

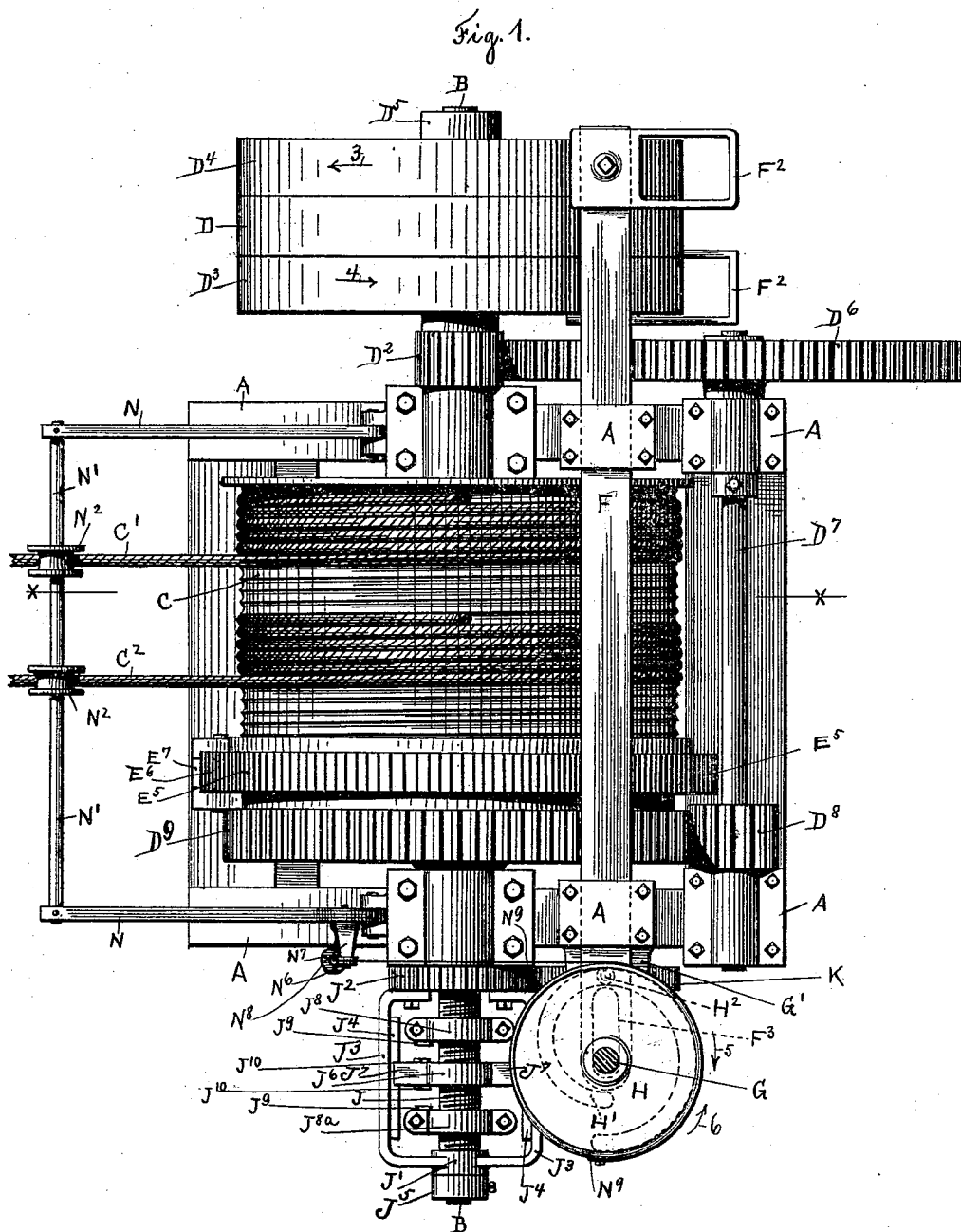
(No Model.)

4 Sheets—Sheet 1.

J. A. DEAN.
ELEVATOR.

No. 511,727.

Patented Dec. 26, 1893.



Witnesses
Chas. F. Johnson
H. W. Fowler.

Inventor
John A. Dean,
By his Attorney
Rufus B. Fowler.

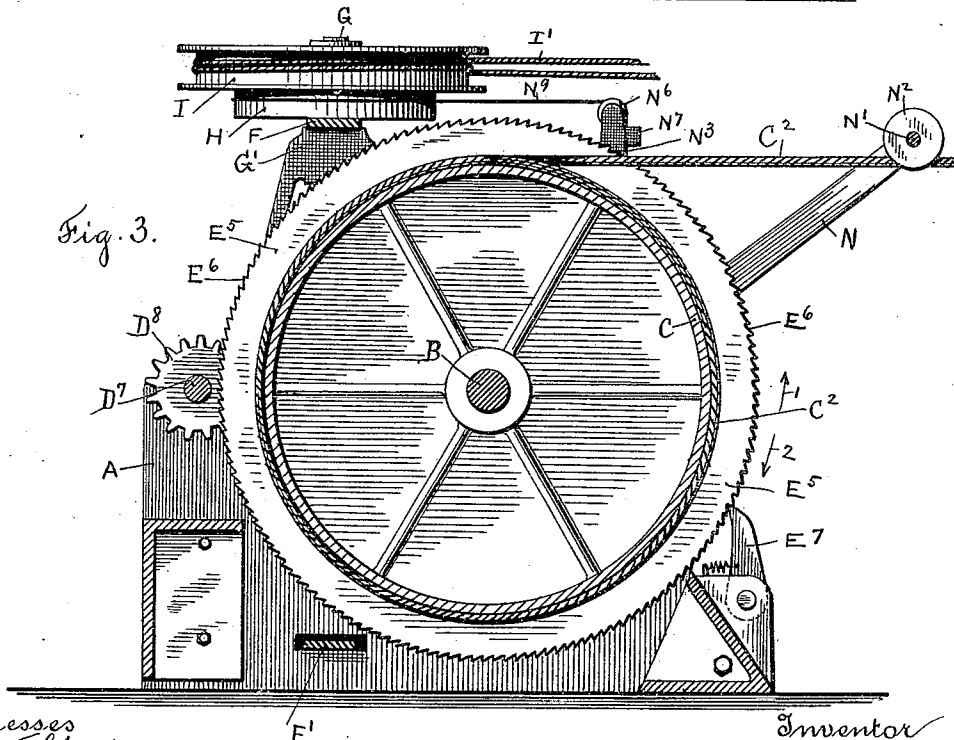
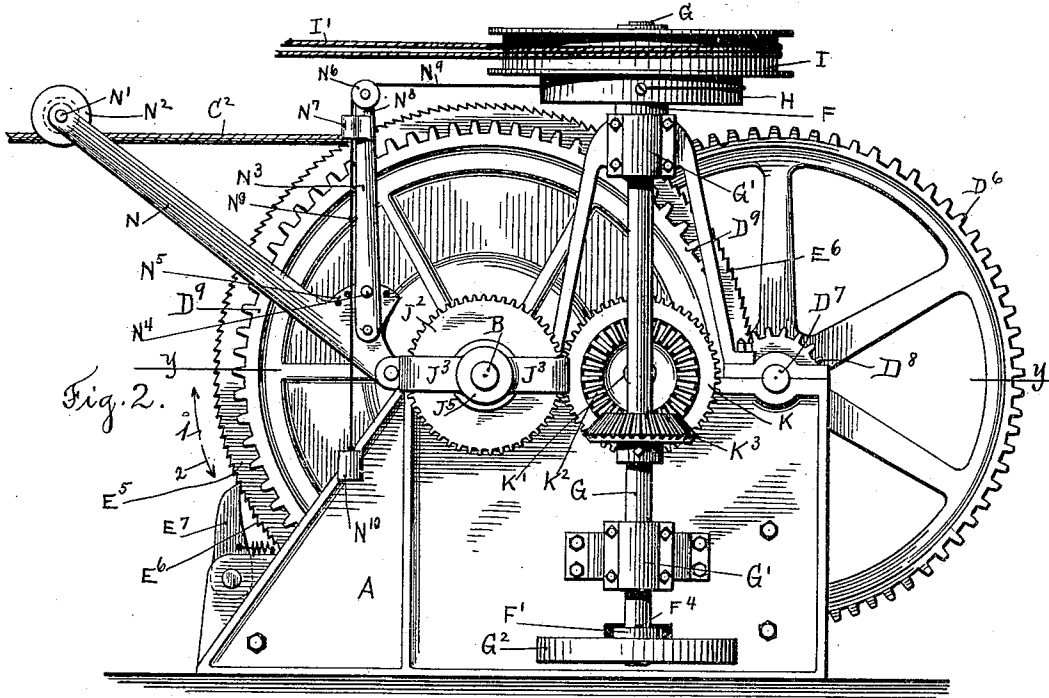
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4 Sheets—Sheet 2.

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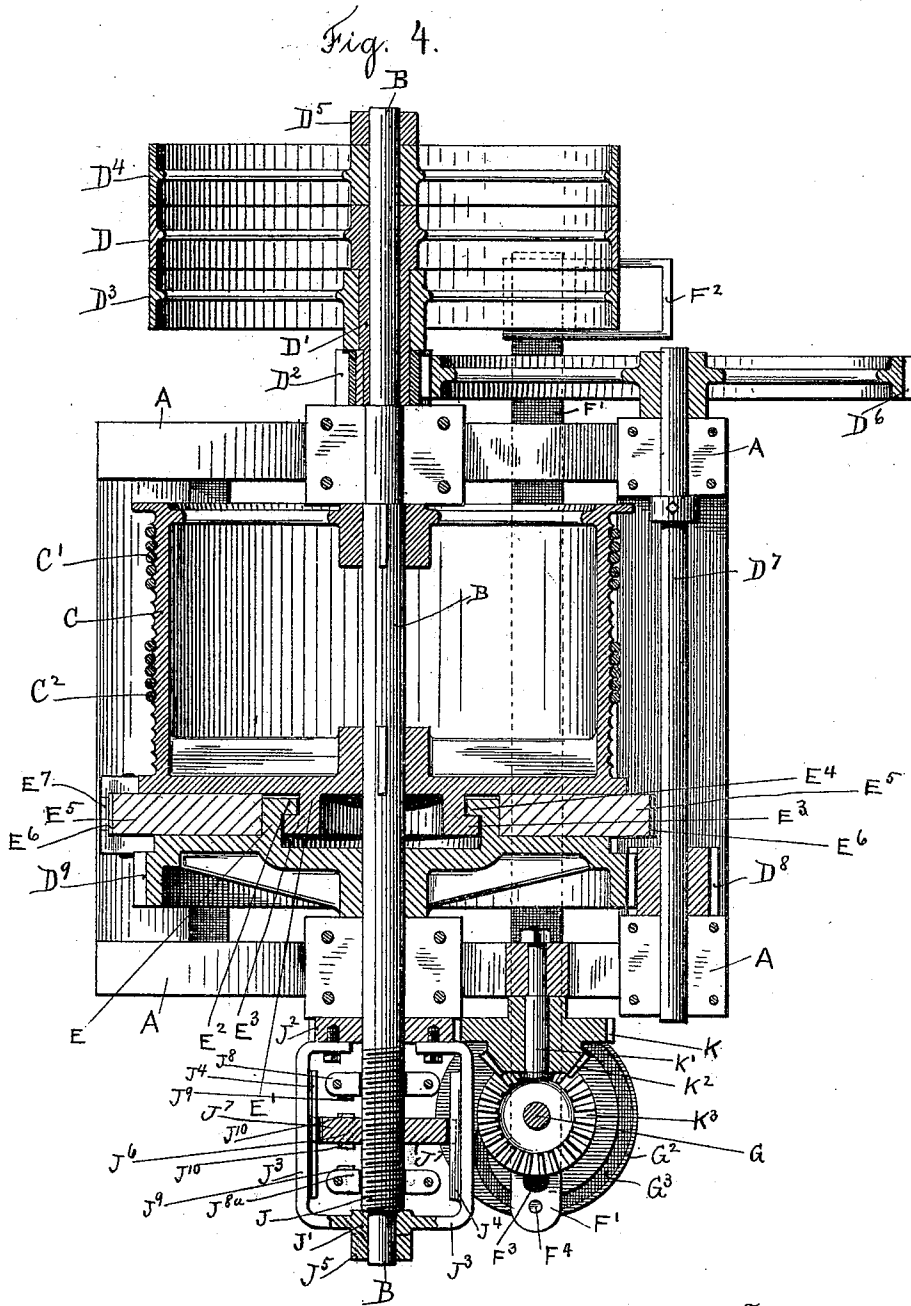
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Fig. 5.

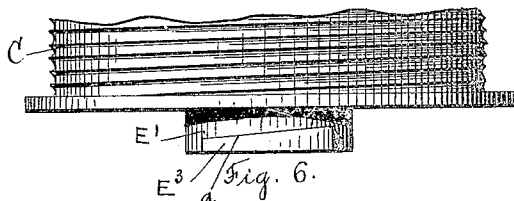
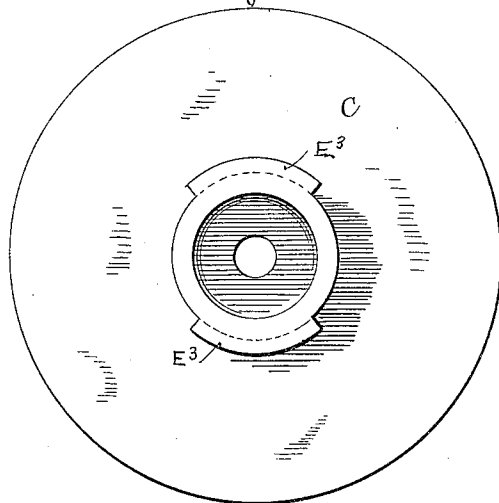
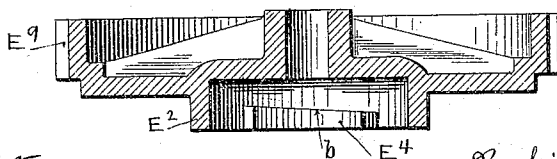
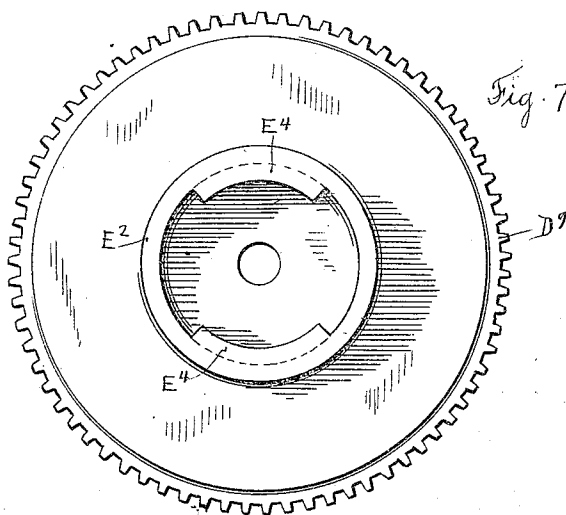


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN A. DEAN, OF WORCESTER, MASSACHUSETTS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 511,727, dated December 26, 1893.

Application filed October 23, 1891. Serial No. 409,578. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. DEAN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Elevators, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the specification, and representing the hoisting mechanism of an elevator.

Figure 1, denotes a top view of a hoisting mechanism embodying my invention. Fig. 2, is an end view of the same. Fig. 3, is a sectional view on line X, X, Fig. 1. Fig. 4, is a central horizontal sectional view on line Y, Y, Fig. 2. Fig. 5, represents an end view of the winding drum. Fig. 6, is a plan view of the end of the winding drum shown in Fig. 5. Fig. 7, is an end view of the driving gear showing the side engaging the winding drum and Fig. 8, is a central sectional view of the driving gear.

Similar letters refer to similar parts in the different figures.

My invention relates to that class of elevators sometimes known as "power elevators" and in which power is applied to raise the load through a hoisting mechanism, and my invention relates particularly to certain improvements in the hoisting mechanism, by which I secure compactness and simplicity of construction and greater certainty and efficiency of operation and these ends are accomplished by means of the construction and arrangement of the hoisting mechanism as hereinafter described and specifically set forth in the annexed claims.

Referring to the drawings A, A, denotes the supporting frame-work upon which the main shaft B is journaled. Keyed to the main shaft B is a winding drum C, upon which are wound a hoisting cable C' attached to an elevator car and a second, or safety, cable C². The main shaft B projects at each end beyond the frame-work, and upon one end a belt pulley D turns loosely provided with a long hub D', to the end of which is keyed a pinion D². Turning loosely upon the hub D' is a belt pulley D³ and turning upon the shaft B is a belt pulley D⁴, held in place by a collar D⁵, the pulleys D³ and D⁴ forming

open and crossed belts and from which the belts are alternately shifted to the central driving pulley D by the shipping mechanism hereinafter described. The pinion D² engages a gear D⁶ upon a shaft D⁷, journaled on the frame-work A, A and carrying a pinion D⁸ engaging the gear D⁹ turning loosely upon the main shaft B. The opposing sides of the drum C and gear D⁹ are provided with the annular concentric flanges E' and E². The flange E' is provided externally with the segmental ribs E³, E³, and the flange E² is provided internally with similar segmental ribs E⁴, E⁴. The inner sides of the ribs E³ and E⁴ are inclined as shown at *a* and *b*, Figs. 6 and 8, forming cam surfaces so that by entering the flange E' within the flange E² and rotating the gear D⁹, so as to bring the ribs E³ behind the ribs E⁴, the inclined cam surface *a*, *b*, will cause the gear D⁹ to be drawn toward the drum C.

Placed upon the flange E² is a ring E⁵ whose thickness is slightly more than the length of the flange E² and having upon its outer face a series of ratchet teeth E⁶ engaged by a retaining pawl E⁷ held in the frame-work of the machine and limiting the rotation of the ring E⁵ to a direction corresponding to that of the winding drum C as the hoisting cable is being wound upon it.

In the operation of raising the load, rotary motion is imparted to the gear D⁹ in the direction of the arrow 1, Fig. 2, through the central belt pulley D and intermediate connecting mechanism, causing the inclined or cam surfaces *a*, *b* of the segmental ribs E³, E⁴ to be rotated upon each other, drawing the gear D⁹ toward the drum C and clamping the ring E⁵ between their opposing surfaces causing the drum C to be rotated in the same direction as the driving gear D⁹, and winding up the cables C' and C², the ratchet teeth E⁶ slipping beneath the spring actuated pawl E⁷. When the load is to be lowered the gear wheel D⁹ is rotated in the direction of the arrow 2, Fig. 2, and the ring E⁵ is held from turning by the retaining pawl E⁷; if the gear D⁹ moves in advance of the drum C in the direction of the arrows 2 the inclined surfaces *a*, *b* are moved upon each other to that extent, thereby reducing the friction of the drum C against the side of the ring E⁵, sufficiently to allow the

load to turn the drum and unwind the hoisting cable; in case, the drum C should turn in the direction of the arrow 2 in advance of the gear D⁹, the action of the inclined surface a, b would again act to clamp the ring E⁵ between the drum C and gear D⁹, thereby checking the rotation of the drum C as the ring E⁵ is held from turning by the pawl E⁷. No movement, therefore, of the drum C in the direction of the arrow 2, Fig. 2, can take place in advance of the rotation of the gear D⁹. If the rotation of the gear D⁹ should cease through the failure of the operating mechanism the drum C would instantly become drawn against the fixed ring E⁵ and the descending motion of the load checked.

The oppositely running belts, carried upon the loose pulleys D⁸ and D⁴, are alternately shifted upon the central driving pulley D by means of the shipping mechanism consisting of the sliding bars F and F' carrying at their ends belt eyes F², F² and sliding in suitable ways provided in the frame-work of the machine; the opposite ends of the bars F, F' are provided with slots F⁸, that in the bar F being shown by broken lines Fig. 1, by which they inclose a vertical shaft G journaled in bearings G' at the end of the machine opposite the belt pulleys. The vertical shaft G carries at its lower end a cam plate G² provided on its upper side with a cam groove G³ the inner half of the cam groove being helical and the outer half concentric with the cam plate G². The sliding shipping bar F' carries a stud F⁴ with a cam roll thereon, entering the cam groove G³, whereby a sliding movement will be imparted to the shipping bar F' by the rotation of the cam G², which causes the stud F⁴ to traverse the helical section of the cam groove G³, and holding the shipping bar from movement while the stud F⁴ traverses the concentric section of the cam groove G³. Near the upper end of the vertical shaft G is placed a cam plate H having a similar cam groove H', denoted by the broken lines in Fig. 1, but having the helical and concentric sections of the cam groove so disposed that their action will be the reverse of the cam groove G³, causing the shipping bar F to be moved during the period of rest of the shipping bar F' and held at rest during the movement of the bar F'. A stud H³ in the bar F carries a cam roll entering the groove H'.

A reciprocating rotary motion is imparted to the shaft G by means of the drum I attached to its upper end and a shipping cord I' wound around the drum and carried through the elevator car in the usual manner.

In the drawings the vertical shaft G and its attached cams and connected shipping bars are shown in that position in which the driving belts would be held upon the loose pulleys D⁸ and D⁴ driving them in the direction of the arrows 3 and 4, Fig. 1. If the vertical shaft G and its attached cams G² and H be turned around half a revolution in the direction of the arrow 5, Fig. 1, the shipping bar

F' will remain stationary, as the stud F⁴ will traverse the concentric section of the cam groove G³ and the shipping bar F will be moved along its way shifting the driving belt from the pulley D⁴ to the driving pulley D, causing the gear D⁹ to be turned in the direction of the arrow 2, Fig. 2, unwinding the hoisting cable from the drum C and allowing the load to descend. By reversing the motion of the vertical shaft G, one half a revolution, the shipping bar F will be returned to the position shown in Fig. 1, carrying the driving belt from the central pulley D to the loose pulley D⁴, and stopping the motion of the hoisting mechanism; the continued rotation of the vertical shaft G in the direction of the arrow 6 will slide the shipping bar F', and move the driving belt from the loose pulley D⁸ to the central pulley D, causing the gear D⁹ to be driven in the direction indicated by the arrow 1 Fig. 2, and winding the hoisting cable upon the drum C.

Whenever the hoisting mechanism is in operation, either in winding or unwinding the hoisting cable, the driving belt by which motion is imparted to the gear D⁹ is automatically shifted from the driving pulley D to the appropriate loose pulley by means of the following mechanism: The end of the shaft B projects beyond the frame-work A, A upon the side opposite the belt pulleys, and the projecting end is provided with a screw threaded J; turning loosely upon the screw threaded section of the shaft is a collar J' and a pinion J² connected together by the frame J³, J³, provided with guides J⁴, J⁴, the whole being held upon the shaft by the fixed collar J⁵.

Midway between the collar J' and the pinion J² is placed a nut J⁶ provided with arms J⁷ embracing the ways J⁴, J⁴, by which the nut J⁶ is held from rotation and made to traverse along the screw threaded section J. Clamped upon the screw threaded section J are the collars J⁸, J^{8a}, which are adjustably fixed upon the shaft B in the desired position. The collars J⁸ and J^{8a} are provided with the projecting spurs J⁹, J⁹ and the nut J⁷ is provided with similar projecting spurs J¹⁰, J¹⁰. When the shaft B is rotated in the direction of the arrow 1, Fig. 2, in the operation of winding the hoisting cable, the nut J⁷ is traversed along the shaft B toward the frame-work until its projecting spurs engage the projecting spur upon the fixed collar J⁸, when the rotation of the shaft B will be communicated through the fixed collar J⁸ and the engaged nut J⁷ to the frame J³ and pinion J², causing the pinion J² to rotate in the same direction as the shaft. The rotation of the pinion J² is communicated to a pinion K turning loosely upon the stud K' held in the frame-work of the machine and carrying upon its side a bevel pinion K² engaging a bevel pinion K³ upon the shaft G, causing the shaft G to be rotated in the direction of the arrow 5, Fig. 1; until the driving belt then in action is carried upon its loose pulley, when the mo-

tion of the hoisting mechanism will cease. If, however, the motion of the main shaft B is in the direction of the arrow 2, Fig. 2, the nut J⁷ will be made to traverse along the screw threaded section J, until its projecting spur engages the spur upon the fixed collar J^{8a}, causing the pinion J² to be rotated in the opposite direction, reversing the motion of the vertical shaft G and shifting the driving belt upon its appropriate loose pulley.

Pivoted to the frame-work are levers N, N, carrying at their free ends the rod N' upon which are placed the scored pulleys N², N² capable of rotating upon and traversing along the rod N'. These pulleys rest upon the cables C', C² and are moved along the rod N' as the cables traverse along the drum C. The weight of the levers N and rod N' of rolls N² are supported upon the hoisting cables in the position represented in the drawings.

Pivoted to one of the levers N is a vertical lever N³ capable of being adjusted in its angular relation to the lever N by means of a pin N⁴ entering holes in a blade N⁵, or by any other obvious and known method of adjustment. The upper end of the vertical lever N³ carries a guide pulley N⁶ and is provided with an eye N⁷, the lever being offset at N⁸ to bring the guide pulley and eye in a plane tangential to the face of the upper cam plate H.

A cord N⁹ is attached to the cam plate H and carried over the guide pulley N⁶ and through the eye N⁷ supporting the weight N¹⁰, the length of the cord N⁹ being such that when the vertical shaft G is turned in the direction of the arrow 5, shifting the belt from the loose pulley D⁴ to the driving pulley D and causing the drum C to be turned in the direction of the arrow 2, Fig. 2, in the operation of unwinding the hoisting cable, the weight N¹⁰ will be brought against the under side of the eye N⁷. If during the operation of unwinding, the cables are broken or slackened allowing the levers N, N to fall, the cord N⁹ will be drawn off the cam plate H rotating the vertical shaft G in the direction of the arrow 6, Fig. 6, until the driving belt is shifted to its loose pulley and the hoisting mechanism stopped.

In the construction shown by the accompanying drawings the drum is attached to the main shaft while the driving gear D⁹ turns loosely upon the shaft. If preferred, however, the winding drum may turn upon the shaft and the gear D⁹ be keyed to the shaft. I have also shown an annular flange E' upon the side of the winding drum entering within the annular flange E upon the side of the driving gear D⁹; the conditions might, however, be changed and the larger flange carrying the internal ribs can be placed upon the side of the drum, inclosing an externally ribbed flange upon the side of the driving gear.

The entire operation of winding and unwinding the hoisting cable is carried on in-

dependently of the main shaft, which is thereby relieved of the end thrust or torsional strain incident to the operation of the machine, the only function performed by the rotation of the main shaft B being to actuate the nut J⁶ and connected mechanism by which the hoisting mechanism is stopped at each end of the travel of the load. By drawing the gear and winding drum together by means of the cam shaped segmental ribs upon the flanges E and E' the torsional strain is transferred to surfaces of greater diameter than the driving shaft.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an elevator, the combination of a winding drum, an annular flange projecting from the end of said drum, a driving gear having its axis coincident with the axis of said drum, an annular flange projecting from the side of said driving gear, opposing the flanged end of said drum, said annular flanges overlapping each other and segmental cam shaped ribs carried by said flanges, said ribs interlocking each other, by which said gear and said drum are drawn toward each other, substantially as described.

2. In an elevator, the combination of a winding drum, a driving gear having its axis coincident with the axis of said drum, interlocking annular flanges on the opposing sides of said gear and said drum, a ring interposed between said gear and said drum and cam shaped external and internal ribs on said flanges, whereby said gear and said drum are drawn together against said annular ring and the motion of said gear communicated to said drum, substantially as described.

3. In an elevator, the combination of a winding drum, a driving gear having its axis coincident with the axis of said drum, interlocking flanges on the opposing sides of said gear and said drum, external and internal cam shaped ribs on said flanges, whereby said gear and said drum are drawn together, a ring interposed between said gear and said drum and retaining mechanism by which said ring is held from rotation in one direction, substantially as described.

4. In an elevator, the combination of a winding drum, a driving gear having its axis coincident with the axis of said drum, interlocking flanges on the opposing sides of said gear and said drum, cam shaped ribs on said flanges, by which said gear and said drum are drawn together, a ring interposed between said gear and said drum, retaining mechanism by which said ring is held from turning in one direction, a driving pulley with its axis coincident with the axis of said drum, a pinion carried upon the hub of said driving pulley, an intermediate shaft, a gear carried on said intermediate shaft and engaging said pinion, and a pinion carried on said intermediate shaft and engaging said driving gear, substantially as described.

5. In an elevator, the combination with a

supporting frame-work, of a shaft journaled in said frame-work, a driving pulley turning loosely on said shaft, a pinion attached to the hub of said driving pulley, a driving gear 5 carried on said shaft, a winding drum carried on said shaft and operatively connected with said driving gear, an intermediate shaft carrying gears engaging said pinion and said driving gear, whereby the rotary motion of 10 said driving pulley is transmitted to said driving gear and winding drum, and said shaft relieved from torsional strain, substantially as described.

6. In an elevator, the combination with a 15 shaft, provided with a screw threaded section, a winding drum operatively connected with said shaft, and driving mechanism connected with said shaft, by which it may be rotated in opposite directions, of a nut J⁶ carried upon 20 the screw threaded section of said shaft, a frame J³ provided with ways J⁴, said nut having arms engaging said ways, collars J⁵ and J^{8a} adjustably fixed on said shaft, spurs projecting from said collars and said nut and arranged to mutually engage each other, a pin- 25 ion J² attached to said frame J³, a shaft G, cam plates H and G² carried by said shaft, shipping bars actuated by said cams, said pinion J² and said shaft G, being operatively 30 connected through intermediate mechanism, substantially as described.

7. In an elevator, the combination with a main shaft and a winding drum carried on said shaft and operatively connected therewith, of a pinion J² held loosely on said shaft, 35 mechanism by which said pinion is intermittently connected therewith, a stud held by the frame-work, a spur gear K turning loosely on said stud and engaging said pinion J², a 40 bevel gear attached to said spur gear and engaging a bevel gear upon a shaft G, a shaft G, cams H and G² carried by said shaft and shipping bars actuated by said cams, substantially as described.

8. In an elevator, the combination of a shaft 45 G, cams, carried by said shaft, shipping bars actuated by said cams, a lever N pivoted at one end and having its free end supported by the tension of the hoisting cable, a lever N³ 50 pivoted upon said lever N, capable of angular adjustment thereto, and a flexible connection between said lever N³ and said shaft G, by which the release of said lever will cause the shaft G to be rotated, substantially as described. 55

Dated at Worcester, in the county of Worcester and State of Massachusetts, this 19th day of October, 1891.

JOHN A. DEAN.

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