(No Model.)

5 Sheets—Sheet 1.

H. M. L. CROUAN.

HYDRAULIC LIFT OR HOIST.

No. 344,307. Patented June 22, 1886.

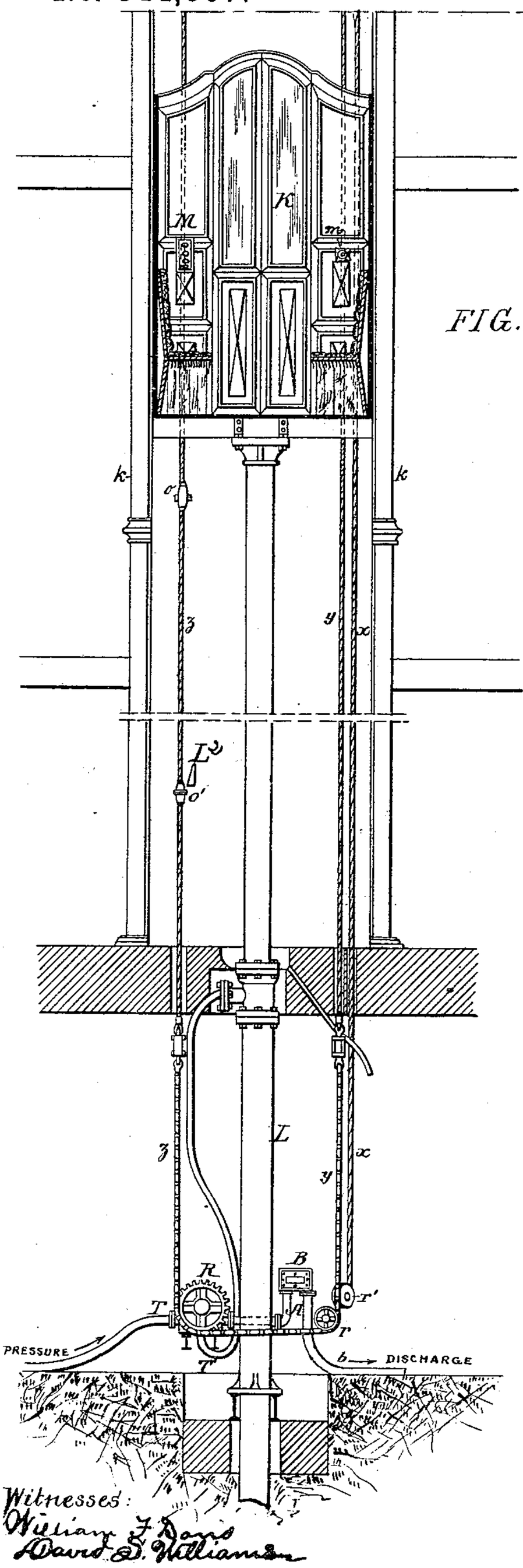


FIG. 1.

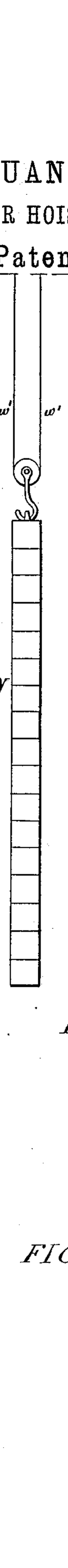


FIG. 8.

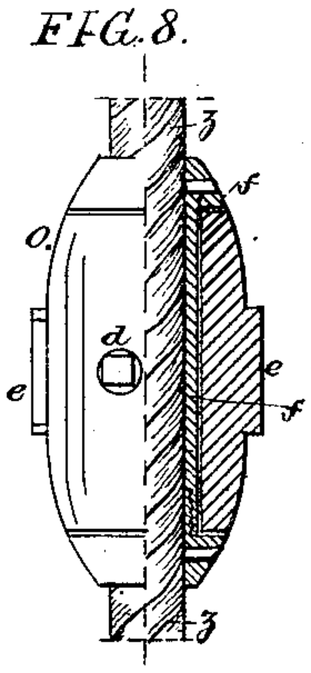
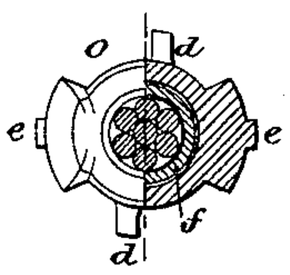


FIG. 9.



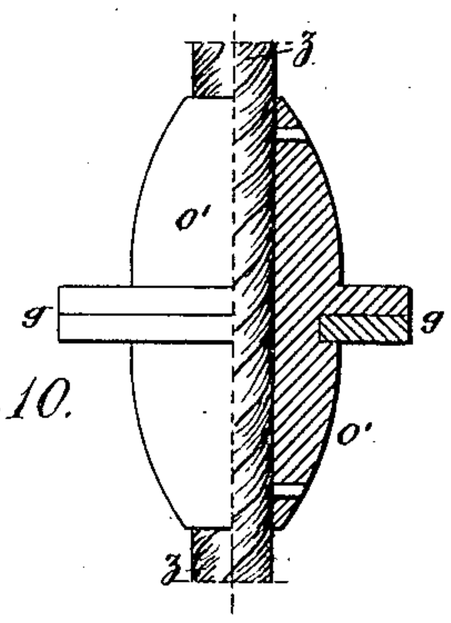


FIG. 10.

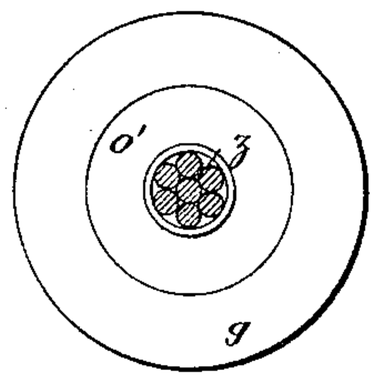


FIG. 11.

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FIG. 6.

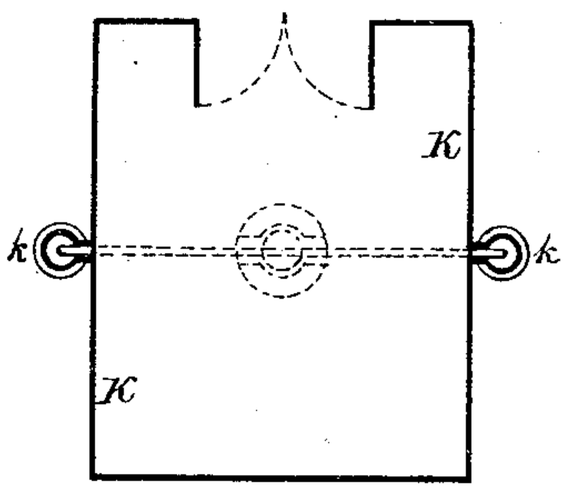


FIG. 7.

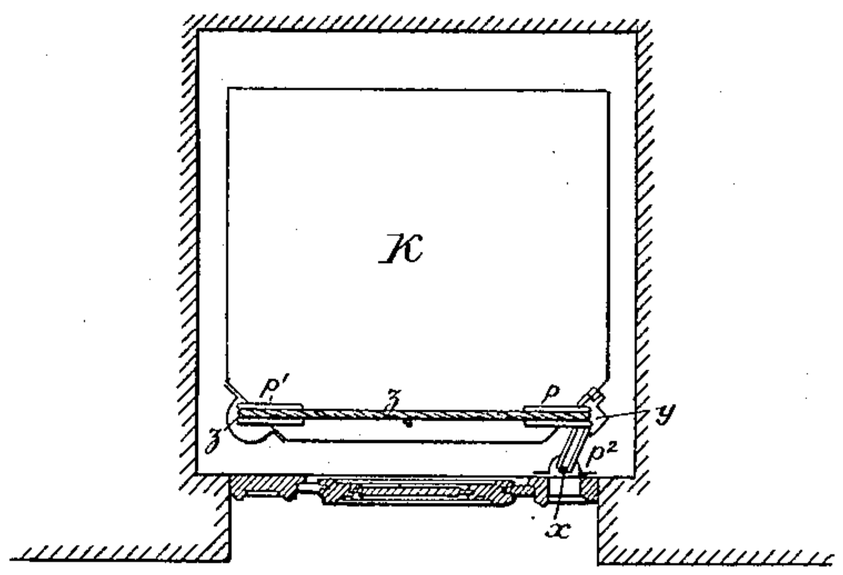
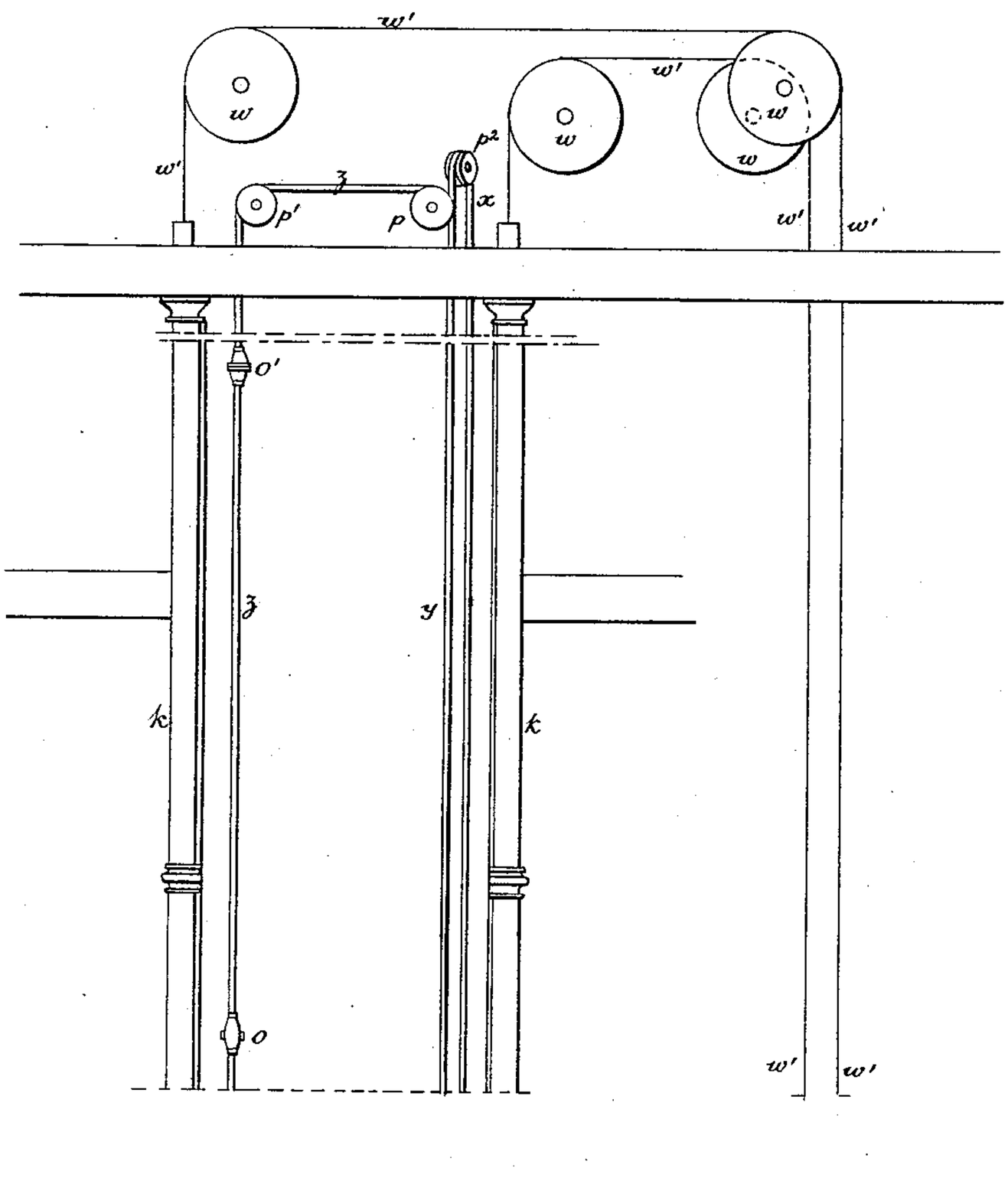


FIG. 2.



Witnesses
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FIG. 4.

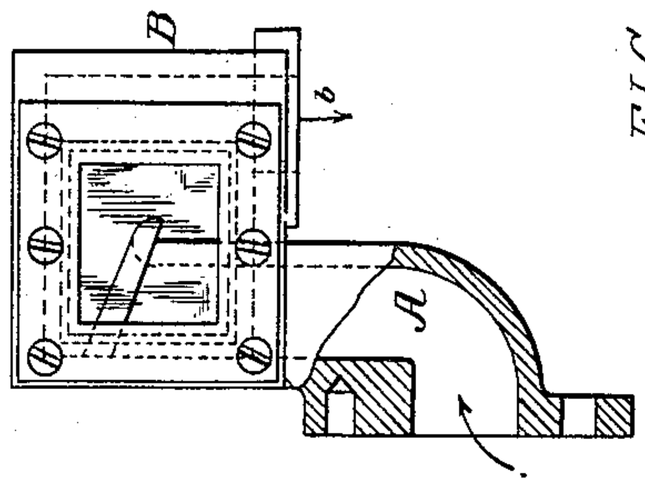

FIG. 5.

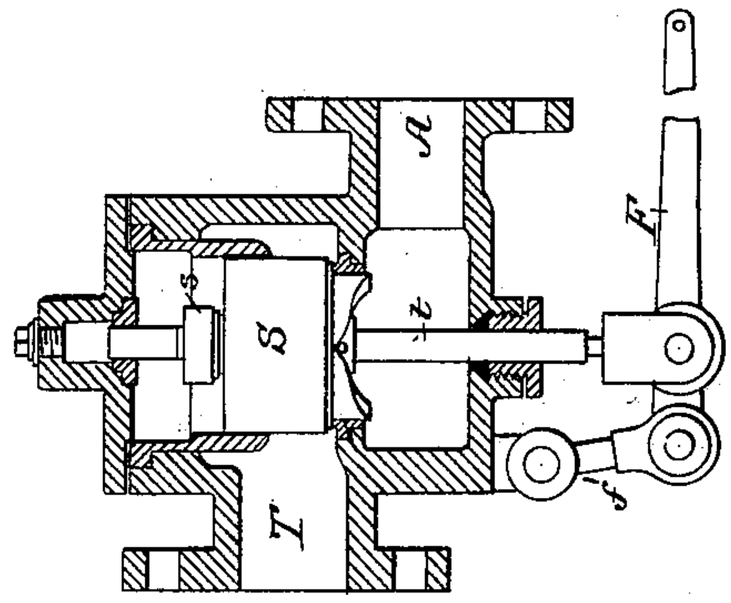

FIG. 3.

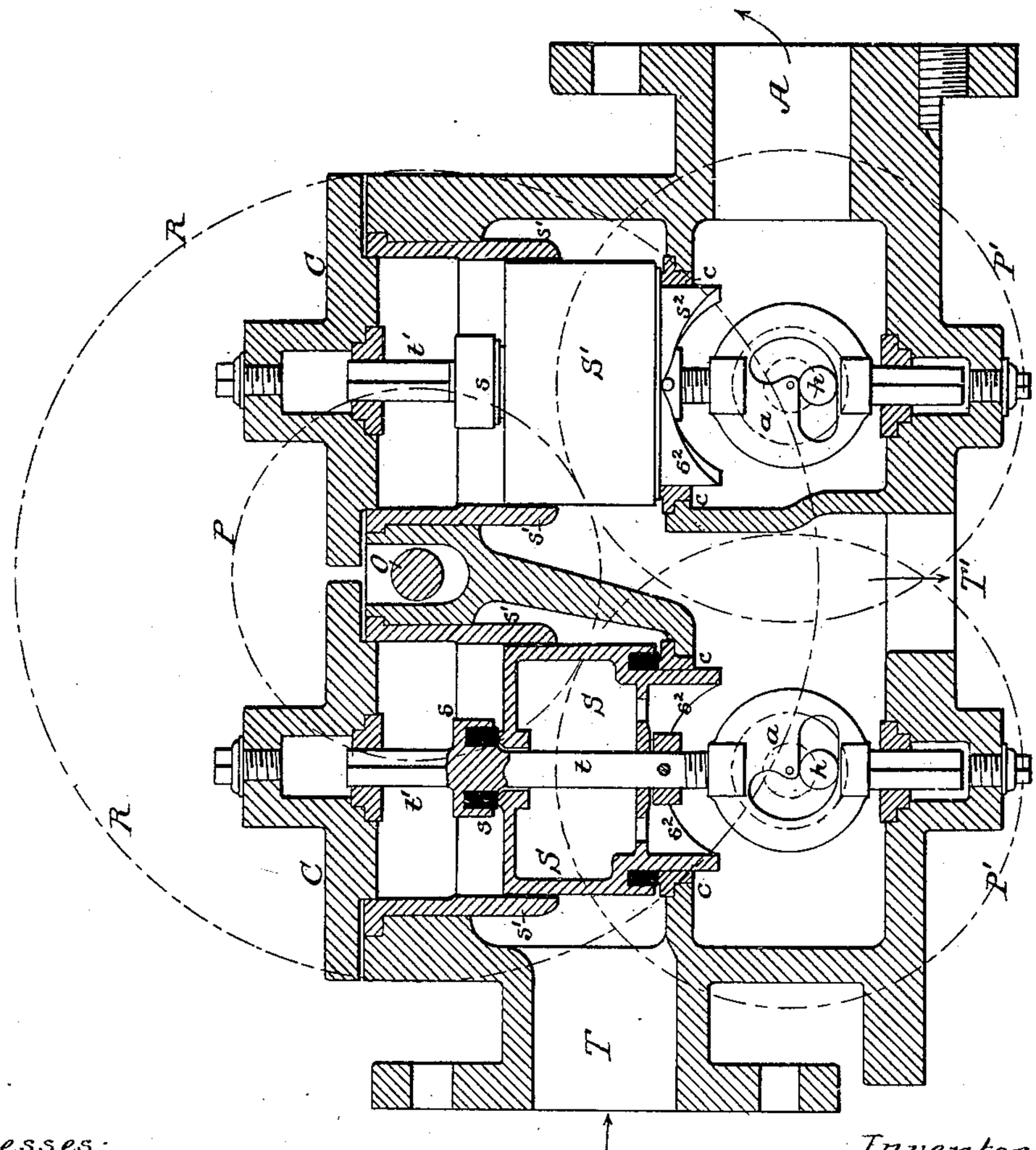

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FIG. 12.

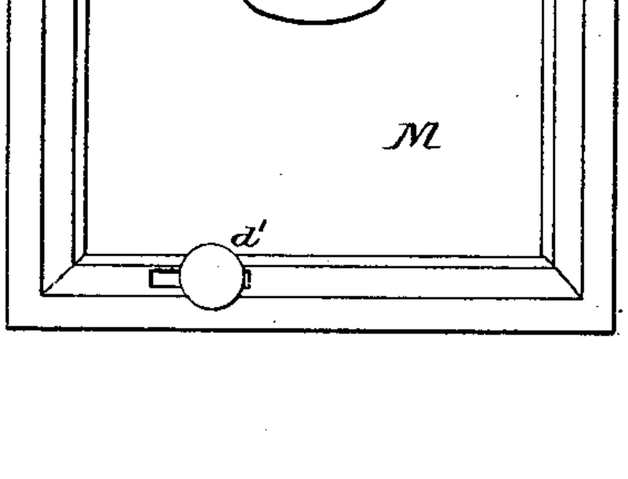


FIG. 13.

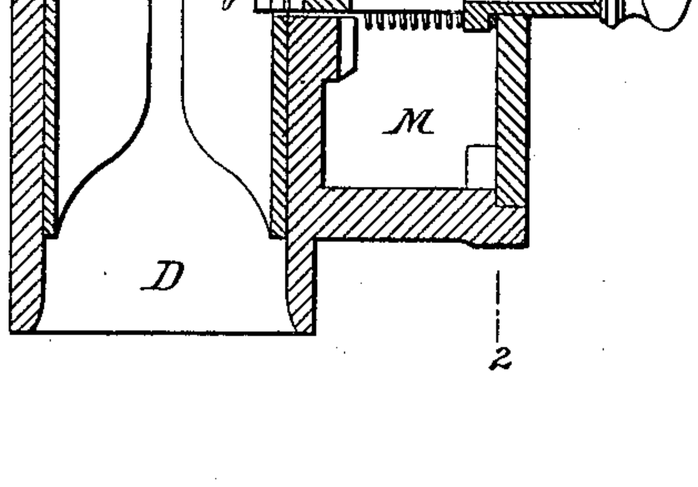


FIG. 14.

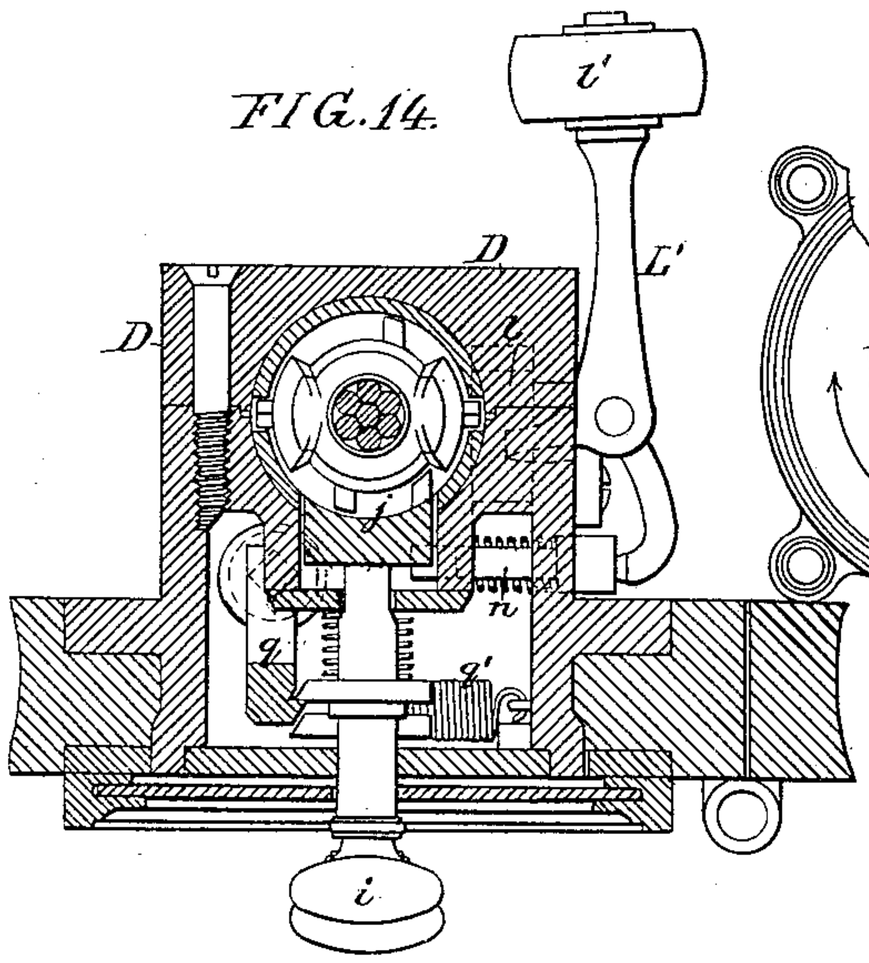
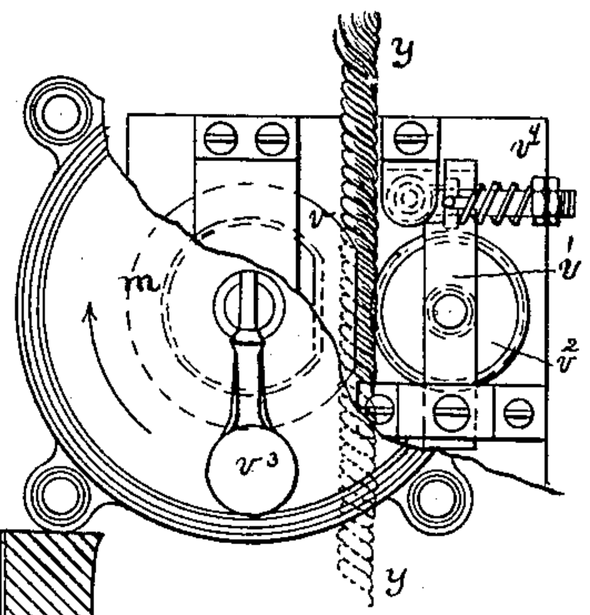


FIG. 18.



Witnesses:
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FIG. 15.

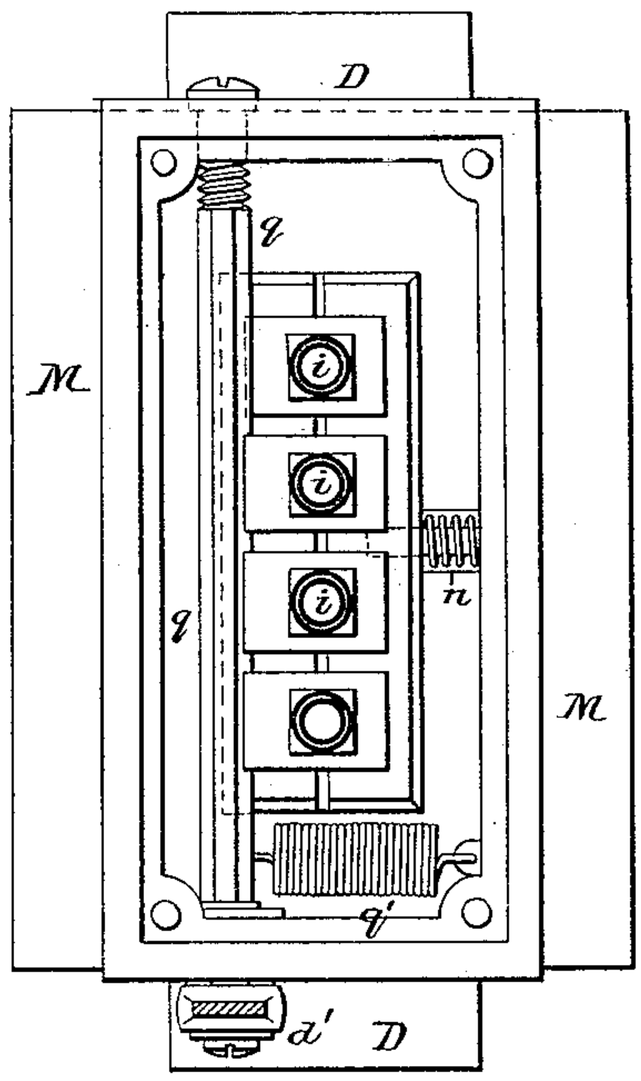


FIG. 16.

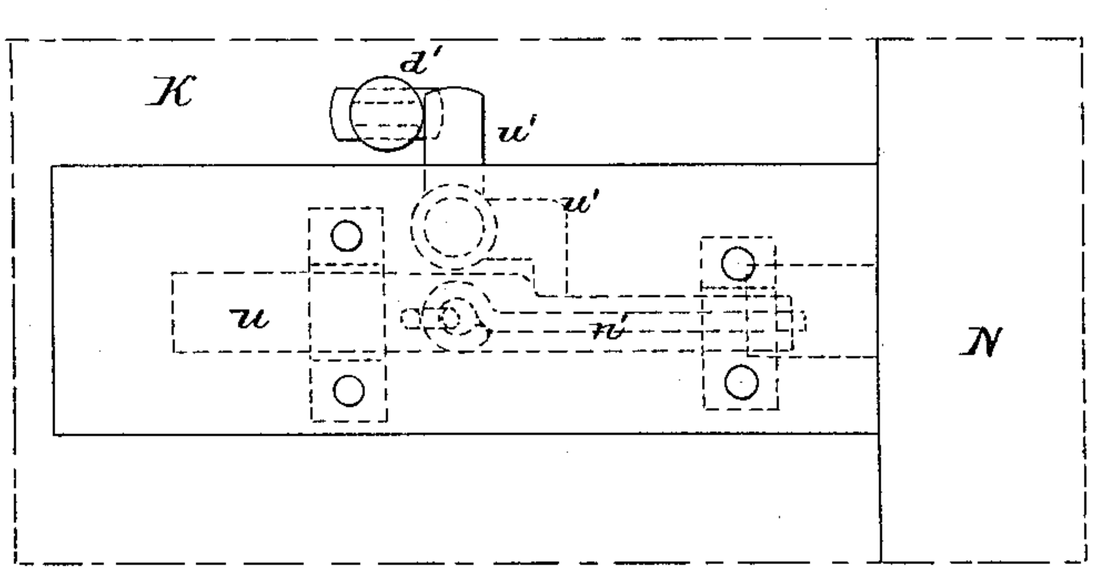
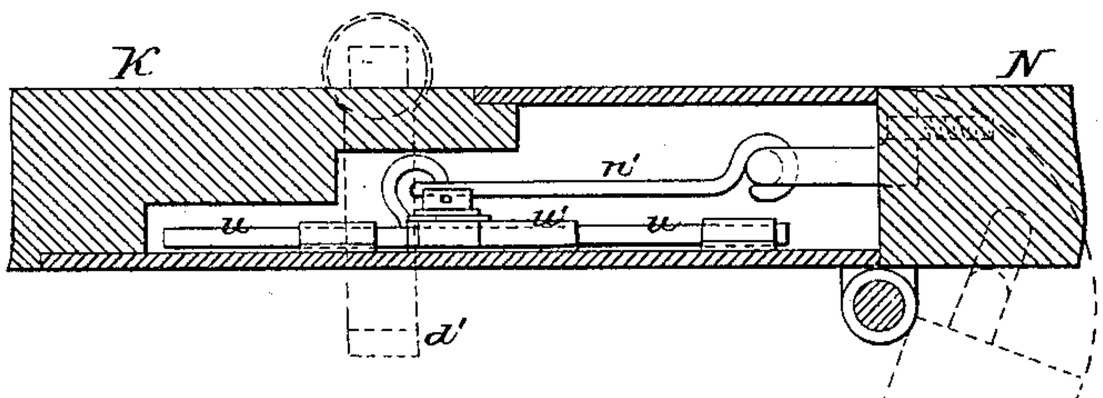


FIG. 17.



Witnesses:
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William F Davis

Inventor:
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by his Attorneys:
Howson & Sons

UNITED STATES PATENT OFFICE.

HENRY MARIE LÉON CROUAN, OF PARIS, FRANCE.

HYDRAULIC LIFT OR HOIST.

SPECIFICATION forming part of Letters Patent No. 344,307, dated June 22, 1886.

Application filed February 20, 1884. Serial No. 121,404. (No model.) Patented in France March 16, 1881, No. 141,595; in Belgium November 6, 1883, No. 63,123; in England November 14, 1883, No. 5,381, and in Germany January 27, 1884, No. 28,555.

To all whom it may concern:

Be it known that I, HENRY MARIE LÉON CROUAN, a citizen of the Republic of France, and residing in Paris, France, have invented Improvements in Hydraulic Lifts or Hoists, (for which I have obtained French Patent No. 141,595, dated March 16, 1881; Belgium Patent No. 63,123, dated November 6, 1883; German Patent No. 28,555, dated January 27, 1884, and British Patent No. 5,381, dated November 14, 1883,) of which the following is a specification.

My invention consists of certain improvements in the construction of hydraulic elevators designed, mainly, with the view of improving the construction of the valve mechanism and the devices for operating the same, to facilitate the starting and stopping of the elevator.

In the accompanying drawings, Figure 1, Sheet 1, is a view, partly in section, of a portion of an elevator embodying my improvements. Fig. 2, Sheet 2, is a view of the corresponding upper portion of the same. Fig. 3 is a sectional view, drawn to an enlarged scale, of the valve mechanism. Fig. 4 is a view, partly in section, of an attachment to detect leakage in the valves. Fig. 5 is a sectional view, drawn to a smaller scale, of a modified form of valve mechanism. Fig. 6 is a sectional plan view of the elevator-cage and parts of the frame. Fig. 7 is a sectional plan view illustrating a modified construction of cage and arrangement of valve-controlling ropes. Fig. 8 is a side view, partly in section, and Fig. 9 is a plan view, partly in section, of one form of stop carried by the valve-rope. Fig. 10 is a side view, partly in section, and Fig. 11 is a plan view, of another form of stop carried by the valve-rope. Fig. 12 is a face view of the rope-controlling device carried by the elevator-cage. Fig. 13 is a vertical section of the same. Fig. 14 is a sectional plan. Fig. 15 is a section on the line 1 2, Fig. 13. Fig. 16 is a side view, and Fig. 17 is a sectional plan view, of an attachment; and Fig. 18 is a view, drawn to an enlarged scale, of the gripping device *m*, for starting the elevator, the casing being broken away to illustrate the interior construction.

Referring to Figs. 1 and 2, L is the hydraulic cylinder for raising and lowering the cage K, which is provided with a suitable counterweight, W, suspended from the rope *w'*, passing over suitable pulleys, *w*, at the upper part of the structure. The cage is guided in any suitable manner, in the present instance by slotted tubular posts *k*, extending to the top of the building through the different floors or stairs. The ropes *x y z*, which control the valve mechanism in the lower part of the building, preferably do not pass through the inside of the cage, but outside thereof, as illustrated in the drawings, and are controlled by suitable stopping and starting devices within the interior of the elevator-cage, as hereinafter fully described.

T is the pipe connecting the interior of the hydraulic elevator L with the valve-chest, which receives its pressure-supply through the pipe T, and discharges the waste through the pipe A, leading to the siphon leak-detector B, having a suitable outlet-pipe, *b*.

The valve mechanism is illustrated more fully in Fig. 3, from which it will be seen that the valve-chest is divided by two partitions into three chambers. Into the first of these chambers opens the inlet-pipe T. From the central chamber leads the passage or pipe T' to the hydraulic cylinder, while from the third chamber leads the discharge-pipe A. These chambers are provided with cylindrical valves S S', respectively, adapted to circular seats *c* in the partitions. The upper portions of the cylindrical valves S S' are adapted to corresponding sleeves, *s'*, leaving, however, a play of about one-sixtieth of an inch between the exterior of the valves and the sleeves. The lower part of each valve S S' is provided with a projecting portion, s^2, within the seat *c*, which projecting portion is cut on an irregular outline, as shown, so that as the valve is raised the opening of the passage will be gradual. Each of the cylindrical valves S S' is hollow and open at its lower end, but closed at its upper end, with the exception of an opening, through which passes the stem *t* of a small valve, *s*, having a packing adapted to a seat in the top of the large valve S S'. The upper portion of the valve *s* is provided with a square stem, *t'*, adapted to a guide in the cover C of the valve-chest.

The valves S S′ may be operated in the manner hereinafter described or by any suitable means, and in the construction, Fig. 3, I have shown the valves *s* as provided on their lower stems, *t*, with yokes *a*, having cam-grooves, to which are adapted crank-pins *h*, carried by the axes of gear-wheels P′ P′. (Shown by dotted lines in the figure.) With these two wheels engages a pinion, P, on a transverse shaft, O, which carries a chain-wheel, R, (shown also in Fig. 1,) and around this chain-wheel passes a chain, which also passes around a guide-pulley, *r*, and is connected to or forms part of the operating chains or ropes *y z*. The third chain or rope, *x*, passes at its lower end over a guide-pulley, *r′*, and at the upper end over a guide-pulley, p^2, Fig. 2, the opposite ends of this rope or chain being connected to the rod, rope, or chain *y*. It will thus be seen that by the proper manipulation of the ropes *x*, *y*, and *z* the wheel R can be turned in one direction of the other, so as to operate the gearing to raise or lower the small valves *s* through the medium or the crank-pin *h* acting on the slots of the yoke *a*. This gearing is such that one valve will be closed while the other is being opened. Under ordinary circumstances the slight space between the exterior of each of the valves S S′ and the sleeves *s′* permits the water to leak slowly through to the upper side of said valves, and thereby keep them to their seats; but when the valve *s* of the valve S, for instance, is raised the water on the upper side of the valve S will escape through the opening around the stem *t*, and the pressure on the upper side of the valve S becomes little or nothing, while that on the under side around the outer edge is sufficient to raise the valve S and allow the water to pass through into the intermediate chamber, and thence through the opening T′ to the hydraulic cylinder.

The operation of the outlet-valve S′ is similar to that described, the opening being produced by the reverse movement of the wheel R and pinion P.

Instead of operating the valve-stem *t* through the medium of the crank-pins and slotted yokes other devices may be employed, such as illustrated in the modification, Fig. 5. In this construction the valve-stem *t* is extended downward, and passes through a stuffing-box in the bottom of the valve-chest, and is connected to a lever, F, pivoted through the medium of a link, *f′*, to a fixed part of the casing. There is a lever F for each valve, and their outer ends are connected to the operating-ropes *y x*.

When the outlet-orifices are open, the water escapes, and the distributing apparatus becomes filled with air, and irregularity in the stoppage of the elevator is thereby produced. To remedy this defect, a siphon is provided to maintain the distributing apparatus full of water. The outlet-tube A is carried upward, as shown in Figs. 1, 3, and 4, and is connected to the chamber B, above the level of the valve-box, above described. The outlet-pipe A extends up into the chamber a little distance above the bottom of the same, which is provided with an escape-pipe, *b*, leading to the sewer or other point of discharge.

I provide one or more sides of the box B with glass, so that when the valves leak from any cause the flow of water through the chamber B may be observed.

For the more convenient manipulation of the valves to stop the elevator, I provide on the elevator-cage K a controlling mechanism, M, to operate in connection with stops O O′ on the rope *z*, as I will now describe. Each of the stops O consists of a sleeve carrying guiding-projections, *e*, and stop-pins *d*. This sleeve is swiveled on a flanged collar, *f*, secured to the rope *z* at the proper point for the stoppage of the elevator at each of the different stories or landings. The stops O′ consist of oblong projections provided with annular flanges *g*, and one is secured to the rope near the bottom of the elevator-way, while the other is secured at a point near the top. The controlling mechanism on the cage K to be used in connection with these stops is illustrated more fully in Figs. 12, 13, 14, and 15, and consists of a casing or box, M, secured in a suitable opening in the side of the elevator-cage, and having on the rear side a tube, D, through which the rope *z* is adapted to pass, while on the inside front of the elevator-cage is provided a series of knobs, *i*, one for each of the different stopping-points. The stem of each knob passes through suitable guides in the box M, and is provided at its inner end with a suitable stop, *j*, adapted to be projected into the interior of the tube D, against the action of a spiral spring, *i′*, Fig. 13. The acting portion of each stop *j* is arranged in a different vertical plane, according to the position of the stop-pins *d* on the corresponding stops O of the rope *z*, so that when any one of the knobs *i* is pushed inward to project its corresponding stop *j* into the tube D, that for the fourth floor, (Figs. 12 and 13,) the elevator in its passage upward will not be arrested until the stop *j* comes into contact with the corresponding stop O at the fourth floor, for the acting portion of the projection *d* on the stops O for the other floors will be out of the path of the stop *j* for the fourth floor.

In order to insure that the stops O on the rope shall pass through the tube D in the proper position, the latter is provided with grooves for the guidance of the projections or fins *e* on the stops, as illustrated in Figs. 13 and 14.

In order to keep any one of the knobs with its stop in proper position after it has been pushed in, I provide a hinged catch-bar, *q*, which, under the action of a spring, *q′*, Figs. 14 and 15, will engage with the flange on the stem of the knob *i*, as illustrated in Fig. 14; but when another knob is pushed in the beveled edge of the catch-flange on that knob will push the catch *q* back to disengage the knob previously pushed in. The stem of the catch *q*

is extended through the bottom of the casing, and is provided with a suitable hand-lever, d', Figs. 12 and 15, by the manipulation of which any of the catch-levers may be released. I prefer to provide also a device for automatically releasing this catch q on the opening of the door of the cage. This is illustrated in Figs. 16 and 17, in which N represents the hinged door of the elevator-cage, which is connected through a suitable link, n', with a sliding bolt, u, having an inclined or cam surface, against which bears the lower arm of a bell-crank lever, u', Fig. 16. The vertical arm of this bell-crank lever acts against the edge of the lever d'. Thus, when the door N is swung back on its hinges, as indicated in Fig. 17, the bolt u will be slid inward on its guides by the link n', and the cam of the bolt, acting on the arm of the bell-crank lever u', will push the lever d' backward to turn the catch q on its center and release whichever of the knobs i had been previously pushed in by the stoppage of the elevator-cage.

It will be observed that the flanges g of the stops O' at the top and bottom of the elevator-way are of such a size that they cannot pass through the tube D, and in consequence the rope will be automatically moved to stop the elevator when it reaches the top or bottom of the way.

Another device for automatically stopping the cage at either end of its journey is illustrated in Fig. 14, and it consists of a hinged lever, L', which is provided at its outer end with an anti-friction roller, l', which is adapted to come into contact with a cam, L^2, at either end of the elevator-way. The action of this cam will be such as to throw the said lever in the direction of the arrow, Fig. 14, and thereby cause the transverse movement of a slide, l, (indicated by dotted lines,) to project itself across the guiding-groove in the tube D, and come into contact with the fin e on the stop O to which the cage is approaching, and thereby stop the elevator. A spiral spring acting on a pin, n, bearing on the outer end of the lever L', tends to return the latter and the slide l to their normal positions, (indicated in Fig. 14,) and the said lever L' is relieved from the action of the cam in the elevator-way. The rope y is arranged at the opposite side of the elevator-cage from the rope z, and said cage is provided with a gripping or other starting device, m, for acting on the rope y to start the elevator. This starting device is illustrated more fully in Fig. 18, and is designed to avoid the necessity of carrying the lifting-rope through the car.

Within the car and outside of the case of the device m is a crank-handle, v^3, on the axis of a grooved pulley, v, which at one side is flattened, as illustrated in Fig. 18. Adjacent to the edge of this grooved pulley is a friction-wheel, v^2, carried by hinged arms v', acted on by a strong spring, v^4, which tends to press the wheel v^2 up toward the gripping-wheel v. Between the two passes the lifting-rope y, and and when the cut-away portion of the gripping-wheel v is adjacent to the friction-wheel v^2, the rope can pass freely between the two; but when the crank-handle v^3 is so turned as to bring the other portions of the wheel v into contact with the rope the latter will be gripped between the friction or pressure wheel v^2 and the wheel v, so that by turning the latter in one direction or the other the rope y can be so operated by the crank within the car as to open the valves of the distributing apparatus below to start the ascent or descent of the elevator.

I claim as my invention—

1. The combination of the valve-box having a sleeve, s', and seat c, with a cylindrical valve adapted thereto, a supplementary valve, s, having a stem, t, with a cam-yoke, a, and operating-crank h, all substantially as set forth.

2. The combination of the stopping-rope of an elevator, carrying a series of different stops for the different landings, with a controlling device on the cage having corresponding movable projections for the different stops to be thrown into and out of the path of the latter, substantially as described.

3. The combination of the cage of an elevator, carrying a guiding-tube, D, and a series of different movable stops to be projected into the said tube with a stopping-rope carrying a series of different stops, O, for the different landings and passing through the tube, substantially as specified.

4. The combination of a cage carrying the grooved guiding-tube and sliding knobs carrying stops j, with a stopping-rope carrying stops O, provided with fins e and projections d, substantially as specified.

5. The combination of the cage and stopping-rope having different stops for the different landings, with a controlling-box carried by the cage, and having a series of spring-knobs provided with corresponding stops, and a catch, q, to retain the said knobs when pushed inward, substantially as described.

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

HENRY MARIE LÉON CROUAN.

Witnesses:
JEAN SERAPHIN GUILLAUME DE KARUEBECK,
ALFRED COINY.