

(No Model.)

7 Sheets—Sheet 1.

J. R. HAMILTON.
ELEVATOR.

No. 561,223.

Patented June 2, 1896.

Fig. 1.

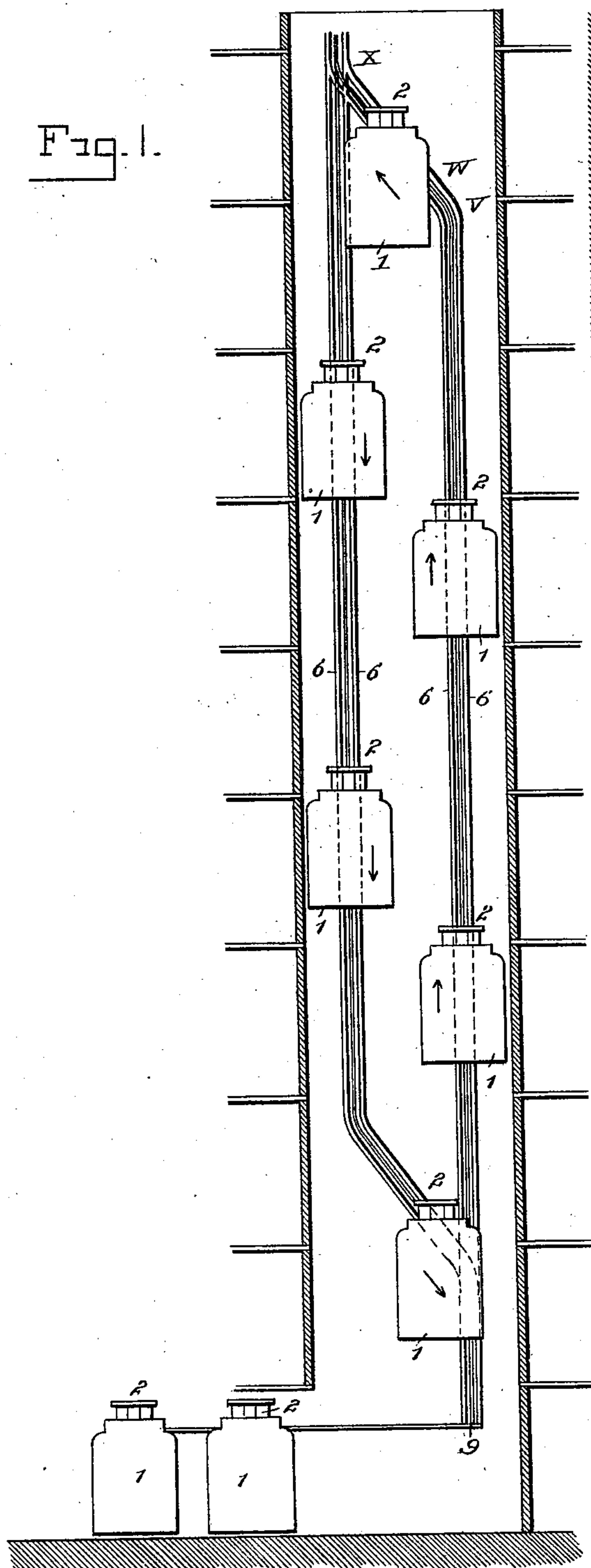
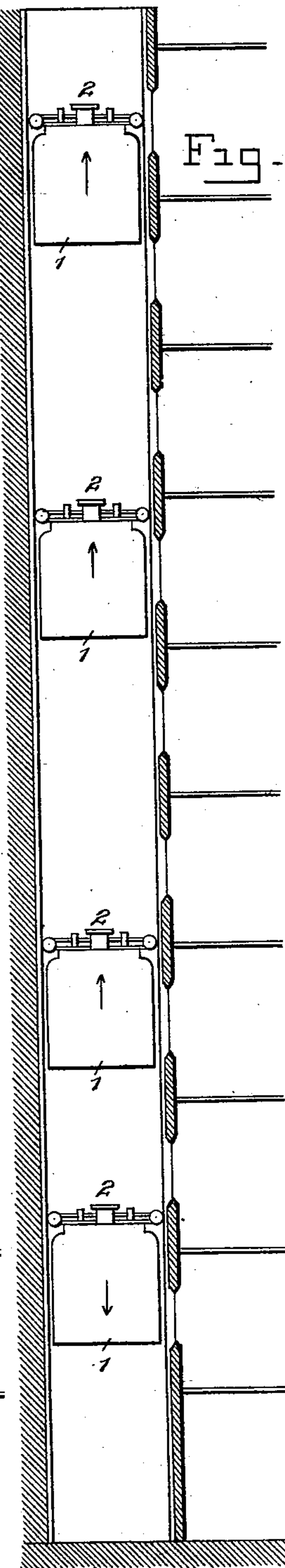


Fig. 2.



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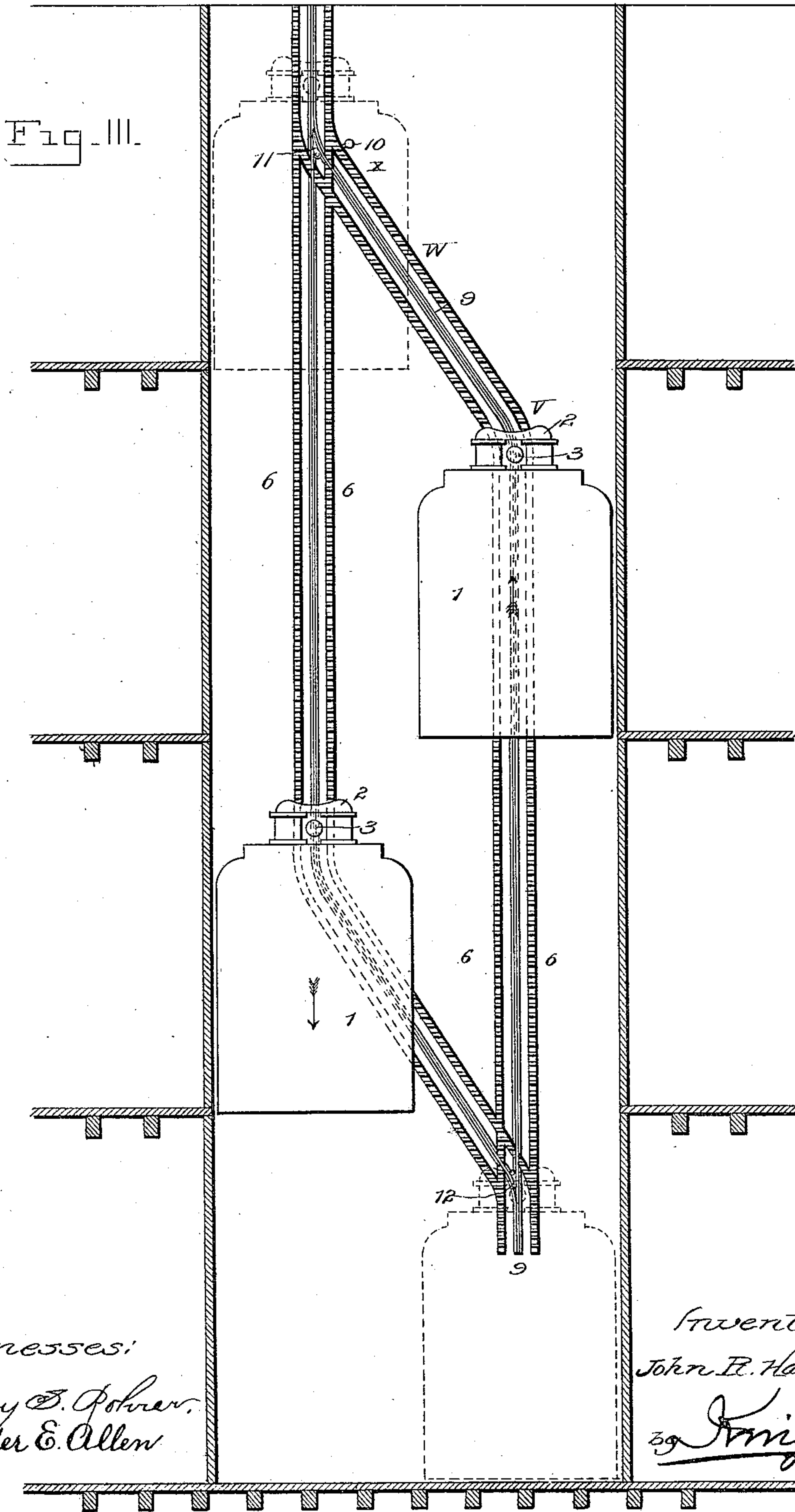
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(No Model.)

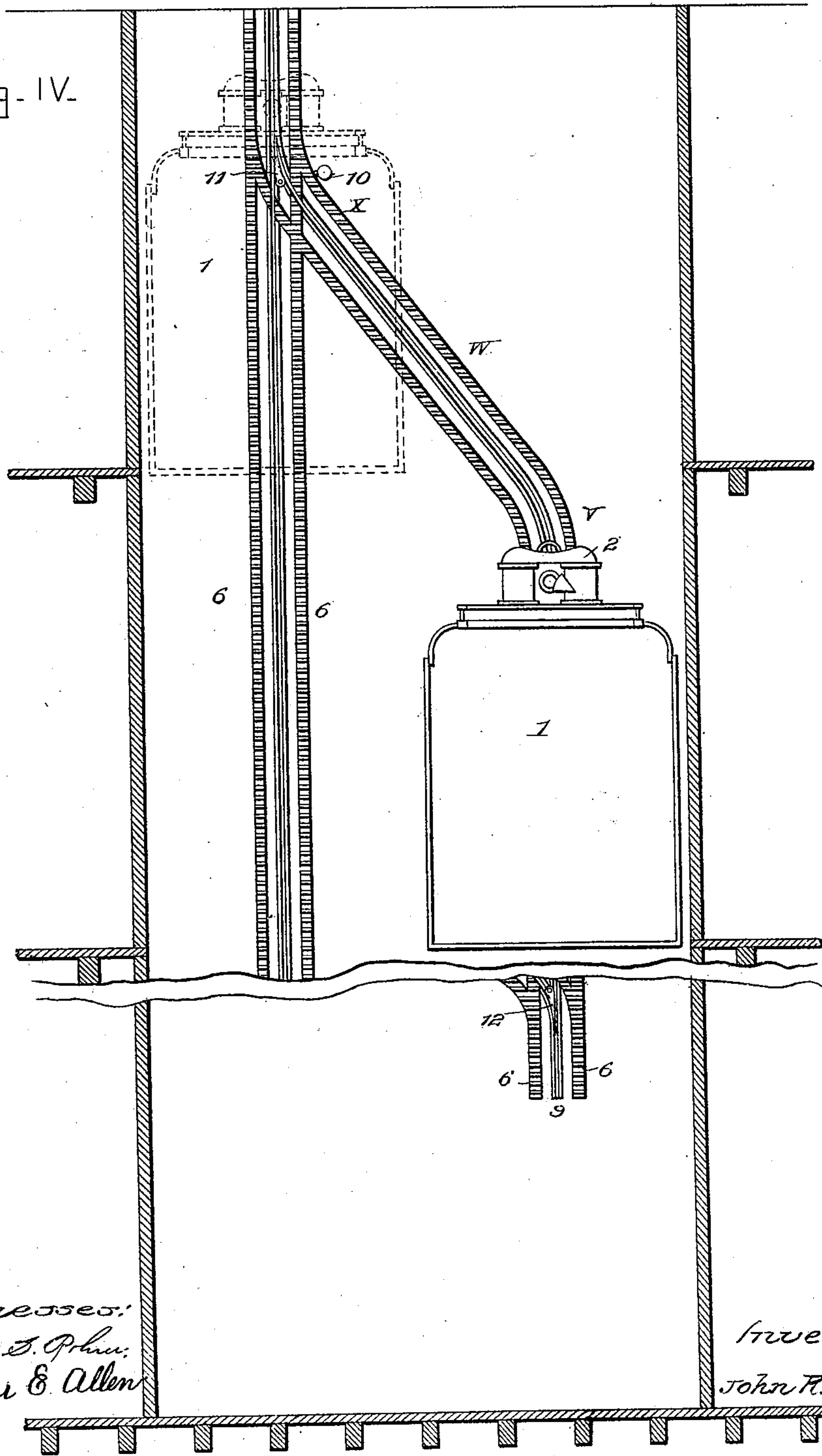
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Fig. IV.



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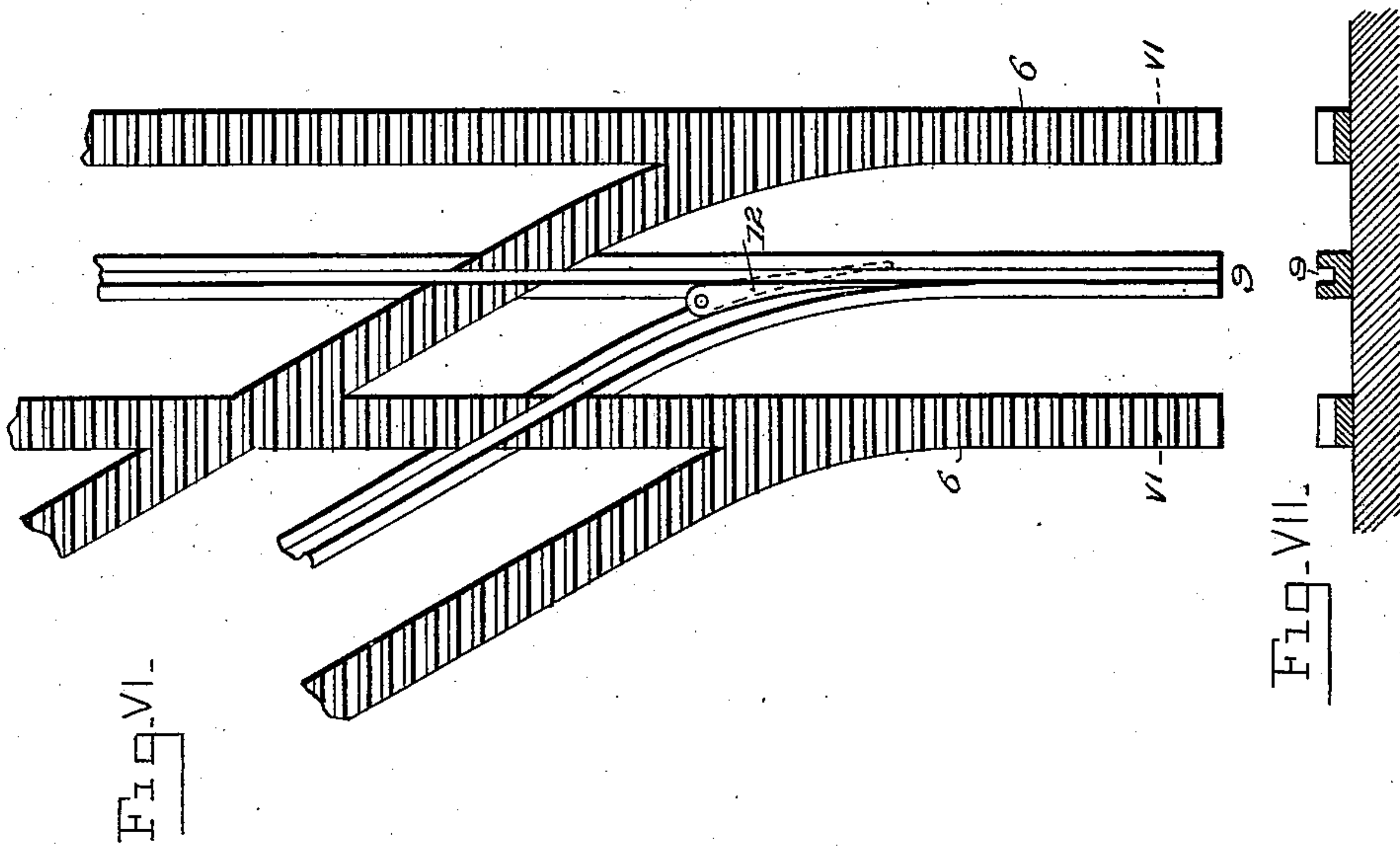
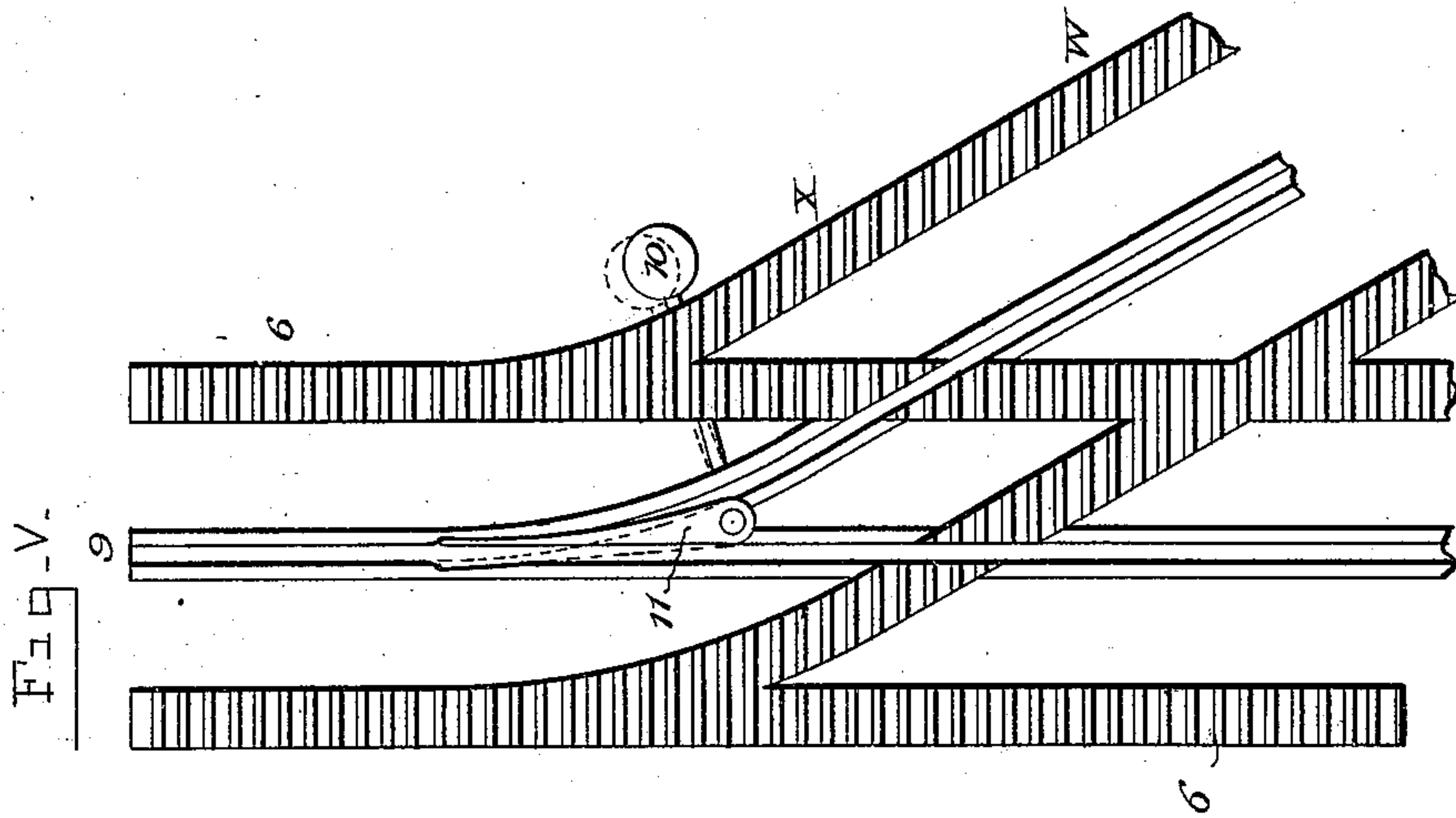
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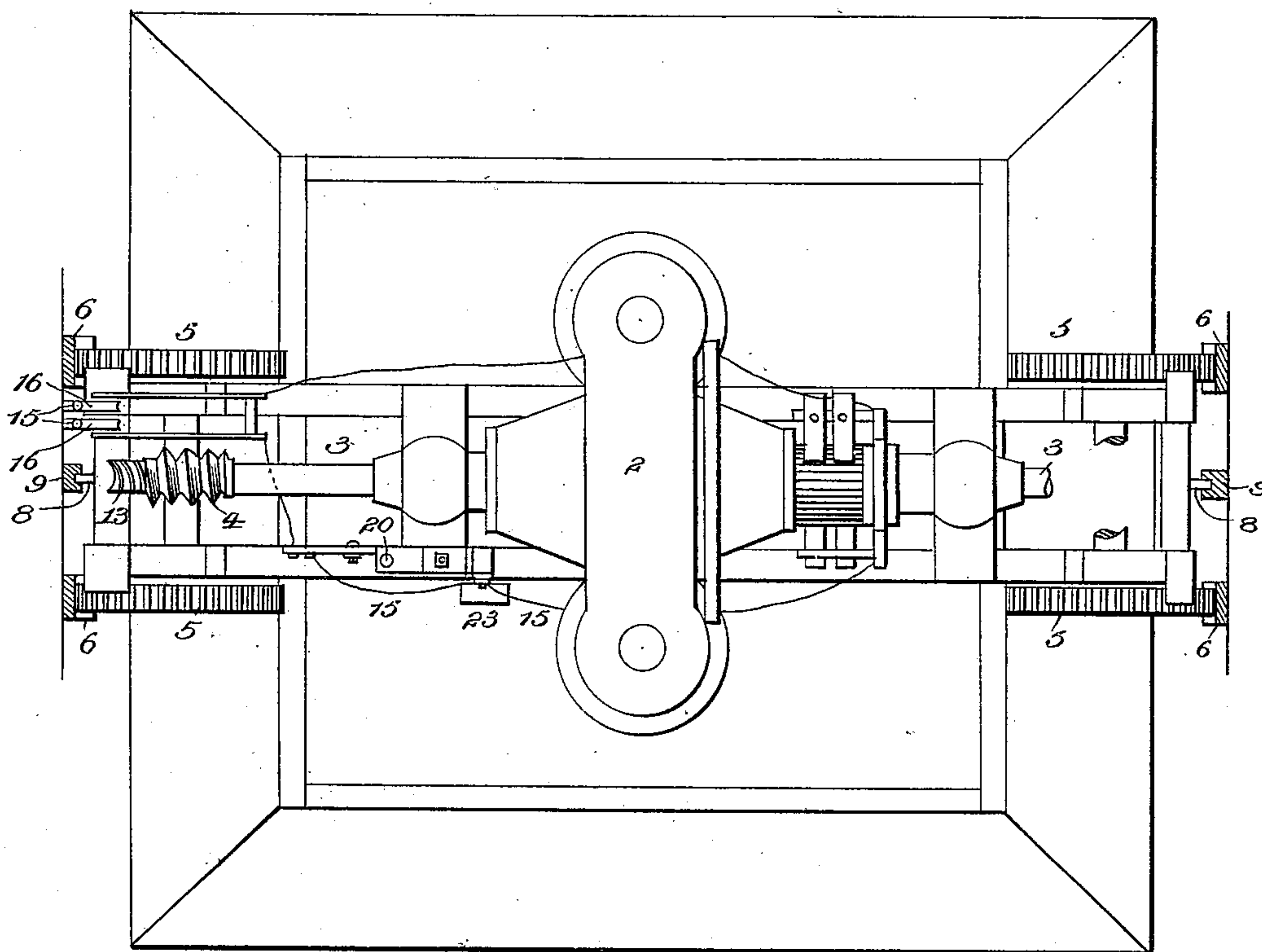
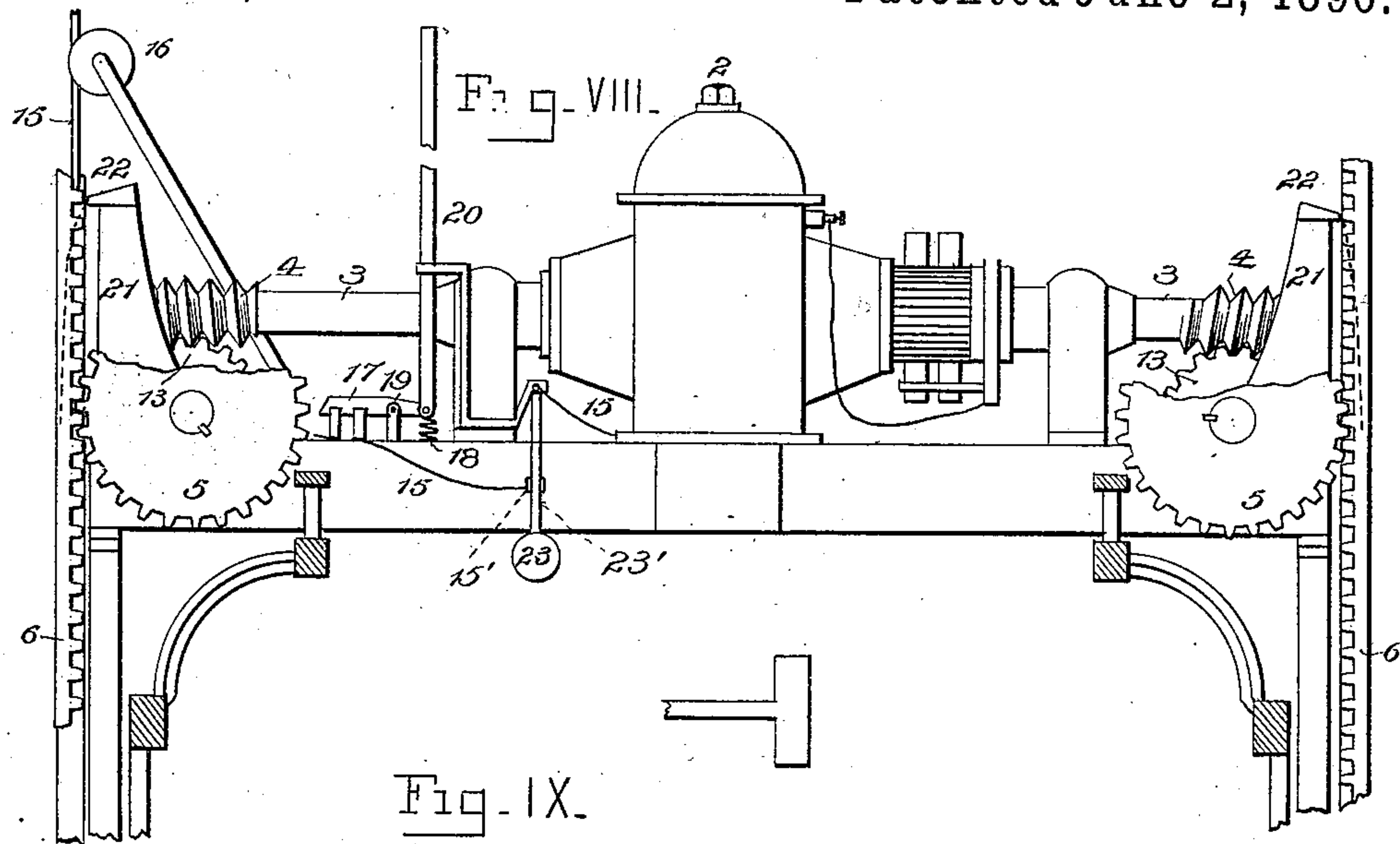
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J. R. HAMILTON.
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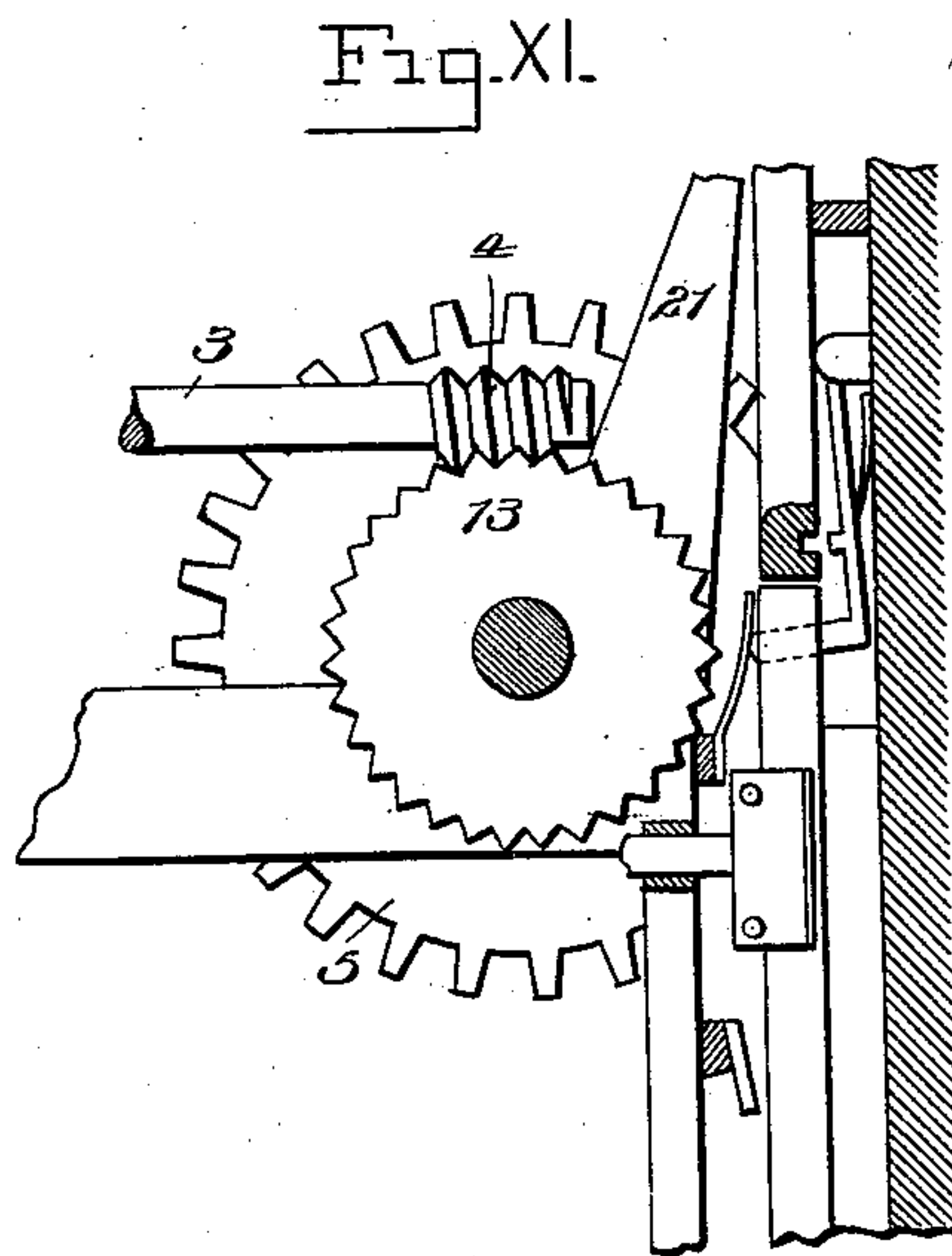
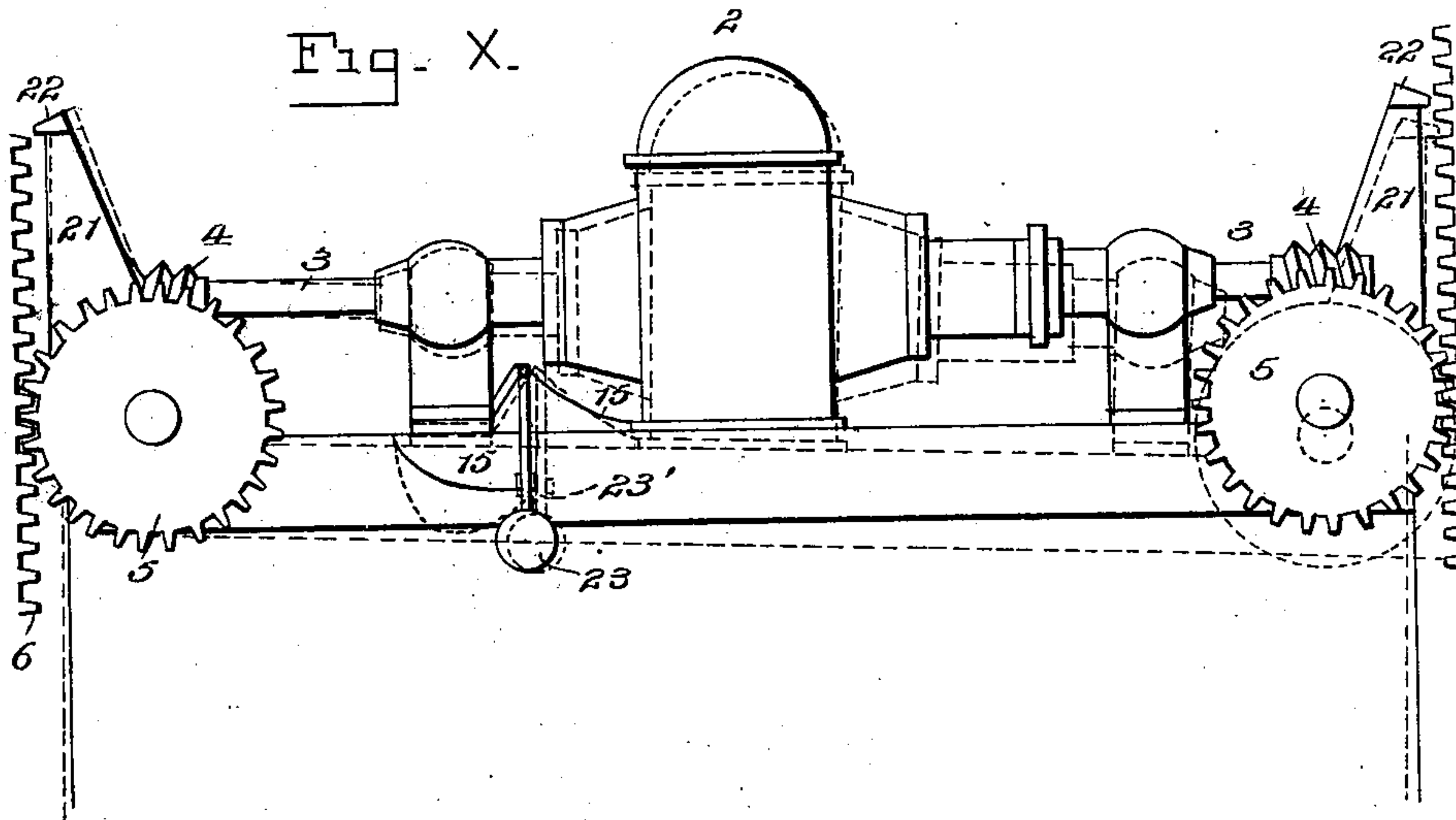
(No Model.)

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J. R. HAMILTON.
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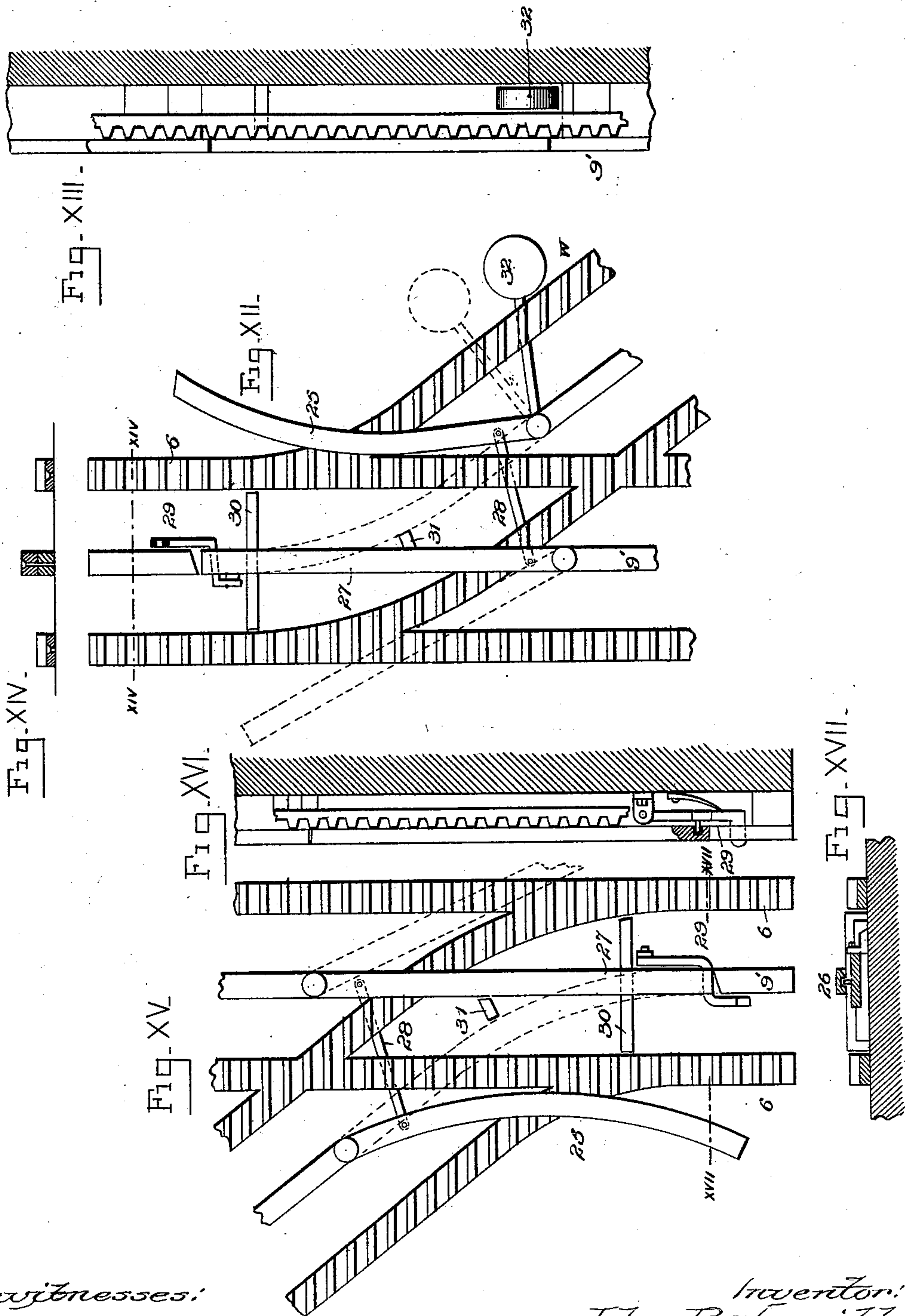
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UNITED STATES PATENT OFFICE.

JOHN R. HAMILTON, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
HARRY E. KNIGHT, OF SAME PLACE.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 561,223, dated June 2, 1896.

Application filed November 11, 1891. Renewed November 5, 1895. Serial No. 568,062. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. HAMILTON, a citizen of the United States, residing in the city, county, and State of New York, have made a certain new and useful Improvement in Elevators, of which the following is a specification.

My invention relates wholly to the class of forwarding instrumentalities known as "lifts" or "elevators" in which the travel is in a vertical line and in which the entire weight of the car is on the motive devices, as contradistinguished from railways, whether level or inclined, in which the weight of the car is wholly or mainly borne by the track.

My improvement, while of very general application, relates more especially to an organization of passenger-lifts for lofty and capacious structures, whereby such lifts may be operated in a manner somewhat analogous to that of a belt-railway, in which each and every car of a series of several simultaneously ascending and descending cars travels continuously onward to the point where it re-enters the place of starting, and so on continuously. For this purpose I provide a pair of vertical trackways, each furnished with a pair of guide-rails and with two pairs of racks. Of these trackways one is used exclusively for up and the other for down travel. These trackways communicate with one another at top and at bottom, respectively. The arrangement is such that a series of cars ascending in procession along the uptrack each car in turn as it reaches the top of said uptrack is shunted over to and enters the upper part of the downtrack, down which all, descending in like procession, are one by one shunted back into the bottom of the uptrack, and so on continuously. Each car preferably carries its own motor, (in the present illustration an electric motor,) and each is provided with means which insure proper headway or track distance between the consecutive cars and which permit within the limits necessary for headway a certain amount of independent stopping, starting, and travel of each car, and occasionally of even brief retrograde movements, just as in a belt-railway provided with the block system. This in my improvement is accomplished by the auto-

matic rupture of the electric circuit of any car which reaches within a certain distance of the car immediately in advance of it. Communication from the top of the uptrack to that of the downtrack and from the bottom of the downtrack to that of the uptrack is by an arrangement of oblique guideways whose rails and racks join the like rails and racks of the respective up and down tracks. The point of delivery of each oblique guideway has a suitable self-acting switch which allows free passage in one continuous direction of each car in succession through the oblique guideway from the delivering into the receiving well.

My invention further comprises means whereby any car whose lifting mechanism has become broken or disordered is automatically locked at the place it may happen at the instant to be, which is followed by the arrest of all the other cars.

Referring to the accompanying drawings, which form a part of this specification, Figure I is a front and Fig. II is a side elevation of my continuous system adapted to a building that contains ten stories and employs six cars. Fig. III represents in front elevation my system in a four-story building employing two cars. Fig. IV represents in front elevation, to a larger scale, portions shown in Figs. I and III. Fig. V is a front elevation showing the junction of upper oblique guideway with the top of the downtrack. Fig. VI is a front elevation showing the junction of lower oblique guideway with the bottom of the uptrack. Fig. VII is a section on the line VII VII, Fig. VI. Fig. VIII is a side elevation, and Fig. IX is a plan, of upper part of a car with its driving mechanism and safety appliances. Fig. X is an elevation to show the operation of the automatic detent following disorder of the lifting mechanism. Figs. XI to XVII, inclusive, represent an inferior modification of my switching mechanism, which employs a solid instead of a grooved guide-rail. Fig. XI is a vertical section which shows the motor mechanism modified for use with a solid guide-rail. Fig. XII is a front and Fig. XIII is a side elevation of the modified switch mechanism for the upper junction. Fig. XIV is a section on the line XIV XIV, Fig. XII.

Fig. XV is a front and Fig. XVI is a side elevation of the modified switch mechanism for the lower junction. Fig. XVII is a section on the line XVII XVII, Fig. XV.

5 In the use of my device any number of elevator cars or cages 1 may be employed, depending on the height and capacity of the building, the numbers to be accommodated, &c. For the purpose of illustration six cars
10 are represented in Figs. I and II and two cars are shown in Fig. III. When only two cars are used, they will ordinarily be so operated that when one car occupies the uptrack the other occupies the downtrack and that when
15 the first-named car is passing from the top of the uptrack to that of the downtrack the second-named car will be passing from the bottom of the downtrack to that of the uptrack, and so on continuously.

20 2 represents an electric motor from whose frame the car is suspended. Said motor works through armature 3 and right and left worms 4. (See Figs. VIII, IX, and X.)

25 Spur-gears 5, which engage in racks 6, are placed two on each side of both trackways. Parallel to and between the racks 6 are grooved or channeled guide rails or tracks 9. At a point V at or near the top of the uptrack the said racks and tracks pass by parallel re-
30 versely-curved sections into an oblique guideway W, having similarly-disposed racks and tracks to the uptrack, which downtrack, by a reversely-curved section, as at X, joins the like members of the downtrack. (See Fig. V.)

35 The bottom of the downtrack is in like manner connected with the bottom of the uptrack. (See Fig. VI.) The cogs of these racks, alike in their vertical and oblique portions, being everywhere horizontal and of a uniform pitch,
40 it follows that the car in climbing these oblique racks remains perfectly upright, the shunt or lateral shift being imparted by a runner 8, which may be either a roller or a rigid stud (see Fig. VIII) running in said grooved
45 tracks 9. At the point where these tracks meet there is an automatic switch 11 provided, which is held normally open by a counterpoise 10 and is closed by impact of the ascending cage (see dotted lines in Fig. V) and
50 after passage of the cage is returned to its normal or open position by said counterpoise. (See strong lines in Figs. III, IV, and V.) The action of this switch is as follows: As the car ascends the stud or runner 8, as it slides on
55 the track 9, coming in contact with the said switch, pushes it into the position shown by dotted lines, thus momentarily closing the track of the downtrack and opening a passage into the upper part of the downtrack;
60 but as the said stud passes beyond the said switch into the downtrack the said counterpoise operates to return the switch to the position shown by the strong lines, thus preventing retrograde movement into the oblique
65 way and opening the way for descent in the downtrack. A precisely similar arrangement of mechanism serves to conduct the car from

bottom of downtrack into bottom of uptrack, only that the switch 12, being necessarily presented downward, rights itself without the
70 necessity of a counterpoise. (See Fig. VI.)

The right and left worms 4 turn worm-wheels 13, with which rotate the integrally-attached spur-wheels 5, (four in number,) that, engaging in the racks 6 before spoken
75 of, operate to propel the car. Having entered the downtrack, the person in charge reverses the motor-circuit and employs just enough current to permit the car to descend at the desired average velocity, the worm-
80 gearing now discharging the functions of a brake to prevent a too rapid descent. On the car's reëntance into the uptrack the attendant of course causes the armature to resume its original direction of rotation. 85

15 may represent any suitable line-wires for the outgoing and return currents, and 16 may represent sliding or rolling current-collectors.

17 is a keeper which is by spring 18 held
90 normally to the position to close the circuit, as shown in Fig. VIII. This keeper is pivoted at 19, and its counter-arm carries a rod 20, which, being extended up to a sufficient height by its impact with the bottom of the car
95 next above, operates to depress the bed and to lift the front portion of the keeper, and thus to break the circuit and stop the car. As soon as the car above moves out of the way the spring 18 restores the keeper to its
100 normal position and the car resumes its ascent. This device in like manner operates to stop the car by contact of the rod 20 with a fixed object at the top of the well. For the descending journey the upwardly-extend-
105 ing rod 20 is temporarily lowered to an ineffective position and there is brought into service a like operating-rod which projects downward from the car.

While the travel of the car will be nor-
110 mally always in one direction, (upward in the uptrack and downward in the downtrack,) it will be seen that the operator can at any moment stop or, for a short distance, either accelerate or retard or reverse the travel of
115 the car.

21 are four plates of wrought-iron that project rigidly from the motor-frame and terminate in strong teeth or detents 22, which in the normal condition of the apparatus just
120 miss engagement with the racks 6; but should a wheel give out or a portion of the rack break or become stripped of its cogs, allowing the car to sag on that side, the detents 22 on the injured side would drop so as to describe an arc, (see dotted lines in Fig. X,) inserting themselves in the racks on that side and so preventing a fall of the cage. This oblique position or sag of the car at the same instant cuts the motor out of circuit by
125 means of a pendulum circuit-breaker 23, whose shaft 23', when hanging in its normal position, rests against the contact-piece 15' and completes the circuit; but when hanging

either in the position shown by the dotted lines in Fig. X or at a corresponding change of position to the left, leaves said contact-piece, and thus breaks the circuit and stops the motor, so as to lock the car to the position it at that moment occupies.

The above-described preferred form of my invention may be modified in various ways without departing from the essential principles of my invention. For example, for use with a solid guide-rail I may use the form of switch mechanism shown in Figs. XI to XVII, inclusive.

I will first describe the details of the upper junction. (See Fig. XII.)

9' represents a plain ungrooved guide-rail.

25 is a curved switch piece or section which constitutes the swinging portion of my modified downtrack. The weight of this switch-piece holds it normally to the position shown by strong lines. On the downward passage of the car this switch-piece is swung to the position represented by dotted lines by means of a grooved shoe 26, that projects from the motor-frame. The curved switch-piece 25 is coupled to straight switch-piece 27 by means of a rod 28. A self-acting catch 29 serves to temporarily lock the switch-pieces to the position shown in strong lines.

30 is a cross-rail over which the switches slide, and 31 is a stop that limits their vibration to either right or left.

32 is a counterpoise. Like members (see Fig. XV) discharge corresponding functions at the lower junction, only that the downward hang of the switch supersedes the necessity of a counterpoise.

For very lofty structures employing numerous cars during hours of business and for which a few cars suffice at other times I provide a gallery 40, into which superfluous cars may be side-tracked and from which they may at any moment be taken and restored to the ascending trackway when needed.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In an elevator, the combination of two parallel vertical tracks or ways, elevator cars or cages which travel upward on one of said tracks and downward on the other, and switches at top and bottom of the elevator-shaft adapted to automatically shift the cars

from one track to the other, substantially as set forth.

2. In an elevator, the combination of two parallel vertical tracks, united at top and bottom by automatically-operated switches to single-track lengths or sections, and independent cars having self-contained propelling devices and adapted to run off at each end of one or the other of said parallel tracks onto the single track and to run back therefrom to the other parallel track, substantially as set forth.

3. In an elevator, the combination of two parallel vertical tracks, a plurality of cars or cages moving in one direction on one track and in the other direction on the other track, means for shifting the cars automatically from one track to the other, and means for automatically arresting a car when it approaches too closely another car, substantially as set forth.

4. An elevator comprising a series of independently-propelled cages each equipped with a motor, transmitting-gearing and guiding-runners; of two parallel vertical trackways sufficiently separated for the passage past one another of the ascending and descending cages, vertical tracks therein for said runners, and racks parallel to said tracks for said gearing, oblique shunt-tracks, oblique racks parallel thereto, which respectively connect the up and down trackways and racks at or near their top and bottom extremities, and automatic switches at the junctions of the shunts and vertical tracks, all substantially as set forth.

5. In an elevator, the combination with two parallel vertical tracks and a plurality of cars adapted to travel all in one direction on one track and all in the other direction on the other track, self-contained propelling devices for said cars, electric motors carried by the cars and adapted to propel the same, a circuit-controlling device on each car, and a projection carried by each car and connected to said circuit-controlling device and adapted to be operated by contact with an arrested neighboring car, substantially as set forth.

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