(No Model.)

3 Sheets—Sheet 1

C. R. PRATT.

ELEVATOR.

No. 448,788. Patented Mar. 24, 1891.

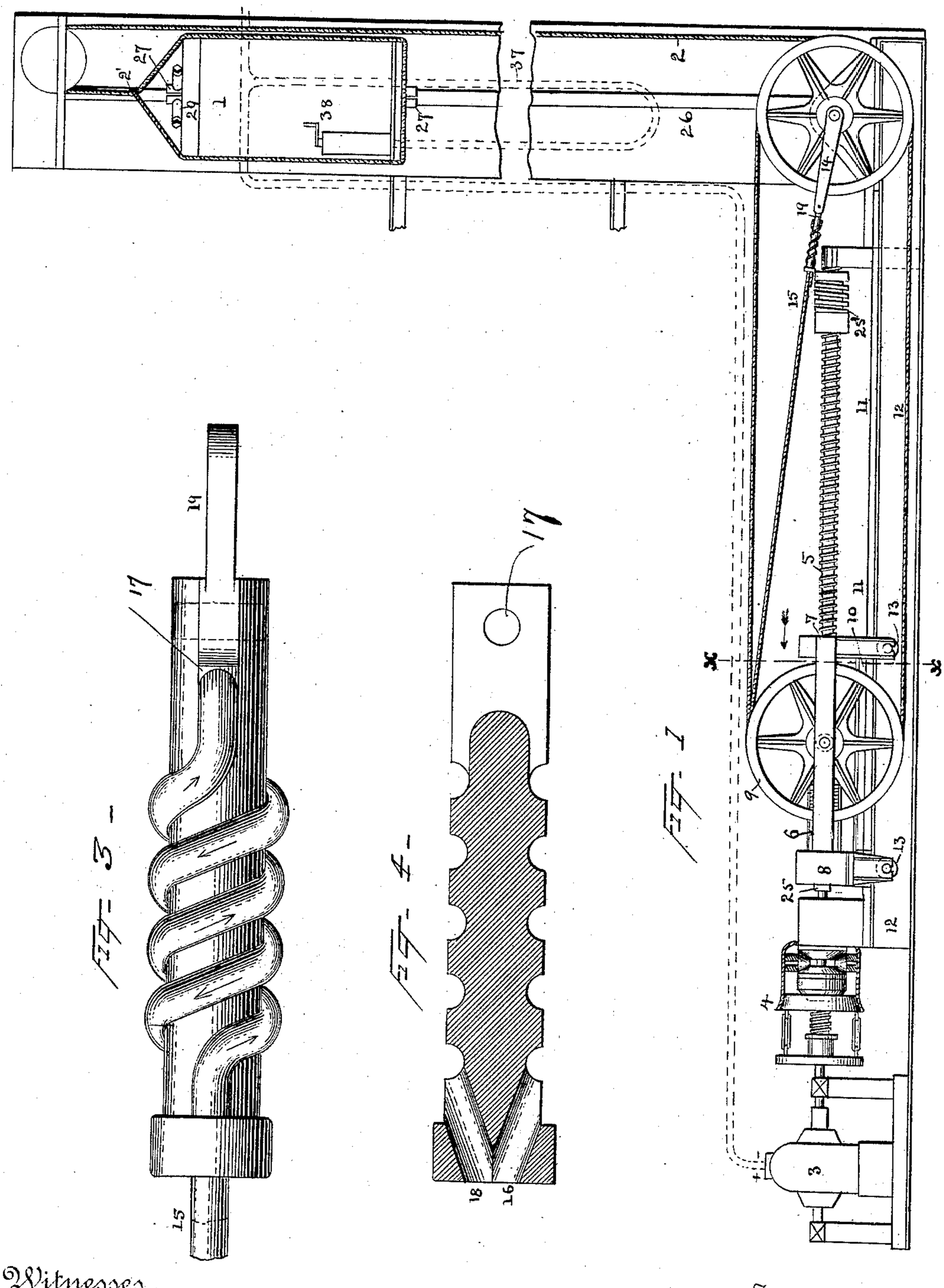

Fig. 1.

Fig. 3.

Fig. 4.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

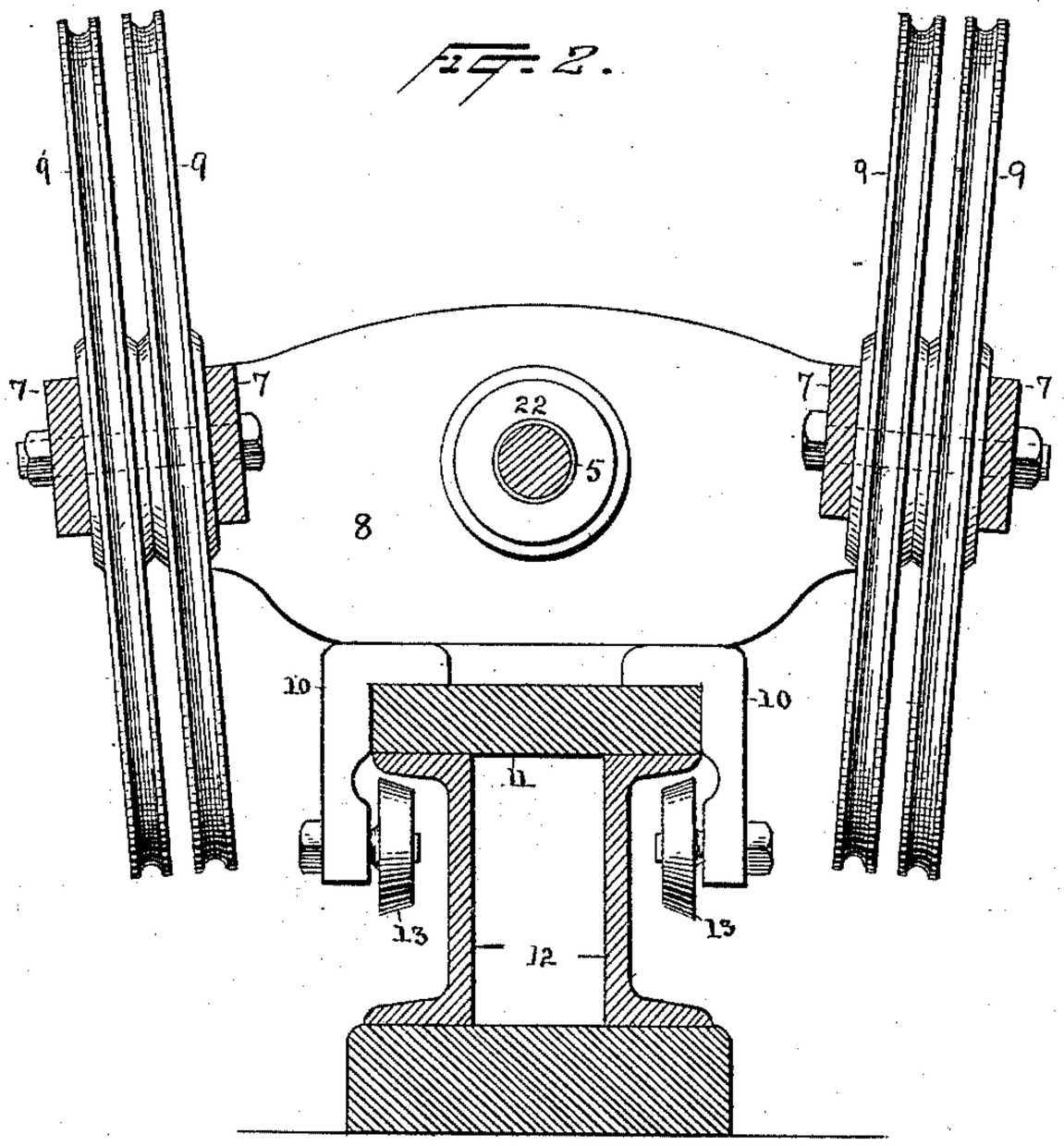
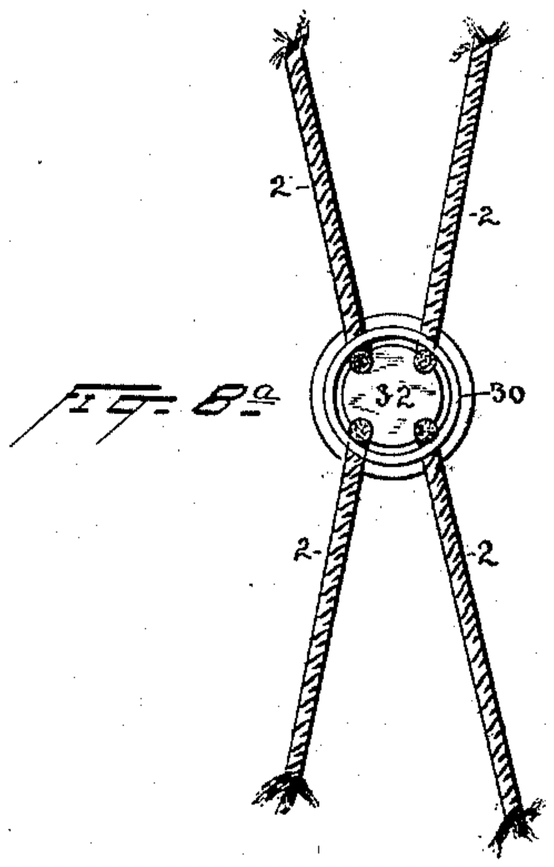


Fig. 6a.



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3 Sheets—Sheet 3.

C. R. PRATT.

ELEVATOR.

No. 448,788.

Patented Mar. 24, 1891.

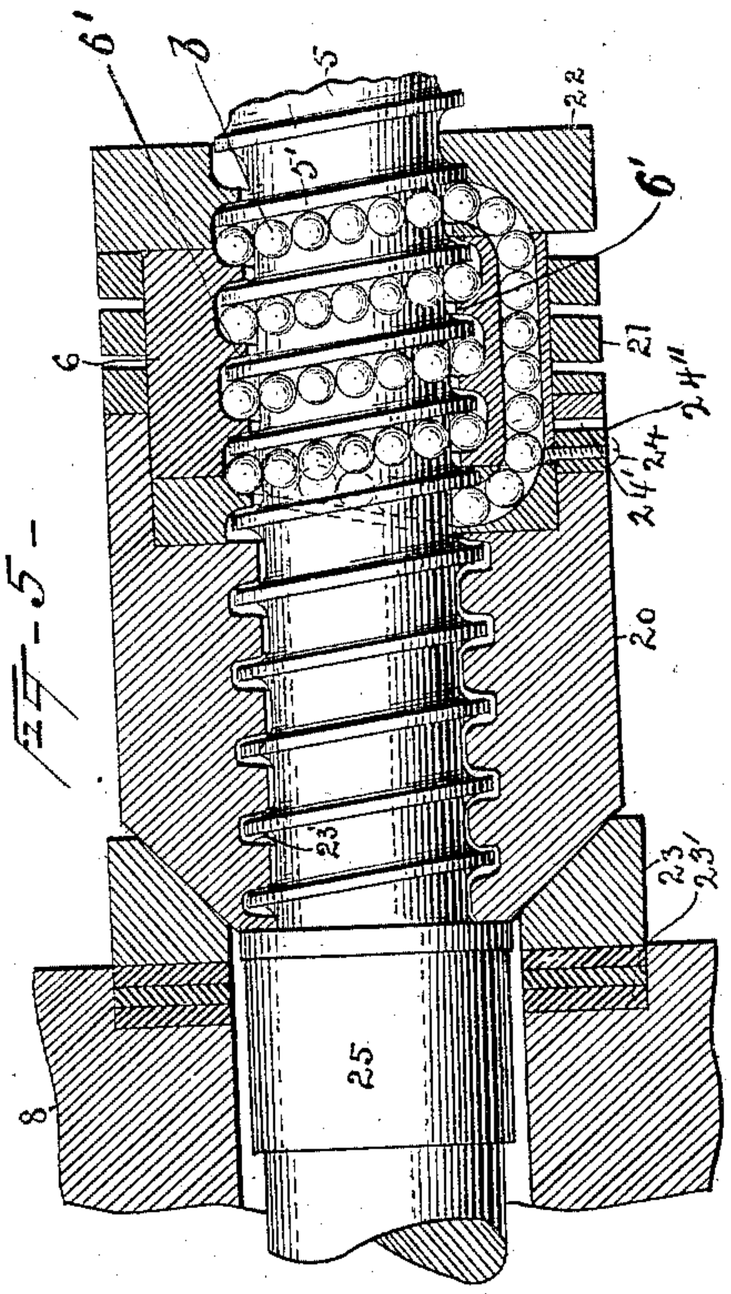


FIG. 5.

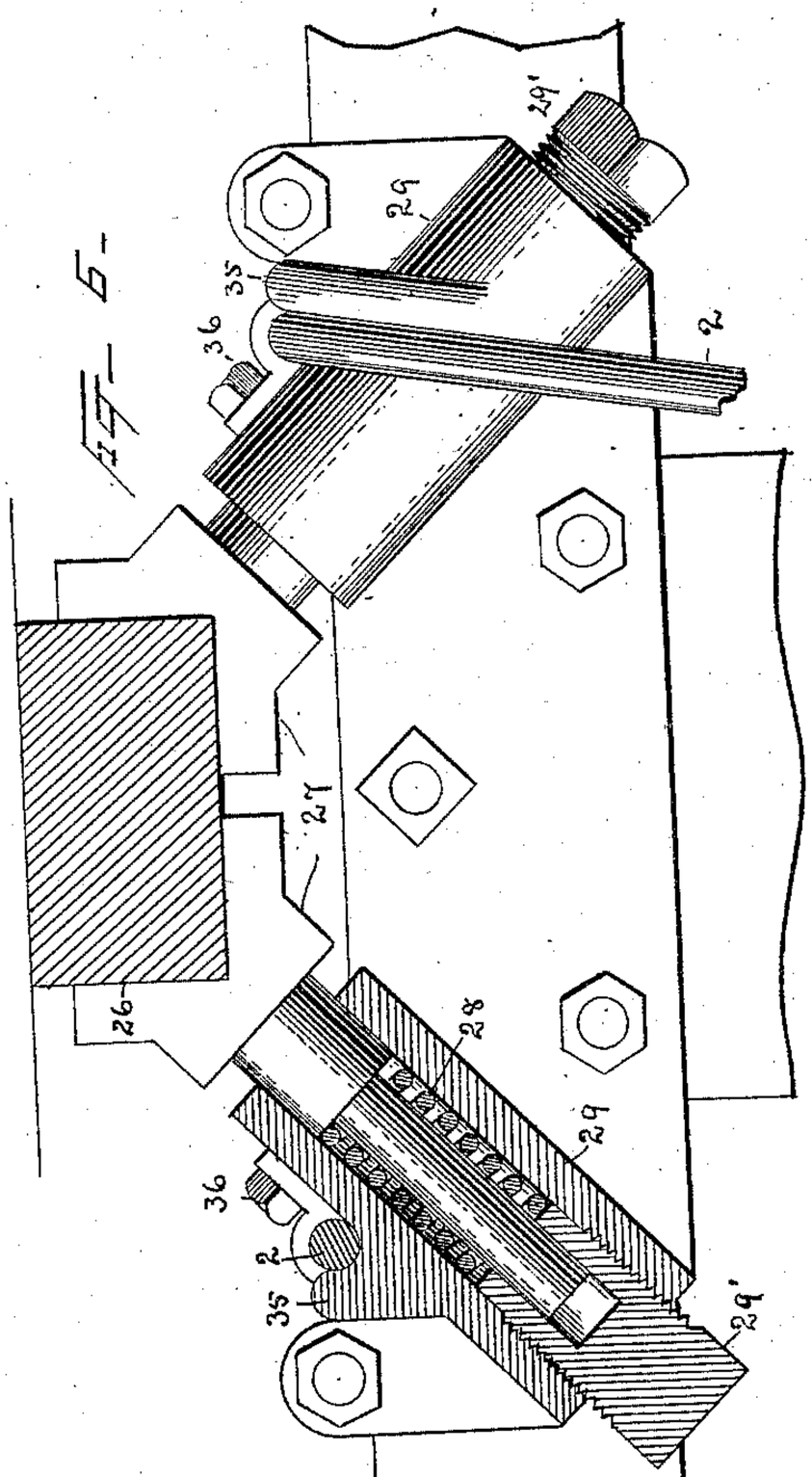


FIG. 8.

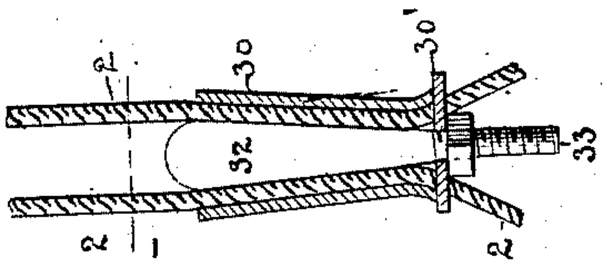
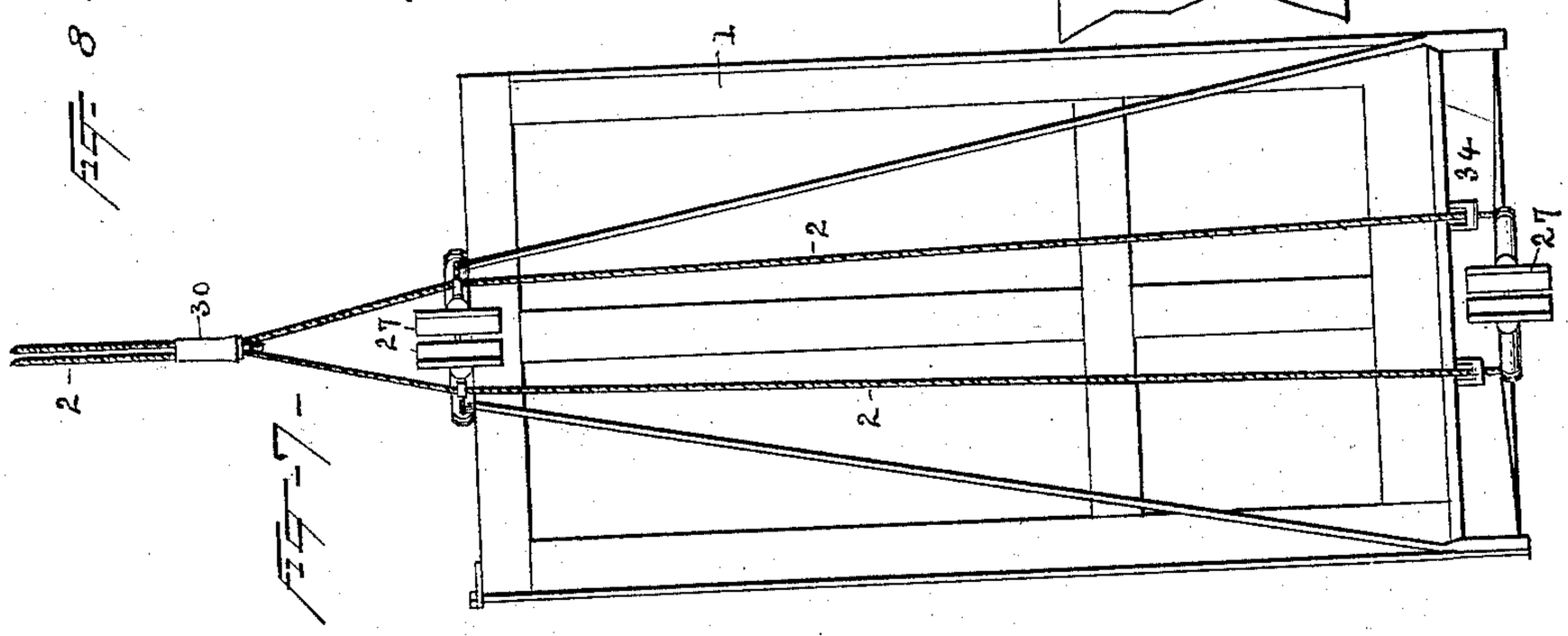


FIG. 7.



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Charles M. Catlin

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By his Attorneys
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UNITED STATES PATENT OFFICE.

CHARLES R. PRATT, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 448,788, dated March 24, 1891.

Application filed April 25, 1890. Serial No. 349,473. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. PRATT, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a new and useful Improvement in Elevators, of which the following is a specification.

My object is to obtain increased efficiency, safety, and economy in elevators; and the present invention is an improvement on the elevator apparatus described by me in my patent, No. 417,087, dated December 10, 1889.

The invention consists in an improved device for reducing the loss of power in the elevator mechanism, in an improved safety-nut, in a guide for the elevator-car, in means for connecting the cable to the car, and in certain minor features hereinafter described and claimed.

In the accompanying drawings, which illustrate the invention, Figure 1 is a general view of the hoistway and elevator-car therein and mechanism for raising and lowering the car. Fig. 2 is a cross-section of Fig. 1 on the line *x x*, looking in the direction of the arrow. Fig. 3 is a side view of the device for anchoring the cable. Fig. 4 is a central section through the body of this device. Fig. 5 is a detail view of the elevator-screw, the nut movable lengthwise of the screw, and the anti-friction device therefor, together with the safety-nut and a section of the cross-head. Fig. 6 shows the elevator-guide. Fig. 7 shows one plan of connecting the cable with the elevator-car; and Figs. 8 and 8ª are detail views, which will be hereinafter described.

1 is the elevator-car, which is capable of movement up and down in the hoistway. At the top of said way are pulleys. The cable 2, which generally consists of two or more ropes, passes from the car over these pulleys and thence to the hoist mechanism, which is preferably arranged in the basement of the building. This mechanism consists, in general terms, of a motor 3, connected, preferably, through a combined friction-clutch and brake 4 to an elevator-screw 5, which screw is supported in bearings which allow it to turn, but prevent longitudinal movement. The friction-clutch and brake is not described in detail, since it is described and claimed in my application Serial No. 338,779, filed January 31, 1890, and is not claimed herein. On the screw is a nut 6, adapted to travel along the length of the screw and to carry with it the frame 7, having the cross-head 8 and supporting the sheaves 9, on which the cable is wound. At the base of the hoistway is a second set of grooved sheaves or pulley-wheels corresponding in number to those on the movable frame. The number of sheaves employed will evidently depend on the distance through which it is desired to move the elevator-car for each turn of the screw. The frame above referred to is supported by means of the sliding pieces 10, connected to the cross-heads and resting upon the plank or carriage-way 11. Other forms of bearing—for example, rollers—may be substituted for these sliding pieces. This plank is preferably supported by channel-irons 12. From the sliding pieces 10 are projecting arms which carry wheels 13, which run under the plank or under the flange of the channel-irons and prevent all possibility of the frame being lifted or tipped from its track. This construction is found to be a great improvement over the double-track arrangement shown in my patent above referred to, since it occupies much less space and is simpler in all respects.

The cable end is anchored to the arm 14 by means of the device illustrated in Figs 3 and 4. The cable 15 is first inserted through the perforation 16 and wound in one of the spiral grooves in the body of the device, thence through the slot 17 at the other end of the device, and back in the parallel groove and through perforation 18, where the cable terminates.

The manner of winding the cable is indicated by the arrows in Fig. 3. No solder or other fastening medium is necessary, since it is practically impossible for the cable to become detached when put in position as above described.

19 is a link for connecting the anchor to arm 14.

Between screw 5 and nut 6 is placed an anti-friction device of suitable construction. In the form illustrated balls *b* are placed between the threads 5′ on the screw and corresponding threads 6′ on the nut. When the elevator-car is being raised or lowered, the lon-

gitudinal thrust on the screw and nut threads is very great, and when the threads of the screw and of the nut are directly in contact a great loss of power results and the threads rapidly wear away, thereby weakening them. These objections are largely obviated in my device.

At one side of the main or working nut is a supplemental safety-nut 20. The thread of this nut is so large that in the normal condition of the main nut 6 there is no contact between it and the screw-threads; but the distance between the threads of this nut and the thread of the screw is preferably less than the thickness of the threads on nut 6, and as the threads on nut 6 wear away the bearing-surface 23′ of the thread in the supplemental nut gradually approaches the thread on the screw, and when the first-mentioned thread has worn to such an extent that it is dangerously thin or weak the threads of the supplemental nut will come into contact with the threads of the screw, thus rendering an accident practically impossible from this cause—that is, from the wearing of the threads of the main nut. The two nuts above referred to are connected by means of screw 24, which passes through a slot 24′ in the outer nut, as indicated. This slot is somewhat longer than the bushing 24″ around the screw, in order to permit a slight longitudinal motion of nut 20 independently of nut 6. 21 is a spring between the safety-nut and the head 22. As the thread of the working-nut and the thread of the screw and the balls or other anti-friction devices wear away, nut 6 and nut 20 will move forward. Since the wear above referred to will be to a very large extent in the thread of the working-nut, the device described constitutes a simple and efficient safety device, for when the threads of the first nut get dangerously thin the second nut comes into play, and if the first-mentioned threads should give way before contact of the second nut the elevator-car would move only a short distance before said second nut would come into play.

When the elevator-car is being lowered, the frame 7 moves from the position shown in the drawings toward the right. The friction between nut 20 and its seat 23 is sufficient to prevent the nut turning in hoisting as well as in lowering the elevator, and no additional locking device between the cross-head and nut is necessary to put the elevator in operation, as in my patented device; but should the car stick in descending for any reason, so that the frame is relieved of the weight and stops, the nut would, by the revolution of the screw, be drawn slightly away from the seat, and, being thus relieved of friction, would then revolve with the shaft without further longitudinal movement, thus preventing the paying out of the hoisting-cable, although the car is stationary and the motor continues to revolve. It will be seen that the nut may be a plain cylinder without a flange, that it may be exterior to the cross-head, and need not be set in the cross-head, as in my patented arrangement.

To form the bearing for nut 20, I preferably sink one or more metal plates or rings 23′ into the cross-head, as shown, and over these place a heavier ring 23 with a conical bearing-face.

The spring 21 is for the purpose of forcing nut 20 against the reverse side of the threads of the screw to produce sufficient friction between the nut and screw to cause the former to turn with the latter before being carried a long distance from the cross-head. In raising the elevator-car the frame moves in the opposite direction. On reaching the limit of its movement in that direction the safety-nut strikes the collar 25 and locks and revolves with the screw, stopping motion of the cross-head, whereby the motor is allowed to run without further strain on the screw. At the opposite end of the screw is a buffer 25′, which serves to stop the car at the bottom of the way, the operation being substantially as above described, and as described in my patent referred to.

In Fig. 6, 26 is a strip of wood, metal, or other suitable material, one of which strips is placed along two of the opposite sides or corners of the hoistway, as indicated in Fig. 1. These strips serve as guides or steadying devices for the elevator-car On both ends of the elevator-car, preferably near the edge, are supported devices such as illustrated in Fig. 6, consisting of guides 27, provided with angle-extensions bearing on two faces of strip 26, preferably forced outward by stiff springs 28 in socket 29. 29′ is a screw-plug for adjusting the tension of the spring or to permit its removal. The said guide-pieces bear on and slide along the strip 26 as the car ascends or descends, and thus prevent unpleasant swaying or movement of the car. Heretofore it has been customary to employ guides operative in one direction only, or to use a separate guide for each of four directions. By the construction shown the two guides are sufficient to steady the car, and by a forward movement of the guide 27 all wear is easily compensated for.

In Fig. 1 is shown the way in which I prefer to connect the hoisting-cable to the car when said cable consists of two ropes. Only one rope is visible in Fig. 1, since the two are directly in line. The two ropes pass entirely around the car, and are passed through the loop or bight at 2′.

In Fig. 7 is shown the way in which I prefer to connect the cable with the elevator-car when four supporting-ropes are employed. Only two of these ropes are visible in Fig. 7.

Fig. 8ª indicates more clearly the arrangement of the ropes. It will be seen that in the arrangement shown and described the elevator-cable passes from the hoisting mechanism to the car and around the same in one continuous length without splices or other

connecting devices, and thereby a great gain is made in strength of said supporting-cable. It is well known that it is exceedingly rare for a cable to break. In case of accident it is nearly always due to giving way of the clamp or connection between the cable and the car. To obtain a perfectly secure connection, I lead the four ropes 2 through a sleeve 30 and plate 30′, then wind them one or more times completely around the car, bringing them back through the sleeve, as indicated in the drawings. In this construction it will be understood there are four pulleys at the top of the hoistway, one for each rope. The several ropes are securely fastened in place by a wedge 32, having a screw end 33. With this construction and arrangement very little strain due to the weight of the elevator-car and its load is borne directly by the clamp or connecting device, but the strain is borne by the cable itself. Other forms of clamp may be substituted for the one shown. Should one, two, or three of the ropes break above the clamp, the car would still be supported by the remaining rope. To secure the proper balance of the car, the ropes are wound symmetrically onto the car, and held in place by eyes 34 or other suitable devices. At the top of the car the cable is shown as passing through or over grooves 35 in the socket of the guide-pieces, and is held in place by clamps 36.

The electric motor shown at 3 may be connected to the elevator-car by any suitable arrangement of conductors. I have shown a circuit in dotted lines extending from the motor to the hoistway, and thence to the elevator-car by means of a flexible connection 37 to a switch device of well-known construction 38. The generator is placed at any suitable point in the circuit. As shown, the wires are supposed to run off to the right of the hoistway to the generator.

Having thus described my invention, what I claim is—

1. The combination of an elevator-hoisting screw held from longitudinal movement, a nut with anti-friction bearings on said screw, a safety-nut connected to and movable with the first nut, and a frame moved by said nut to raise and lower the elevator-car, said safety-nut bearing against the frame, substantially as described.

2. The combination, with a screw, of a working-nut and a safety-nut the thread of which is wider than the thread of the screw and normally out of contact therewith, the working and safety nuts being secured together, substantially as described.

3. The combination of a working-nut, a safety-nut connected to the working-nut by a connection capable of slight longitudinal movement, and a spring between the working and safety nuts, substantially as described.

4. The combination, in an elevator-hoisting apparatus, of the cross-head, the screw-shaft, the working and safety nuts thereon exterior to the cross-head for controlling movement thereof, and a friction-surface between the safety-nut and cross-head, substantially as described.

5. The combination, in an elevator apparatus, of the cross-head, a friction-bearing on said cross-head, a safety-nut bearing against and co-operating with said bearing, and a working-nut connected to said safety-nut, substantially as described.

6. The combination, with a central track, of the frame-carrying sheaves for the elevator-cable on each side of the track and having bearings movable along the central track, and means for holding the frame thereon, substantially as described.

7. The combination, with a frame comprising the cross-heads and connecting side pieces and carrying the inclined cable-sheaves, of a screw passing through the cross-heads, the nut for said screw bearing against one of the cross-heads and the track directly below the frame and narrower than the frame, whereby space is economized, substantially as described.

8. The combination, with a car and a hoisting-cable consisting of several ropes passing around the car, of a clamp or binding device for the ropes comprising sleeve 30 and wedge 32, substantially as described.

9. The combination of the guide-piece 26, the guides on one edge of the elevator-car, grooves in the guide-sockets, and the hoisting-cable passing through said grooves, substantially as described.

10. The combination, with an elevator-hoisting cable, of an anchor therefor consisting of a body with two parallel grooves, said body having at one end perforations, through which the cable and the free end of the cable pass, respectively, and at the other end a slot for the cable, substantially as described.

11. A cable-anchor consisting of a body having two parallel grooves and at one end a head with two perforations and at the other a slot, whereby a cable may be inserted through one perforation and wound in one of said grooves, thence through said slot, and back through the second groove, the cable end passing through the second perforation and there terminating, substantially as described.

12. A cable-anchor consisting of a body having two parallel grooves of a size to receive the cable, and means for securing the cable in said grooves at each end of the body, substantially as described.

13. The combination of cable 15, the anchor comprising a body with two parallel grooves, a head at one end having two perforations, the other end a slot through which the cable passes, and link 19, substantially as described.

This specification signed and witnessed this 18th day of April, 1890.

CHAS. R. PRATT.

Witnesses:
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