(No Model.) 3 Sheets—Sheet 1.

C. E. ONGLEY & E. W. STURTEVANT.

AUTOMATIC MACHINE GOVERNED BY ELECTRICITY FOR CONTROLLING ELEVATORS.

No. 307,064. Patented Oct. 21, 1884.

Fig. 1.

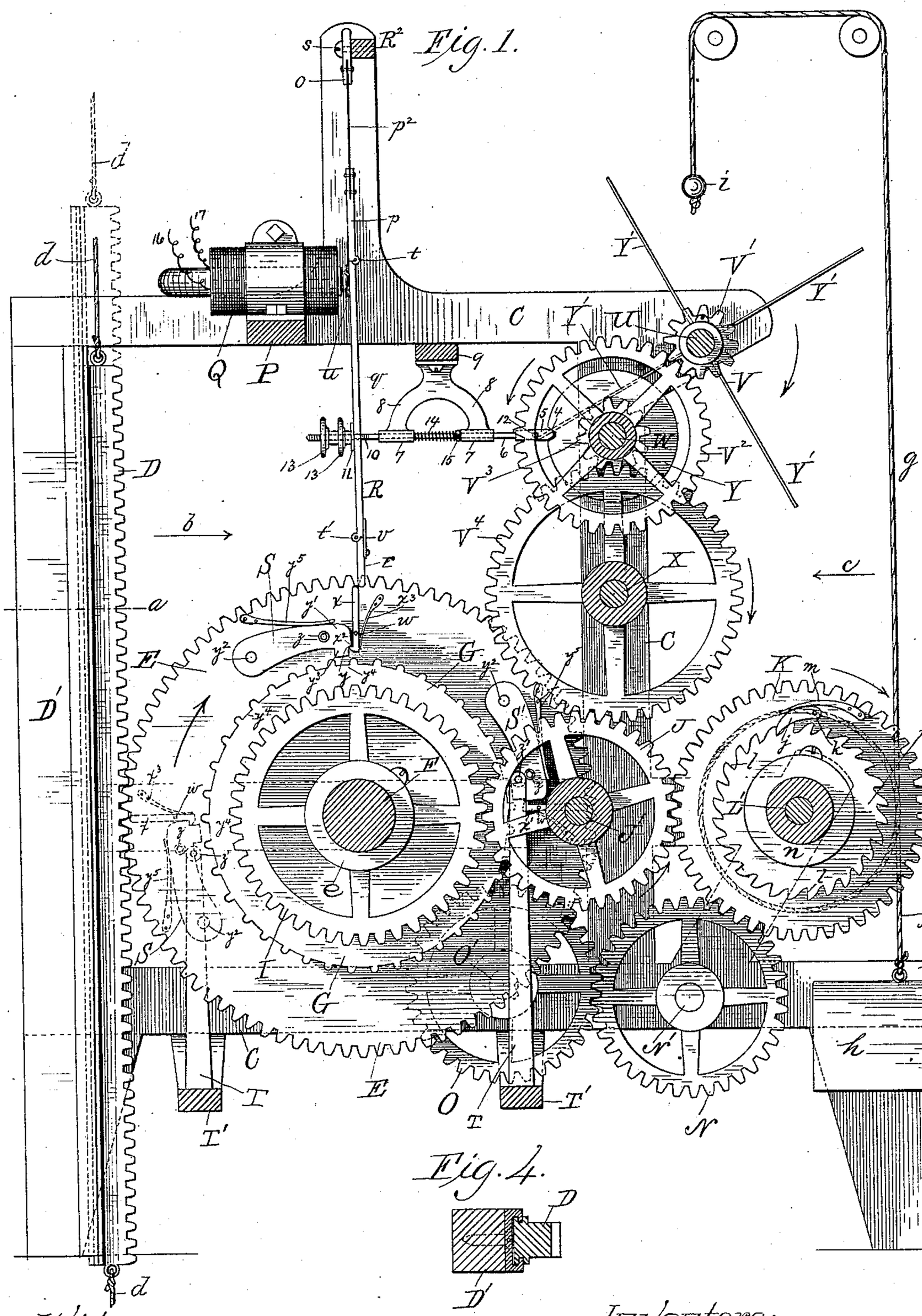

Fig. 4.

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(No Model.) 3 Sheets—Sheet 2.

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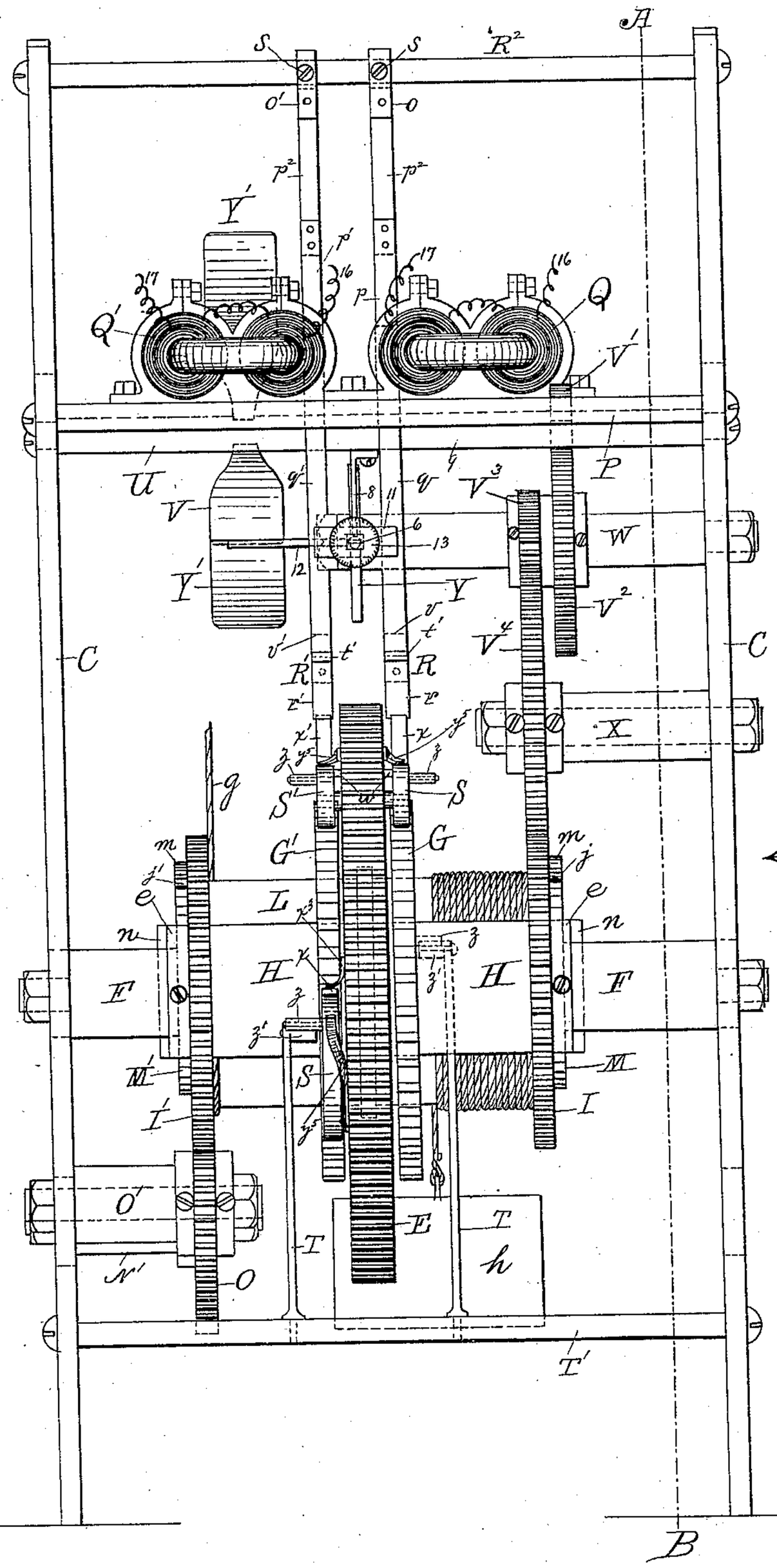
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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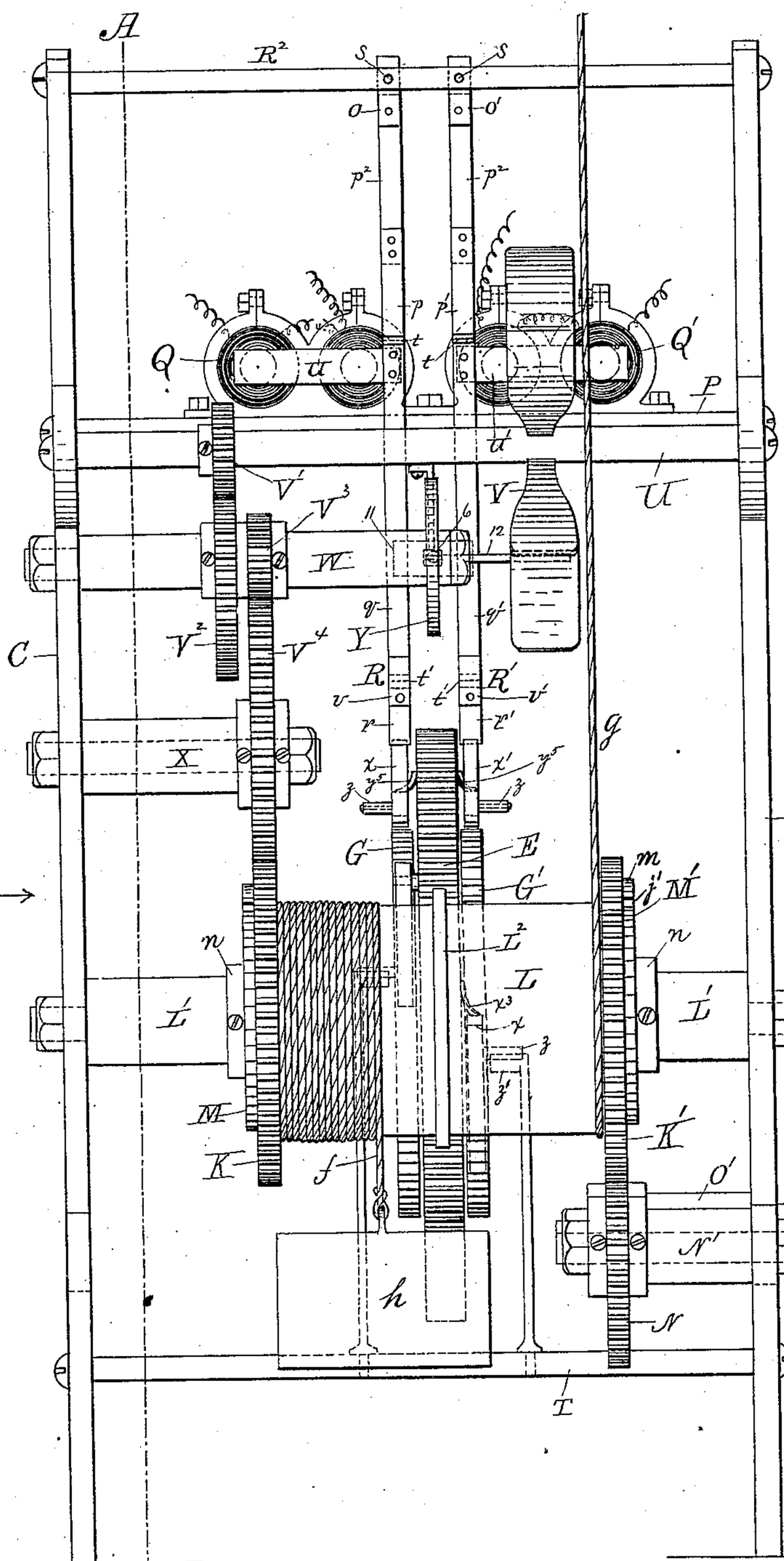

Fig. 3.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC MACHINE GOVERNED BY ELECTRICITY FOR CONTROLLING ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 307,064, dated October 21, 1884.

Application filed December 10, 1883. (No model.)

To all whom it may concern:

Be it known that we, CHARLES E. ONGLEY and EMERY WALLACE STURTEVANT, of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Automatic Machine Governed by Electricity for Starting and Stopping Elevators; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a vertical section taken at the point indicated by lines A B, Figs. 2 and 3, showing a side view of our aforesaid automatic machine for starting and stopping elevators and its connections with an electrical apparatus, as will be hereinafter more fully described. Fig. 2 represents an end view of the machine, looking in the direction indicated by arrow *b*, Fig. 1, with the rack and its guides or ways, hereinafter described, left off to more clearly illustrate the operation of said machine. Fig. 3 represents an opposite end view from that shown in Fig. 2, looking in the direction indicated by arrow *c*, Fig. 1; and Fig. 4 represents a cross-section through the rack and its guide or way, taken on line *a*, Fig. 1.

Our invention may be applied to any kind of an elevator; and it consists in mechanism governed by electricity for operating a rack, connected with the valve, rope, or other shipping mechanism of an elevator, as will be hereinafter more fully set forth.

To enable those skilled in the art to which our invention belongs to make and use the same, we will proceed to describe it more in detail.

In the drawings, the parts marked C represent the frame-work of the machine, and D a toothed rack, which is fitted to slide longitudinally in the guide or way D′. Said rack D may be connected directly with the valve or other shipping mechanism of an elevator, or by a rope, *d*, or similar means, with such mechanism. It is operated to start or stop the elevator through the connection above described by mechanism constructed and arranged as follows: A large spur-gear, E, is fitted to turn on a stationary shaft, F, supported by the frame-work of the machine. Upon each side of said spur-gear E, at a short distance from the same, are also arranged toothed wheels G G′, one upon each side, said wheels being fastened to or formed upon sleeves or collars H, fitted to turn upon shaft F between spur-gear E and stationary collars *e e*. Next to said collars *e e* upon the sleeve H are also formed or fastened spur-gears I I′. The gear I is connected by means of the intermediate gear, J, turning on shaft J′, with the gear K, fitted to turn on one end of the drum or pulley L. Said drum or pulley L is provided with a cord, *f*, and weight *h*, by means of which the elevator is operated up and down or stopped by means of the mechanism hereinafter described, and also with a cord, *g*, equal in length to the cord *f*, and provided with a stop, *i*, against which a dog on the elevator is arranged to catch in its downward movement, thereby winding up the weighted cord *f* over the drum L when it has been unwound by its weight to operate the mechanism hereinafter more fully described.

In practice we design to make the cords of sufficient length to admit of the elevator being used for a considerable length of time before requiring a rewinding of the cord *f*, and also to arrange our apparatus at a distance above the bottom of the elevator-shaft equal to the length of the cord to be wound upon the drum L, so that the elevator in descending will completely wind the cord *f* over said drum (by drawing upon the cord *g*) by the time it arrives at the bottom of the shaft, ready for operation again.

The driving-pulley L is fitted to turn upon the stationary shaft L′, and the spur-gear K is also fitted to turn on the end of the pulley between a shoulder formed on said pulley and a ratchet-wheel, M, rigidly fastened to the end of the pulley. By this arrangement it will be seen that the pulley and ratchet-wheel may be turned back in winding up the weighted cord or chain independent of the spur-gear K. Said gear is made to turn with the driving-pulley and ratchet-wheel, to operate the ma-

chine, by means of the ratchet or pawl *j*, hinged at *k* to the spur-gear, and catching in notches *l*, formed on the ratchet-wheel. The pawl is held in place by a spring, *m*. A similar spur-gear, K′, and ratchet-wheel and pawl M′ *j*′ are arranged at the opposite end of driving-pulley L, for operating the reverse mechanism to that before described, which reverse mechanism will be hereinafter more fully described. The driving-pulley, spur-gears, and ratchet-wheels are held in their proper positions upon the shaft L′ by means of collars *m m*, fastened to said shaft. Driving-power is imparted from spur-gear K′ on driving-pulley L to spur-gear I′ upon sleeve H through intermediate gears, N O, turning on shafts N′ O′, respectively fastened to the frame-work C of the machine.

We have described the motive power and driving mechanism for operating the rack D in reverse direction so as to start or stop the elevator, and will now proceed to describe the mechanism for reversing and governing the aforesaid driving mechanism by means of electricity.

Upon a cross-piece, P, extending between the side frame-work of the machine, are arranged and secured two magnets, Q Q′, one for operating the machine to cause the elevator to ascend, and the other for reversing the motion, and vice versa, as will be hereinafter more fully described.

Just forward of the magnets Q Q′ are arranged the vertical metallic bars R R′, fastened at the top to a cross bar or frame, R². Both of said bars are made in several separate sections, *o p q r* and *o′ p′ q′ r′*. The upper sections, *o o′*, are fastened by means of the screws *s s* to the cross-bar R², as before stated. Said sections *o o′* are connected with the sections *p p′* by means of flat springs *p*² *p*², which admit of a swinging movement to and from the magnets, and also serve to keep the bars at a short distance from the magnets when not in use. The sections *p p′*, *q q′*, and *r r′* are hinged together at the points *t t′*.

Just below the hinges *t*, upon each part of *q q′*, directly in front of and upon a line with the face of the magnets, are fastened plates *u u′*, made of metal, which will be readily attracted by the magnets when charged, and upon the lower parts, *r r′*, just below the joints *t′ t′*, are fastened plates *v v′*, which extend up over said joints *t′ t′*, and serve to hold the joint stiff, when required to be so, in the direction from the magnets, as hereinafter more fully described. The lower ends of the sections *r r′* are rounded and extend a short distance below the periphery of large spur-gear E, as shown in Fig. 1 of the drawings, and to each side of said spur-gear E are hinged, at *w*, short levers *x x′*—two upon each side—arranged a quarter of the circumference of the gear apart. These hinged levers *x x′* have rounded outer ends, and just lap the rounded ends of the parts *r r′* when they come in contact with each other, as shown in Fig. 1. The inner ends of the hinged levers *x x′* have slight notches *x*² upon one side, which at the proper time, as hereinafter described, catch against notches *y*, formed on the heads *y′* of the pawls or dogs S S′, hinged at *y*² to the large spur-gear E. The hinged levers *x x′* are held against the heads *y′* of the pawls S S′ by means of springs *x*³, and the pawls are pressed down, so that their forward ends, *y*³, will catch and hold in notches *y*⁴ of toothed wheels G G′ when they are released by hinged levers *x x′*, as hereinafter described, by means of springs *y*⁵, also secured to the sides of spur-gear E.

Upon the outer side of each pawl S S′, near its forward end, is arranged a friction-roll, *z*, and at the upper end of standards T, supported on cross-bars T′, are arranged friction-rolls *z′*, over which the rolls *z* travel, and thus raise the forward ends of the pawls S S′ when the gear E is turned, as hereinafter described. The pawls S S′, as well as their holding levers and springs, are the same upon both sides of gear E, except that their positions are changed to conform with the reverse motions of the machine, the pawl S upon the opposite side from that shown in Fig. 1 coming where shown by dotted lines in said figure, and the pawl also upon said opposite side corresponding to S′, directly back of and covered by the pawl S, shown by full lines on the front side of Fig. 1. Therefore, in said Fig. 1 the pawls S S′ upon the back side of gear E come one-fourth of the circumference of said gear back of the correspondingly-lettered pawls shown upon the front side of said gear. The purpose of this arrangement will be hereinafter more fully explained.

Upon shaft U, supported by the frame-work of the machine, is arranged a fly-wheel, V, for regulating and holding the machine stationary at stated intervals, as hereinafter described. A pinion, V′, is also arranged to turn with said fly-wheel, both being fastened to the shaft, and said shaft arranged to turn in suitable bearings in the frame-work C. Connection is made between said pinion V′ and the intermediate spur-gear, J, by means of spur-gear V², pinion V³, and spur-gear V⁴. Gear V² and pinion V³ are arranged to turn upon a shaft, W, and gear V⁴ upon a shaft, X, all being kept in their proper positions by suitable collars fastened to the studs, which shafts are in turn fastened to frame-work C. Upon shaft W is also fitted to turn a wheel or disk, Y, having a \/-shaped notch, 4, made in its periphery, to receive a similarly-shaped head, 5, formed upon or fastened to one end of a horizontal spindle, 6, having a longitudinal movement. Said spindle 6 is supported by and slides forward and back in the bearings 7 7, formed on the lower ends of arms 8 8, extending down from cross-frame 9 in this instance; but any other similar way of supporting the same may be adopted, if preferred. The opposite end of spindle 6 from head 5 is provided with a thread, 10, and over said threaded part is fitted a plate,

11, which bears against the suspended bars R R′ on the side next to the magnets, so that when either of said bars R or R′ is drawn back by the action of its respective magnet the head 5 will be withdrawn from the notch in the disk Y, which operation also releases the fly-wheel, which has previously been held by a pin, 12, projecting out at right angles from the head 5, and against which said fly-wheel has been bearing, and held stationary thereby, the pin and arms Y′ of the fly-wheel being so arranged as to just overlap each other, as shown in Fig. 1 of the drawings, when the machine is at rest.

The spindle 6 is held at the end by means of set-screws 13 13, by which it may also be adjusted longitudinally when required. It is forced or sprung forward when the magnets release one or the other of the suspended bars R R′ by means of a spiral spring, 14, arranged over the same between its bearings 7 7, one end of said spring bearing against a collar, 15, fastened to the spindle, and the other end against one of said bearings 7, as shown in Fig. 1.

In practice the wires 16 17 of the magnets are extended up into the elevator through one or more batteries, as the case may be, and said magnets are operated to operate our machine, and in turn the elevator, as hereinafter described, by means of buttons connected with said wires, batteries, and magnets, in the usual way, the buttons being arranged at a convenient place in the elevator, and designated so as to be readily understood which of the buttons is to be pressed to operate the elevator in the desired direction and to stop the same.

A person using the elevator will proceed as follows, supposing it to be a hydraulic elevator and its position at the bottom of the shaft: To ascend, he will press the button, which we will suppose to be marked "Up;" then, to stop the elevator, he will press upon the other button, which we will suppose to be marked "Down," this operation causing the valve or shipper to occupy the same position as when at the bottom of the shaft, or with the valve in a horizontal position half-way between the points that it occupies when fully opened or closed; therefore it may now be operated either up or down by pressure upon the proper button; or, in other words, by pressure upon the button marked "Up," our machine causes the valve or shipper to be operated to raise the elevator by connection with the shipper-rope *d* in the same manner that the same result is now obtained by hand-power, the operation of stopping the elevator and causing it to descend, as well as ascend, also being the same as at present, except that the operation is performed automatically, as before described, and shown by the drawings. Said drawings represent the several parts of the machine in the various positions that they occupy when the elevator is stopped at any given altitude, all of the pawls S S′ being disengaged from the toothed wheels G G′ and the driving mechanism stopped and held by one of the arms Y′ of the fly-wheel V bearing against the locking-pin 12, before described. The machine is therefore in its proper position to operate in either direction to raise or lower the elevator by pressure upon the proper button, as before described.

The operation may be briefly summed up as follows: Supposing the machine to be in the position before described—viz., when the elevator has been stopped at any given altitude above the bottom of the shaft—and, also, supposing that by raising the rack D the elevator will be made to ascend, the attendant or person using said elevator, in order to ascend, will press upon the button marked "Up," which operation causes the jointed bar R to be drawn forward, as before described, by the magnet Q, thereby unhooking the forward end of the pawl S from the holding-lever *x* and locking it into the toothed wheel G, as also before described. At the same time, or immediately after the aforesaid locking operation, the driving mechanism of the machine connected with this side of said machine is set in operation by withdrawing the head 5 from the notch in the disk Y and releasing the fly-wheel V, when the wheel G is then turned in the direction shown by the arrow in Fig. 1, thereby turning the spur-gear E in the same direction, and consequently raising the rack D to operate the elevator, as before described. The gear E continues to travel in the direction above stated until the friction-roll *z* of the pawl S comes in contact with the roll *z′* upon the upper end of the standard T upon that side, when the pawl S is then raised out of its notch in the toothed wheel G by the roll *z*, traveling over the roll *z′*, thus stopping the gear E, and the machine is at the same time stopped by the head 5 entering the notch 4 in the disk Y, and by one of the arms Y′ of the fly-wheel coming in contact with the pin 12, a constant pressure being produced upon the spindle to force it forward when the head arrives opposite to the notch 4 of the flat spring p^2 at the upper end of the jointed bar R, as before described.

The disk Y and fly-wheel V, it will be understood, are constructed, arranged, and timed so as to work in perfect unison with the locking and unlocking mechanism upon both sides of gear E—*i. e.*, so that they will be operated at each quarter of a revolution of said gear when turned in either direction.

In practice the machine is constructed and aaranged so that one-quarter of a revolution of gear E will operate the valve or other shipping mechanism the same as ordinarily by hand. After the pawl S has been unlocked from wheel G and the machine is stopped, as before described, the elevator continues to travel upward until the button marked "Down" is pressed, which operates the other side of the machine in a reverse direction to

that before described, and stops in the position shown in Fig. 1, thus stopping the elevator by causing the valve or shipper to occupy the proper position to stop the motive power of said elevator, as before described. Now, if it is desired to lower the elevator from this point, a second pressure upon the button marked "Down" will cause the gear E to be turned in the same direction another fourth of a revolution, or so that the pawl S' at the right in Fig. 1 will be at the top, and the pawl S on the other side (shown by dotted lines) will come at the bottom of said figure, thereby operating the shipping mechanism in the direction required to withdraw the motive power, and thus allow the elevator to descend. The operation in ascending, it will be understood, is the same, except reversing the pressure upon the indicator-buttons, so as to apply instead of withdrawing the motive power. The elevator is stopped automatically at the top and bottom of the shaft in the usual way.

It is obvious from the foregoing description that an elevator provided with one of our machines may be started and stopped in a much easier and more convenient manner than by the usual methods now employed. Then, again, the inside of the elevator may be made to present a much neater and more tasty appearance, as the ropes or chains connected with the shipping mechanism may be covered upon the inside, incased in any suitable manner, or dispensed with entirely.

Our machine may be used in connection with any kind or style of an elevator, and may be connected with any elevator already built and in operation. It is both practical and useful, as will readily be seen by those skilled in the art to which it appertains.

As is well known, in operating hydraulic elevators by hand the valve is often injured in operating the same on account of the sudden and uneven pulls made upon the valve-ropes, thereby wearing out the valve very rapidly and requiring its frequent renewal.

By the use of our machine the valve is opened and closed by a steady and regular movement, and always stopped at exactly the right place to start or stop the elevator. Thus it will be seen that we entirely obviate the aforesaid objections, as well as other minor objections unnecessary to mention.

We are aware it is not new to start and stop an elevator by means of electricity, having electricity for its motive power to raise and lower the same, and where the starting and stopping mechanism constitutes a part of the mechanism employed for producing said motive power, and therefore make no claim in a broad sense to the feature of starting and stopping elevators by electricity.

Our invention relates to elevators such as are in common use, and more particularly to what are known as "hydraulic elevators," and has nothing whatever to do with those having electricity for their motive power, said invention constituting no part of the motive power, but as a means to control or govern said motive power when imparted by other means than electricity, as in the ordinary well-known ways, the purpose of our invention being simply to substitute electricity and the necessary mechanism hereinbefore described for hand-power to operate such elevators.

Having described our automatic machine governed by electricity for starting and stopping elevators, what we claim therein as new and of our invention, and desire to secure by Letters Patent, is—

1. A starting and stopping mechanism for elevators, which consists of a train of wheel-work adapted to release the driving mechanism by means of suitable connections, in combination with electro-magnets and connections substantially such as described, whereby the movements of the said train of wheel-work are controlled.

2. The combination of magnets Q Q' with suspended jointed bars R R', frame-work C, springs p^2, plates u u', locking-levers x x', springs x^3, pawls S S', springs y^5, rolls z z', toothed wheels G G', and spur-gear E, substantially as and for the purposes set forth.

3. The combination of the suspended jointed bars R R', plates u u', springs p^2, magnets Q Q', and the frame-work of the machine, with plate 11, spindle 6, set-screws 13, bearings 7, spring 14, collar 15, head 5, pin 12, notched disk Y, and fly-wheel V, substantially as and for the purposes set forth.

4. The combination, with rack D, working in a suitable way, D', and connected with the shipping mechanism of an elevator, of spur-gear E, pawls S S', springs y^5, rolls z z', toothed wheels G G', spur-gears I I', sleeves H, collars e, and shaft F, substantially as and for the purposes set forth.

5. The combination of spur-gear I on shaft F with intermediate gear, J, on shaft J', gear K on drum or pulley L, ratchet-wheel M, fastened to said pulley, pawl j, spring m, collars n n, shaft L', frame-work C, cord or chain g, provided with ball i or its equivalent, cord or chain f, and weight h, substantially as and for the purposes set forth.

6. The combination, with spur-gear I' on shaft F, of intermediate gears, O N, turning on studs O' N', respectively, spur-gear K' on pulley L, ratchet-wheel M', fastened to said pulley, its pawl and spring j m, collars n n, shaft L', frame-work C, cord or chain g, provided with ball i or its equivalent, cord or chain f, and weight h, substantially as and for the purposes set forth.

7. The combination of gear I on shaft F with intermediate gears, J V^4 V^3 V^2, arranged on shafts J', X, W, and U, notched disk Y on shaft W, fly-wheel V on shaft U, and frame-work C, substantially as and for the purposes set forth.

8. The combination, with magnets Q Q' and cross-bar R^2, of suspended jointed bars R R',

made in sections *o o'*, *p p'*, *q q'*, and *r r'*, provided with springs p^2, plates *u u'*, and plates *v v'*, and jointed at *t t'*, substantially as and for the purposes set forth.

9. The combination, with fly-wheel V on shaft U and notched disk Y on shaft W, of head 5, provided with pin 12, fastened or formed upon the forward end of spindle 6, properly supported, and operated forward and back by suitable spring, 14, and bars R R', substantially as shown and described, for the purpose stated.

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