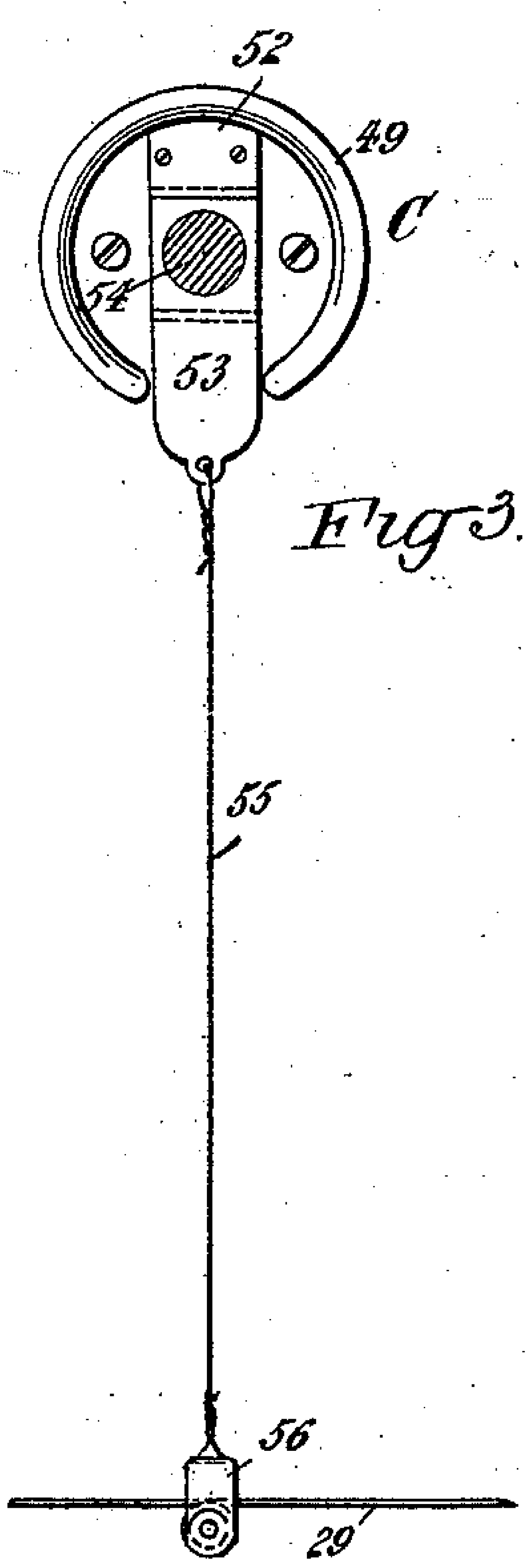

Fig. 5.

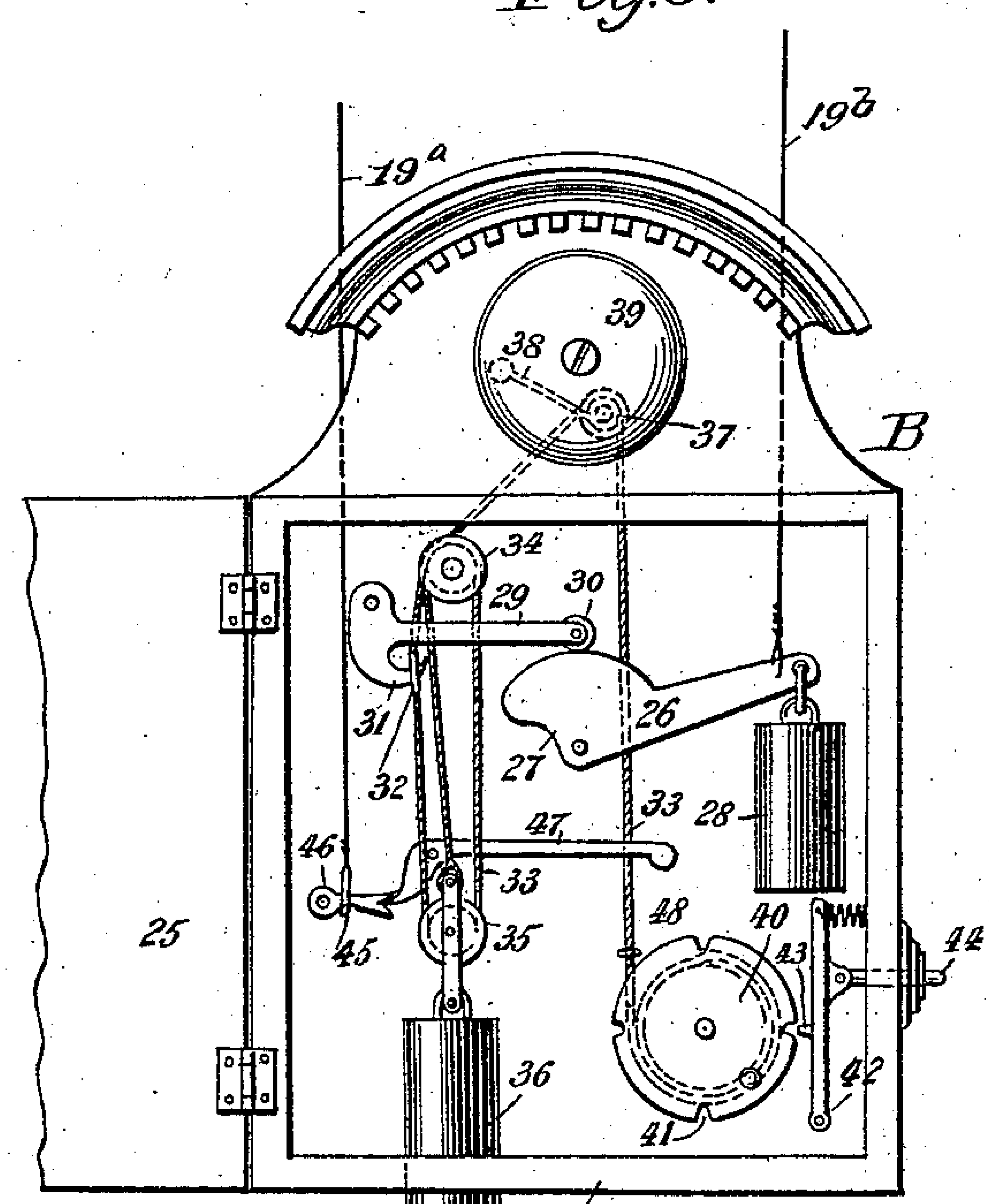

Fig 4.

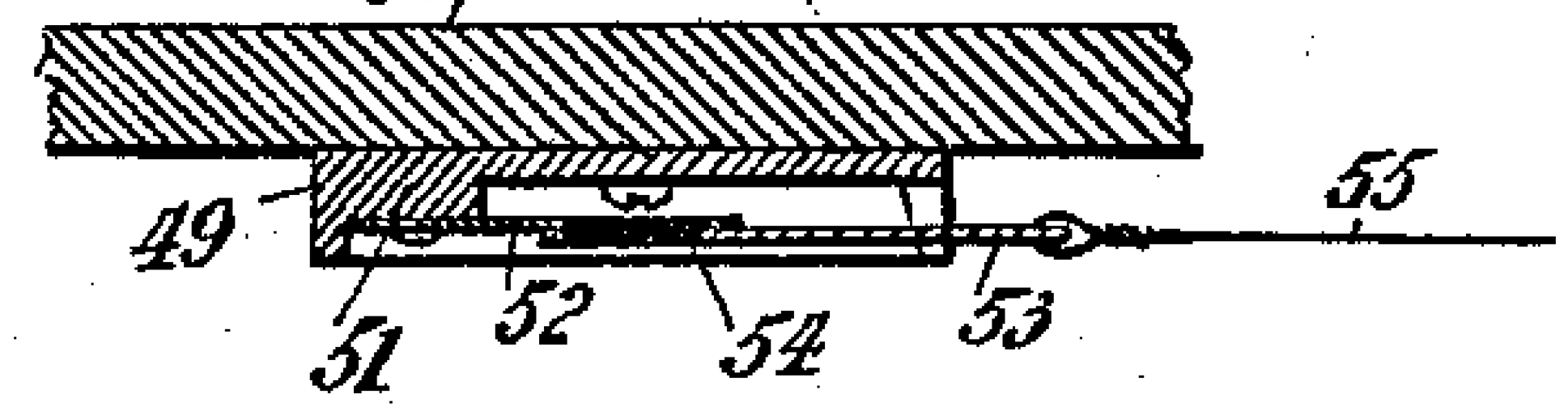

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Fig 7.

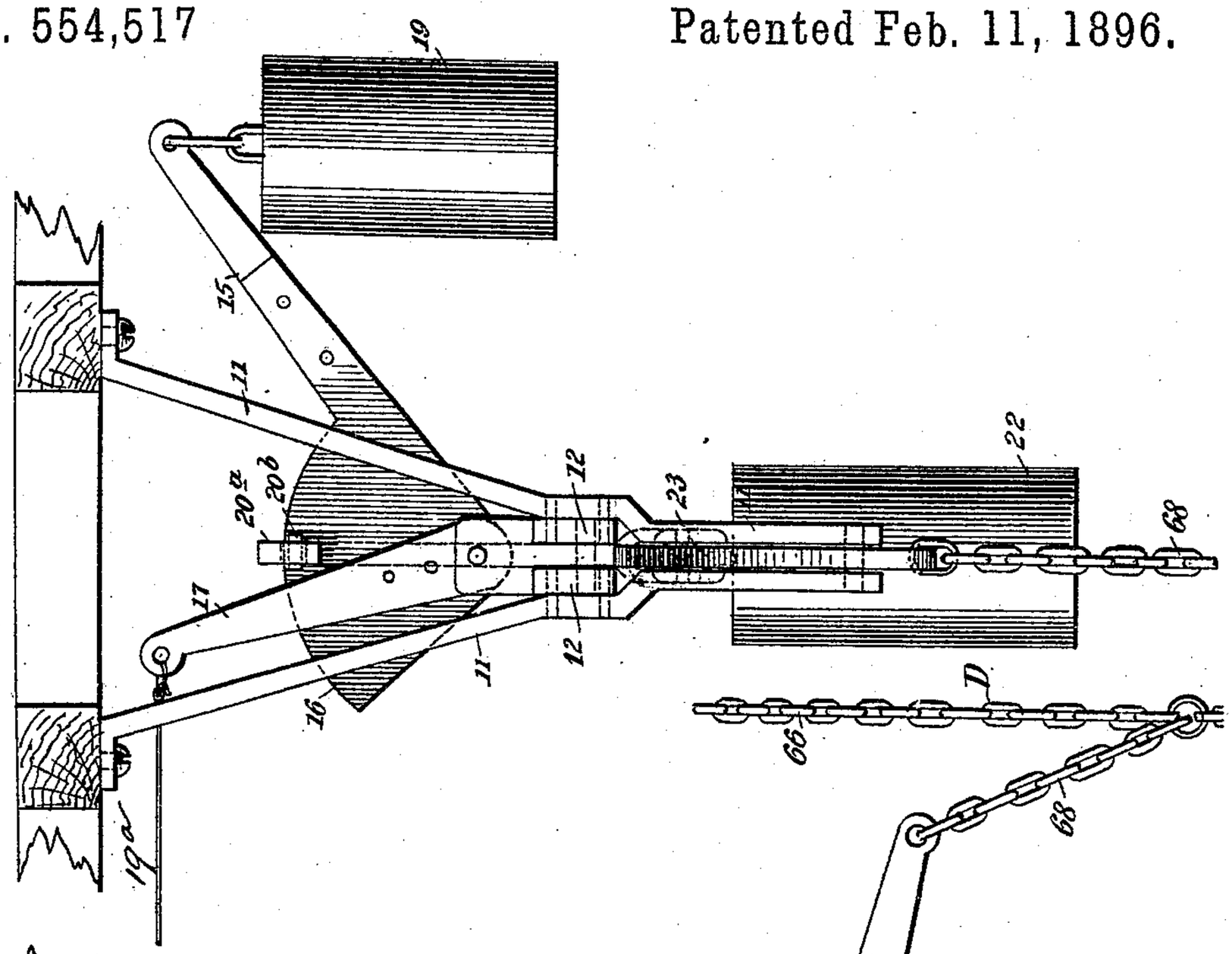

Fig 6.

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