No. 847,867. PATENTED MAR. 19, 1907.

J. J. WESTBROOK.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED OCT. 22, 1906.

3 SHEETS—SHEET 1.

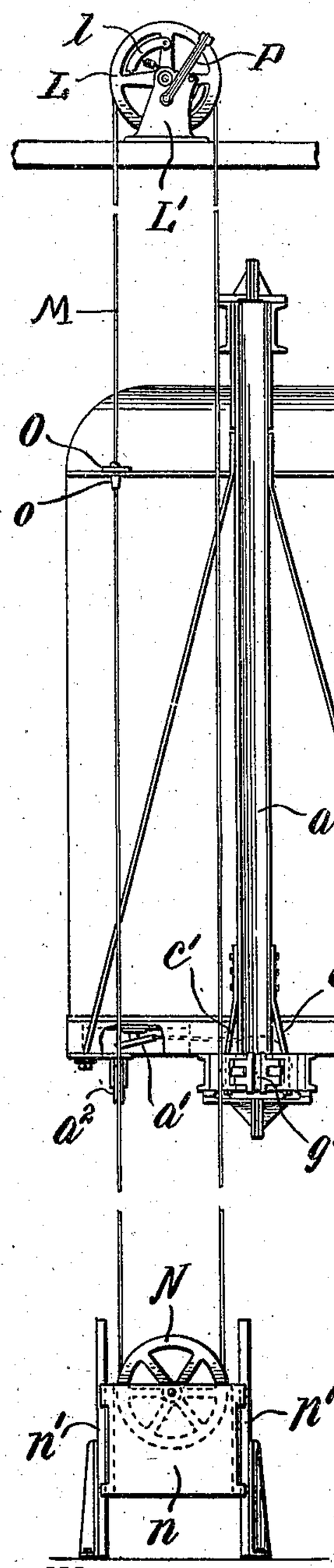


Fig. 1.

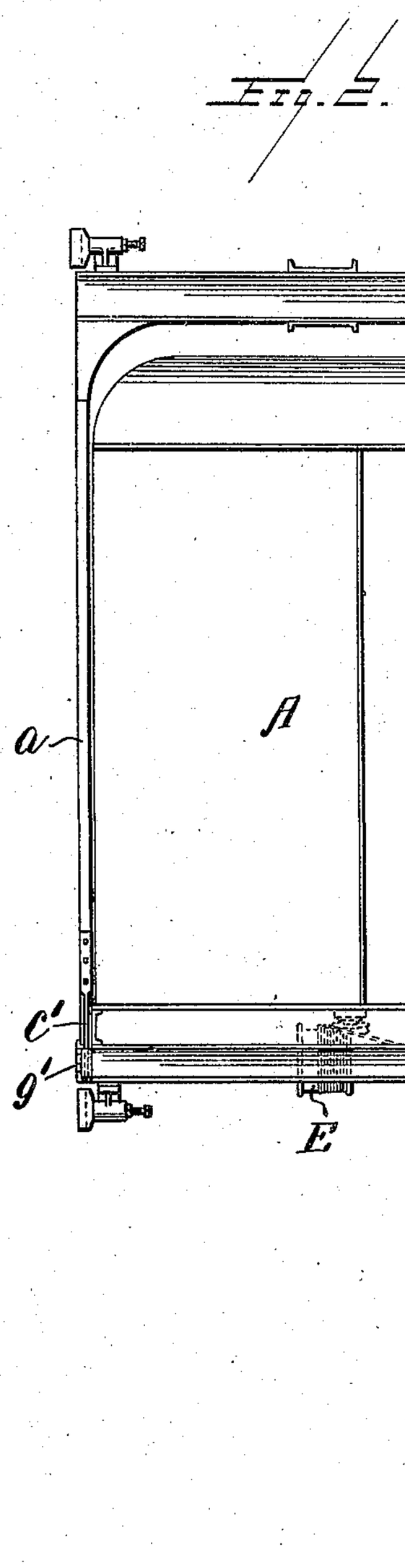
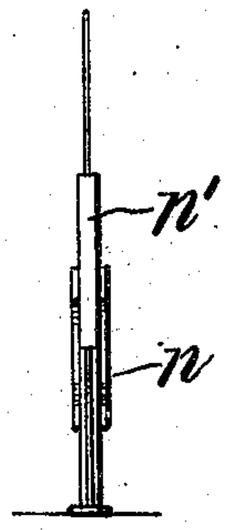


Fig. 2.



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3 SHEETS—SHEET 2.

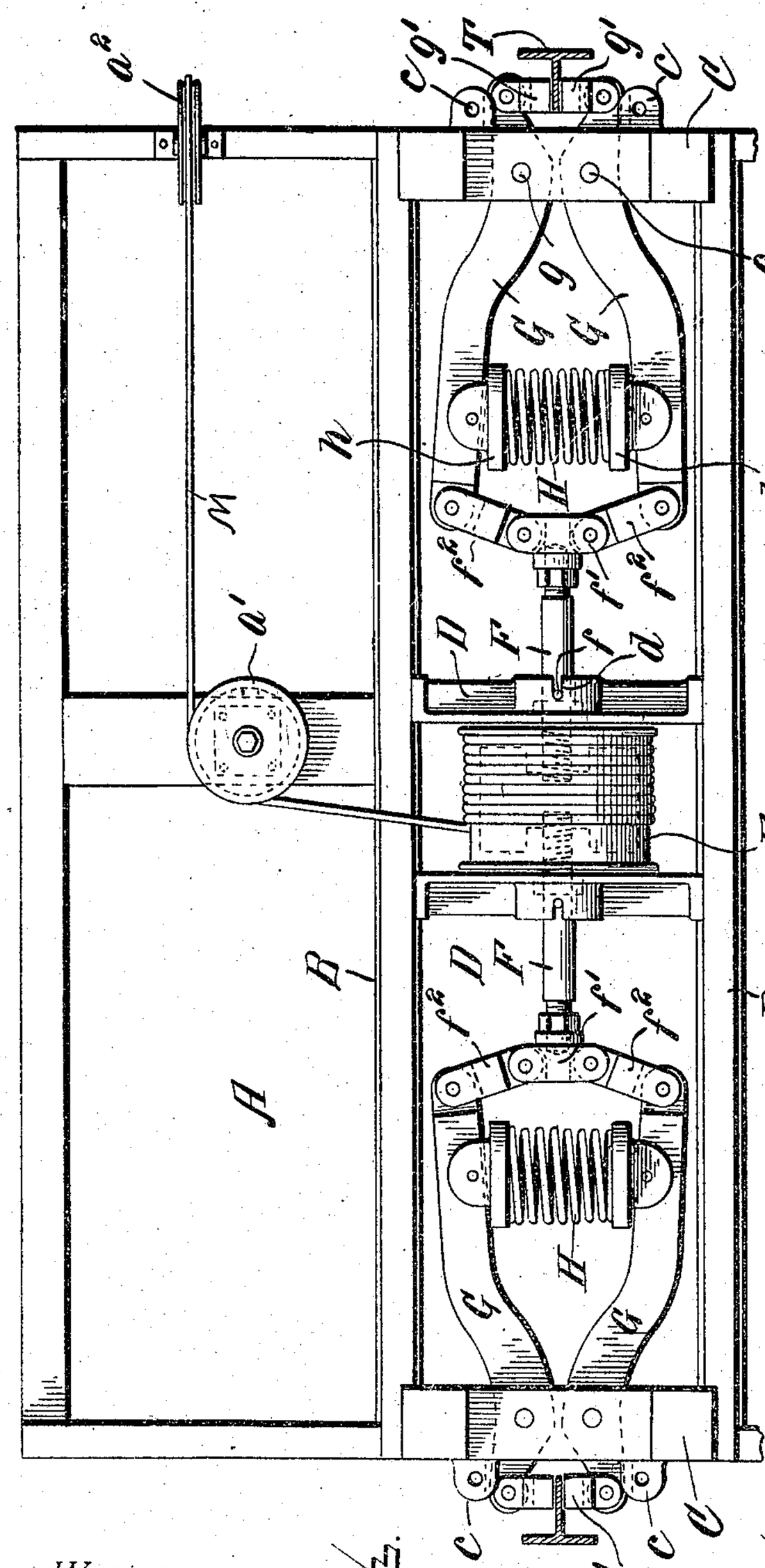

FIG. 1.

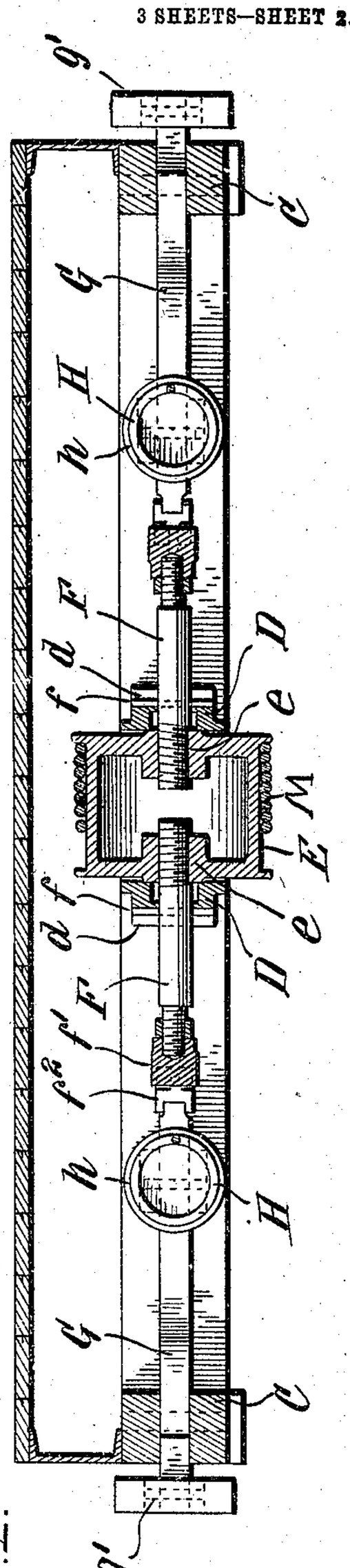

FIG. 2.

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3 SHEETS—SHEET 3.

Fig. 6.

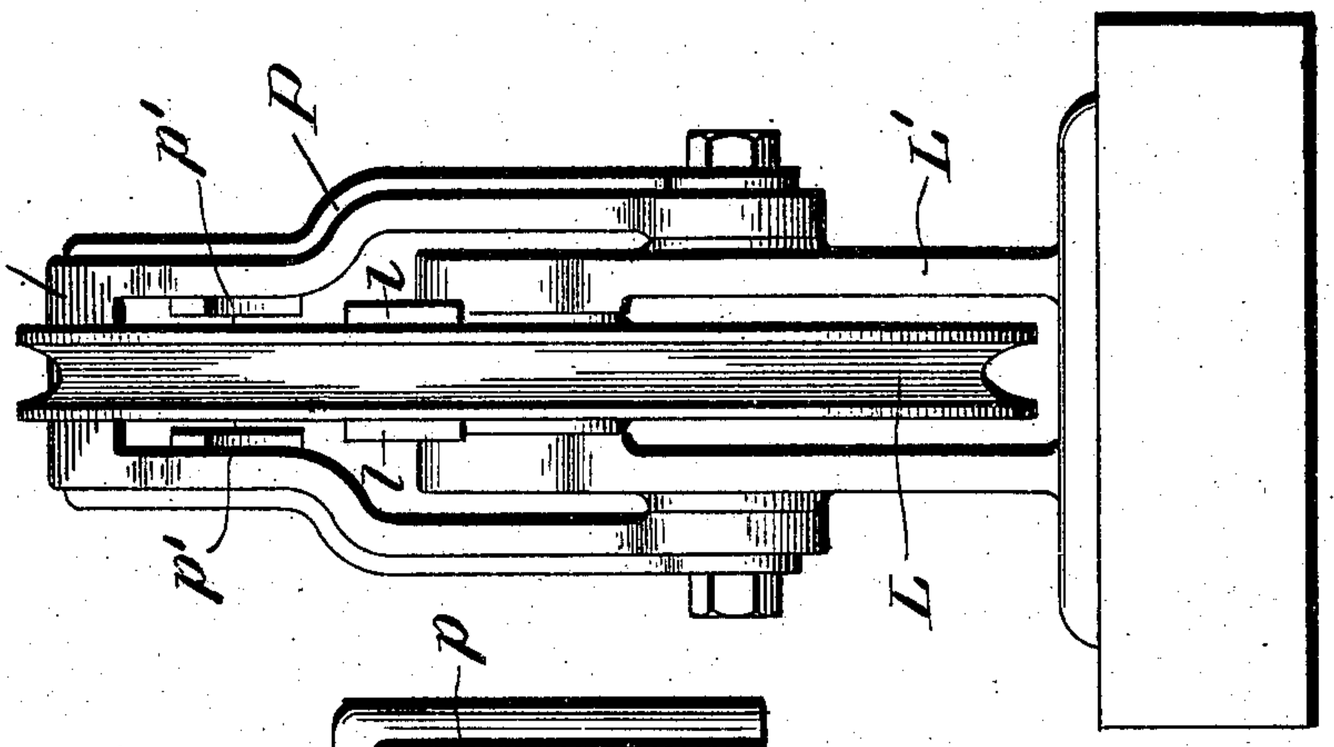


Fig. 7.

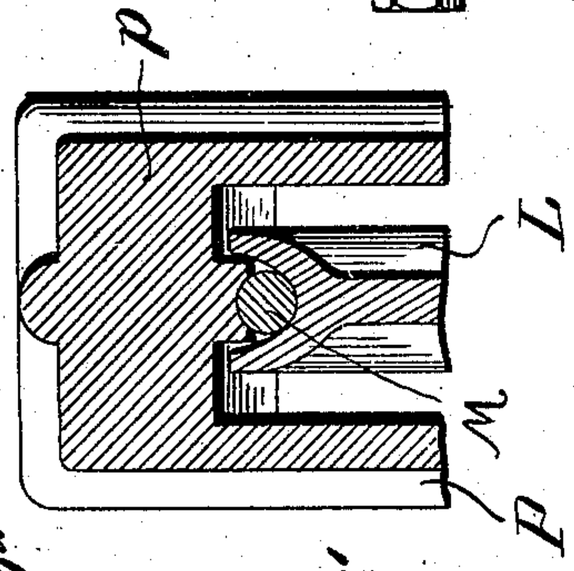
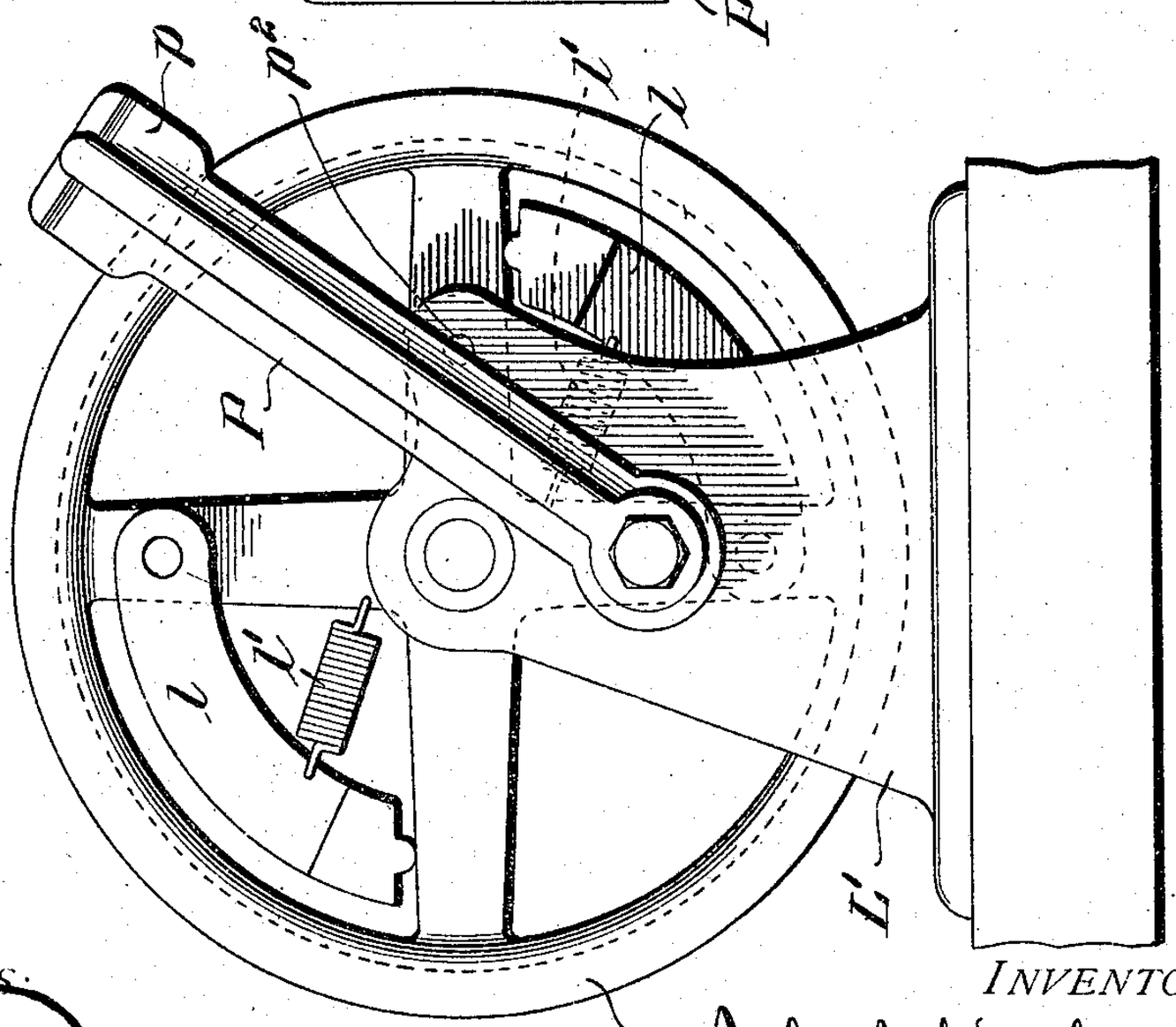


Fig. 5.



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SAFETY DEVICE FOR ELEVATORS.

No. 847,867. Specification of Letters Patent. Patented March 19, 1907.

Application filed October 22, 1906. Serial No. 340,033.

To all whom it may concern:

Be it known that I, JOHN J. WESTBROOK, a citizen of the United States, residing at Danville, in the county of Pittsylvania and State of Virginia, have invented certain new and useful Improvements in Safety Devices for Elevators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawings, which illustrate one form in which I have contemplated embodying my invention, and said invention is fully disclosed in the following description and claims.

Referring to the drawings, Figure 1 represents a side elevation of portions of an elevator shaft or well, showing a car and provided with my improved safety device. Fig. 2 is a similar view taken at right angles to Fig. 1. Fig. 3 is a partial bottom plan view of the car, drawn to an enlarged scale, showing the parts of the safety device carried thereby. Fig. 4 is a central longitudinal vertical section of the parts shown in Fig. 3. Fig. 5 is an enlarged side elevation of the rope-clamp lever and automatic governor therefor. Fig. 6 is an end view of the same. Fig. 7 is a detail view portion of the rope-clamp.

The object of my invention is to provide a safety device for arresting the downward movement of an elevator-car and causing it to come quickly and easily to a full stop without appreciable jar in case the lifting-cables break or the actuating mechanism exceeds its normal speed for any reason, such as by the grounding of an electric motor in case an electric elevating mechanism is employed.

My improved device is applicable to all kinds of elevators, whether actuated by fluid, belt-drive, or electric power, and to any kind of a car, whether platform, closed, or other type.

I will first describe that portion of the mechanism which is applied to the car. Beneath the bottom or platform of the car A, I secure what I term the "safety-plank," which consists of two parallel channel-bars of steel, (indicated at B B,) which are disposed longitudinally between the vertical T-guides, which guide the car in its movements. These channel-bars are connected at their ends by supporting-castings C C and are also connected between their ends by the supporting-braces D D, all of which are bolted securely to the channel-irons B B and constitute the safety-plank. This frame or safety-plank may be supported from the car in any desired manner. I prefer, however, to provide the supporting-castings C C with lugs *c c*, which are engaged by vertically-disposed strap-braces *c' c'*, secured at their upper ends to the stiles *a a* of the elevator-car, and thus firmly supporting the safety-plank, as shown.

Between the supporting-braces D D is hung a drum E, having a hub portion *e* at each end, provided with a threaded aperture therethrough, said apertures being reversely threaded to receive oppositely-threaded shafts F. The shafts F extend through apertures in the braces D D and are prevented from turning therein by means of pins *f f*, which engage slots *d d* on the outer sides of said braces. Each shaft F is provided at its outer end with block *f'*, to which it is adjustably connected, and this block is provided at opposite ends with toggle-links f^2 f^2, the outer ends of which are pivoted to the ends of a pair of clamping or gripping levers G G, pivoted at *g g* in the castings C C and having their outer ends extending on opposite sides of the center flange of the T-guide T for the elevator-car and provided with gripping-shoes *g' g'*, pivotally connected to the ends of said levers and having their inner faces in close proximity to the center flange.

Between the inner ends of the levers G G is arranged a heavy coiled spring H, its ends resting in cups *h*, pivotally connected to said levers, said spring being normally held under compression, as shown in Fig. 3. It will be obvious from an examination of the parts just described that if the drum E is revolved in the proper direction shafts F F will be moved longitudinally outward, and the toggle-levers formed by links f^2 f^2 will tend to throw the inner ends of levers G G apart. This movement will be practically and instantly anticipated by the springs H H, the expansion of which will force the rear ends of the levers apart, and the first effect of the toggles will be merely to allow the rear ends of the levers to separate under the tension of the spring, thus applying the gripping-shoes to the T-guide T with a spring or yielding pressure and gradually arresting the downward movement of the car. The lost mo-

tion required to enable the springs to thus act instantly in advance of the positive actuation of the toggle-levers by the threaded shafts F F is provided by the pivotal connections between the links f^2 f^2 and the levers G G and shafts F F. There is always a slight amount of play in any pivotal connection of this kind, and ordinarily the normal amount of play in these four pivotal connections will be sufficient to provide the lost motion necessary to enable the springs H to act in advance of the positive operation of the toggles. Should this amount of play not be sufficient for any reason, it is obvious that the holes in the parts engaging the pivots may be slightly enlarged. The continued revolution of the drum E and outward movements of the shafts F F will cause the toggle-levers to actively distend the rear ends of levers G G and finally clamp the gripping-shoes rigidly upon the flange of the T-guide.

By locating the springs directly between the gripping-levers G G and relieving said springs by the first part of the outward movement of the shafts F F and toggle-levers I get a direct and instantaneous yet elastic action of the clamping-shoes on the T-guide which serves to bring the car to a stop without jar, or at least to greatly reduce its speed, so that when the power is directly applied by the toggle-levers no appreciable jar is felt.

The drum E is operated by means of a wire tiller-cable M, having its end rigidly secured to the drum and having a number of coils around the same. In winding this cable around the drum the drum is turned in a direction to draw the shafts F F inward, and thus compress the springs H, as shown in Fig. 3. The tiller-cable is passed around suitable idle guide-sheaves a' a^2 on the car, thence up to the top of the shaft, where it passes over a governor-sheave L, thence to the bottom of the shaft around a weighted idler-sheave N, (having attached thereto a weight n, sliding on guides n',) and thence up to the car, where it is secured permanently, as by means of a rope-socket o, to a bracket O on the car. (See Figs. 1 and 2.)

The governor-sheave L is mounted in a suitable supporting-frame L′ (see Figs. 5, 6, and 7) and is provided in this instance with pivoted weighted levers l l', which project laterally beyond the side faces of the sheave L, which are maintained in position by springs l' l' under normal speed of the governor-sheave as the car moves. I provide a governor-operated device for arresting the downward movement of the bight of the rope leading to the drum E on the car in case normal speed is exceeded, which consists in this instance of a clamping yoke or lever P, pivoted to the frame L′ eccentrically to the axis of the sheave L and having a clamping-jaw p, which may be grooved or otherwise shaped to engage the tiller-cable in the groove of the governor-sheave L. This clamping-yoke normally extends toward one side of the sheave and is held by gravity against a stop p^2, with the clamping-jaw out of engagement with the tiller-rope, which can pass freely thereunder. The yoke P is provided on one or both sides with inwardly-extending lugs p' p', which are just outside of the path of the weighted arms or levers l l of the governor-sheave, but will be struck thereby if normal speed is exceeded, thus moving the yoke P and clamping the tiller-rope rigidly between the clamping-jaw p and the sheave L and stopping the sheave and the rope instantly. The result of locking the tiller-rope as just described is to cause it to unwind from the drum E as the car descends, thus instantly gripping the T-guide, as before described, and bringing the car to a full stop.

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

1. In a safety device for elevators, the combination with the car and guide therefor, of clamping-levers on the car having devices for gripping the guide, a spring directly connected to said levers, for applying them to the guide, an actuating mechanism connected to said levers for positively applying them to the guide, said mechanism being constructed to hold said springs under compression when in inoperative condition, substantially as described.

2. In a safety device for elevators, the combination with the car and guide therefor, of the clamping-levers carried by said car, having portions movable in opposite directions to cause them to clamp said guide, a spring interposed between said levers, and actuating devices for positively drawing said levers together to compress said spring when moved in one direction and forcing them apart when moved in the opposite direction, substantially as described.

3. In a safety device for elevators, the combination with the car, and guide therefor, of the clamping-levers, carried by the car, having portions movable in opposite directions to cause them to clamp said guide, a spring interposed between said levers, toggle-levers connected with said clamping-levers, a longitudinally-movable shaft, connected to said toggle-levers, and a rotary device having a screw connection with said shaft for effecting the longitudinal movement thereof in both directions, substantially as described.

4. In a safety device for elevators, the combination with the car, and guide therefor, of the clamping-levers, carried by the car, having portions movable in opposite directions to cause them to clamp said guide, a spring interposed between said levers, tog-

gle-levers connected with said clamping-levers, a longitudinally-movable shaft connected to said toggle-levers, a projection on said shaft engaging a guiding-recess in a stationary part to hold said shaft from rotation, a drum having a threaded connection with said shaft, and means for rotating said drum in a direction to apply said clamping-levers to said guide, substantially as described.

5. In a safety device for elevators, the combination with the car and guide therefor, of a pair of clamping-levers carried by said car, for engaging said guide, toggle-levers, connected with said clamping-levers, a longitudinally-movable shaft connected with said toggle-levers, a drum having a threaded connection with said shaft for moving it in opposite directions, and a spring for forcing said clamping-levers into operative engagement with the guide, normally held under compression, by the engagement of said drum and shaft, substantially as described.

6. In a safety device for elevators, the combination with the car and guide therefor, of a pair of clamping-levers carried by said car for engaging said guide, a spring interposed between said clamping-levers for forcing the same to grip said guide, an actuating device, positive connections between said actuating device and said clamping-levers for positively causing the clamping-levers to grip said guide, when moved in one direction, said connections providing lost motion to permit the action of the spring to precede that of the said actuating device, said actuating device and connections being constructed to compress and hold said spring under compression when said actuating device is moved in the other direction, substantially as described.

7. In a safety device for elevators, the combination with the car and guide therefor, of a pair of clamping-levers carried by said car for engaging said guide, longitudinally-movable screw-shaft, operative connections between said shaft and said clamping-levers, having provision for securing lost motion, a spring interposed between said clamping-levers for applying them to said guide, a drum on said screw-shaft, a cable wound on said drum, and a governor-controlled device for stopping said cable when the speed of the car exceeds a predetermined speed, said drum, shaft and connections being constructed to normally hold said spring under compression when in inoperative position, substantially as described.

8. In a safety device for elevators, the combination with the car and vertical guides therefor, of a pair of clamping-levers secured to the car, for gripping each of said guides, longitudinally-movable screw-shafts, oppositely screw-threaded, a drum oppositely threaded and engaging each of said shafts, toggle-levers connecting each screw-shaft with one pair of said clamping-levers, and providing lost motion in the joints of said levers, a spring interposed between the clamping-levers of each pair, and held normally under compression and in inoperative position by the engagement of said drum with said screw-shafts, a cable having a part adjacent to one end wound on said drum and a governor-controlled device for automatically stopping said cable, the lost motion provided by said toggle-levers, permitting said springs to act in advance of said toggle-levers, in applying said clamping-levers to said guides, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN J. WESTBROOK.

Witnesses:

W. J. WESTBROOK,

G. E. SCROGHAM.