No. 645,951. Patented Mar. 27, 1900.

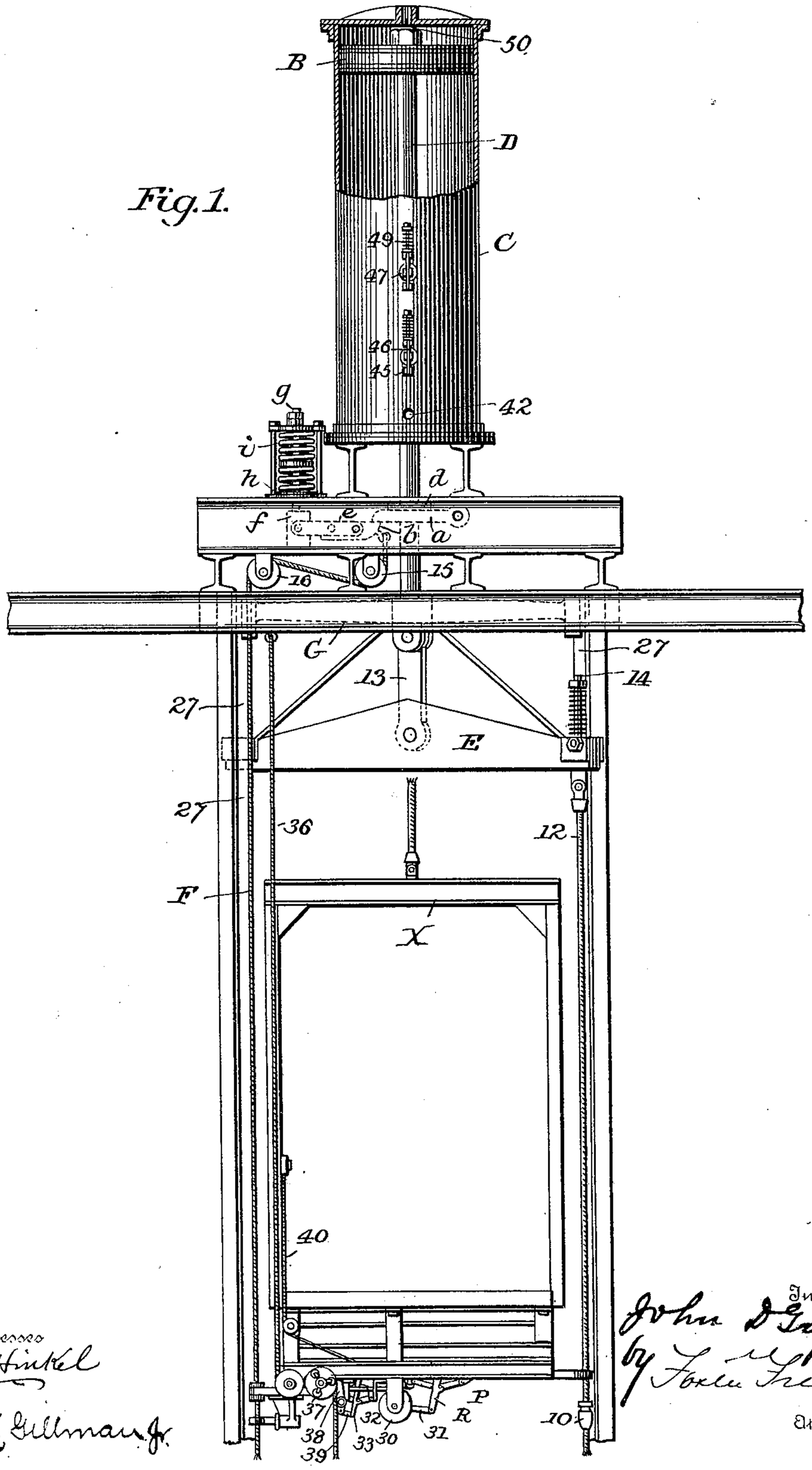
J. D. GRIFFEN.

ELEVATOR.

(Application filed Oct. 12, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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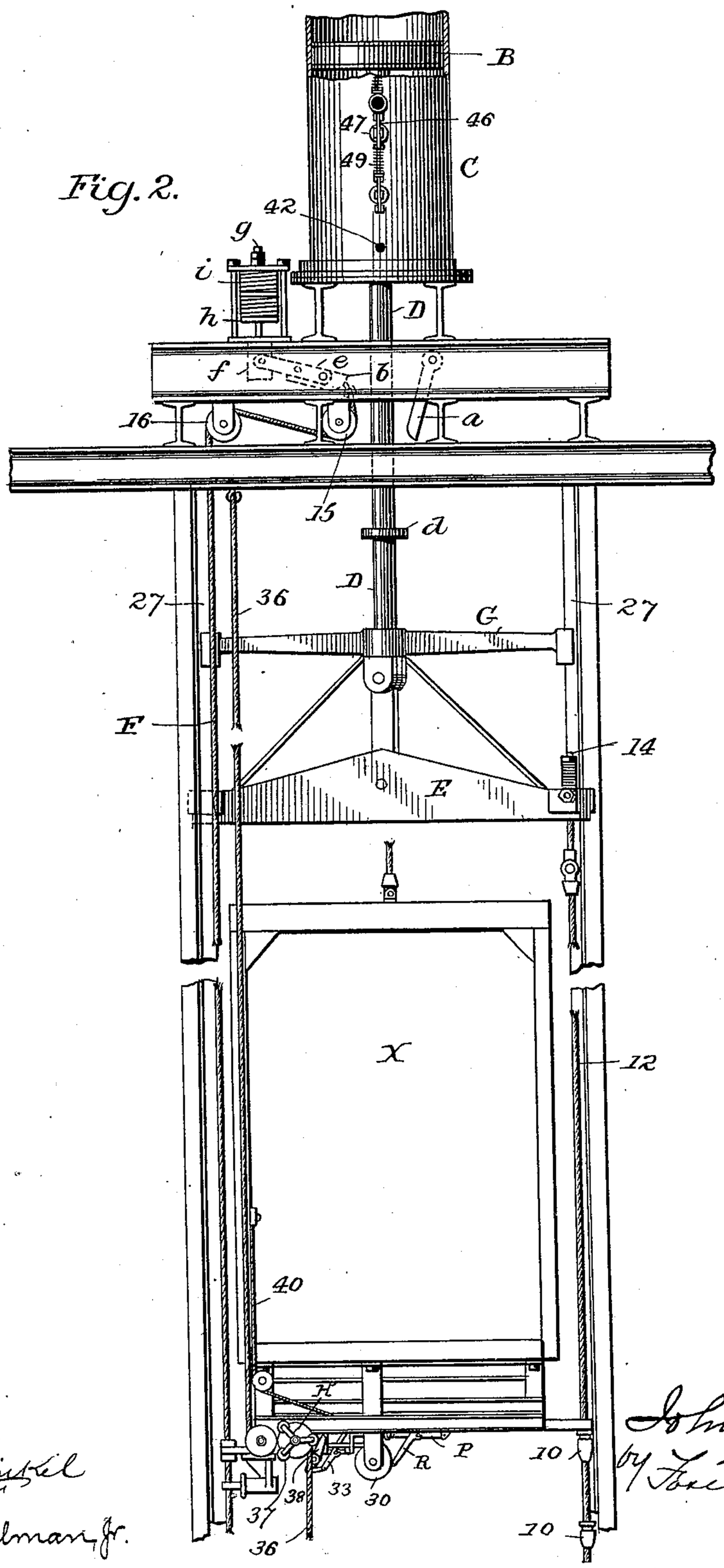
4 Sheets—Sheet 2.

Fig. 2.



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4 Sheets—Sheet 3

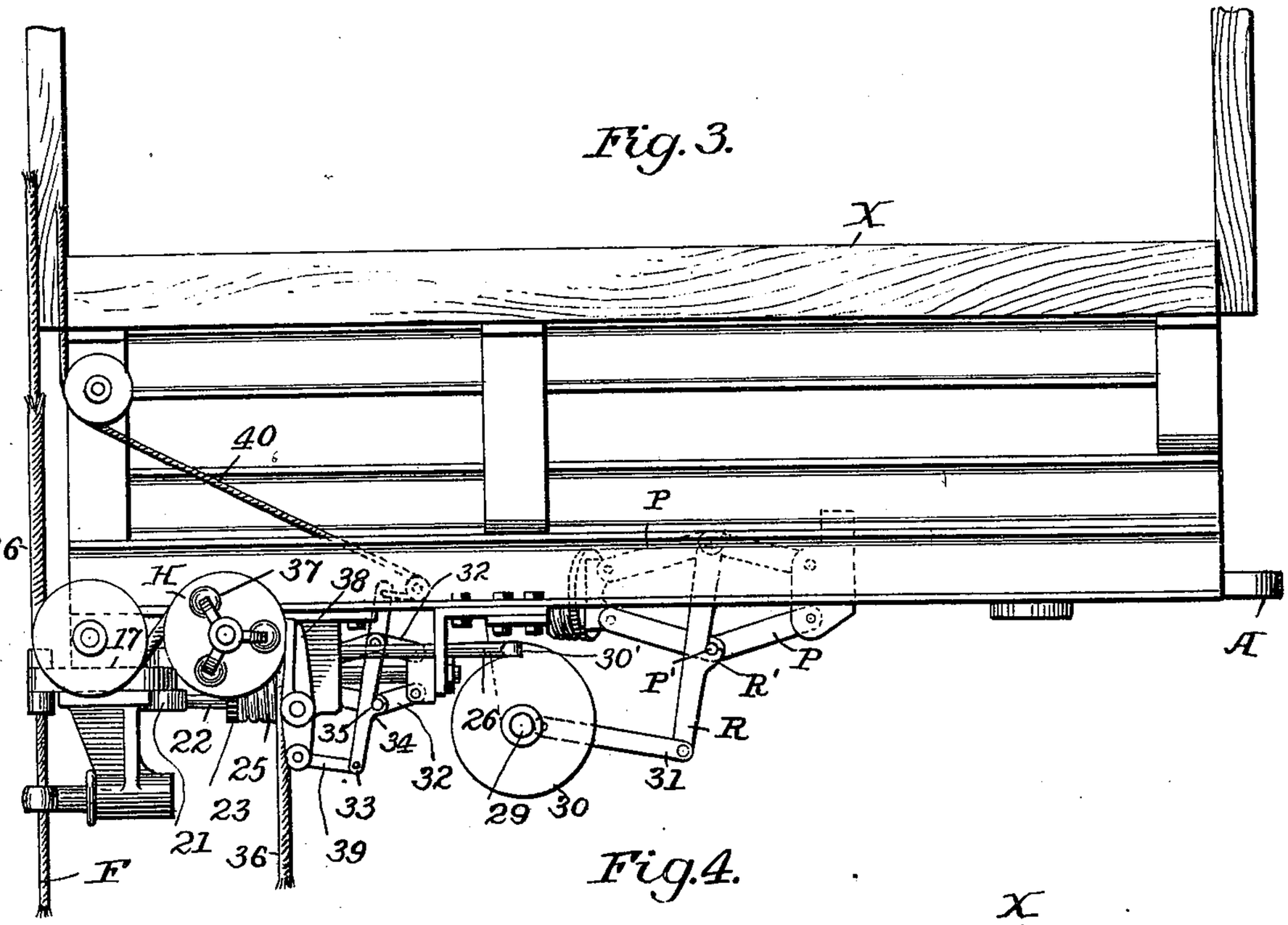
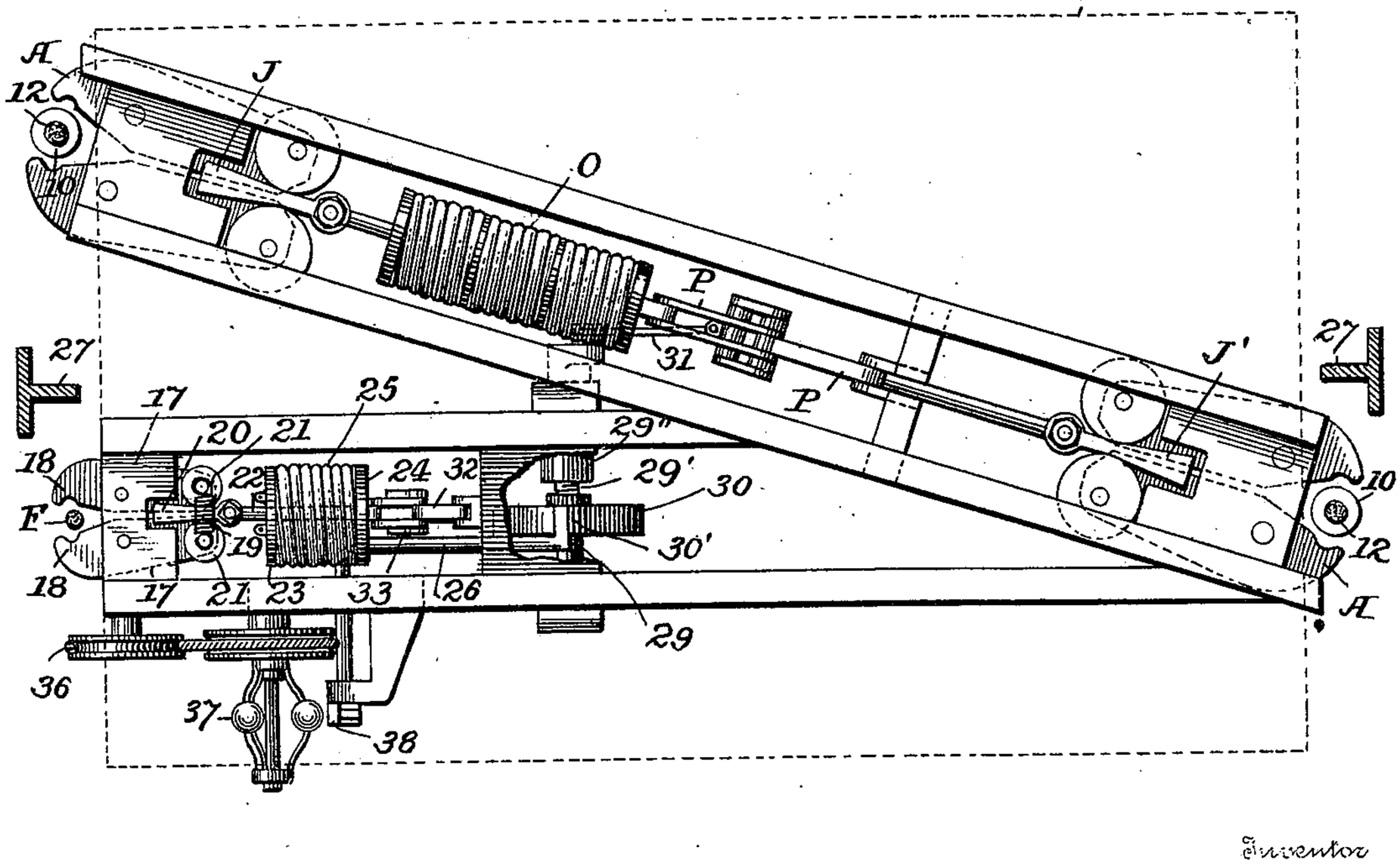


Fig. 3.

Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

Fig. 5.

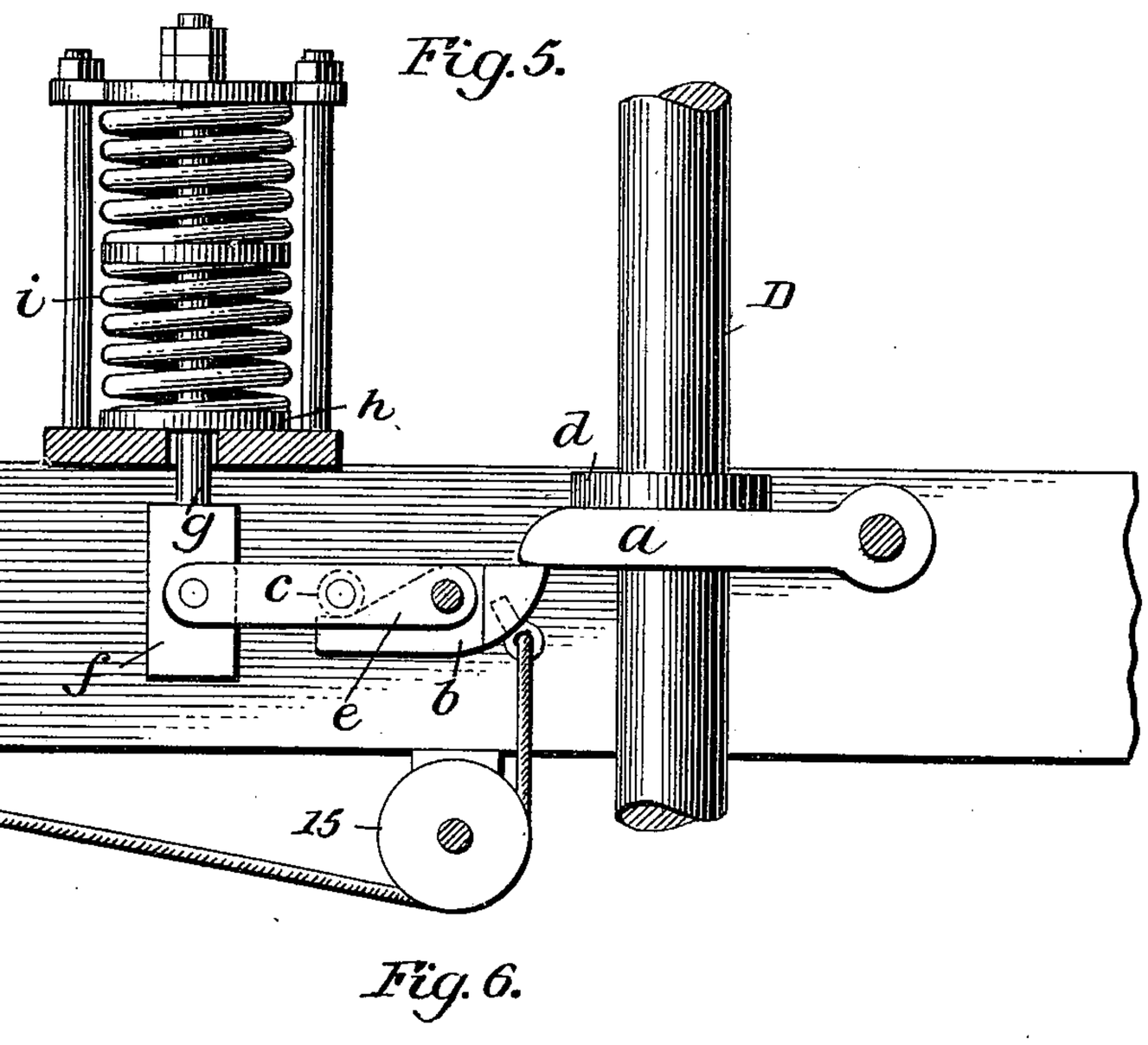


Fig. 6.

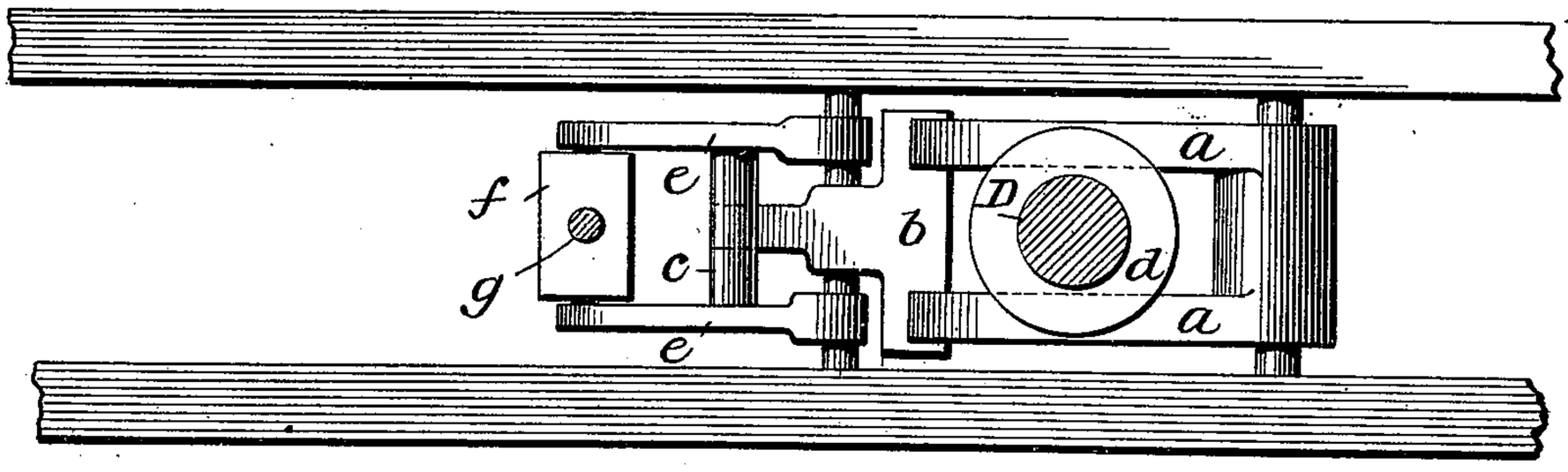


Fig. 7.

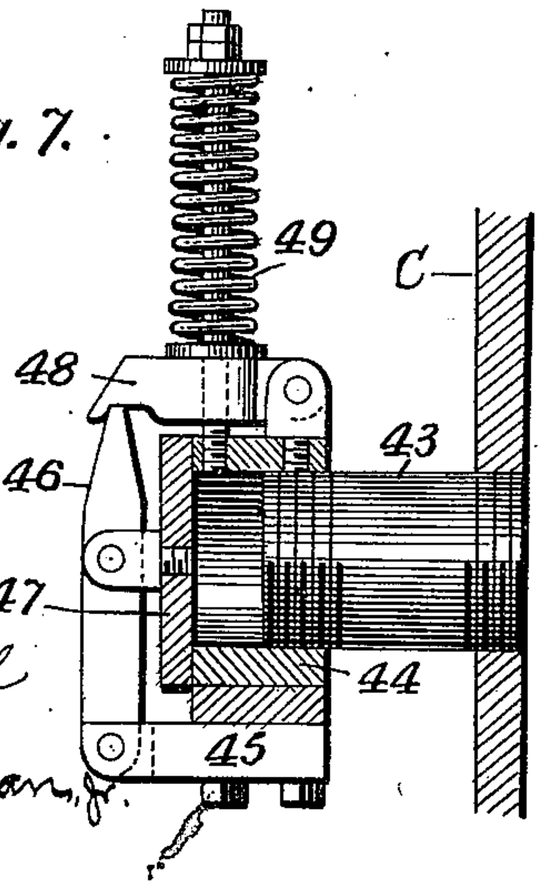
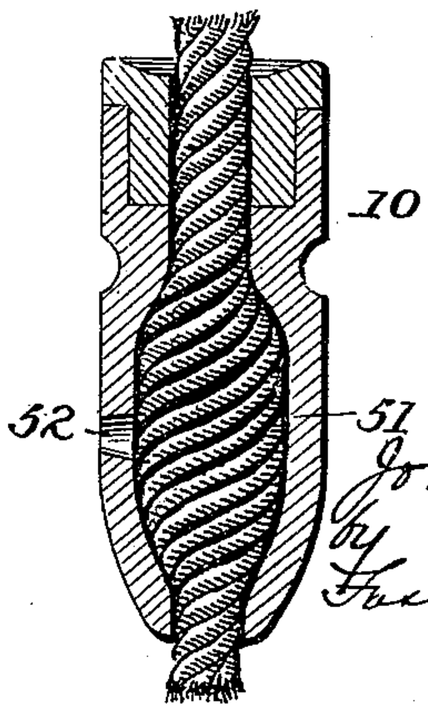


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN D. GRIFFEN, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 645,951, dated March 27, 1900.

Application filed October 12, 1899. Serial No. 733,421. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. GRIFFEN, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

My invention relates to elevator apparatus, and has for its object to prevent the injurious results ensuing when the elevator-car becomes detached from a hoisting-rope or descends at too great a speed.

The present invention is an improvement on that illustrated and described in Patent No. 628,090, granted to me July 4, 1899. In the practical tests of the invention described in said patent it was found that while the car was stopped and held suspended by the grippers and cables in all cases, no matter what speed the falling car had acquired, that at high speeds and on free falls the car sustained a heavy impact shock caused by the inertia of the pendent cables, which are in a three-hundred-foot-high building of approximately five thousand pounds weight.

The special object of the present invention is therefore to obviate these shocks, and in order to do so I provide mechanism which acts to put the pendent cables in motion before the grippers engage them.

The invention will be fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of part of an elevator apparatus sufficient to illustrate my invention. Fig. 2 is the same, showing the parts in different positions. Fig. 3 is an enlarged view showing in elevation the gripper appliances. Fig. 4 is an enlarged plan view showing the gripper appliances. Fig. 5 is an enlarged view in elevation of the balanced locking mechanism to hold the cables and piston in their normal position. Fig. 6 is a plan view of the same. Fig. 7 is a detail view of a valve-controlled relief-opening for the cylinder, and Fig. 8 is a sectional view of one of the cable-buttons.

The cage X, connected by cables or otherwise with any suitable actuating-engine, moves vertically in the well between guides and is provided with grippers A A, which are normally out of operation, but which when brought together will close around suspended cables or rods 12 12 at opposite sides of the well and after a certain movement on the cables will engage stops or buttons 10 thereon, the said stops being opposite each other upon the opposite cables and rigidly secured thereon at distances of, say, from two to four feet, the closer arrangement being preferable in proportion as the normal speed of the cage is greater. It is intended that the grippers shall be brought into action preferably automatically, so that when caused to engage the stops the said cables and cage shall move uniformly and the cables shall be the means of imparting movement to a piston B, arranged within a cylinder C, to compress the air below the piston and also preferably to cause a partial vacuum above the piston, which gradually retards the movement of the cables and cage until such movement is finally arrested.

Various different connections may be made between the cables or rods 12 and the piston in the air-cylinder, and one, two, or more such pistons and cylinders may be employed, and the cylinders may be arranged vertically at the top or bottom of the well or horizontally, the rods or cables being connected with the piston-rod when the cylinders are at the bottom of the well or horizontal through the medium of flexible connections. In the construction and arrangement shown there is a single cylinder at the top of the well, and the piston-rod D, extending downward, is pivoted through the medium of a link 13 to a yoke E, from which the cables or rods 12 are suspended. Each cable is preferably connected with a rod 14, having a spring-retarded sliding connection with the yoke E, the springs serving to relieve the shock upon the yoke, as more fully described in my patent previously referred to. To prevent lateral strains on the outer end of the piston-rod, it will preferably be connected to a cross-head G, sliding between guides 27. The yoke E is below the cross-head and diagonal thereto.

Some means must be employed to hold the piston B, the yoke E, and the cables or rods 12 in their highest or normal positions, and one means is shown as consisting of a balanced locking mechanism, which engages the piston-rod D. The piston-rod D is provided with a collar *d*, and a fork *a*, pivoted to one

side of the piston-rod, straddles the rod and engages the lower face of the collar. On the opposite side of the piston-rod a trigger *b* is pivoted intermediate its end, one end being wide enough to engage both prongs of the fork *a* and support them in substantially a horizontal position. The other end of the trigger, which is narrower, extends under a bar *c*, carried by two arms *e*, which are journaled at one end on the pivot which carries the trigger, one on each side of the latter. A block *f* is pivotally connected to the free ends of the arms *e*, and a rod *g* extends upwardly from the block and carries a collar *h*, upon which a spring *i* is seated. The pressure of the spring upon the collar is designed to be somewhat in excess of what would be just sufficient to hold the trigger *b* in position to support the piston B, yoke E, and cables 12 in their normal positions, and the tension of the spring can be adjusted to permit the trigger to be pulled away from the fork *a* by the application of any desired degree of force. When the trigger is disengaged from the fork *a*, the cables or rods 12, yoke E, and piston B will be free to move.

Some means must be provided to actuate the trigger *b*, and preferably I employ a lanyard F, which is connected to the wide end of the trigger beneath the fork *a*, said lanyard passing under a pulley 15 and over a pulley 16, from which it extends down to the bottom of the well. It is obvious that the application of the necessary force to the lanyard will result in rocking the trigger on its pivot, and thereby releasing the fork *a*.

Any preferred form of mechanism to close the grippers A around the cables may be employed, and for the purpose of showing a means of carrying out my invention I have illustrated a mechanism such as that shown and described in Patent No. 580,894, granted April 20, 1897, to C. R. Pratt, with the exception that the tripping mechanism is not actuated by the balls of the centrifugal governor and the spring O is composed of sections with interposed washers. It is unnecessary to describe this mechanism in detail, as its operation is well known to those skilled in the art to which this invention pertains. Furthermore, any other of the standard safety devices or special devices may be employed to close the gripping-jaws. Briefly described, however, the spring O is held compressed by the toggles P, and these are held in position by a catch R′ on a lever R, engaged with a pin P′. When the catch R′ and pin P′ are disengaged, the spring O will be free to expand and cause the wedges J J′ to move toward each other and spread the rear ends of the grippers A apart and close their jaws around the cables or rods 12.

Now in order to carry out my invention it is necessary to provide means to exert the necessary pull on the lanyard F, which will preferably be controlled by the centrifugal governor H, or may be controlled by a lever inside the cage. As shown, I employ an additional gripping mechanism to act on lanyard F, which is similar in some respects to that employed for the cables or rods 12; but as only one lanyard is employed the jaws at one end of the Pratt gripping mechanism are omitted and also the wedge J′ and the rod which carries it. To avoid confusion, the parts of the lanyard-gripping mechanism will be indicated by reference-numerals, although their construction is in most respects similar to that of the similar parts of the gripping mechanism for the cables or rods 12.

The grippers 17 are pivoted intermediate their ends, and their jaws 18 are held open by a spring 19, and a wedge 20, working between the rollers 21, will, when moved to the right, close the jaws on the lanyard F. The wedge is a part of a rod 22, which passes loosely through an abutting plate 23, secured to the bottom of the car and is rigidly secured to a disk 24. Between the plate and disk is a spring 25, normally tending to move the disk away from the plate. A rod 26 is secured at one end to the disk 24 to move with it. This rod 26 rests at its other end against a lug cast on the periphery of a balance-wheel or disk 30. When the spring 25 operates, the rod 26 is shot to the right and balance-wheel 30 revolves on shaft 29. This shaft has on it a screw-thread 29′ and lock-nuts 29″, and a link 31 is connected at one end to the shaft 29 eccentrically and at its other end to the lower end of the lever R. When the balance-wheel 30 turns on the screw-thread cut on the shaft 29, it will move into engagement with the lock-nut 29″ aforesaid, jam against it, and thereby cause the shaft 29 to turn. This turning of shaft 29 will pull the link 31 to the left, and thereby disengage the catch R′ from the pin P′.

The spring 25 is held in its compressed position by the toggles 32 and a lever 33, which latter has a catch 34 to engage a pin 35, similar to the catch R′ and pin P′.

The governor-rope is indicated by 36 and the governor-balls by 37. A lever 38 is pivoted intermediate its ends adjacent to the governor, one end being in position to be struck by the balls when the car acquires undue speed. A link 39 connects the other end of the lever 38 with the lever 33 in a manner substantially as shown in the Pratt patent referred to. A rope 40 may also be connected to the lever 38 and lead over suitable pulleys to a lever 41 in the cage X, so that the lever 33 may be released from within the cage, if desired.

The operation is as follows: When the car attains an undue speed from any cause, the governor-balls or one of them will strike the lever 38, and thereby actuate it to move the lever 33 and release the toggles 32, when the spring 25 will expand and close the jaws 18 on the lanyard, which will then move with the car and pull on the trigger *b*. The latter will be immediately released from the fork *a*, and

the cables or rods 12 and the piston-rod D and its piston will begin to move. In the meantime the rod 26 will also have been moved, which will result in rotating the disk 30, thereby actuating the link 31 and lever R to release the toggles P, which will result in closing the grippers A around the cables or rods 12. The tripping mechanisms will be so arranged that the grippers A will not be closed until, say, one-fifth of a second after the jaws 18 have closed on the lanyard, so that the cables 12 will have started on their down movement and acquired some momentum before the grippers A can possibly engage any of the buttons 10 on such cables.

As before stated, the special form of gripping mechanism for the lanyard and cables illustrated and described is not of my invention, and any other mechanism adapted to release the cables or rods 12 to permit them to start on their downward movement before they are gripped may be employed, for my invention contemplates the use of any means to accomplish the desired result.

In order to prevent shock and rebound, which might be caused by a too-sudden compression of the air in the cylinder, it is necessary to provide the latter with relief-openings, and actual tests have demonstrated that these openings may be very advantageously arranged as follows: An absolutely-free escape-opening 42 of about one and a half inch diameter, more or less, is provided about six or eight inches from the bottom of the cylinder, and above this at suitable intervals other openings are provided, which are normally closed by spring-seated valves. A preferred form of valve for this purpose is illustrated on enlarged scale in Fig. 7. 43 is a teat to be screwed into the cylinder, and on the outer end a sleeve 44 is secured. To a lug 45, bolted or otherwise fastened to the sleeve, an arm 46 is pivoted, and this arm carries a valve 47, adapted to close the end of the sleeve. A pivoted latch 48 engages the free end of the arm 46 when the valve is closed, and a spring 49 tends normally to hold them in engagement. The engaging surfaces of the latch 48 and arm 46 are beveled, and when the pressure against the inner face of the valve is sufficient to overcome the tension of the spring the latch and arm will be disengaged and the valve swing entirely free from the end of the sleeve, thus affording an unobstructed relief-opening. The spring can be set to permit the valve to be opened at any desired pressure. In the top head of the cylinder an opening 50 is provided, affording a free unobstructed communication between the interior of the cylinder above the piston and the atmosphere. During the stroke of the piston a partial vacuum will be created above the piston, which will gradually decrease as the speed of the piston decreases and at the end of the stroke will be entirely overcome by the inflow of air through the opening 50. There will also be a final compressed-air cushion of about six inches between the bottom of the cylinder and the piston. Experience has demonstrated that with such arrangement of openings in the cylinder there is no rebound and scarcely any shock in stopping the cage.

Another important necessity is that the buttons 10 shall be absolutely immovable on the cables 12, because it is intended that they shall form the support for the grippers, which latter are when closed designed to slide loosely on the cables, thereby preventing any injury to the latter. A sectional view of one of the buttons 10 is shown in Fig. 8. As shown, the button is provided with an enlarged interior cavity 51, preferably oval in shape. After the button is threaded on the cable the strands of the latter are opened between the ends of the button by giving it a right and left twist, and by the use of suitable clamps drawing on the cable in opposite directions the opened strands will be spread out within the cavity 51, after which molten Babbitt metal is poured in through the opening 52 until all the interstices in the distended part of the cable are filled, and the button will then be immovably secured upon the cable.

Without limiting myself to the details of construction of any of the parts shown and described, I claim—

1. The combination with an elevator-car, of a cylinder and piston, suspended cables connected to the piston and movable therewith, means for holding the piston in its normal position, grippers on the car to engage the cables, means to release the piston, and means to cause the grippers to engage the cables subsequent to the release of the piston, substantially as set forth.

2. The combination with an elevator-car, of a cylinder and piston, suspended cables connected to the piston and movable therewith, a balanced locking mechanism to support the piston and cables in their normal position, grippers on the car to engage the cables, means to trip the locking mechanism and release the cables and piston, and means to cause the grippers to engage the cables subsequent to their release, substantially as set forth.

3. The combination with an elevator-car, of a cylinder and piston, suspended cables connected to the piston and movable therewith, grippers on the car to engage the cables, and means to put the cables in motion prior to their being engaged by the grippers on the car, substantially as set forth.

4. The combination with an elevator-car, of a cylinder and piston, suspended cables connected to the piston and movable therewith, grippers on the car to engage the cables, and means to put the cables in motion prior to their being engaged by the grippers on the car, said means being brought into action automatically when the speed of the car exceeds the normal, substantially as set forth.

5. The combination with an elevator-car, of a cylinder piston and piston-rod, suspend-

ed cables connected to the piston-rod and movable therewith, a balanced locking mechanism engaging said piston-rod to hold it and the cables in their normal positions, a lanyard leading from the locking mechanism and extending down the elevator-well, means on the car to exert a pull on the lanyard to release the locking mechanism from the piston-rod, grippers on the car to engage the cables, and means to cause the grippers to engage the cables subsequent to the release of the piston-rod, substantially as set forth.

6. The combination with an elevator-car, of an air-cylinder and piston, suspended cables connected to and movable with the piston, grippers on the car to engage said cables, the said cylinder having a plurality of relief-openings, one of which is free and the others controlled by spring-pressed valves, substantially as set forth.

7. The combination with an elevator-car, of an air-cylinder and piston, suspended cables connected to and movable with the piston, grippers on the car to engage the cables, the said cylinder being provided with relief-openings in its side one in advance of the other, the opening nearest the head where the stroke ends being unobstructed, and the others normally closed by spring-seated valves, substantially as set forth.

8. The combination with an elevator-car, of an air-cylinder and piston, suspended cables connected to and movable with the piston, and gripper on the car to engage said cables, the cylinder having relief-openings in its side, and an unobstructed opening in its head for the passage of air to relieve the vacuum behind the moving piston, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN D. GRIFFEN.

Witnesses:
J. H. GOLDBERG,
GILE MANNY.