H. A. SMITH.

DUMB WAITER AND ELEVATOR.

APPLICATION FILED JAN. 4, 1909.

950,828.

Patented Mar. 1, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

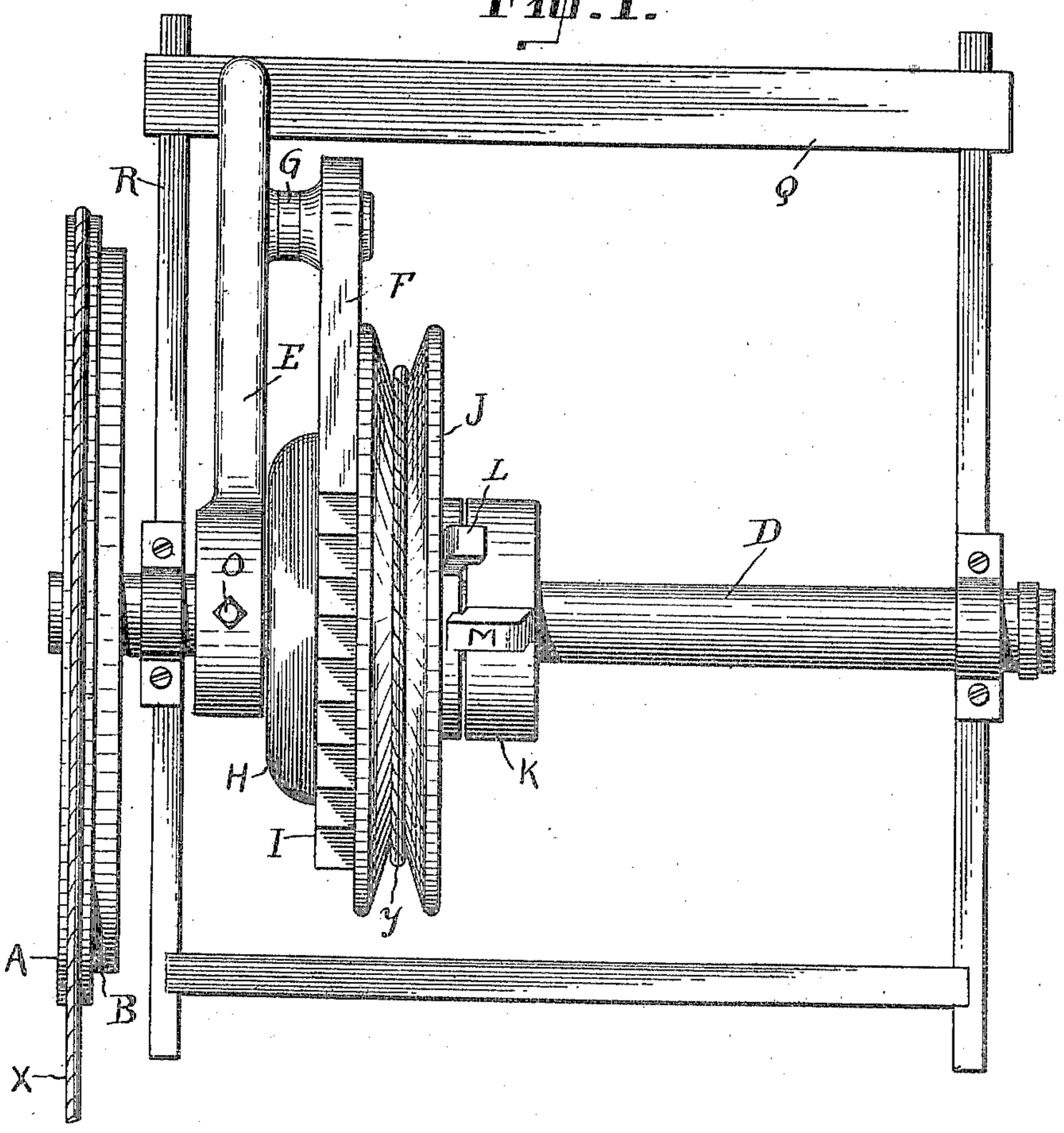
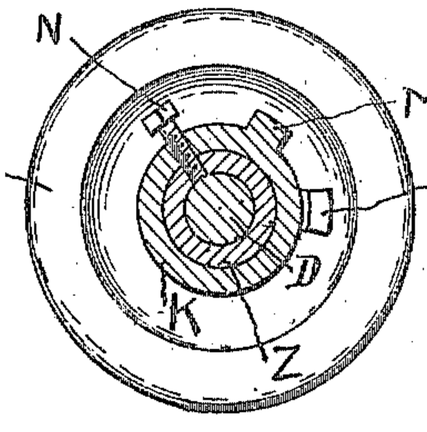


Fig. 4.



WITNESSES:

James B. Allen

Ethel L. Townsend

INVENTOR:

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2 SHEETS—SHEET 2.

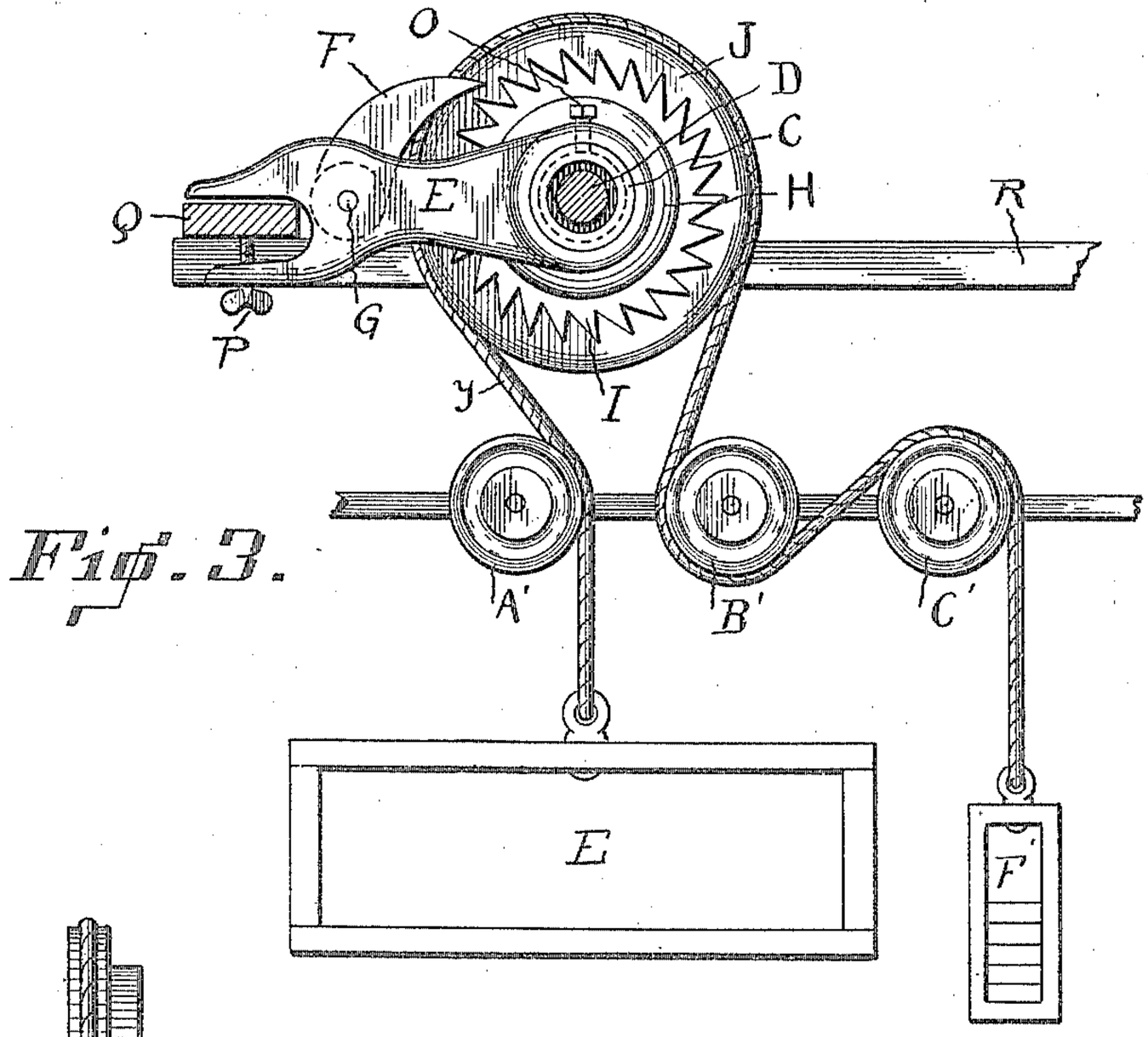

Fig. 3.

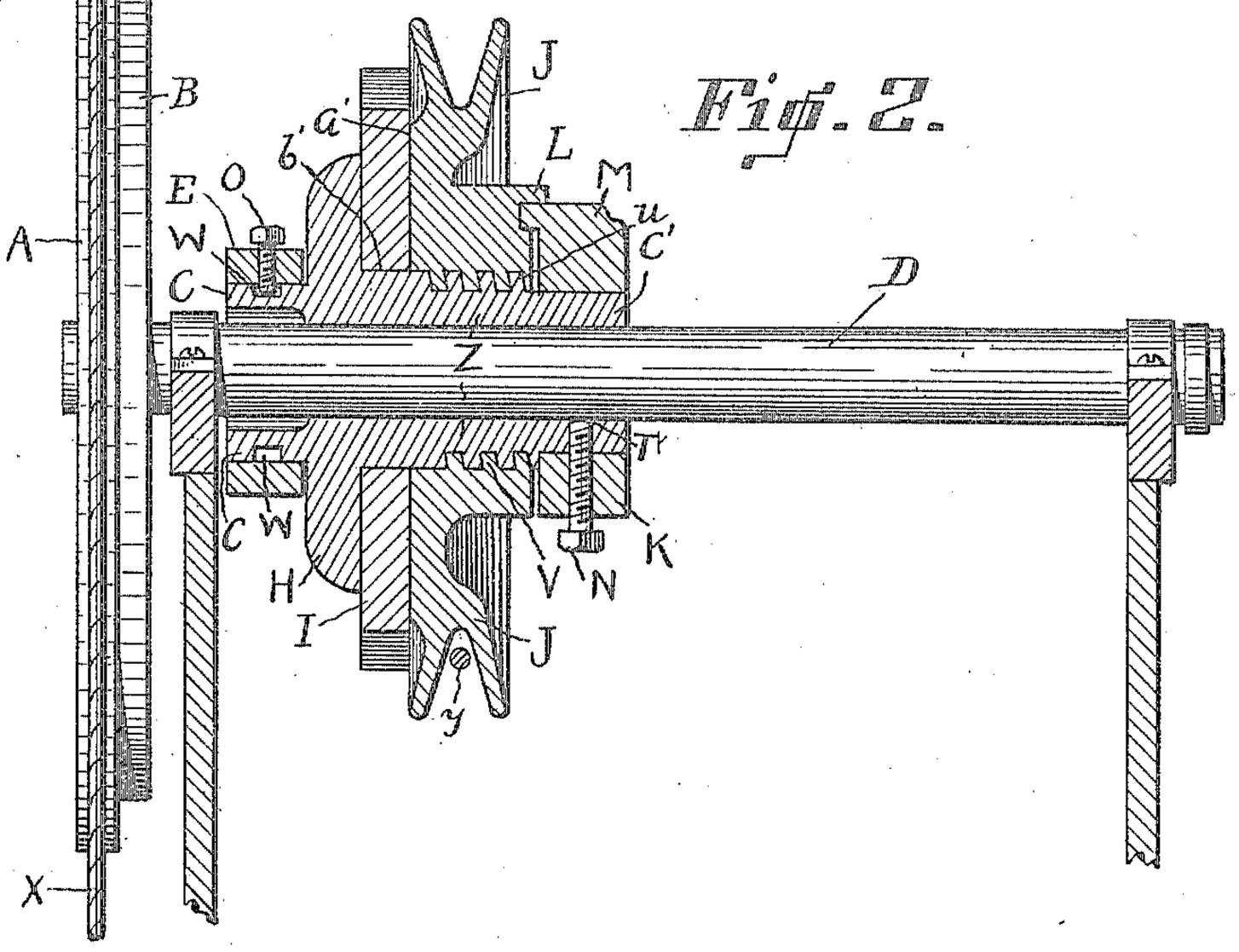

Fig. 2.

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UNITED STATES PATENT OFFICE.

HORACE A. SMITH, OF NEW YORK, N. Y.

DUMB-WAITER AND ELEVATOR.

950,828. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed January 4, 1909. Serial No. 470,732.

To all whom it may concern:

Be it known that I, HORACE A. SMITH, of the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Automatic Locks for Dumb-Waiters and Elevators; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in hoisting apparatus generally, and in particular to elevators and dumb-waiters.

The main object of my invention is to control the elevator car, dumb-waiter or other weight being hoisted and to prevent the same from falling when the hoisting power is removed.

Another object of my invention is to automatically hold the elevator car or dumb-waiter at any point of its movement.

In the accompanying drawings is illustrated a preferred embodiment of the invention but it will be understood that various changes may be made therein without departing from the spirit and scope of the invention.

In the drawings: Figure 1 is a plan view of the invention in its application to a dumb-waiter. Fig. 2 is a longitudinal sectional view of the invention, with certain of the parts shown in elevation. Fig. 3 is a view in side elevation with the shaft and a part of the framework shown in section. Fig. 4 is a cross-sectional view of the shaft and the collar thereon, illustrating the manner of engagement between the lugs on the collar and sheave.

Similar reference characters denote like parts throughout the several views.

Briefly stated, the invention consists primarily of a reversely acting clutch which becomes operative to stop the descent of the car or dumb-waiter when the weight of the same exceeds that of the counterweight. This clutch is preferably made in the form shown in the drawings, wherein is provided a sleeve Z having external screw-threads U near one end and with an outstanding retaining flange H near its opposite end, there being a lift-sheave J mounted upon said sleeve and provided with internal screw-threads V to engage those on the sleeve, and a ratchet-wheel or disk I, which is loosely confined on the sleeve between the retaining flange and the lift-sheave. The lift-sheave is preferably provided with a plane side surface adjacent the side of the ratchet-wheel, as shown. The movement of the lift-sheave on the sleeve in one direction (to the left in Fig. 2) is limited by its clamping engagement with the ratchet-wheel, and in the opposite direction the turning movement of the sheave is limited by means of a lug L on the sheave coming in engagement with a corresponding abutment lug M on the collar K, which collar is fixedly secured upon the shaft. In the preferred construction the collar is mounted direct on the end of the sleeve and the two are rigidly secured upon the supporting shaft D by means of a set-screw N passing through both the collar K and the sleeve Z into engagement with the shaft. The draft-rope Y extends from the car or dumb-waiter E′ up over and around the lift-sheave or pulley and has connected to its other end a counterweight F′. The usual guide-pulleys A′, B′ and C′ serve the purpose of holding the draft-rope or cable in close engagement with the lift-sheave and to sustain the counterweight at a point to one side of the car. As a means for operating the device, a handwheel A is preferably mounted upon one end of the supporting shaft over which passes a hand-rope X.

A pawl F is pivoted at the point G so as to engage the teeth of the ratchet-wheel. This pawl is preferably carried by a supporting member E which is conveniently supported at one end on the hub extension C of the sleeve Z which projects beyond the retaining flange. The opposite end of the support E may conveniently be secured to a portion Q of the supporting framework R by means of a screw P. By thus supporting the member E upon the hub extension of the sleeve, the pawl is always held in proper alinement with the ratchet-wheel. In order to prevent the supporting member from working off the end of the hub, a set-screw O may be secured in said member so as to engage the annular groove or channel W in the hub extension.

The operation of the device is as follows: The counterweight is preferably heavier than the car so that when the car is empty and at the bottom of the well or shaft, there will be a tendency for the car to rise to the top of the shaft and there remain. If a load is placed in the car and the car is thus made heavier than the counterweight, the

downward pull on the draft-rope (on the left-hand side in Fig. 3) will cause the lift-sheave to rotate to the left, thereby clamping the ratchet-wheel rigidly between the retaining flange and lift-sheave (see Fig. 2), and the ratchet-disk and lift-sheave thereby become locked with respect to each other and the pawl being in engagement with the ratchet teeth, the rotation of the lift-sheave in a direction to lower the car is instantly arrested. The screw-threads of the sleeve and lift-sheave are preferably made comparatively large and coarse so that the rotative movement necessary to bring the sheave and ratchet-disk into locking engagement is comparatively slight. If, now, power is applied to the handwheel to lower the weighted car, the turning movement of the shaft and sleeve (to the left in Fig. 3) causes the retaining flange on the sleeve and the sheave to separate slightly so as to permit the ratchet-disk to become loose with respect to the lift-sheave. As long as power is applied to the handwheel to lower the load, this condition exists, that is, the shaft, sleeve and sheave rotate to lower the car while the ratchet-disk, now being loose with respect to the sheave, remains stationary (being held so by the pawl). As soon, however, as the downward pull on the hand-rope ceases, the weight of the load rotates the lift-sheave into binding engagement with the ratchet-wheel and the further descent of the car is arrested. When power is applied to the hand-rope to lift the car, the shaft and sleeve rotate in a direction (to the right in Fig. 3) to bring the retaining flange into clamping engagement with the ratchet-disk and lift-sheave. The ratchet-disk is now clamped rigid with respect to the lift-sheave but as the rotation is in a direction away from the pawl, the pawl simply plays idly over the teeth of the ratchet-wheel.

It will be evident from the foregoing that when the car is empty and it is desired to lower the same, the handwheel is rotated in a direction to release the ratchet-disk from clamping engagement between the retaining flange and sheave, that is, the lift-sheave is caused to rotate with respect to the sleeve in a direction to carry it away from the ratchet-disk. When this takes place the lug on the lift-sheave engages the lug on the collar K and the load is then carried by these two lugs. The engagement of these lugs thus serves to limit the turning movement of the sheave and at the same time to carry the load when the clutch is in the off or released position.

I find in practice that the abutting lugs on the lift sheave and collar are a very material improvement over prior forms of the device, wherein the turning movement was simply limited by the sheave coming into frictional engagement with the collar. These lugs are of special service when an empty car is being lowered. The counterweight is preferably heavier than the empty car, so that the greatest exertion in lowering the car really consists in elevating the counterweight. When the empty car is to be lowered, a downward pull on the handrope causes the shaft to be rotated (the sheave in the meantime being held stationary by the counterweight) in such a direction as to separate the sheave from clamping engagement against the ratchet disk and this slight backward rotation of the sheave brings the lug on the collar into engagement with the lug on the sheave. The lugs thus serve as a means of communicating the motion of the shaft to the sheave and the empty car is lowered while the somewhat heavier counterweight is elevated. The lugs may be so spaced as to permit the sheave to rotate only about one half inch, more or less, or just sufficient to properly separate the clutch members. The rotary movement of the sheave may be thus limited to a very slight extent and on account of this slight movement there will be no jar or concussion when the clutch members or the abutment lugs come into engagement. Again by means of these abutment lugs the sheave is not allowed a sufficient rotary movement to cause it, by reason of its screw-like action, to tend to push the collar off the sleeve (which would be the case if the lugs were not present).

What I claim is:

1. A shaft, a sleeve thereon provided with screw-threads and having a retaining flange at one end, a pulley mounted on the sleeve having internal screw-threads in engagement with the threads of the sleeve, a ratchet-disk confined on the sleeve between the pulley and the retaining flange, a pawl supported for engagement with the ratchet, an abutment collar on the opposite end of the sleeve, a lug on the pulley, and a corresponding lug on the collar adapted to make driving engagement with the first lug for rotating the pulley.

2. A shaft, a sleeve thereon provided with screw-threads and having a retaining flange near one end, a lever having one end loosely supported on the sleeve alongside the retaining flange, a pulley mounted on the sleeve having screw-threads in engagement with the threads of the sleeve, a ratchet-disk loosely mounted on the sleeve between the pulley and retaining flange, a pawl carried by the lever adapted for engagement with the ratchet-disk, an abutment lug on the pulley, a collar on the opposite end of the sleeve, and a driving lug on the said collar adapted for driving engagement with the lug on the pulley.

3. Hoisting apparatus comprising a shaft,

a handwheel on said shaft, a sleeve mounted on the shaft and provided with external screw-threads near one end and a retaining flange near its opposite end, a lift-sheave mounted upon the sleeve having internal screw-threads in engagement with the screw-threads of the sleeve, a ratchet-wheel loosely mounted on the sleeve and confined between the retaining flange and the lift-sheave, an outwardly projecting lug on said lift-sheave at the side farthest from the ratchet-wheel, and a collar rigidly secured to the shaft having an inwardly projecting lug adapted to engage the lug of the sheave, whereby the rotary turning movement of the sheave on the sleeve in one direction is limited by engagement of the lugs on the sheave and collar respectively, and in the opposite direction the turning movement is limited by reason of the sheave clamping the ratchet-wheel in engagement with the retaining flange.

4. Hoisting apparatus comprising a shaft, a handwheel on said shaft, a sleeve mounted on the shaft and provided with external screw-threads near one end and a retaining flange near its opposite end, the said sleeve having also a hub extension projecting beyond the retaining flange, a lift-sheave mounted upon the sleeve having internal screw-threads in engagement with the screw-threads of the sleeve, a ratchet-wheel loosely mounted on the sleeve and confined between the retaining flange and the lift-sheave, a member having its one end loosely mounted on and supported by the hub extension of the sleeve, a pawl pivotally carried by said member for engagement with the ratchet-wheel, the said sheave having a plane side surface for braking engagement with the side surface of the ratchet-wheel, said lift-sheave having also an outwardly projecting lug at the side farthest from the ratchet-wheel, and a collar rigidly secured on the shaft having an inwardly projecting lug adapted to engage the lug on the sheave, whereby the rotary turning movement of the sheave on the sleeve in one direction is limited by engagement with the lugs on the sheave and collar respectively, and the movement in the opposite direction is limited by reason of the sheave clamping the ratchet-wheel in engagement with the retaining flange.

5. Hoisting apparatus comprising a shaft, a handwheel on said shaft, a sleeve mounted on the shaft and provided with external screw-threads near one end and a retaining flange near its opposite end, a lift-sheave mounted upon the sleeve having internal screw-threads in engagement with the screw-threads of the sleeve, a ratchet-wheel loosely mounted on the sleeve and confined between the retaining flange and the lift-sheave, an outwardly projecting lug on said lift-sheave at the side farthest from the ratchet-wheel, a collar on the sleeve having an inwardly projecting lug adapted to engage the lug of the sheave, whereby the rotary turning movement of the sheave on the sleeve in one direction is limited by engagement of the lugs on the sheave and collar respectively, and in the opposite direction the turning movement is limited by reason of the sheave clamping the ratchet-wheel in engagement with the retaining flange, a set-screw passed through the collar and sleeve serving to rigidly secure the sleeve and collar upon the shaft, and a pawl supported to engage the ratchet-wheel.

6. Hoisting apparatus comprising a shaft, a handwheel on said shaft, a sleeve mounted on the shaft and provided with external screw-threads near one end and with a retaining flange near its opposite end, said sleeve also having a grooved hub extension projecting beyond the retaining flange, a lift-sheave mounted upon the sleeve having internal screw-threads in engagement with the screw-threads of the sleeve, a ratchet-wheel loosely mounted on the sleeve and confined between the retaining flange and the lift-sheave, a supporting member having one end resting on the hub extension of the sleeve, a pin carried by said supporting member engaging the groove in the hub extension, an outwardly projecting lug on the lift-sheave on the side farthest from the ratchet-wheel, and a collar rigidly secured to the shaft having an inwardly projecting lug to engage the lug on the sheave.

7. Hoisting apparatus comprising a shaft, a handwheel on said shaft, a sleeve mounted on the shaft and provided with external screw-threads near one end and with a retaining flange near its opposite end, said sleeve also having a grooved hub extension projecting beyond the retaining flange, a lift-sheave mounted upon the sleeve having internal screw-threads in engagement with the screw-threads of the sleeve, a ratchet-wheel loosely mounted on the sleeve and confined between the retaining flange and the lift-sheave, a supporting member having one end resting on the hub extension of the sleeve, a pin carried by said supporting member engaging the groove in the hub extension, an outwardly projecting lug on the lift-sheave on the side farthest from the ratchet-wheel, a collar mounted on the sleeve having an inwardly projecting lug to engage the lug on the sheave, and a securing bolt passing through the collar and sleeve for securing said collar and sleeve upon the shaft.

8. Hoisting apparatus comprising a shaft, a handwheel on said shaft, a sleeve mounted on the shaft and provided with external screw threads near one end and a retaining flange near its opposite end, a lift sheave

mounted upon the sleeve having internal screw-threads in engagement with the screw-threads of the sleeve, a ratchet wheel loosely mounted on the sleeve and confined between the retaining flange and the lift sheave, a pawl supported for engagement with the ratchet wheel, the said sheave having a plane side surface for braking engagement with the side surface of the ratchet wheel, said lift sheave having also an outwardly projecting lug at the side farthest from the ratchet wheel, and a collar rigidly secured on the shaft having an inwardly projecting lug adapted to engage the lug on the sheave, whereby the rotary turning movement of the sheave on the sleeve in one direction is limited by engagement with the lugs on the sheave and collar respectively, and the movement in the opposite direction is limited by reason of the sheave clamping the ratchet wheel in engagement with the retaining flange.

9. Hoisting apparatus comprising a shaft, a hand-wheel on said shaft, a sleeve mounted on the shaft and provided with external screw-threads near one end and with a retaining flange near its opposite end, a lift sheave mounted upon the sleeve, having internal screw-threads in engagement with the screw threads of the sleeve, a ratchet wheel loosely mounted on the sleeve and confined between the retaining flange and the lift sheave, a pawl supported for engagement with said ratchet wheel, an outwardly projecting lug on the lift sheave at the side farthest from the ratchet wheel and a collar rigidly secured to the shaft, having an inwardly projecting lug adapted to engage the lug of the sheave, a cable passing over the lift sheave, a car connected to one end of the cable, and a counterweight connected to one end of the cable, and a counterweight connected to the opposite end of the cable of greater weight than the car, whereby when the combined weight of car and load is greater than that of the counterweight, the ratchet disk will be clamped between the retaining flange and lift sheave, and when the empty car is being lowered, the lugs on the collar and sheave respectively will be brought into engagement and the load of the counterweight will be carried by said lugs.

HORACE A. SMITH.

Witnesses:
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ETHEL L. TOWNSEND.