No. 850,619. PATENTED APR. 16, 1907.

R. C. BROMLEY.

ELEVATOR VALVE MECHANISM.

APPLICATION FILED MAY 9, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

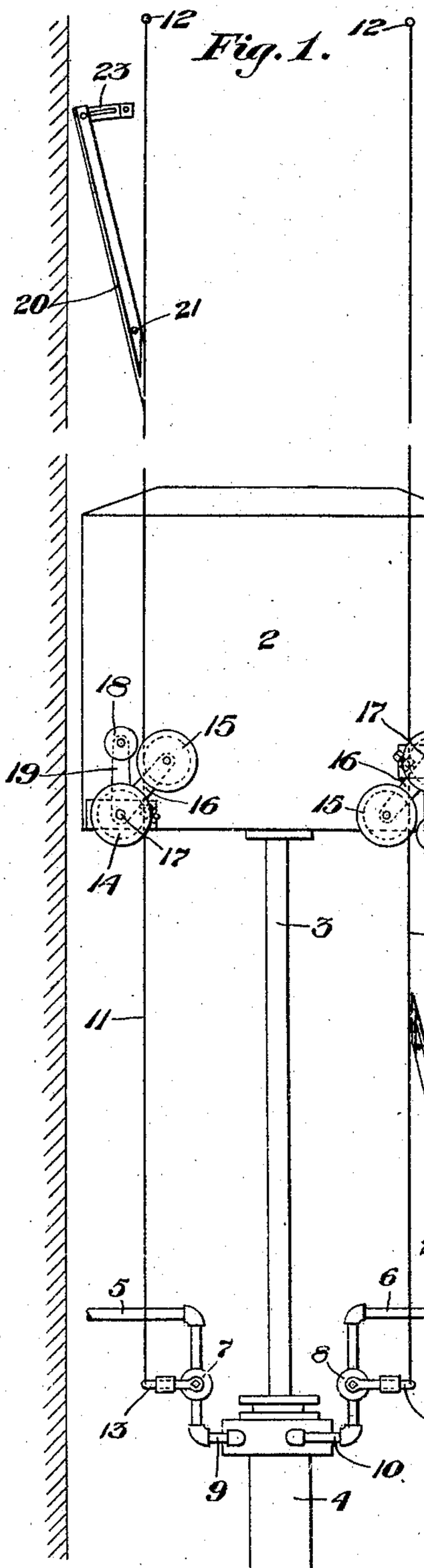


Fig. 2.

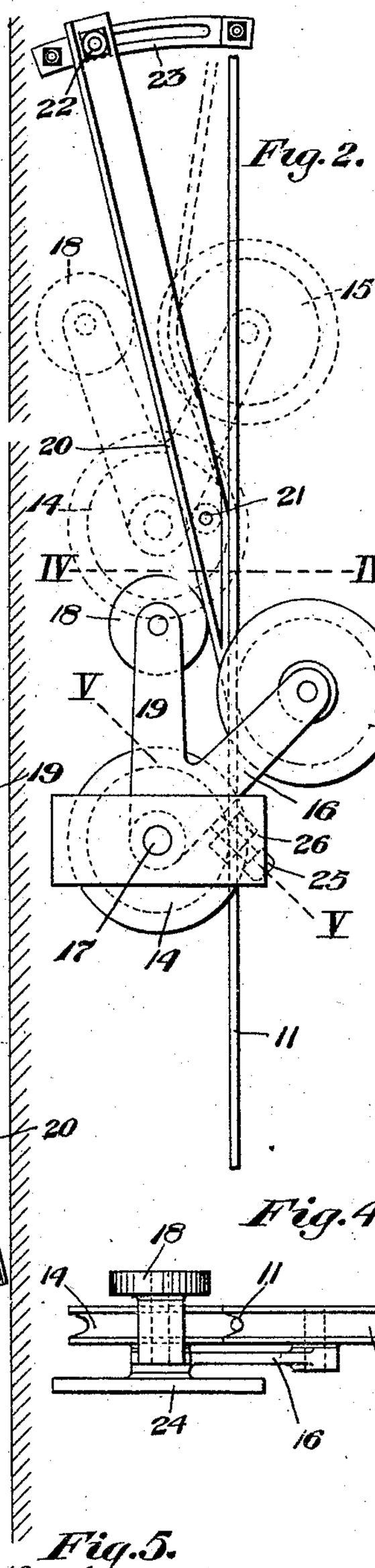


Fig. 3.

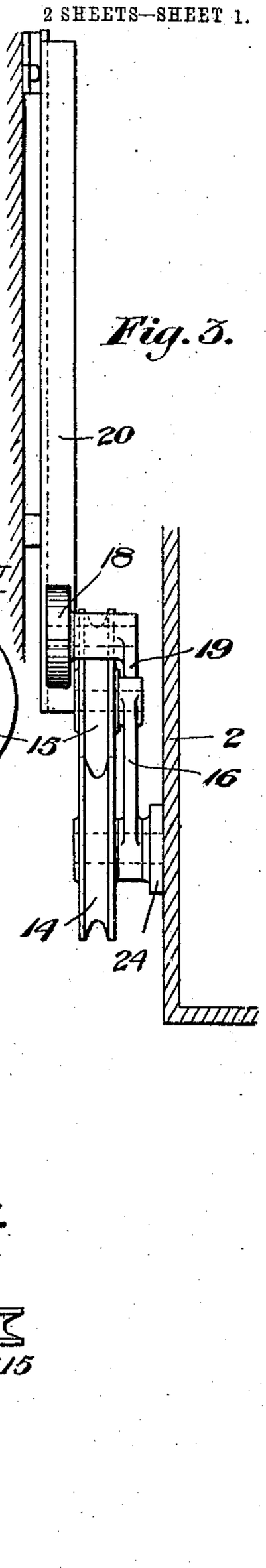
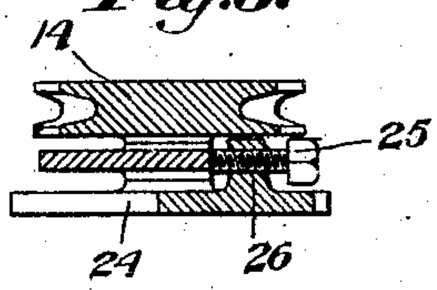


Fig. 4.

Fig. 5.



Witnesses:

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Inventor:

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by C. M. Clarke

Atty.

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2 SHEETS—SHEET 2.

Fig. 6.

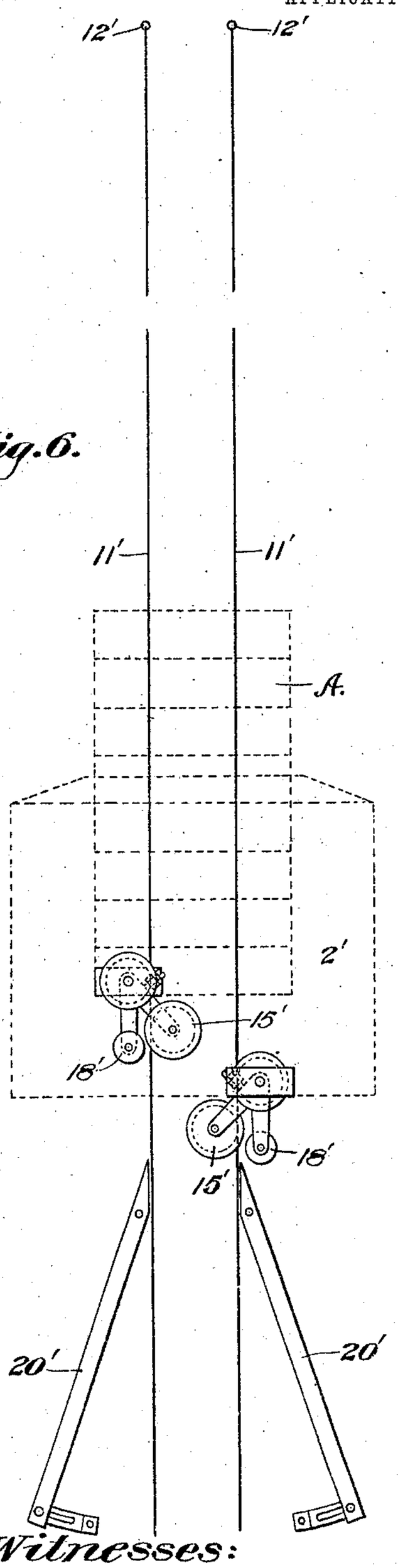

Fig. 7.

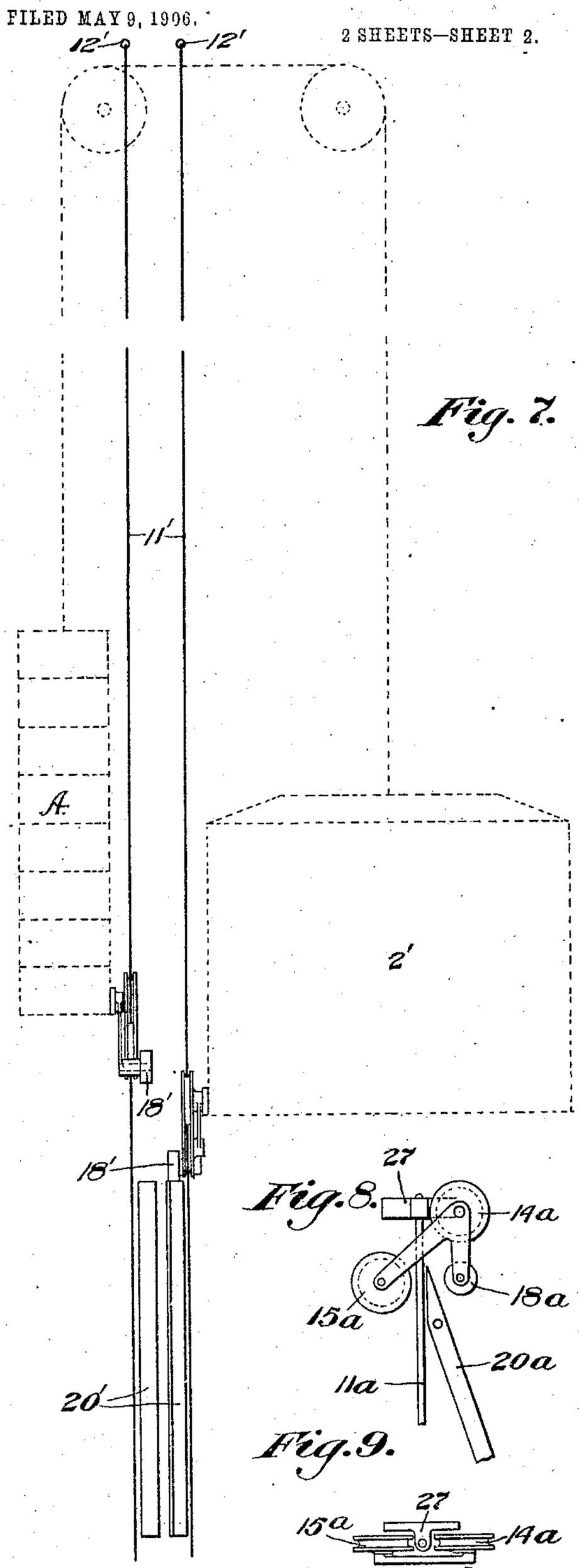

Fig. 8.

Fig. 9.

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UNITED STATES PATENT OFFICE.

ROBERT C. BROMLEY, OF BEN AVON, PENNSYLVANIA.

ELEVATOR VALVE MECHANISM.

No. 850,619. Specification of Letters Patent. Patented April 16, 1907.

Application filed May 9, 1906. Serial No. 315,888.

To all whom it may concern:

Be it known that I, ROBERT C. BROMLEY, a citizen of the United States, residing at Ben Avon, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Elevator Valve Mechanism, of which the following is a specification, reference being had therein to the accompanying drawings, forming part of the specification.

My invention refers to improvements in automatic controlling apparatus for hydraulic elevators, having for its object to provide means for automatically arresting the upward or downward travel of the car at the desired limit of its movement in either direction.

In carrying out the invention I employ mechanism mounted on a moving portion of the apparatus—as, for instance, the car or the counterweight—so arranged with relation to the valve and its operating mechanism that it will actuate the controlling-valve to shut off the flow of fluid thereto or therefrom.

Referring now to the drawings, Figure 1 is a longitudinal vertical section of portions of an elevator-shaft, showing a car in elevation and illustrating one application of my improvement. Fig. 2 is a detail view, on an enlarged scale, of the mechanism for engaging the valve cord or cable. Fig. 3 is an edge view of Fig. 2, showing the movable and stationary portions of the apparatus in operative relation to each other. Fig. 4 is a plan view of the swinging sheave-frame indicated by line IV IV of Fig. 2. Fig. 5 is a cross-sectional detail view on the line V V of Fig. 2. Fig. 6 is a view similar to Fig. 1, showing a modified arrangement whereby both the car and counterweight are utilized to close the valve at the desired downward and upward limit of travel of the car. Fig. 7 is a view similar to Fig. 6 at right angles thereto. Figs. 8 and 9 are detail views illustrating the construction employed for short cables to be engaged only at or about the limit of travel of the elevator-car.

2 represents the elevator-car of any suitable construction, mounted within the usual shaft upon a supporting-plunger 3, located in a cylinder 4 or suitably suspended by the usual cable or in any other manner. The operation of the elevator is controlled by passage of fluid through the supply and exhaust connections 5 and 6, by which fluid under pressure is admitted to the cylinder or other actuating element to raise the elevator-car and through which on lowering of the elevator-car the fluid may escape through the waste-pipe, respectively.

7 8 represent controlling-valves by which, through connections 9 and 10, pressure is admitted from the supply and from which exhaust is discharged to the waste.

The specific construction or operation of the valve mechanism *per se* is not essential to the operation of the invention, nor do I desire to be limited to any specific form, inasmuch as the present invention does not relate to the valve mechanism itself but to the means by which the supply or exhaust through any suitable valve mechanism is automatically controlled at or about the desired limit of travel of the car.

In carrying out my invention I utilize a cable or cord or other similar flexible connection 11, attached at the top to a stationary support 12 and depending vertically or substantially vertically within the elevator-shaft and connected with the valve-actuating mechanism or lever 13, together with means mounted on a traveling portion of the apparatus so arranged as to engage said vertically-disposed connection 11 at or about a predetermined point in such a manner as to exert an upward pull upon the valve-lever or to correspondingly actuate the valve-controlling mechanism whereby the circulation of the fluid through the valve will be checked, resulting in automatic stoppage of the car.

In the principal figures of the drawings I employ a bearing sheave-wheel 14, arranged with its grooved periphery in substantial alinement with the cable 11, and a swinging sheave-wheel 15, mounted in a swinging frame or arm 16, pivoted at 17, preferably upon the pivotal bearing of wheel 14, with means for deflecting said frame and wheel 15 to engage the cable 11 and to produce a kink or bend in it. For the purpose of tilting said frame or arm 16 at the desired point I employ a bearing-roller 18, likewise mounted in an arm 19, forming a part of the tilting frame and so located that it will come into contact with the inclined cam or switch bar 20. Said cam is so arranged with relation to the desired limit of travel of the car that it will engage bearing-wheel 18 to effect the

bending and resulting shortening of cable 11 in the manner indicated in dotted lines in Fig. 2, thereby resulting in an upward lift of valve-lever 13. The cam-bar 20 is conveniently located with relation to cable 11, as shown, and is preferably pivoted, as at 21, so that its inclination may be adjusted to provide for more or less abrupt engagement with bearing-roller 18. For this purpose its free end may be adjustably secured by bolt 22 in a slotted frame 23, as clearly shown.

The pivoted frame carrying the wheel 15 and roller 18, and likewise wheel 14, are mounted upon a bearing-plate 24, secured upon the side of the elevator-car, as shown, or in any other suitable or convenient manner, or the structure may be otherwise mounted to secure the same results.

For the purpose of adjusting the position of sheave-wheel 15 with relation to cable 11 I employ a set-screw 25, mounted in lug 26, bearing underneath arm 16, as clearly shown, whereby the sheave-wheel 15 may be accurately set so as to insure engagement with the cable with a minimum of lost motion.

The operation is as follows: Assuming the car to be descending, the bearing-wheel 18 will make contact with the inclined face of cam-bar 20, thereby shifting wheel 15 inwardly to engage the cable, sheave-wheel 14 maintaining engagement therewith and holding the cable in normal vertical position above said wheel, thereby producing a kink or bend in the cable, whereby the distance between the support 12 and point of attachment with lever 13 is decreased, resulting in the lifting of said lever, closing of valve 8, shutting off the exhaust, and arresting the downward travel of the car. Assuming the car to be ascending, bearing-wheel 18 will in like manner engage the inclined cam-bar 20 in the same manner and likewise actuate lever 13 of the supply-valve 7, thereby shutting off the supply and resulting in stoppage of the upward travel of the car.

In Figs. 6 and 7 I have shown the same mechanism attached, respectively, to the car 2′ and the usual counterweight A. (Shown in dotted lines.) In this arrangement the cables 11′ are preferably connected at the upper end of the elevator-shaft, as at 12′ 12′, while the inclined cam-bars 20′ 20′ are both located at the lower portion of the shaft, as shown, and in position for engagement by one or the other of the downwardly-traveling rollers 18, which actuate sheave-wheels 15′, each set of wheels being mounted upon the elevator-car and counterweight, respectively. It will be obvious that the downward limit of travel of the counterweight A corresponds to the desired upward limit of travel of the elevator-car 2′, and by this construction the actuating-cams are both located at the lower portion of the shaft. The construction, arrangement, and mode of operation and the result and effect of the device otherwise is the same as above described.

In Figs. 8 and 9 I have illustrated a construction wherein I obviate the necessity of employing cables for the full length of the elevator-shaft, utilizing comparatively short cables 11ª, connected a short distance above the engaging terminal of cam-bar 20ª and secured in any suitable supporting or holding device, as a lug 27. With this arrangement it becomes necessary to somewhat separate the sheave-wheels 14ª and 15ª, as shown in Fig. 8, to provide sufficient clearance for lug 27, as shown in Fig. 9, whereby when said wheels have arrived in their downward travel at the location of said lug they will pass along it at each side downwardly and will be in position to engage the cable 11ª immediately upon engagement of bearing-roller 18ª with cam-bar 20ª. It will be understood that wheels 14ª and 15ª are so mounted upon the elevator-car or upon the counterweight and that the car and counterweight are suitably maintained in unvarying alinement as to insure engagement of said wheels with the cable at the proper time. In other words, it is not necessary to maintain engagement with the cable during the full travel of the car or counterweight or to make engagement therewith, except immediately before the desired stoppage of the car either in its up or down travel, and such construction thereby obviates the necessity and expense of cables for the full length of the shaft. It will be understood that the cable 11ª is in duplicate arrangement, as in Fig. 6, for utilization with the car and counterweight or that but one of such short cables may be used with another one of the full length of the shaft, as in Fig. 1, where it is desirable to mount the operating-sheaves on the car only. It will be further understood that different mechanism may be employed to engage the cable, so as to effect a pull upon the valve-lever or actuating mechanism or equivalent stop-motion device, and that the construction may be otherwise changed or varied by the skilled mechanic in various features or details without departing from the invention; but all such changes are to be considered as within the scope of the following claims.

What I claim is—

1. The combination with a stop-motion device, a normally straight vertically-pendent stationary element connected therewith, and a cam; of a normally stationary and a swinging sheave-wheel mounted on an elevator-car, and an arm adapted to actuate the sheave-wheel provided with a bearing portion arranged to engage the cam, substantially as set forth.

2. The combination with a stop-motion device, a normally straight vertically-pend-

ent stationary element connected therewith, and an adjustable cam-bar; of a normally stationary and a swinging sheave-wheel mounted on an elevator-car, and an arm adapted to actuate the sheave-wheel provided with a bearing portion arranged to engage the cam, substantially as set forth.

3. In an elevator, the combination with a motor and a valve controlling the circulation of the operating fluid thereof; of an elevator-car, a normally straight vertically-pendent stationary element connected with the lever of said valve, a cam, a normally stationary sheave-wheel mounted on the car, and a swinging frame also mounted on the car provided with a swinging wheel and an arm having a terminal arranged to engage the cam at the desired limit of travel to deflect the swinging sheave-wheel, substantially as set forth.

4. In an elevator, the combination with a motor and separate supply and exhaust valves controlling the circulation of fluid to and from said motor; of an elevator-car, normally straight vertically-pendent stationary cables depending from the top of the elevator-well and connected with the levers of the supply and exhaust valves respectively, a cam-bar located at the top and bottom of the well respectively, and separate actuating mechanisms for operating one or the other of said cables to operate either the supply or exhaust valve consisting of a relatively stationary sheave-wheel and a swinging frame carrying a sheave-wheel and an arm having a terminal arranged to engage its appropriate cam, substantially as set forth.

5. In an elevator, the combination with a stop-motion device and a normally straight vertically-pendent stationary cable connected therewith, of a stationary sheave-wheel, and a swinging sheave-wheel arranged to cooperate therewith and engage the cable, and means for actuating the swinging sheave-wheel, substantially as set forth.

6. In an elevator, the combination with a stop-motion device and a normally straight vertically-pendent stationary cable connected therewith, of a vertically-traveling sheave-wheel, a swinging frame provided with a sheave-wheel adapted to engage the cable, said frame having a bearing device, and a relatively stationary element adapted to engage said bearing device, substantially as set forth.

7. In an elevator, the combination with a stop-motion device and a vertically-pendent stationary cable connected therewith, of a vertically-traveling sheave-wheel, a swinging frame provided with a sheave-wheel adapted to engage the cable, said frame having a bearing device, and a relatively stationary inclined cam adapted to engage said bearing device, substantially as set forth.

8. In an elevator, the combination with a stop-motion device, of a vertically-pendent stationary cable connected therewith, a vertically-traveling sheave-wheel mounted on the elevator-car, a swinging frame mounted on the journal of said wheel and provided with a sheave-wheel arranged to engage the cable and swing with relation to said first-named sheave-wheel, said frame having a terminal bearing-roller, and a relatively stationary inclined cam arranged to engage said bearing-roller to actuate the device, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT C. BROMLEY.

Witnesses:

CHAS. S. LEPLEY,

C. M. CLARKE.