

(No Model.)

L. S. GRAVES.

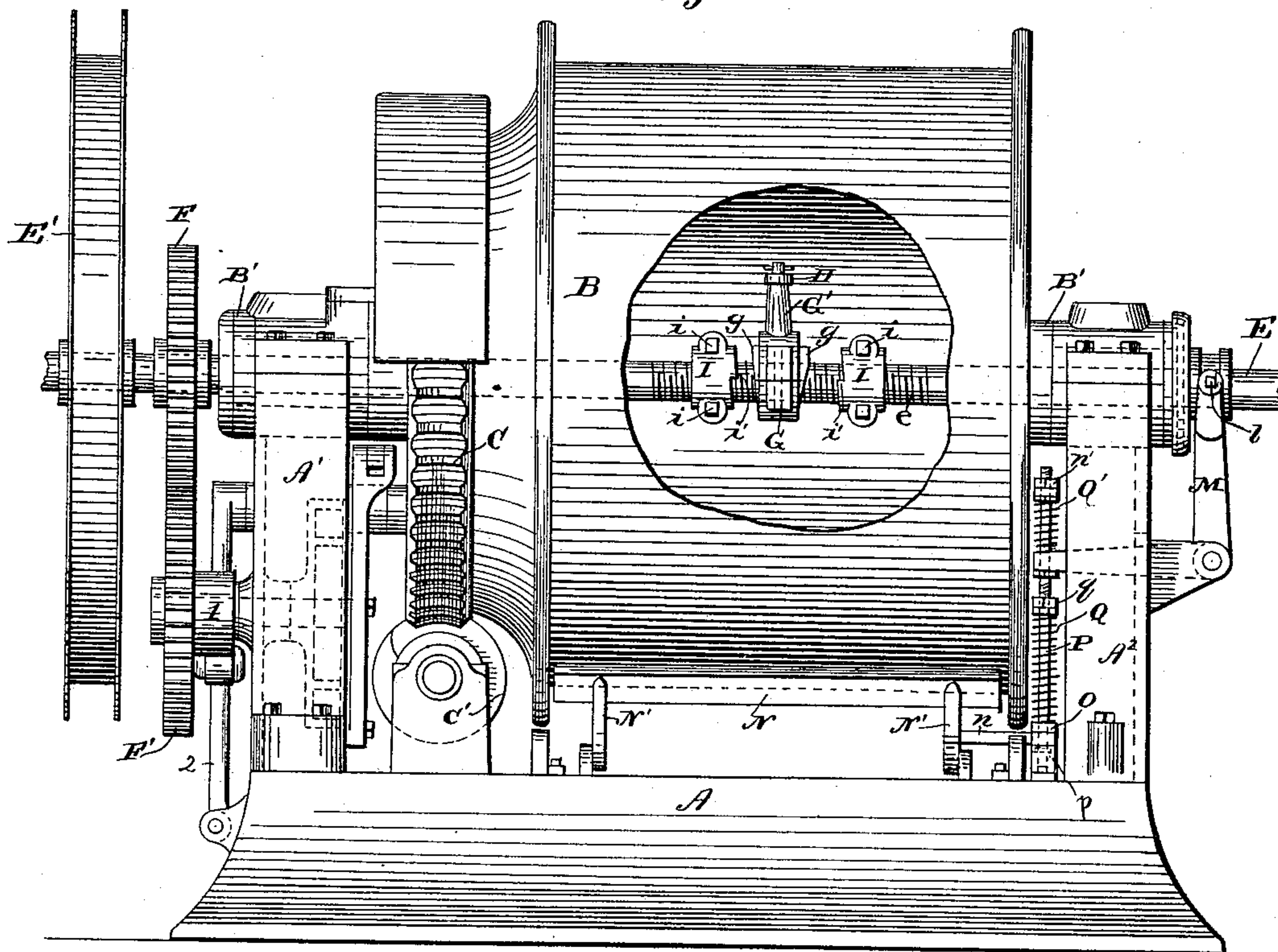
2 Sheets—Sheet 1.

SLACK CABLE STOP MOTION FOR ELEVATORS.

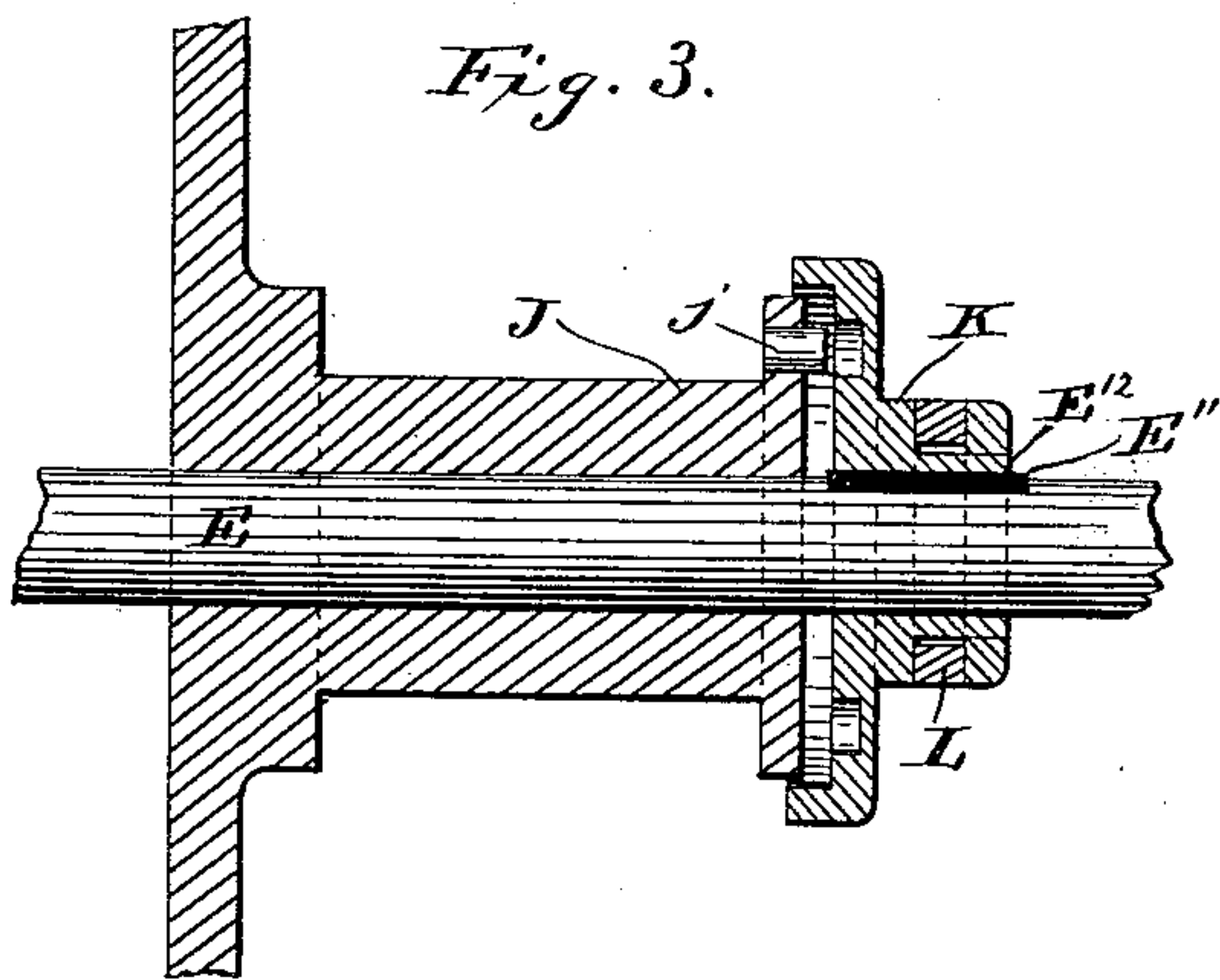
No. 386,464.

Patented July 24, 1888.

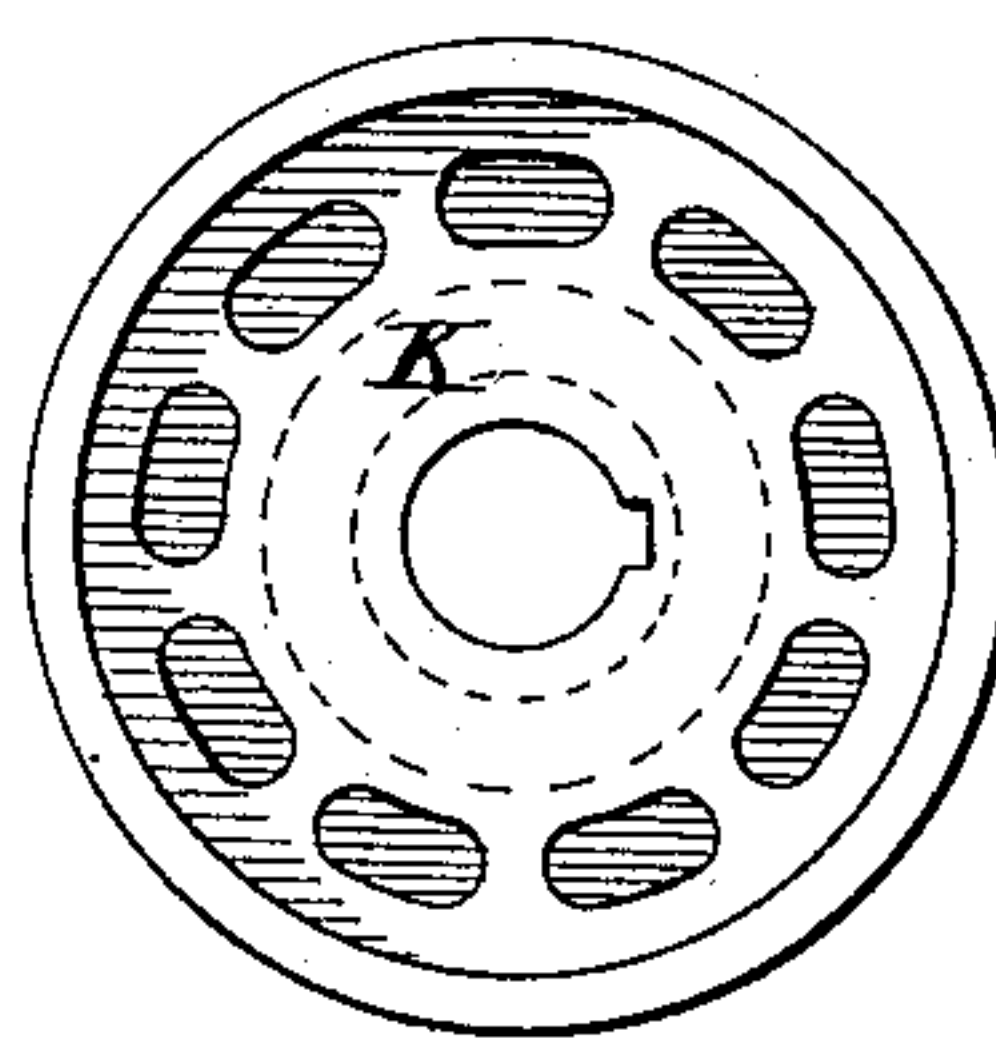
*Fig. 1.*



*Fig. 3.*



*Fig. 4.*



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(No. Model.)

2 Sheets—Sheet 2.

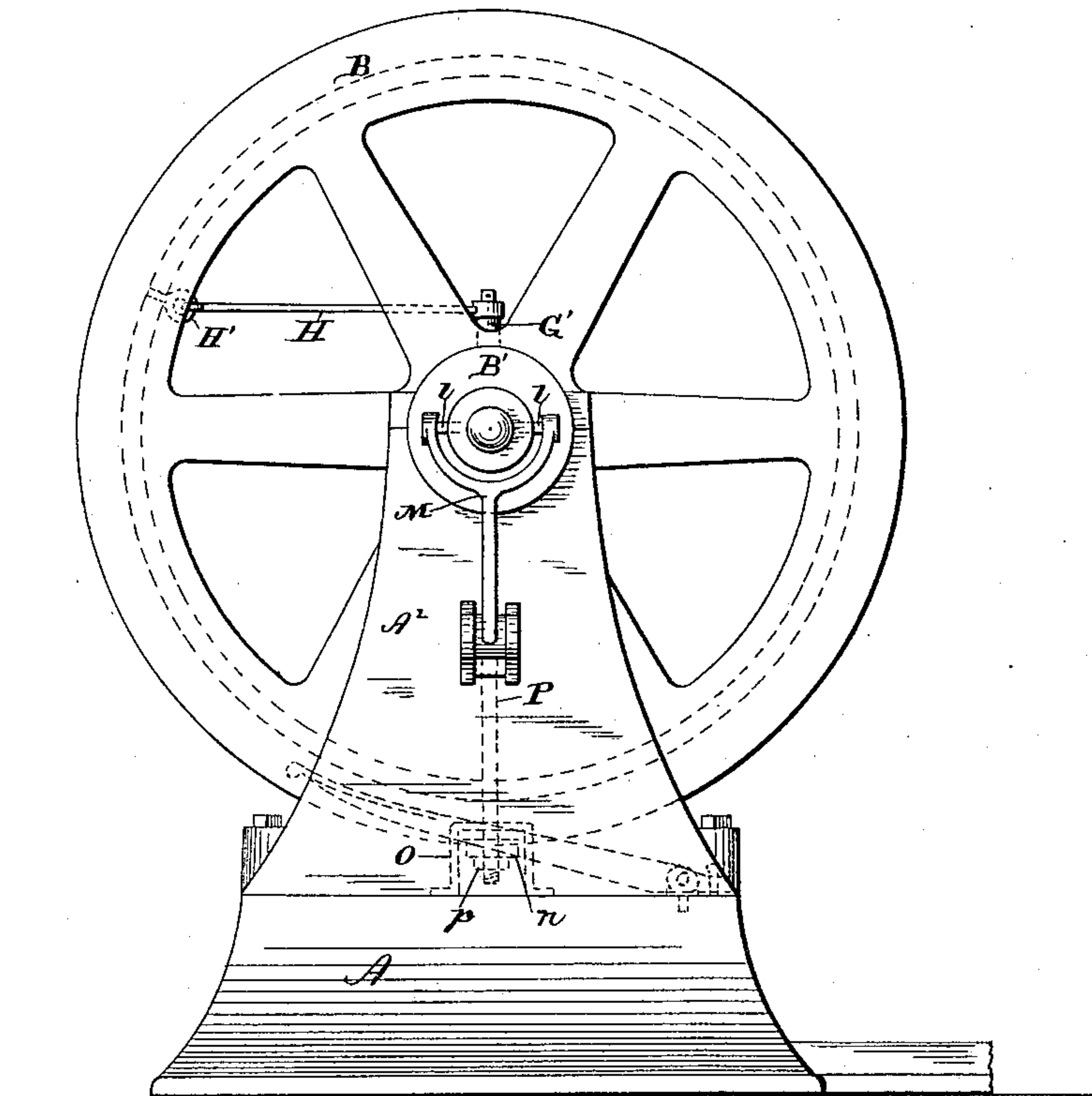
L. S. GRAVES.

SLACK CABLE STOP MOTION FOR ELEVATORS.

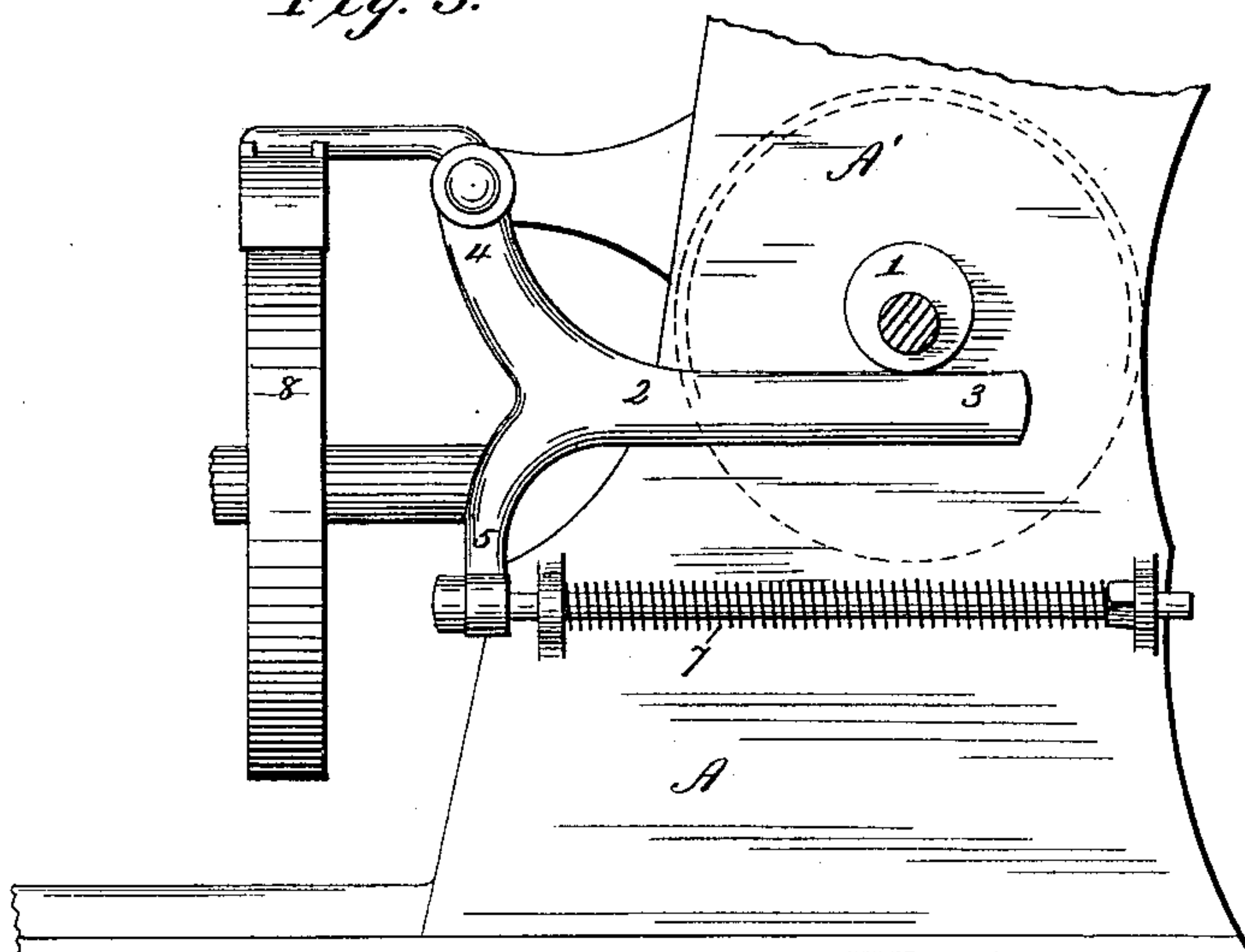
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*Fig. 2.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

LORENZO S. GRAVES, OF ROCHESTER, NEW YORK, ASSIGNOR TO L. S. GRAVES & SON, OF SAME PLACE.

## SLACK-CABLE STOP-MOTION FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 386,464, dated July 24, 1888.

Application filed March 21, 1888. Serial No. 267,977. (No model.)

*To all whom it may concern:*

Be it known that I, LORENZO S. GRAVES, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Slack-Cable Stop-Motions for Elevators; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and to the figures and letters of reference marked thereon.

My invention relates to improvements in devices applicable to hoisting-machines generally, but particularly for use upon the class of elevator-operating machines adapted to rest upon the floor or other suitable base, for preventing accident resulting from the continued unwinding of the suspending cable after the car or weight attached has ceased moving from some cause other than the manipulation of the controlling rope or cable by the operator, and it has for its object to improve the construction and operation of said devices, and reduce the cost of manufacturing and setting up said machines; and it consists in certain novel constructions and combinations of parts, all hereinafter described, and pointed out particularly in the claims at the end of this specification.

In the drawings, Figure 1 represents a side elevation, partly in section, of a hoisting apparatus, showing the application of my invention thereto; Fig. 2, an end view of the same, showing in dotted lines some of the parts; Fig. 3, a sectional view of the end of the drum and shaft and the clutch operated by the slack cable-stop; Fig. 4, an end view of the movable clutch-section. Fig. 5 is a view of the brake-operating mechanism.

Similar letters of reference in the several figures indicate the same parts.

The construction of the winding apparatus will be but generally described, as its specific construction, except as specified in the claims, forms no part of my present invention.

The base A is constructed with suitable standards, A' A<sup>2</sup>, containing journal-boxes for the drum B, which latter is provided with hollow tubular bearing portions B' B' at the ends, resting in said journal-bearings in standards A' A<sup>2</sup>. On one end of the drum is provided a worm-wheel, C, with which engages a worm, C', sup-

ported in bearings on the base, and having at one end the ordinary fast and loose pulleys, around which a driving-belt is passed in the ordinary manner and adapted to be shifted from loose to fast to start and from fast to loose to stop the winding-drum.

Passing through the journals of the drum B and projecting at opposite ends is a shaft, E, on one end of which the wheel E' is secured, to which the hand-rope passing in proximity to the car is attached; also secured to this shaft is a gear, F, meshing with another gear, F', supported in bearings in standard A', and connected with the belt-shifting device or a clutch, its equivalent, in any suitable manner.

In the brake mechanism shown in Fig. 5, when the belt-shifting devices are moved to position to stop the elevator, the cam 1 releases arm 3 of the three-arm lever 2, pivoted in suitable bearings in the standard; and arm 5, being in engagement with the spring 7 in a direction to hold the arm 3 in contact with the cam, and the brake shoe on arm 4 in contact with brake-wheel 8, quickly stops the motion of the shaft, as will be readily understood.

It will be seen that by the rotation of shaft E in the proper direction the belt will be shifted to start or stop the rotation of the winding-drum.

Within the drum B the shaft E is provided with a screw-threaded portion, e, and upon this is mounted a separable nut, G, provided with clutch-teeth g g on opposite ends and free to move thereon toward the ends when rotated. On one side it is provided with an extension, G', connected by a rod, H, and hook or ring H' with the interior of the drum B, so that as the latter rotates the nut is carried with it, and as the shaft E is normally stationary said nut will move toward one or the other end of the shaft by reason of the thread.

At suitable distances apart on the threaded portion of said shaft E are provided nuts I I, adapted to be adjusted to suitable distances apart, regulated by the height of the building, and secured in said adjusted position in any suitable manner, preferably, however, by tightly clamping the securing-bolts i i, as will be readily understood; and these nuts are further provided with clutch-teeth i' i' on their inner proximate sides corresponding with and



adapted to be engaged by the teeth *g* on the central movable nut when the latter reaches its extremes of movement.

From the above it will be seen that when the required amount of cable is unwound from the winding drum and the car is in lowest position, the teeth on the traveling nut *G* will engage those on one of the nuts *I*, turn the shaft in the proper direction, shift the belts through the mechanism described, and stop the unwinding of the cable, and also when the car is in highest position the teeth on the opposite side of nut *G* will engage the other nut *I*, rotate the shaft in the same direction, shift the belts, and stop the winding as before.

The end of the bearing of the winding-drum opposite the worm-wheel is provided with a disk, *J*, having teeth *j* thereon forming one member of a clutch, the other member being formed by a sleeve, *H*, having a disk, *K'*, with recesses corresponding to teeth *j* on the disk *J*, and being further provided with a groove, *h*, for the accommodation of a collar, *L*, to which are connected studs *l l* on the end of a bifurcated bell-crank-shifting lever *M* pivoted on the standard *A*<sup>2</sup>. Shaft *E* is provided with a spline, *E''*, engaging a corresponding groove, *E*<sup>2</sup>, in the sleeve, so as to be rotated by it, but permitting its free longitudinal movement thereon, caused by lever *M*.

It will be understood that instead of the form of clutch shown any other suitable one could be employed, and also that the feather-and-groove connection described could be varied in any suitable manner.

Slightly below the winding-drum and extending from end to end thereof is a bar, *N*, connected at opposite ends to levers *N'*, the whole constituting a frame pivoted to the base at one end and capable of a limited motion toward and from the surface of said drum, as in Fig. 2; and one of these levers, *N'*, on the side toward the standard *A*<sup>2</sup> is provided with an extension, *n*, passing beneath a stirrup or loop, *O*, secured to the base. Through the top of this loop (which in effect constitutes a stop, as hereinafter described) is a perforation, through which projects a threaded connecting-rod, *P*, also preferably passing through the end of extension *n* of the lever, and a head or nut, *p*, is preferably located on the end of said rod beneath extension *n*, as shown, so as to adjust said rod, if desired.

Upon the rod *P* above the loop is screwed a collar or stop, *q*, adapted to be adjusted up or down thereon, and between this collar and the loop is interposed a spring, *Q*, encircling the rod, as shown, and operating to pull upward with a light pressure, supporting the bar *N* in close proximity to the surface of the drum, but permitting its ready depression against said spring by a very slight weight applied to it. The horizontal arm of bell-crank *m* is provided with a perforation in its end, (or is forked, which will answer the same purpose,) through which passes the rod *P*, and between an adjustable nut or nuts, *n'*, in the end of the lat-

ter and said lever end is interposed a spring, *Q'*, resting upon the lever, while its tension can be adjusted by the nut, which can then be secured in adjusted position.

Any other suitable form of connection can be made, however, and I do not desire to be confined to precisely the arrangement shown.

From the above the operation of my invention will be apparent.

When in normal operation, the clutch *J K* is disengaged, the horizontal portion of bell-crank *M* raised, bar *N* held in close proximity to the surface of the drum by its spring *Q*, while the operation of the mechanism is governed by the operator through the hand-rope and shaft *E*, the operation at the extremes of the movement being governed by the stops on shaft *E* automatically, as before described.

As before stated, it sometimes happens that an elevator-car is arrested or prevented from descending by reason of some obstruction in the hatchway or on its guides, and the cable, still unwinding from the drum, piles upon the car, leaving the latter at the mercy of the obstruction, with the added danger of weight of cable upon it, tending to loosen and cause it to drop; but when this happens the cable will of course be loosely removed from the drum, and coming in contact with the bar *N* will press it down and, through rod *P*, spring *Q'*, and lever *M*, move the clutch section *K* into engagement with the drum, causing the rotation of shaft *E* and the shifting of the belts to arrest the unwinding of the cable. As soon as the obstruction is removed and the cable wound again and lifted from the bar, the spring *Q* raises the said bar until the bell-crank releases the clutch, returning the parts to first or normal position.

The spring *Q'*, interposed in the connection between the bar and clutch, I regard as important, in that by its employment the liability of breaking the parts, should the lugs or teeth on the clutch fail to enter their recesses when first moved, or from any other reason, is obviated.

Numerous modifications can be made without departing from the spirit of my invention, and I do not therefore desire to be confined to the particular details herein shown. The particular hoisting-machine not being essential, I do not desire to be confined to the details of its construction in considering the claims hereinafter noted, except in so far as such limitations are expressed.

Having thus described my invention, what I claim as new is—

1. In a hoisting-machine, the combination of the winding drum, the mechanism for rotating it, the shaft passing through the journals of the drum, to which the hand-rope wheel and the starting and stopping devices are connected, the clutch-section formed on the drum, the movable clutch-section mounted on the hand-rope shaft, the frame or bar arranged in close proximity to the surface of the drum, and connections between the movable clutch



portion and the frame, whereby upon the movement of said frame away from the drum the clutch will be thrown into engagement, substantially as described.

5 2. In a hoisting-machine, the combination, with the winding-drum, mechanism for rotating it, a starting and stopping mechanism, the hand-wheel shaft connected to said last-mentioned mechanism extending through said  
10 drum, the clutch-section on the drum, the clutch-section on the hand-wheel shaft, and a bell-crank lever for moving it into connection with the section on the drum, of a bar or frame arranged in proximity to the surface of the  
15 drum, and connections between said frame and the movable section of the clutch, whereby when the former is moved away from the drum the clutch will be thrown into operation, substantially as described.

20 3. In a hoisting-machine, the combination of the hoisting-drum, mechanism for rotating it, and a shaft to which the starting and stopping mechanism is connected, a clutch interposed between said drum and shaft, a bar arranged  
25 in close proximity to the surface of the drum, a lever connected to the clutch for operating it, and a spring interposed between and forming a connection between the bar and the clutch-operating lever, substantially as described.  
30

4. In a hoisting-machine, the combination, with the hoisting-drum, mechanism for rotating

ing it, and a shaft to which the starting and stopping mechanism is connected, of a clutch interposed between said drum and shaft, a bar  
35 arranged in close proximity to the drum, a lever connected to the clutch for operating it, and a spring-connection between the lever and bar, whereby motion will be transmitted therefrom only through the interposed spring,  
40 and a spring supporting said bar and holding the clutch normally disengaged, substantially as described.

5. In a hoisting-machine, the combination, with the hoisting-drum, mechanism for rotating  
45 it, and a shaft to which the starting and stopping mechanism is connected, of a clutch interposed between said drum and shaft, the bell-crank lever having one of its arms connected to the movable clutch-section, a bar arranged in close proximity to the drum having  
50 an extension, the rod connected to the extension, two stops on the rod, the loop or stop through which the rod passes, a spring interposed between one of the stops on the rod and  
55 the loop, and the spring interposed between the other stop on the rod and the end of the bell-crank lever operating the clutch, substantially as described.

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Witnesses:

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