No. 737,108. PATENTED AUG. 25, 1903.

W. H. HULTGREN.

AUTOMATIC ELEVATOR.

APPLICATION FILED MAR. 25, 1903.

NO MODEL.

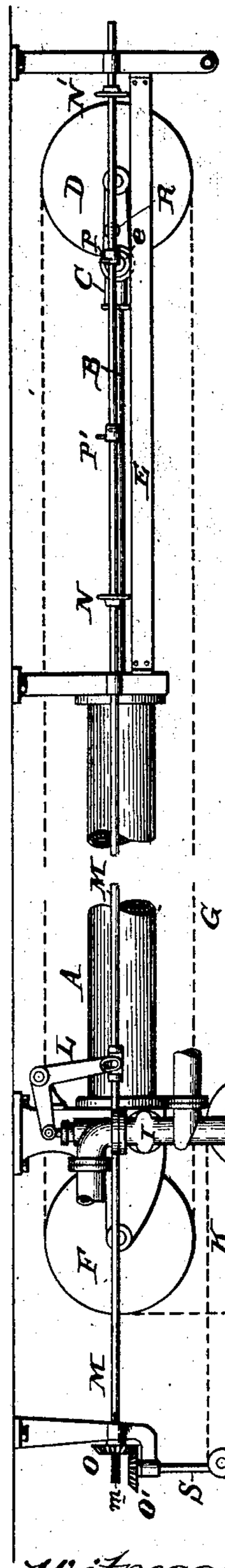


Fig. 1

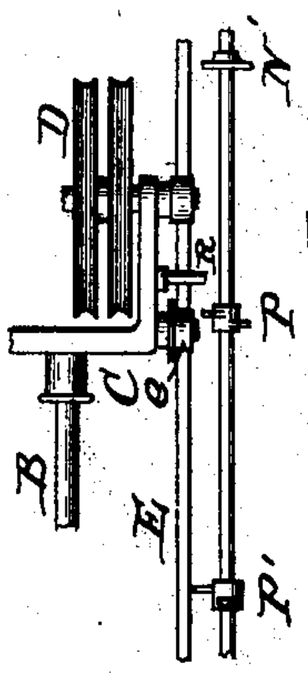


Fig. 4

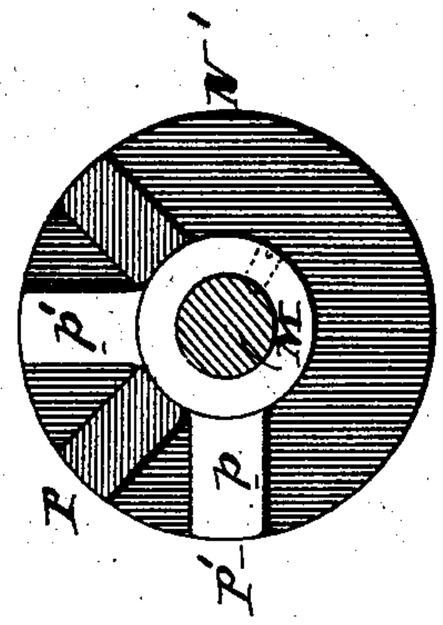


Fig. 2

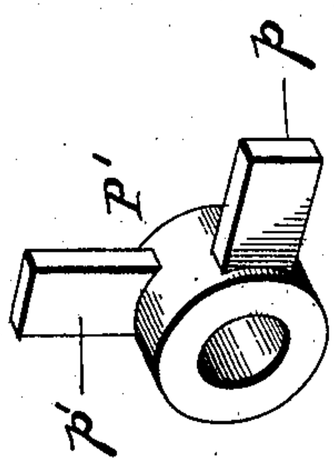
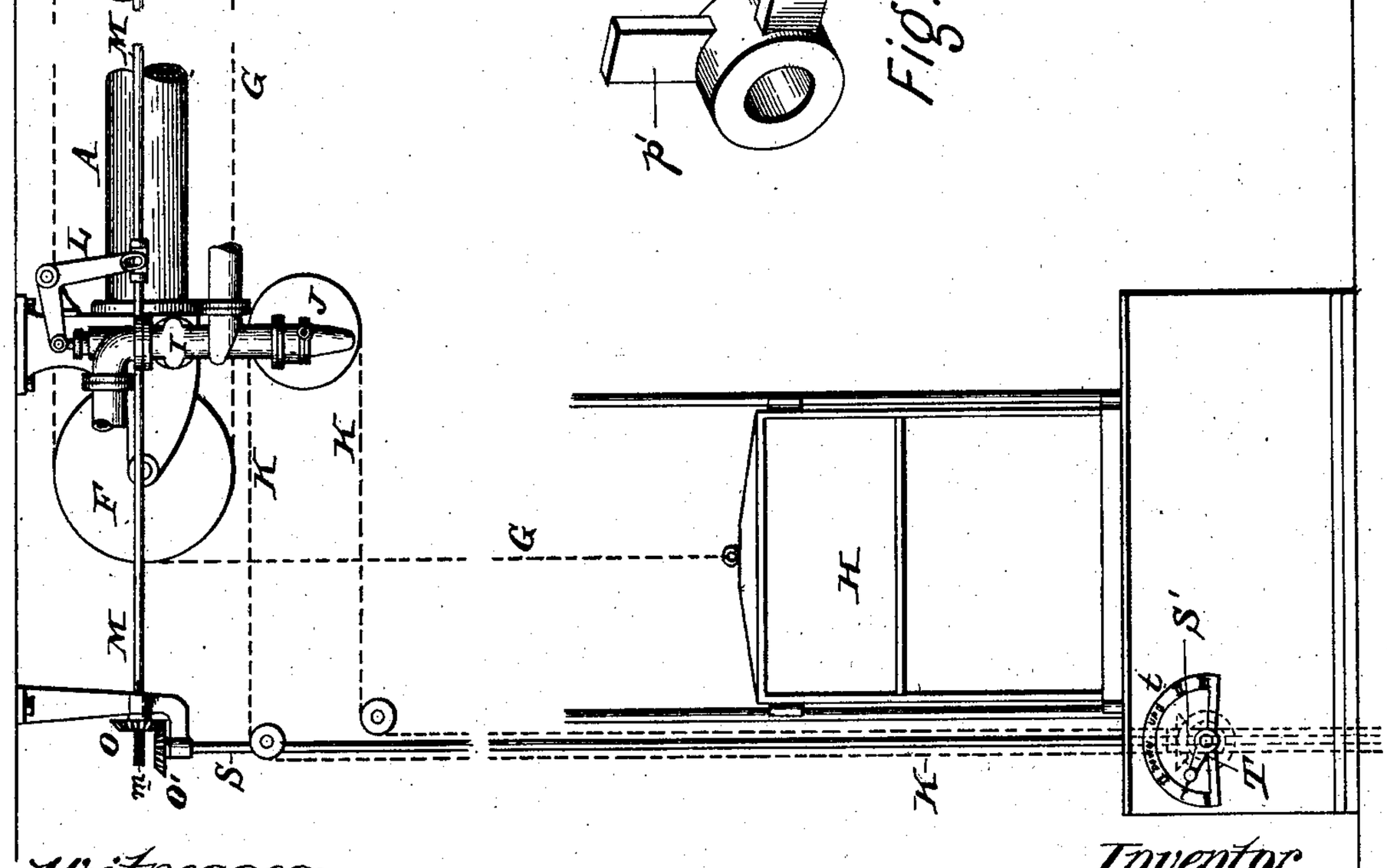


Fig. 3



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UNITED STATES PATENT OFFICE.

WILLIAM H. HULTGREN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE OTIS ELEVATOR COMPANY, A CORPORATION OF NEW JERSEY.

AUTOMATIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 737,108, dated August 25, 1903.

Application filed March 25, 1903. Serial No. 149,420. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. HULTGREN, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Automatic Elevators, of which the following is a specification.

My invention has reference to elevators; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to provide an elevator with devices of such a character that the car or cage can be brought automatically to a state of rest at any predetermined floor or landing desired and to operate the car or cage from any floor or landing by simple means of hand-operating devices.

In carrying out my invention I provide a rod movable in the direction of its length and to be rotated by hand. The hand-operating connections for this rod are preferably located in some accessible position at one or more floors adjacent to the elevator. The rod is provided with radially-projecting arms or fingers along its length adapted to engage with some convenient part of the hoisting engine or motor with the object of controlling the source of energy of the engine or motor by acting upon the devices ordinarily used for that purpose to bring the elevator automatically to a state of rest after the rod has been moved and rotated, as previously explained, by hand.

In the application of my invention I have in this case adopted the use of the well-known horizontal hydraulic engine, in which with some modifications the usual three-way valve controlling the water-supply is acted upon.

My invention also includes novel details of construction, which, together with the features above described, will be better understood by reference to the drawings, in which—

Figure 1 is an elevation of a hoisting apparatus embodying my improvements. Fig. 2 is a cross-section of the controlling-rod, showing the arrangement of the projecting arms. Fig. 3 is a perspective view of one set of the projecting arms of the controlling-rod; and Fig. 4 is a partial view of Fig. 1, showing the cross-head of the hydraulic engine upon which a lug R is fastened.

A is the hydraulic cylinder.

B is the piston-rod.

C is the cross-head or carriage, moved by the piston-rod and guided by supporting-wheels *e* on the longitudiual guides E.

D represents a series of cable-sheaves journaled in the cross-head C, and F indicates a corresponding series of sheaves journaled at the distant end of the hydraulic cylinder, as is well known in hydraulic-elevator construction. The elevator-cable G passes about the sheaves, and the free end thereof extends downward and is attached to the cage H, which is guided in suitable vertical guides, as desired.

I is the hydraulic control-valve for admitting water to and from the hydraulic cylinder M.

J is the valve-operating sheave.

K is the control-cable running downward along the elevator-shaft in any suitable manner. By moving the said cable K the valve may be moved to admit or discharge water to and from the cylinder A, and hence the said cable K may be considered as the starting-cable.

M is the automatic control-rod and is adapted to be moved in the direction of its length as well as be given a partial rotation. It is suitably guided and is mechanically connected to operate a lever L when moved longitudinally for the purpose of closing the control-valve I when the said rod M is shifted automatically. The means for shifting this rod is as follows: Upon the rod are disks N N′, which are designed to be moved by the lug R on the cross-head C when it approaches its extreme movement in elevating or lowering the cage. In this manner when the disk N′ is reached, and the rod M thereby moved, the cage will be approaching the top of the elevator-shaft, and when the disk N is reached and moved the cage will be at the basement. At these extreme positions the movement of the rod M closes the valve I and stops the movement of the cage. Intermediate of these parts N-N′ are the projecting radial arms P P′, also secured to the rod M and adapted to

move the rod and close the valve when the cage reaches intermediate positions corresponding to the several floors. As shown, two sets of these projecting radial arms are indicated, and consequently there will be provision for arresting the cage at the basement and at the elevations of three floors. These intermediate projecting arms are fully shown in Figs. 2 and 3. They are provided with a hub and clamped upon the rod M and are arranged at an angle to each other in different planes for purposes to be described. The lug R on the cross-head or carriage C engages the projecting arms p p', as the case may be, the arms p being engaged when the cage is descending and the arms p' being engaged when the cage is ascending. The space between the arms p p' is designed to make allowance for the lap of the valve, so as to insure the cage both in rising and lowering to stop exactly at the proper floor, as it will be understood that the movement of the valve to close it must start in advance of the cage reaching the floor. For this reason the arms cannot be placed in the same plane. The essential feature is that the operating surfaces or faces of the arms p p' shall be supported longitudinally along the rod M a sufficient distance apart to compensate for the lap of the valve to insure the cage stopping at an exact level with the floor whether it is ascending or descending and to provide spaces in the plane of their rotation to allow the lug R on the cross-head to pass longitudinally between the intermediate arms, which are not called into engagement when stopping the cage at different floors. These projecting arms p p' are not only adjustably secured along the length of the rod M, so as to be properly spaced for stopping the elevator at the proper moment, but are also relatively adjustable circumferentially, so that the several arms p p' will be brought into operative position for different rotary positions of the rod M.

The control-rod M extends through the hub of a bevel-gear O and is rotated thereby. It is free to slide longitudinally through the gear; but it positively rotates with it through the medium of a key m. The gear O is rotated by a gear O', which is upon the end of the rod S, extending vertically close to or in the elevator-shaft. This rod S is geared at one or more of the floors, as at S', to a handle and pointer T, which latter may be moved over a dial t. The dial has upon it figures or characters to indicate the several floors, and these are arranged in two sets, one set being coupled with the word "Down" and the other set coupled with the word "Up." When the pointer is directed to the figures or characters coupled with the word "Down," the cage is to descend and stop automatically at the floor so designated, and likewise if the pointer be directed to the figures or characters coupled with the word "Up," then the elevator-cage will travel upward and stop at the floor so designated. Each floor or landing may have a dial and handle for adjustment of the rods S M, or, if desired, such means may be arranged at any floor desired.

The valve-sheave J and cable K are designed to always start the elevator up or down as desired by shifting the valve I in the well-known manner, and this same valve is acted upon by the lever L and rod M to stop the travel of the cage, the said parts simply performing automatically the function performed by the cable and sheave under hand manipulation as ordinarily used.

The operation of my invention will now be understood. In the position of parts shown the second floor is indicated with the cage descending to come to rest at the first floor. The pointer T has been set to "Down I" on the dial, and the carriage C is traveling to the left. The lug R will engage the arm P', clamped upon the rod M by means of its hub. The said arm P' corresponding to the position of the cage at the first floor, it will move the rod M, which in turn, operating upon the lever L, will close the valve I, said action taking place simultaneously with the cage H reaching the level of the first floor, thus stopping the cage at this predetermined floor. Had the handle been turned to bring the pointer T to "Down II" the lug R would have engaged the arm P, corresponding to the position of the cage at the second floor, in the same manner as above described. This action also takes place in ascending and brings the cage to rest at any desired floor if the pointer T is first turned to the floor desired on the side of the dial t (indicated "Up") before starting the cage. In the down movement of the cage the lug R engages the extensions p of the arms P P', while in the up movement of the cage it engages the extensions p'. The working faces of the radial extensions p p' of the arms P P', corresponding to the position of the cage at each floor, are separated a distance sufficient to compensate for the lap of the valve I to insure the cage stopping exactly at the floor-level in either direction of its travel.

The radial arms P P' are so secured upon the rod M that for any position of this rod the lug R can only engage one of the radial arms at any one time or none of them, as may be determined, in case it should be desired to have the cage make a full trip between terminal floors or landings. The lug R cannot engage two arms in one continuous travel. The adjustment of the radial arms to engage with the lug R is accomplished by the rotation of rod M under the action of the gears O O', rod S, gears S', and pointer-handle T. It is obvious that the radial arms upon the rod M must be placed relatively to correspond with the movement or rotation of the pointer-handle T.

It is immaterial what form of power device may be used to raise and lower the cage, that shown being illustrated as a type of hydraulic

elevator excellently adapted to the purpose of my invention. It is also evident that the said power devices may be located in the basement or any other place. Hence the means for rotating the rod M from the handle T would be varied to suit. It is also evident that while a pivoted indicator-handle is convenient it may be made in any other suitable manner so long as its movement imparts a rotary motion to the rod M or the projecting arms P P'.

I do not limit myself to the details of the construction illustrated, as they may be varied in many ways without departing from the spirit of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an elevator, the combination of a cage, hoisting devices therefor having a movable part, a series of projecting devices each having two arms arranged at a distance apart and adapted to be moved by the movable part, hand-controlled means extending to the line of travel of the cage for bringing either of the arms of any one of the projecting devices separately into line with the movable part of the hoisting devices, a valve to control the operation of the hoisting devices, and means for actuating said valve to arrest the operation of the hoisting devices controlled by the projecting devices when moved.

2. In an elevator, the combination of a cage, hoisting devices therefor having a movable part, a series of projecting devices each having two arms arranged at a distance apart and adapted to be moved by the movable part, hand-controlled means extending to the line of travel of the cage for bringing either of the arms of any one of the projecting devices separately into line with the movable part of the hoisting devices, a valve to control the operation of the hoisting devices, and means for actuating said valve to arrest the operation of the hoisting devices controlled by the projecting devices when moved and consisting of a rotary reciprocating rod to which the projecting devices are secured adapted to be rotated by the hand-controlled means and reciprocated by the movable part of the hoisting devices.

3. In an elevator, the combination of a cage, hoisting devices therefor having a movable part, a series of projecting devices adapted to be moved by the movable part, hand-controlled means extending to the line of travel of the cage for bringing either one of the projecting devices separately into line with the movable part of the hoisting devices consisting of an upright rod and a handle geared to the rod and adjustable over a dial, a valve to control the operation of the hoisting devices, and means for actuating said valve to arrest the operation of the hoisting devices controlled by the projecting devices when moved consisting of a rotary reciprocating rod to which the projecting devices are secured adapted to be rotated by the hand-controlled means and reciprocated by the movable part of the hoisting devices.

4. In an elevator, the combination of hoisting devices having a rectilinearly-moving part, a cage and cable moved thereby, a valve to control the hoisting devices, a rod having two sets of radial projections carried thereby said projections being disposed about the rod in different angular positions and adapted to be engaged by the rectilinearly-moving part of the hoisting devices one set operating to shift the rod when the cage is ascending and the other set operating similarly when the cage is descending, a valve for the hoisting devices controlled by the rod, and hand-controlled means extending to the line of travel of the cage for rotating the rod and its projections to insure the cage being brought to rest at predetermined positions.

5. In an elevator, the combination of a cage, a hydraulic hoisting device for raising and lowering the cage, a valve to control the hydraulic hoisting device, a rotary reciprocating rod arranged parallel to the cylinder of the hydraulic hoisting device and having a series of projecting parts thereon arranged in different alinement about the rotary reciprocating shaft and adapted to be separately acted upon by a movable part of the hydraulic hoisting device, means extending adjacent to the path of the cage for imparting to the rotary reciprocating shaft an adjusting rotary motion, a lever for operating the valve and a hinged connection between the lever and the rotary reciprocating shaft whereby the shaft may be rotated without affecting the lever before any reciprocation imparted to the shaft will operate the lever and control the valve.

In testimony of which invention I have hereunto set my hand.

WILLIAM H. HULTGREN.

Witnesses:

WILLIAM HILL,

R. M. KELLY.