

A. J. McADAM.

ELEVATOR.

No. 347,433.

Patented Aug. 17, 1886.

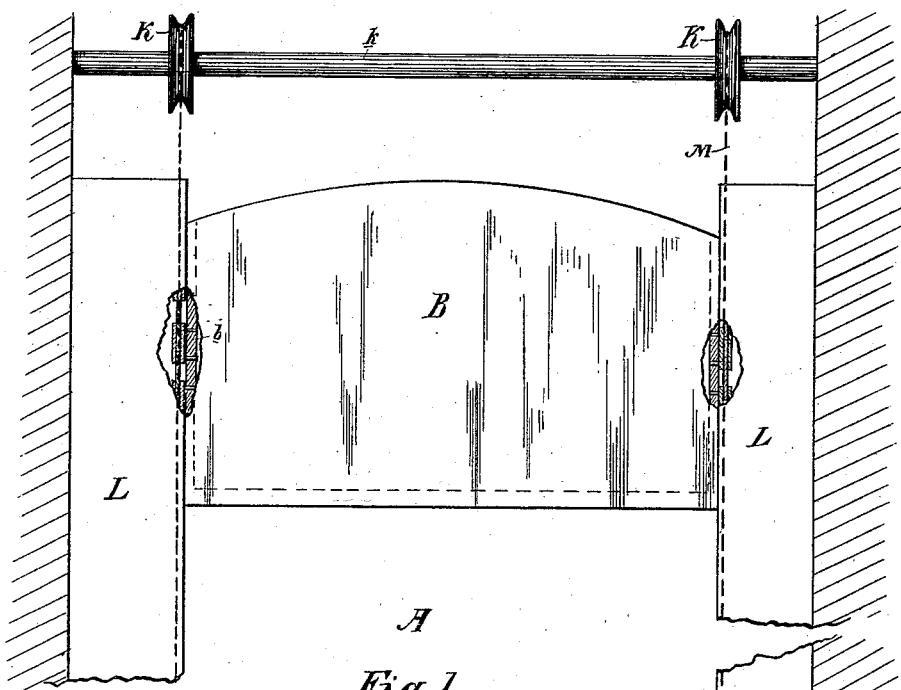
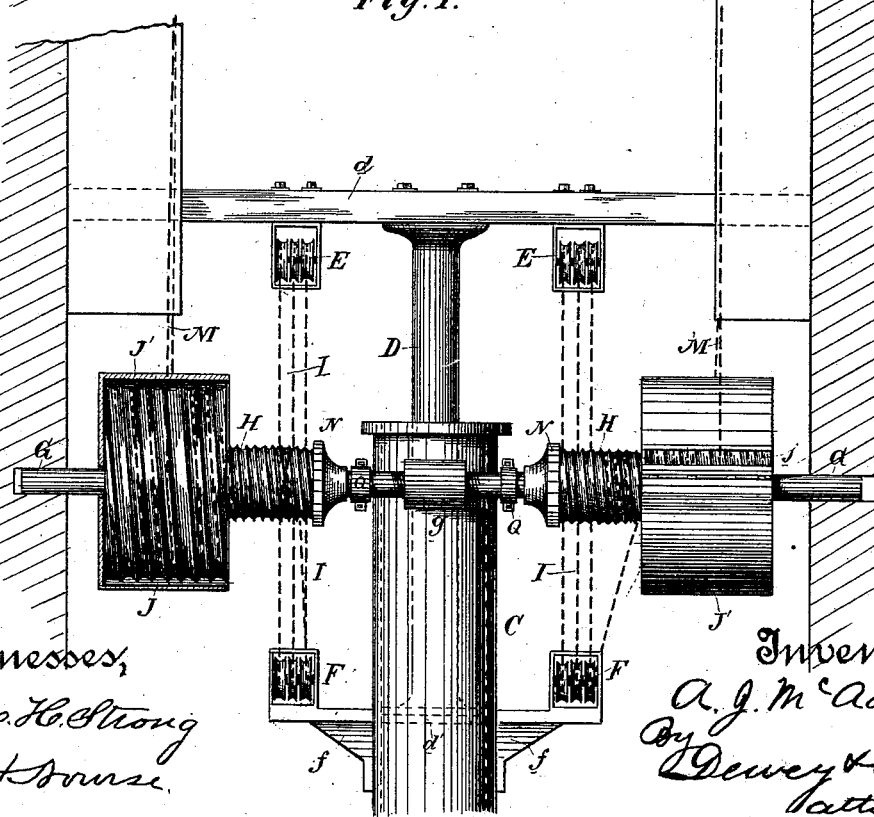


Fig. 1.



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(No Model.)

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Fig. 2.

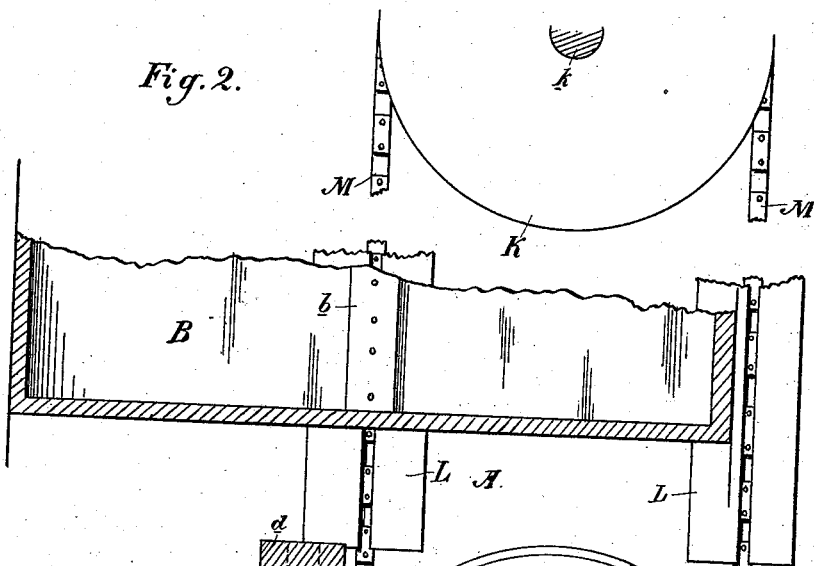


Fig. 3.

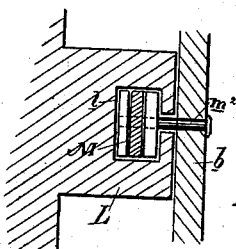
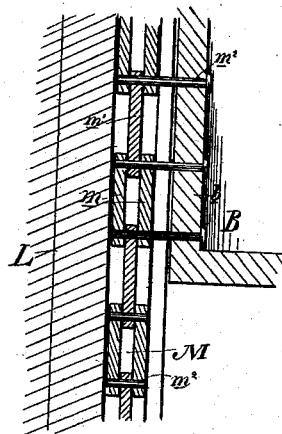


Fig. 4.

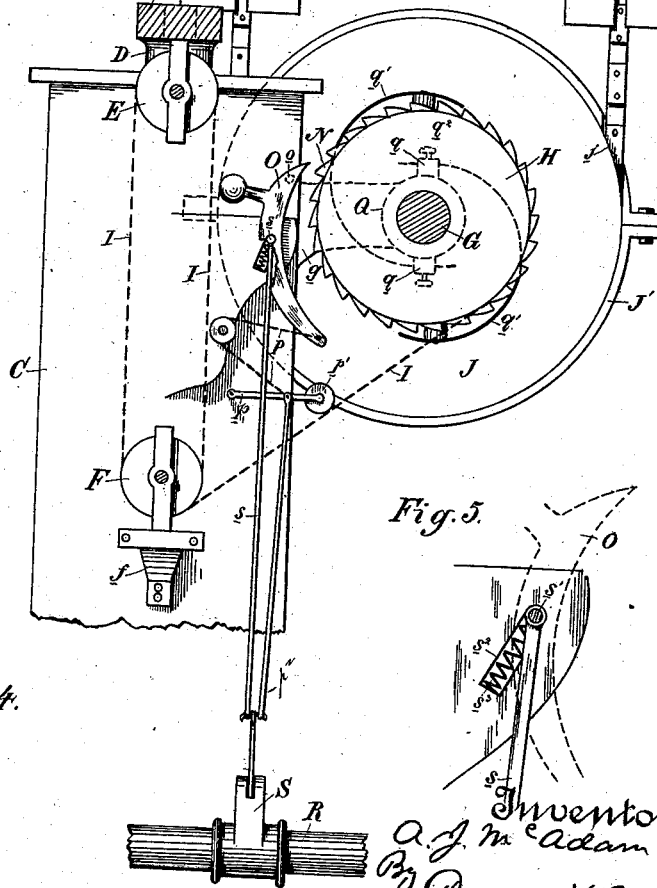


Fig. 5.

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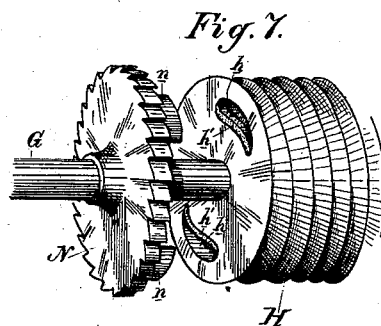
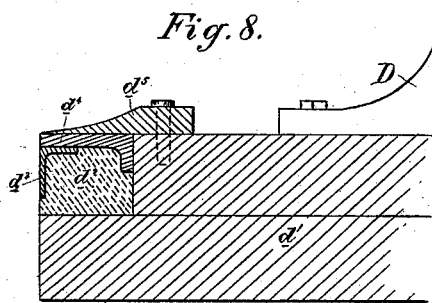
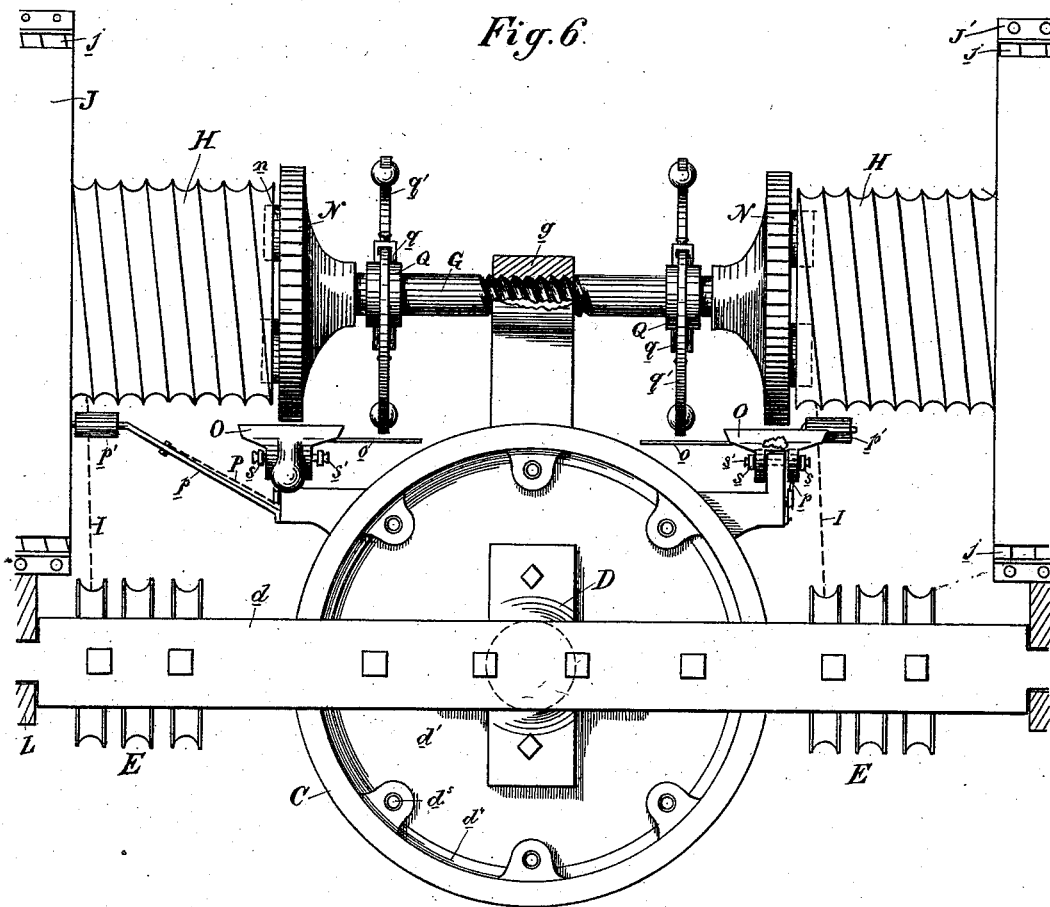
3 Sheets—Sheet 3.

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ELEVATOR.

No. 347,433.

Patented Aug. 17, 1886.



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UNITED STATES PATENT OFFICE.

ALEXANDER J. McADAM, OF SAN FRANCISCO, CALIFORNIA.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 347,433, dated August 17, 1886.

Application filed February 15, 1886. Serial No. 192,036. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER J. McADAM, of the city and county of San Francisco, and State of California, have invented an Improvement in Elevators; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the class of elevators, and especially to that class known as "rams;" and my invention consists in a short ram and peculiar block-and-tackle mechanism, by which the comparatively short movement of the ram is multiplied to produce the required distance of movement or travel of the car or cage; in the hoisting apparatus, consisting of drums below and sheaves above and intervening chains; in the application of a peculiarly-constructed chain or a wire rope for this purpose, and in its housing, whereby in case of a break it becomes a rigid bar, preventing the descent of the car; in a safety clutch and dog by which the tackle mechanism is guarded, and in the mechanism by which said dog is automatically operated; in a governor, also adapted to operate the safety-dog; and in a mechanism connecting the safety appliance with a valve or gate controlling the water supply and exhaust; in a peculiar packing for the piston or ram, and in various details of construction, all of which I shall hereinafter fully describe by reference to the accompanying drawings, in which—

Figure 1 is an elevation showing the casing J' on one side in section. Fig. 2 is an elevation showing the safety mechanism and the water supply and exhaust automatic controlling-valve. Fig. 3 is a vertical section of one of the guides L, showing the chain M housed therein and its connection with the cage or car. Fig. 4 is a cross-section of same. Fig. 5 is a detail of the manner of mounting dog O. Fig. 6 is a plan view, looking down the elevator-shaft. Fig. 7 is a detail perspective of the drum H and clutch N. Fig. 8 is a section of the ram-packing.

The object of my invention is to provide an elevator in which the mechanism is in a solid and compact form and located entirely out of the way; also, to provide practical means for operating the elevator, and to insure it against any accident.

A is the elevator-shaft, and B is the cage or car.

C is the cylinder or well in the bottom of the shaft, and D is the piston or ram in said cylinder. On the top of the ram is a cross-head, *d*, to which on each side are hung the blocks E, Fig. 1, here shown as three in number, though this is a matter depending upon the amount of movement required. Mounted in brackets *f*, secured to the sides of the cylinder C, are the sheaves F, also three in number on each side.

G is a shaft mounted transversely and having its center threaded and fitting a socket-nut, *g*, Fig. 1, fixed on the cylinder, so that said shaft in its rotation may move longitudinally from side to side. Upon this shaft are drums H, provided with spirally-arranged grooved surfaces.

I are cables which pass around the fixed sheaves F, around the blocks E, and wind upon the drums H, the arrangement being much the same as in block-and-tackle mechanism.

The operation, as far as described, is as follows: The ram D being moved upward, carrying its cross-head *d* and the blocks E with it, effects through the cables I a rotary movement of the drums H and shaft G. The threaded central bearing of the shaft G, which causes it to move laterally, provides for the accurate or true position of the drums H in winding and unwinding the cables I upon or from their spirally-arranged surfaces, keeping them in proper position for the blocks and sheaves, and preventing any cramping or bending. Upon the shaft G are also mounted the large drums J, which have spirally-arranged grooved faces, as shown. Enveloping these drums are casings J', provided with openings or slots *j*, Fig. 1.

In the top of the elevator-shaft is a shaft, *k*, on which are mounted the grooved-face sheaves K. In the sides of the elevator-shaft are the guides L, having a T-shaped chamber or recess, *l*, Fig. 4, made in their inner faces, and communicating with the outside.

M are chains, constructed, as shown in Fig. 3, of alternate links of two parallel plates, *m*, and alternate links of single plates *m'*, pivoted to the double links by cross-pins *m''*. These chains occupy and snugly fill, though without

causing undue friction, the chambers *l* of the side guides, *L*. They pass around the upper sheaves, *K*, being set edgewise in their grooves, and their ends are brought down through the casings *J'* and wound upon the spirally-grooved faces of the large drums *J* in the bottom of the shaft, one end being wound from the center in one direction to one side, while the other end is wound from the center in the other direction to the other side of said drums; and the amount of chain upon each one-half of these drums is equal to the distance of travel of the cage or car. The pivot-bolts *m*² of the chains project through the opening of the T-shaped chamber *l*, Fig. 3, in the side guides, and are secured in suitable manner to the gate-post *b* of the cage or car *B*. The operation, again, is thus: Rotation is imparted, as before described, to the shaft *G*, which carries the winding-drums *J*. The chains *M* are wound upon and unwound from said drums, thus causing the ascent and descent of the cage or car. The chains wind up straight on their drums, because of the lateral movement of shaft *G*. By reason of the character of the chains, and their being housed so snugly in the side guides and in the casings *J'*, enveloping the drums *J*, it is evident that if a break should occur in said chains they would at once become, in effect, for want of room, rigid bars or rods, and would prevent the car from descending. I do not, however, desire to wholly confine myself to the use of the hoisting-chains *M*, as I may, when desired, use heavy metal cables or wire ropes, which, by being housed in the guides *L*, will accomplish the same result of becoming rigid for want of room when a break occurs.

By the block-and-tackle mechanism which I have described I am enabled to use a comparatively short ram, whose motion is multiplied to effect the distance required for the car, and by thus having but a short ram I am enabled to give it greater strength, and also to prevent freezing, which so often occurs in cold climates.

The drums *H* are fast on the shaft *G*, and their inner ends are provided with tapering curved recesses *h*, as shown in Fig. 7. In these recesses are placed elastic wedges *h'*. Upon the shaft *G* are mounted loosely the clutch ratchet-disks *N*, the inner faces of which are provided with short curved lugs *n*, which fit within the recesses *h* of the drums *H*. Pivoted to brackets secured to the cylinder are dogs *O*, Figs. 2 and 6, which, when thrown forward, are adapted to engage with the ratchet-clutches *N*. These dogs have secured to their lower ends a short cable, *P*, Fig. 2, which is secured to a pivoted arm, *p*, having in its outer end a heavy roller, *p'*, which bears on that portion of the cable *I* which passes from the fixed sheaves *F* to the drums *H*. Now, if said cable *I* should break, the weighted arm *p* would drop, and through the short cable *P* throw the dog into engagement with the ratchet-clutch *N*, and would thus stop the rotation of the

shaft *G*. This stoppage would not, however, be sudden on account of the character of the clutch, the lugs of which bind against the elastic wedge *h'* in the recess *h* of the drum *H*, and would stop it without much jar; but where no break occurs, but the speed of the car is too great, I provide a governor for regulating this beyond a certain point.

Upon the shaft *G*, Fig. 6, are mounted on each side hubs *Q*, having socketed short lugs *q*, in which are seated and adapted to slide the governor-arms *q'*, whose movement is controlled by set-screws *q''*, Fig. 2, which produce whatever friction may be desired. From the dogs extends to one side a pin, *o*, Fig. 6, which lies in the path of the governor-arms when said arms are extended sufficiently. Now, when the speed of the shaft *G* has become great enough to effect the outward movement of the governor-arms, these come in contact with the pins *o* of the dogs, and throw said dogs into engagement with the ratchet-clutches *N*.

In order to automatically shut and open the water communication to the cylinder when any accident occurs, or too great speed is attained, I have the following mechanism: *R* is the water-pipe, Fig. 2, through which the water is to be furnished to the cylinder, and through which it also exhausts. *S* is a gate or valve in said pipe, the stem of which is connected by a rod, *s*, with the ends of the pivot-pin *s'* on the dog *O*. The dog is mounted loosely in bearings having an elongated slot, *s''*, in which is seated a spiral spring, *s'''*, Fig. 5, which holds the dog in its normal position. Now, when the dog is thrown into engagement with the ratchet-clutch, it is forced by said clutch down upon the spring *s'''*, thus forcing down also the valve or gate *S*, and cutting off the supply; but to provide a greater guaranty of this effect of shutting off the water-supply I also connect the lever *p* with the valve-stem by a rod, *p''*, so that the moment the cable *I* breaks the valve is forced down, and all the strain is immediately removed from the other side. The connection of the rods *p''* and *s* with the valve-stem may be made in any manner.

In Fig. 8 I show the packing for my piston. *d'* is the piston-head, the upper portion of which is provided with a shoulder or offset, in which is confined the packing *d''* by means of an angular brass strip, *d'''*, pressed down upon the packing by an annular ring, *d''''*, held by screws *d'''''*.

Ordinarily the packing, which usually consists of leather or hemp, comes in contact with the sides of the cylinder; but in my device the packing does not come thus in contact, but is protected by the thin sheet of brass *d'''*, which also holds it to its seat.

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

1. In an elevator, the combination of a traveling ram, blocks secured to it, fixed sheaves, winding-drums, and cables passing over the blocks and sheaves and winding on and un-

winding from the drums hoisting-drums, rotated by said winding-drums, and connecting mechanism between the hoisting-drums and the elevator cage or car, whereby the latter is
5 hoisted and lowered, substantially as described.

2. In an elevator, the combination of a traveling ram, blocks secured to it, fixed sheaves, a shaft, and drums H on the shaft, cables I,
10 passing over the blocks and sheaves, and winding on and unwinding from the drums H, whereby the motion of the ram is multiplied in the rotation of said drums, hoisting-drums on said shaft, and a connecting mechanism
15 between said drums and the elevator cage or car, whereby the latter is raised and lowered, substantially as described.

3. In an elevator, the vertically-moving ram D, having a cross-head, *d*, the blocks E, carried by said head, and the fixed sheaves F below,
20 in combination with the shaft G, the drums H thereon, and the cables I, whereby the motion of the ram is multiplied in the rotation of the drums, and mechanism by which
25 the shaft G causes the ascent and descent of the elevator cage or car, substantially as described.

4. In an elevator, the vertically-moving ram D, having a cross-head, *d*, the blocks E, carried by said head, the fixed sheaves F below,
30 the shaft G, the drums H on said shaft, and the cables I on the blocks, sheaves, and drums, in combination with drums J on the shaft G, the sheaves K in the top of the elevator-shaft,
35 the chains M, operated by drums and sheaves J K, and a connection between said chains and the elevator cage or car, substantially as herein described.

5. In an elevator, the combination of a vertically-moving ram, a shaft having a longitudinal movement as it rotates, winding-drums on said shaft, and a block-and-tackle mechanism between them and the ram, whereby
40 they are rotated, hoisting-drums on said shaft, and a connection between said drums and the elevator cage or car, whereby the latter is operated, substantially as described.

6. In an elevator, the vertically-moving ram carrying the blocks E, and the fixed sheaves
50 F below, in combination with the longitudinally-moving shaft G, the drums H thereon, and the cables I on the blocks, sheaves, and drums, and a mechanism by which the shaft G is caused to operate the elevator cage or car,
55 substantially as herein described.

7. In an elevator, the cylinder C, ram D therein, blocks E, carried by the ram, and fixed sheaves F, mounted on the cylinder below, in combination with the shaft G, the fixed nut *g*,
60 in which said shaft is threaded, whereby it moves longitudinally as it rotates, the spirally-grooved drums H on the shaft, the cables I on the drums, sheaves, and blocks, and mechanism for causing the operation of the cage or car by
65 the rotation of shaft G, substantially as described.

8. In an elevator, the ram D, having cross-

head *d*, the blocks E, carried by the cross-head, and the fixed sheaves F below, in combination with the longitudinally-moving shaft G, the
70 drums H on the shaft, and the cables I, as described, the hoisting-drums J on shaft G, the sheaves K at the top of the elevator-shaft, the chains or cables M, passing over the sheaves and winding on and unwinding from the drums
75 J, and a connection between the chains and the elevator cage or car, substantially as described.

9. In an elevator, the rotating hoisting-drums J below and the sheaves K above, in
80 combination with the chains or cables M, passing over the sheaves and winding on and unwinding from the drums and connected with the cage or car, and a housing in which the chains or cables move snugly, substantially as
85 and for the purpose herein described.

10. In an elevator, the combination, with the hoisting-drums, the enveloping casing, and the sheaves K, of the hoisting chains or cables
90 M and the guides L, having T-shaped recesses in which said cables or chains are housed, substantially as described.

11. In an elevator, the hoisting-drums, the casings enveloping the same, the sheaves K above, and the guides L in the elevator-shaft,
95 having the T-shaped recess *l*, in combination with the chains M, consisting of alternate double and single plates pivoted together, and the pivot bolts *m*², projecting through the opening of the recess and secured to the cage or car,
100 substantially as herein described.

12. In an elevator, the hoisting-drums J, the slotted casings J', enveloping them, and the sheaves K above, in combination with the recessed side guides, L, and the chains or cables
105 M, secured to the elevator cage or car, passing over the sheaves K, housed in the guides L, entering the slotted casings J', and winding on the drums J, substantially as described.

13. In an elevator, the vertically-moving
110 ram D, the hoisting-shaft G, and the cable I of the block-and-tackle mechanism by which the power of the ram is transmitted to the shaft, in combination with a ratchet on the shaft, a pivoted dog or pawl, and a means actuated by the breaking of the cable I, for throwing
115 the dog or pawl to its engagement with the ratchet, and thus holding the shaft, substantially as described.

14. In an elevator, the vertically-moving
120 ram D, the hoisting-shaft G, the drums H, fast on said shaft, having cushioned recesses *h* in their inner faces, the loose ratchet-clutches N, having lugs *n* fitting the cushioned recesses of the drums, and the cable I of the block-and-tackle mechanism, by which the power of the
125 ram is transmitted to the shaft, in combination with the pivoted dog O, the pivoted arm *p*, having roller-weight *p'* resting on cable I, and the short cable P, connecting the arm with the
130 dog, whereby upon the breaking of the cable I the dog is thrown to its engagement with the ratchet-clutch, substantially as herein described.

15. In an elevator, the hoisting-shaft G, having ratchets N, in combination with the governor on the shaft, consisting of the centrifugally-sliding bent arms q' and the pivoted dog or pawl O, having pins o projecting into the path of the governor-arms, whereby the dog is thrown forward to engage the ratchets, substantially as described.

16. In an elevator, the hoisting-shaft G, the drums H thereon having cushioned recesses h , and the loose ratchet-clutches N, having lugs n fitting the cushioned recesses, in combination with the governor on the shaft, consisting of the centrifugally-sliding bent arms q' and the pivoted dog or pawl O, having pins o projecting into the path of the governor-arms, whereby the dog is thrown forward to engage the ratchets, substantially as described.

17. In a ram-elevator, the hoisting-shaft G having ratchet N, in combination with the dog O, adapted to engage the ratchets, as described, and a connection between said dog and the valve or gate controlling the water supply and exhaust, whereby when the dog is operated the water is cut off, substantially as described.

18. In a ram-elevator, the hoisting-shaft G, having ratchet N, in combination with the dog O, having a pin, s' , mounted in a slotted bearing, and the controlling-spring s'' in said bearing, as described, the valve or gate S, controlling the water supply and exhaust, and the rod s , connecting said valve or gate with the pin of the dog, whereby when the latter engages the ratchet it is forced down and operates the valve or gate, substantially as described.

19. In a ram-elevator, the hoisting-shaft G,

having drum H, and the cable I, by which the shaft is operated, in combination with the weighted lever p , dependent upon cable I, the valve or gate S of the water supply and exhaust pipe, and the rod p^2 , connecting said valve or gate with the weighted lever, substantially as described.

20. In a ram-elevator, the hoisting-shaft G, having clutch-ratchet N, the pivoted dog O, the cable I, operating the shaft, the weighted lever p , dependent upon the cable I, and the short cable P, connecting the weighted lever with the dog, in combination with the valve or gate S, controlling the water supply and exhaust, and the rods $p^2 s$, connecting the valve or gate with the weighted lever and the dog, respectively, substantially as described.

21. In an elevator, the combination of the hoisting-shaft G, the drums J thereon, the sheaves K above, and the hoisting chains or cables M, as described, and the casings J', inclosing drums J and holding the chain or cable windings snug, substantially as described.

22. In an elevator, the cylinder C, in combination with the ram D, having the head d' with a peripheral shoulder or recess, the packing d'' in said recess, the angular brass strip d^3 , confining said packing, the annular ring d^4 , pressing the brass strip to place, and the screws d^5 , holding said ring, substantially as herein described.

In witness whereof I have hereunto set my hand.

ALEXANDER J. McADAM.

Witnesses:

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CHAS. H. CARTER.