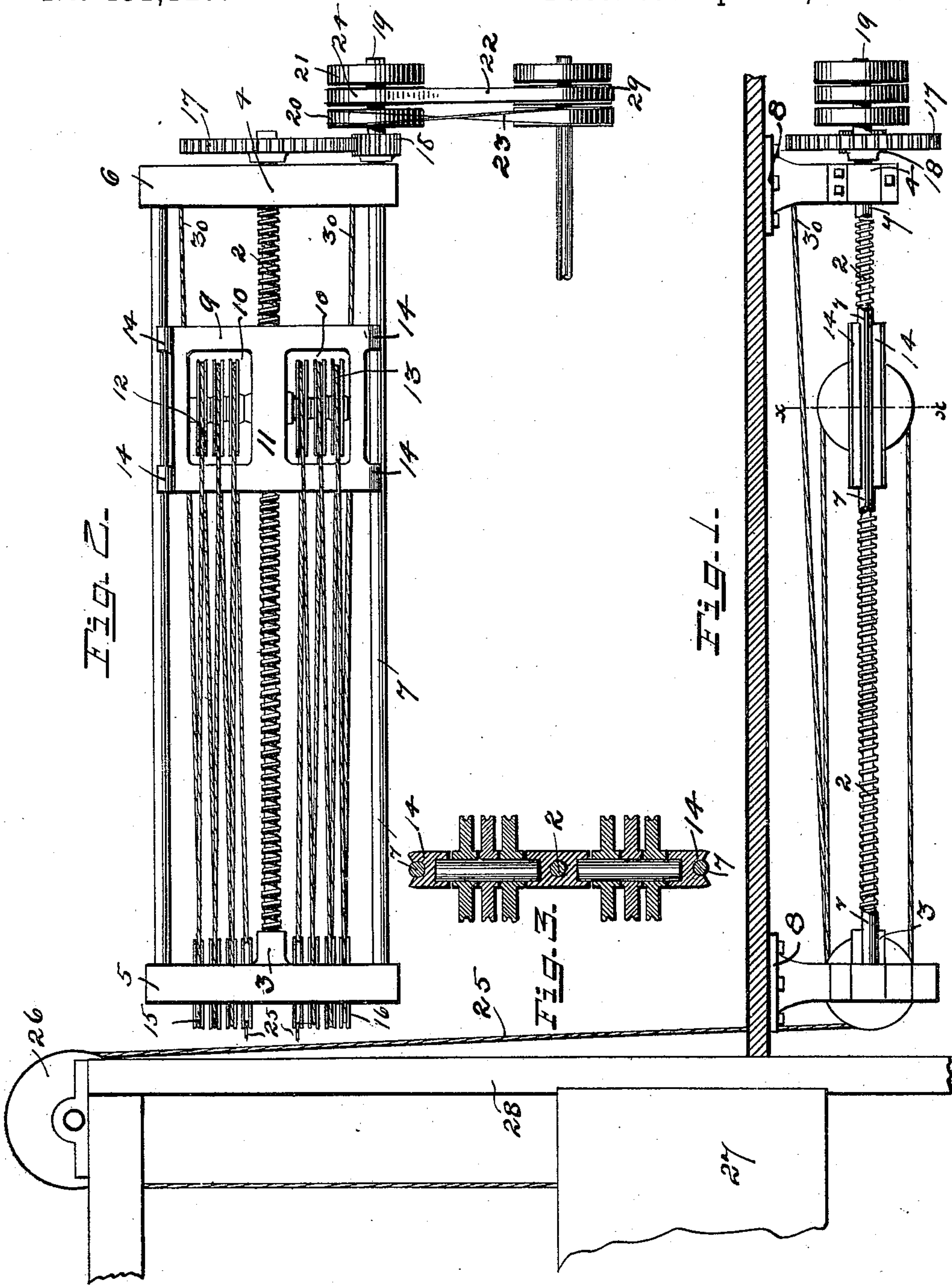


(No Model.)

G. LAGERQUIST.
ELEVATOR.

No. 451,127.

Patented Apr. 28, 1891.



Witnesses.

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UNITED STATES PATENT OFFICE.

GUST LAGERQUIST, OF MINNEAPOLIS, MINNESOTA.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 451,127, dated April 28, 1891.

Application filed October 23, 1890. Serial No. 369,131. (No model.)

To all whom it may concern:

Be it known that I, GUST LAGERQUIST, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Elevators, of which the following is a specification.

My invention relates to elevator machinery of the class in which mechanical power alone is used for hoisting the elevator-car, the power being originally derived from a belt or engine, as distinguished from hydraulic elevators.

The objects of my invention are to provide a cheap and simple hoisting device, to make the same absolutely safe, and to effectually apply an originally small power in such a way as to hoist articles of great weight.

My invention consists in a movable cross-head provided with suitable pulleys independently placed upon a transverse shaft therein in connection with a similar device provided with corresponding pulleys, a long screw engaging with a suitable threaded opening in said cross-head and having smooth bearings at its ends, the rear end thereof being provided with a large gear-wheel adapted to engage a small fixed pinion revolved by a suitable power connection, suitable guides for said cross-head, and two or more hoisting-cables wound, respectively, upon corresponding sets of said pulleys, one end of said rope being fixed to the stationary part of the elevator mechanism and the other passing over suitable sheaves and down to the elevator car or hoist.

My invention consists, further, in various details of construction, and in combinations hereinafter described, and particularly pointed out in the claim.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of a hoisting mechanism embodying my invention shown in connection with an elevator-car. Fig. 2 is a plan view from beneath of the hoisting mechanism. Fig. 3 is a detail sectional view of the pulleys' cross-head, taken upon line *x x* of Fig. 1.

As shown in the drawings, the long screw 2 is provided with a strong square thread and is adapted to rotate in bearings 3 and 4, provided in the end pieces 5 and 6, respectively. These pieces are strong heavy castings braced

and held apart by the stout rods 7, extending between them. Suitable feet 8 are provided upon the end pieces, through which the bolts securing the same to the ceiling or wall or floor are secured.

The cross-head 9 is provided with the two openings 10, one on each side of the central solid portion 11. This central portion is threaded to correspond with the screw 2 and is of such length as to afford perfect safety against slipping upon the screw. The sets of three pulleys 12 and 13 are provided in each of the openings 10, adapted to move independently upon a fixed shaft provided between the sides of the openings occupying a position transverse to the screw 2. The feet 14 are adapted to engage the guide-rods 7 to prevent any tilting of the cross-head. As shown, similar pulleys 15 16 are provided upon the fixed axle or axles in the end piece 5. The forward end of the screw 2 may be provided with an anti-friction bearing in the block 3, though as a usual thing a simple bearing is all that is provided. The bearing in the end piece 6 is a simple straight shaft-bearing, in which the screw-shaft is adapted to revolve freely. The large gear 17 is keyed to the rear end of the screw-shaft and engages with the pinion 18, provided on the pulley-shaft 19, having the loose pulleys 20 and 21, adapted to receive the straight and cross belts 22 and 23, respectively, and also with the fixed pulley 24 between the two loose pulleys. The loose pulleys accommodate the idle-belt, whichever it may be, accordingly as the elevator-car is being raised or lowered. Two hoisting-ropes 25 are provided, one on each set of pulleys 12 15 and 13 16. The rope or cable is in each case fastened to the rear end piece 30 or to any other fixed object. From thence it is passed over the fourth or outer wheel of the forward sets of pulleys, and thence passes in turn back and forth around the several pulleys on the cross-head and end piece 5. From the last pulleys or "sheaves," as they may be called, on the end 5 the ropes are carried up over the large sheave 26, and thence down, to be securely fastened to the top of the elevator-car 27, running in the vertical guides 28 in the elevator-shaft.

The power is applied from the power-shaft and pulley 29 through one or the other of the

belts 22 or 23. These belts are arranged to be shifted by means of a wire rope passing in the ordinary manner vertically through the elevator-car and operating a suitable belt-shifter. As one or the other of the belts is thrown onto the fixed pulley the other is carried onto its loose pulley. Suppose it is desired to raise the car. In this case the screw 2 would be revolved in a direction to carry the cross-head gradually toward the rear end 6, thus drawing the rope or cable 26 to raise the elevator 27, the speed of which will be several times greater than that of the cross-head. The distance through which said parts are moved is correspondingly different.

By the use of the two sets of pulleys I am enabled to maintain a constant and equal balance of the cross-head upon the screw 2, thereby minimizing the friction and the power required to operate the device to raise the elevator-car or other heavy object. It will be seen that owing to the gradual pitch of the thread of the screw 2 the friction between the same and the cross-head will at all times be too great to allow the same to turn and the cross-head to be drawn forward by simply the weight of the car or its load. It is thus necessary that the screw 2 should be revolved by the power connection therewith, whether the car is to be raised or lowered. The strain upon the screw 2 will always be exerted longitudinally, thereby avoiding all possibility of breaking or bending the same. It is thus seen that I provide an elevator device by the use of which the elevator-car could in no way be dropped suddenly except by the breaking of both cables 25, an occurrence which practically never happens.

It is obvious that various details in the construction of my device as shown might be altered without departing from the spirit of my invention, and I therefore do not limit myself to the exact construction shown.

It is evident that the fourth or outside pulleys revolving the shaft in the end piece 5 might be dispensed with and the ends 25 attached directly to the piece 5 or to the cross-

head. For several reasons, however, the construction shown is preferred. It is obvious, further, that any number of pulleys constituting the different sets might be used. The greater the number of pulleys or sheaves over which the rope passes the greater will be the distance through which this rope will move, and consequently the speed with which the elevator-car is raised and lowered.

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

The combination, with the end pieces 5 and 6, securely fastened upon a permanent support, of the end bearing 3, the screw 2, having its forward end secured in said bearing 3 and its rear end in a suitable bearing in the piece 6, the cross-head adapted to engage said screw 2, the pulleys 12 and 13, adapted to rotate independently upon suitable shafts provided in said cross-head transverse to said screw, the guide or brace rods 7, the feet 14 upon the cross-head engaging said rod, the pulleys 15 and 16, adapted to rotate independently within the end piece 5, the duplicate cables 25, passing consecutively over all of the pulleys upon their respective sides of the screw 2 and having their ends permanently secured, the large gear-wheel 17, keyed on the end of the screw, the pinion 18, engaging said gear 17, the pulleys 20 and 21 on the same shaft with the pinion 18, and the pulley 24 provided between them, said pulleys alternately engaging the straight and twisted belts 22 and 23, passing over the pulley upon the power-shaft 29, whereby upon revolving the screw 2 in one or the other direction the elevator-car or other object may be raised or lowered, substantially as described.

In testimony whereof I have hereunto set my hand this 11th day of October, 1890.

GUST LAGERQUIST.

In presence of—

C. E. VAN DOREN,
C. G. HAWLEY.