No. 796,210. PATENTED AUG. 1, 1905.

C. W. HOFFMAN.

ELEVATOR ENGINE.

APPLICATION FILED FEB. 24, 1905.

3 SHEETS—SHEET 1.

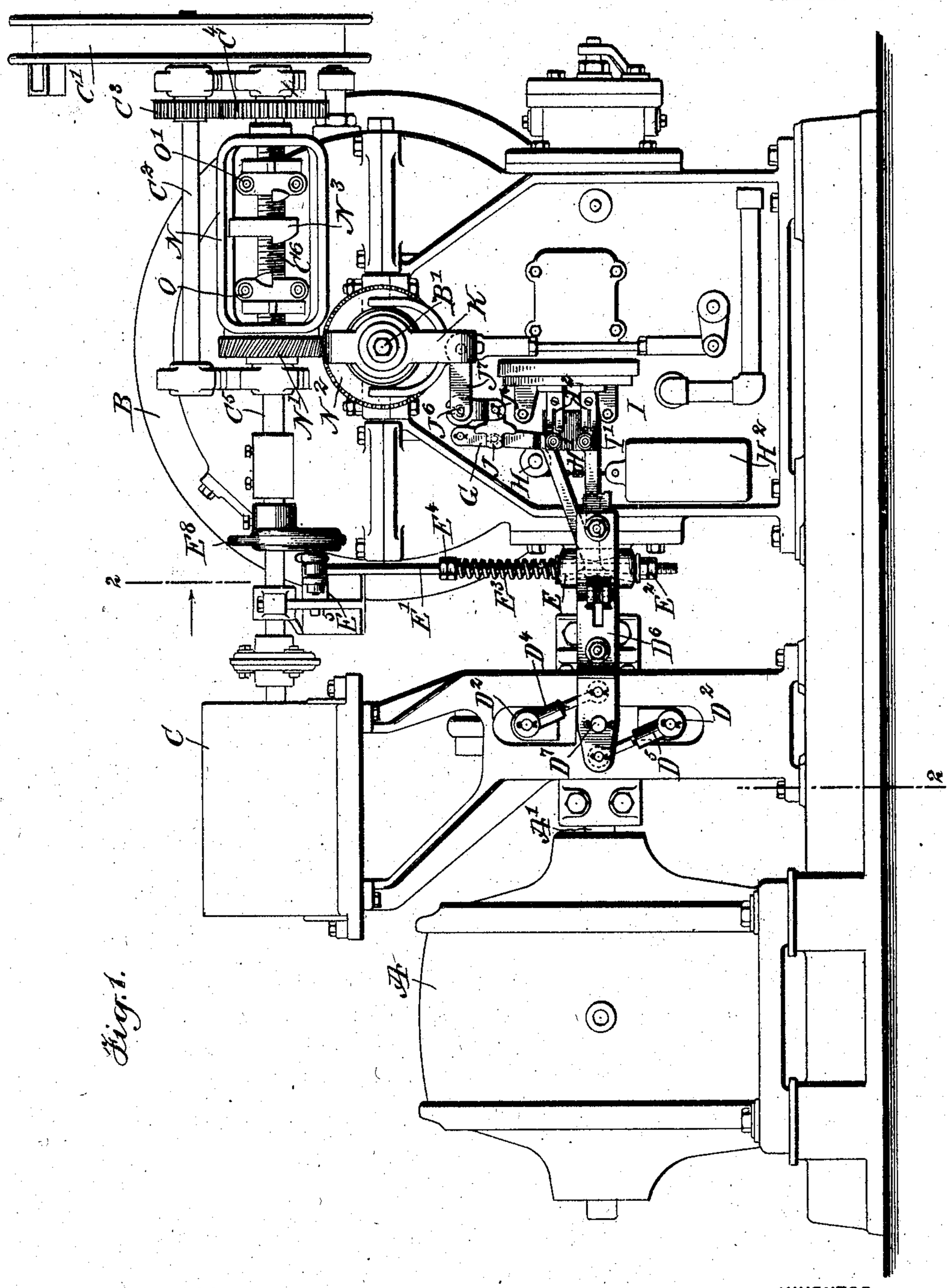

Fig. 1.

WITNESSES:

Geo. H. Maylor.

Rudy. Hoosteds

INVENTOR

Charles W. Hoffman

BY Munn & Co.

ATTORNEYS

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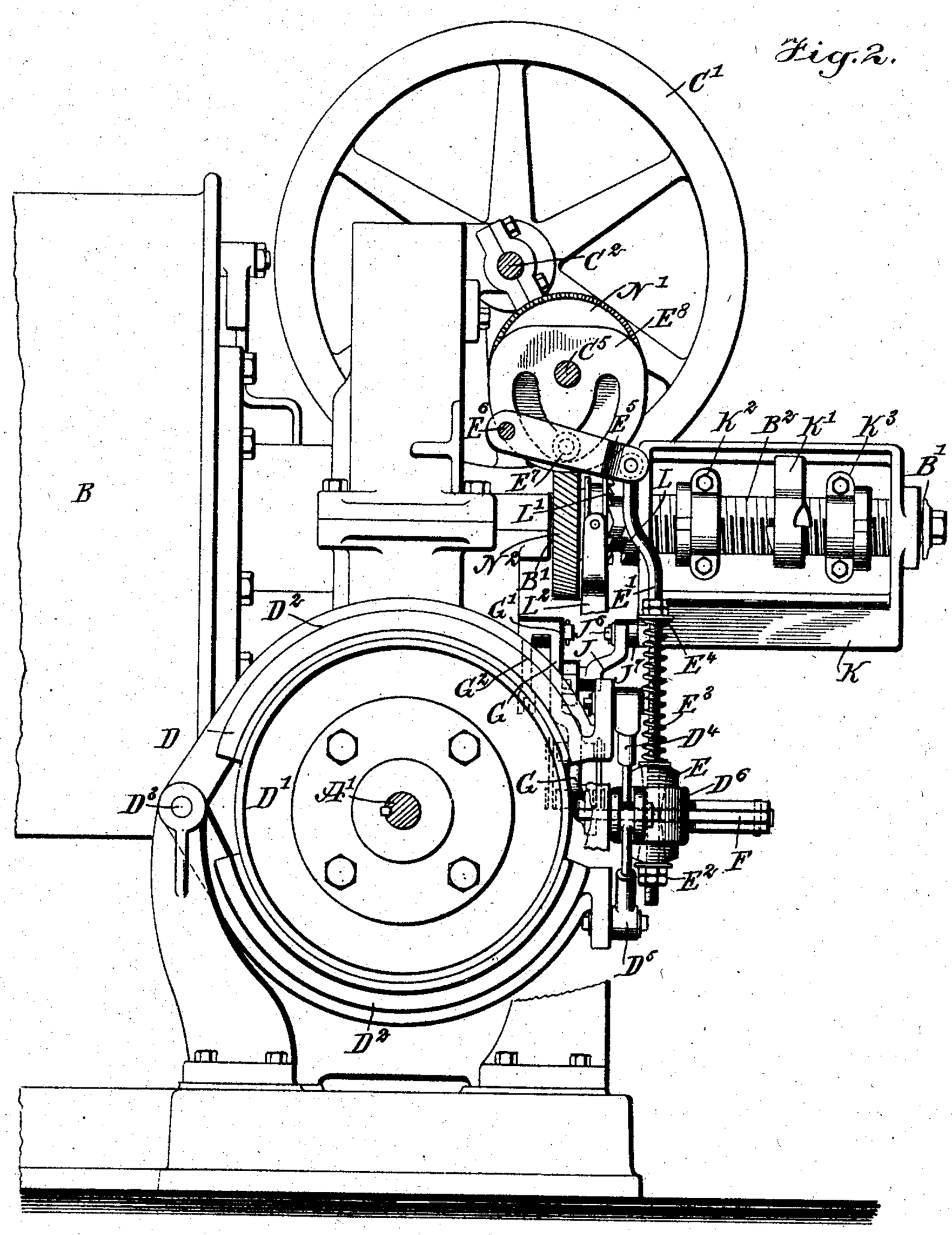
3 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

Geo. W. Maylor.

Thos. J. Hooker Jr.

INVENTOR

Charles W. Hoffman

BY Munn & Co.

ATTORNEYS

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3 SHEETS—SHEET 3.

Fig. 3.

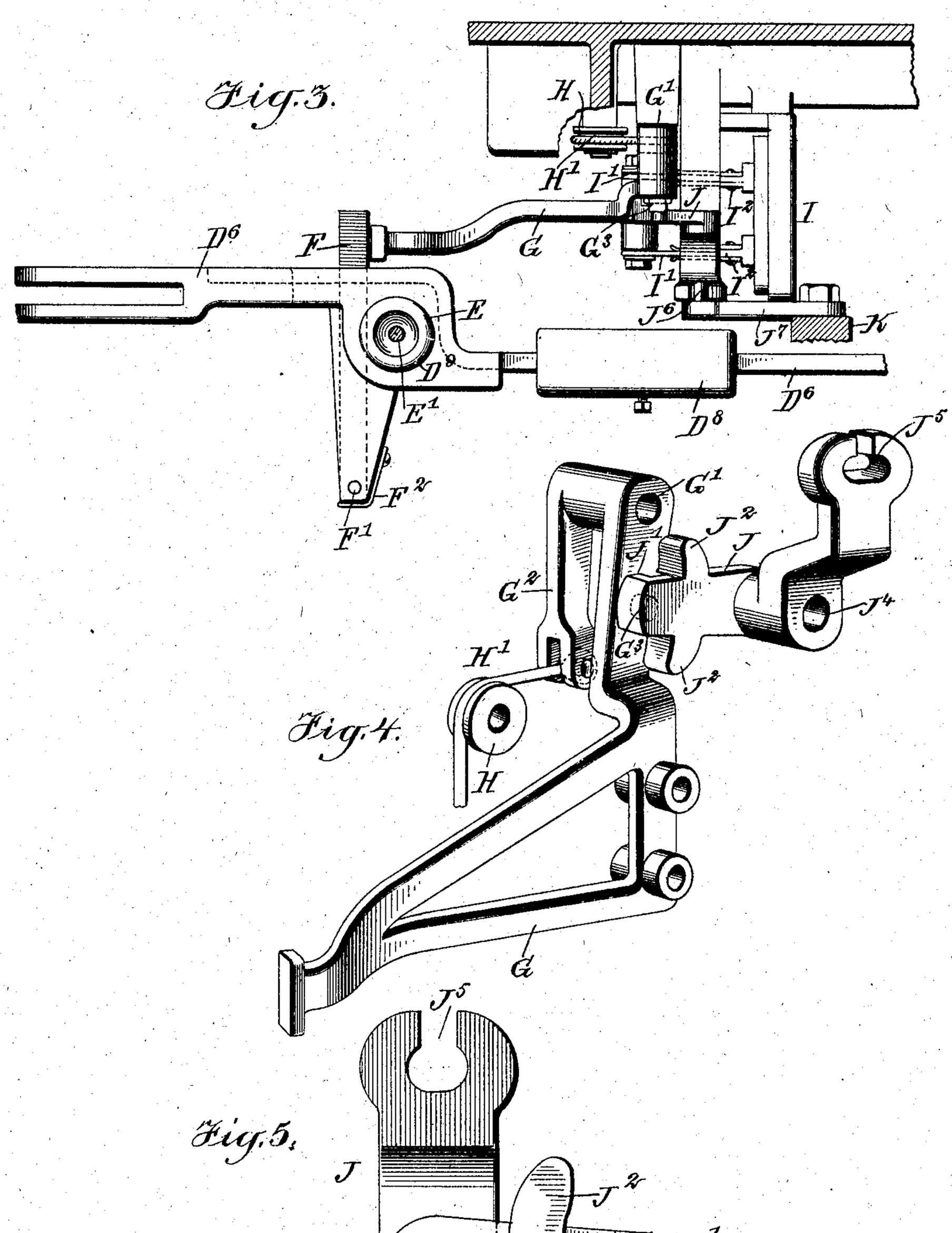

Fig. 4.

Fig. 5.

WITNESSES:

Geo. W. Naylor.

Alvey. Hooper

INVENTOR

Charles W. Hoffman

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES W. HOFFMAN, OF NEW YORK, N. Y.

ELEVATOR-ENGINE.

No. 796,210. Specification of Letters Patent. Patented Aug. 1, 1905.

Application filed February 24, 1905. Serial No. 247,128.

To all whom it may concern:

Be it known that I, CHARLES W. HOFFMAN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented new and useful Improvements in Elevator-Engines, of which the following is a full, clear, and exact description.

The invention relates to elevators; and its object is to provide certain new and useful improvements in elevator-engines whereby the engine is stopped in case of accident to the machinery by shutting off the motive agent from the engine and by applying the engine-brake by the same brake-lever which normally controls the brake on ordinarily stopping and starting the engine.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement as arranged on an electric elevator-engine. Fig. 2 is an enlarged cross-section of the same on the line 2 2 of Fig. 1. Fig. 3 is a plan view of the improvement. Fig. 4 is a perspective view of the device for disconnecting the brake-lever from the operating device or switch, and Fig. 5 is a rear face view of the bell-crank lever for the disconnecting device.

The shaft A′ of the engine or motor A is connected by the usual gear (not shown) with the shaft B′ of a hoisting-drum B, and the motive agent (electricity, steam, or the like) for the engine or motor A is controlled in the usual manner by an operating device or switch C, actuated in the ordinary running of the engine or motor by the operator in charge of the cage to stop and start the latter at the different landings of the elevator-shaft. For this purpose the operating-rope (not shown) under the control of the operator in the cage passes around a wheel C′, secured on a shaft C^2, connected by a gear-wheel C^3 with a gear-wheel C^4 on the shaft C^5 of the operating device or switch C. By turning the operating-wheel C′ from a normal or stopping position in one direction the motive agent is turned on to start and run the engine or motor A, and by turning the wheel C′ in a reverse direction back to the normal stopping position the motive agent is shut off to stop the cage at the desired landing.

The mechanism so far described is common to elevators now in use, so that further detailed description of the same is not deemed necessary.

When throwing the operating device or switch C into a stopping position, a brake D on the engine-shaft A′ is applied to bring the engine or motor A quickly to a standstill, and when the operating device or switch C is moved into a starting and running position then the brake D is released. This brake D is normally controlled from the operating device or switch C, and for this purpose the following arrangement is made: A brake-wheel D′, secured on the engine-shaft A′, (see Fig. 2,) is engaged at its peripheral surface by brake-bands D^2, fulcrumed at D^3 and pivotally connected at their free ends by links D^4 D^5 with a brake-lever D^6, fulcrumed at D^7 and carrying a weight D^8. (See Fig. 3.) In the brake-lever D^6 is formed an opening D^9, through which extends vertically a block E, having an enlarged bore for the passage of a rod E′, provided at its lower end with washers and nuts E^2 engaging the under side of the block E, the top of which is pressed on by a spring E^3, coiled on the rod E′ and abutting with its upper end on nuts E^4, screwing on the rod E′. By adjusting the nuts E^4 more or less tension can be given to the spring E^3. The upper end of the rod E′ is pivotally connected with the free end of a lever E^5, (see Fig. 2.) fulcrumed at E^6 and carrying a friction-roller E^7, engaging the U-shaped cam-groove of a cam E^8, secured on the operating-shaft C^5, so that when the latter is turned on, manipulating the operating-wheel C′ to start the engine or motor, then an upward-swinging motion is given to the lever E^5 to lift the rod E′ and with it the block E to impart an upward swinging motion to the brake-lever D^6 to swing the brake-bands D^2 out of frictional contact with the brake-wheel D′, so that the brake is released and the engine-shaft A′ is free to rotate. When the operating-wheel C′ is turned in the reverse direction for throwing off the motive agent from the engine or motor A, then the turning of the shaft C^5 and cam E^8 causes the lever E^5 to swing downward, whereby the rod E′ is moved downward and by its spring E^3 pressing on the block E causes the lever D^6 to swing downward, the latter in doing so

applying the brake-bands D^2 on the peripheral surface of the brake-wheel D′ to bring the engine-shaft A′, and consequently the engine or motor A, to a stop.

It is understood that by having the spring E^3 the brake-lever D^6 is yieldingly actuated to insure the application of the brake without shock or jar, especially as the action of the cam E^8 on the friction-roller E^7 is positive.

In case the operating device or switch C becomes deranged, it is desirable to apply the brake with a view to bring the engine or motor A to a standstill, and for this purpose it is necessary that the operating device or switch C be disconnected from the brake D. In order to do this, the following arrangement is made: The block E is locked to the brake-lever D^6 by a transversely-extending arm F, fulcrumed at F′ on the brake-lever D^6, the said arm extending into a notch formed in one side of the block E, so as to hold the latter against up-and-down movement in the brake-lever D^6. When the arm F is swung from the right to the left, (see Fig. 3,) then it disengages the notch in the block E to unlock the latter from the brake-lever D^6, thus freeing the latter of the block to allow the weight D^8 to swing the brake-lever D^6 downward to apply the brake by throwing the brake-bands D^2 in firm frictional contact with the brake-wheel D′. The arm F is normally held in an engaging position with the block E by a spring F^2, held on the brake-lever D^6 and pressing the fulcrum end of the said arm.

In order to actuate the arm F with a view to disconnect the brake-lever D^6 from the operating device or switch C, as above mentioned, the following device is provided: The device for actuating the arm F automatically in an emergency is connected with the drum-shaft B′, and the device also controls an auxiliary device for shutting off the motive agent from the engine or motor in the emergency. For the purpose mentioned the free end of the arm F is engaged by the free end of a swing-arm G, fulcrumed at G′ and provided with an auxiliary arm G^2, connected with one end of a chain or rope H′, extending over a pulley H and carrying a weight H^2, so as to insure a quick action of the swing-arm G when released. The swing-arm G controls an auxiliary device I for shutting off the motive agent from the engine or motor A in an emergency, and the said auxiliary device I may be of any approved construction and built according to the nature of the engine or motor employed. For instance, as shown in the drawings, the auxiliary device I is in the form of an auxiliary switch in the main line employed for supplying electrical energy to the motor A.

The auxiliary device I consists of contact-plates I′, secured to the swing-arm G (see Figs. 1 and 3) and normally held in frictional engagement with clamping contact-plates I^2, connected with the main-line wire, to keep the main-line circuit normally continuous; but when the contact-plates I′ are moved out of engagement with the contact-plates I^2 then the main-line circuit is broken—that is, the electrical energy is shut off from the motor A. On imparting a swinging motion to the swing-arm G from the right to the left the circuit is broken, and at the same time the arm F is disconnected from the block E to release the brake-lever D^6, which by its weight D^8 now applies the brake wholly independent of the operating device or switch C. It is understood that the frictional contact of the plates I′ with the plates I^2 somewhat overbalances the weight H^2; but when the swing-arm G receives a swinging motion from the right to the left and the contact-plates I′ start to disengage the plates I^2 then the weight H^2 will exert itself to insure a quick action of the swing-arm G to disengage the contact-plates I′ quickly from the plates I^2 and to push the arm F out of engagement with the block E.

The swing-arm G is provided with a pin G^3, extending between spaced lugs J′ and J^2 on the horizontal member of a bell-crank lever J, pivoted at J^4 on the engine-frame and having its vertical member provided in the top with an elongated open slot J^5, engaged by a pin J^6, projecting from an arm J^7, secured to the frame K of a flier mounted to turn loosely on the shaft B′ of the drum B. The lug J′ is formed with a recess J^3, into which extends partly the pin G^3 to hold the link J in the proper position, and when the flier-frame K is caused to rotate in either direction, as hereinafter more fully described, then the arm J^7 by engaging the bell-crank lever J causes the latter to rock so that the recess J^3 disengages the pin G^3, and the latter is then engaged by the lug J^2, so that on the further rocking of the bell-crank lever J in either direction a swinging motion is given to the swing-arm G from the right to the left to actuate the auxiliary device I and the arm F, as above explained. In case the flier-frame K rotates farther the pin J^6 leaves the open slot J^5 to prevent damage to the device.

The flier-frame K engages a nut K′, mounted to screw on the threaded end B^2 of the drum-shaft B′, and the said nut K′ is adapted to engage either of the collars K^2 or K^3, secured on the threaded end B^2 of the drum-shaft B′. The collars K^2 and K^3 are set on the threaded end B^2 such a distance apart that on the travel of the cage in its normal range in the elevator-shaft the nut K′ does not touch the collars K^2 and K^3; but in case the cage travels beyond its normal range at either end then the nut K′ engages the corresponding collar K^2 or K^3, and in doing so the corresponding collar K^2 or K^3 carries the nut K′ along, thereby turning the flier-frame K. After this takes place the swing-arm G is actuated by the connection above described and

for the purpose set forth. It is understood that when the cage travels, say, a foot or so beyond its normal top position then the nut K′ is engaged by the collar K^2, and in case the cage travels a foot or two beyond its normal lowermost position then the nut K′ engages the collar K^3 and is carried around by the latter. The flier-frame K is also actuated in case the cage stops accidentally at any point in its descent and while the drum B is still running, and for this purpose the following device is provided. On the inner end of the flier-frame K is formed or secured a clutch member L, adapted to be engaged by a clutch member L′, mounted to slide on and to rotate with the drum-shaft B′. (See Fig. 2.) The clutch member L′ is normally out of engagement with the clutch member L and is adapted to be shifted into engagement with the clutch member L by a shifting-fork L^2, actuated by the slack occurring in the hoisting-cable, so that when the drum B is running and unwinds the hoisting-cable while the cage is held stationary then the shifting-fork L^2 moves the clutch member L′ in engagement with the clutch member L to turn the flier-frame K for actuating the swing-arm G, as above described. The mechanism for actuating the shifting-fork L^2 by slack occurring in the hoisting-cable is well known, so that further description of the same is not deemed necessary.

On the operating-shaft C^5 is mounted to rotate loosely a flier-frame N, provided at one end with a spiral gear-wheel N′ in mesh with a spiral gear-wheel N^2, secured on the drum-shaft B′, and the said flier-frame N is engaged by a nut N^3, screwing on the threaded end C^6 of the operating-shaft C^5, the said nut N^3 being adapted to engage either of the collars O or O′, adjustably secured on the threaded end C^6 of the shaft C^5. The collars O and O′ are spaced apart, so that when the cage reaches the end of its normal travel then the nut N^3 engages the corresponding collar O or O′, and as the nut N^3 rotates with the flier N, driven in unison with the drum B, it is evident that the engaged collar O or O′ is carried along by the nut N^3, so that the shaft C^5 is turned from a running to a stopping position—that is, the operating device C is actuated to shut off the motive agent from the engine or motor A whenever the cage reaches the end of its normal travel in either direction.

The flier mechanism just described is common to elevator-machines and does not form a part of the improvement.

From the foregoing it will be seen that in case of disarrangement of the elevator machinery the motive agent is automatically shut off and the engine-brake is applied to bring the engine, and consequently the drum F, to a stop before much damage can be done and before the cage has acquired too much momentum. It will also be seen that in case the operating device C becomes out of order the brake is automatically disconnected from the said device to allow the brake to apply itself while the motive agent is shut off from the engine or motor A, it being understood that this takes place on the cage traveling beyond its range of travel or by the cage being accidentally interrupted in its descent.

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

1. An elevator-engine provided with an auxiliary device for shutting off the motive agent, a swing-arm controlling said auxiliary device and a mechanism on the drum-shaft, connected with the swing-arm to move the same, to automatically actuate the said auxiliary device on derangement of the machinery.

2. An elevator-engine provided with an auxiliary device for shutting off the motive agent, a swing-arm controlling said auxiliary device a mechanism on the drum-shaft, a connection between said mechanism and the swing-arm to move the latter to automatically actuate the said auxiliary device on derangement of the machinery, and a brake for the engine, controlled from the said swing-arm, to apply the brake when shutting off the motive agent by the said auxiliary device.

3. An elevator-engine provided with an auxiliary device for shutting off the motive agent, a swing-arm controlling said device, and a flier device on the hoisting-drum shaft, for moving the swing-arm to actuate the said auxiliary device on the elevator-cage traveling beyond its normal predetermined range of travel.

4. An elevator-engine provided with an auxiliary device for shutting off the motive agent, a swing-arm for controlling said device, a bell-crank lever engaging the said swing-arm, and a mechanism on the hoisting-drum shaft, and connected with the said bell-crank lever, for actuating the said auxiliary device on the elevator-cage traveling beyond its normal predetermined range of travel in both an upward and downward direction.

5. An elevator-engine provided with an operating device for controlling the motive agent, an auxiliary device for shutting off the motive agent, a mechanism on the hoisting-drum shaft, for actuating the said auxiliary device on the elevator-cage traveling beyond its normal predetermined range of travel, a brake on the engine-shaft, normally locked to the operating device, and arranged to apply itself when released from said operating device, and means controlled from the said mechanism on the hoisting-drum shaft for disengaging the brake from the operating device on shutting off the motive agent by the said auxiliary device.

6. An elevator-engine provided with an operating device for controlling the motive agent, to stop and start the engine, an aux-

iliary device for shutting off the motive agent to stop the engine in case of accident, a brake for the engine, having a weighted brake-lever, a rod connected with the operating mechanism and engaging the brake-lever, a locking device for normally locking the said rod to the weighted brake-lever, and a device operating in unison with the auxiliary device, for disengaging said locking device to allow the brake to apply itself in case of accident.

7. An elevator-engine provided with an operating device for controlling the motive agent, to stop and start the engine, an auxiliary device for shutting off the motive agent to stop the engine in case of accident, a brake for the engine having a weighted brake-lever, normally controlled from the said operating device, and a disconnecting device operating in unison with the said auxiliary device, for disconnecting the brake-lever from the said operating device, to allow the brake to apply itself.

8. An elevator-engine provided with a brake having a weighted brake-lever, an operating device for controlling the motive agent to stop and start the engine, a connection between the said brake-lever and the said operating device, an auxiliary device for shutting off the motive agent in case of accident, and a disconnecting device operating in unison with the said auxiliary device and engaging the said connection, for disconnecting the latter from the said brake-lever, to allow the latter to apply the brake by the weight on the brake-lever.

9. An elevator-engine provided with an operating device for controlling the motive agent, to stop and start the engine, a brake for the engine, having a weighted brake-lever, a connection between the said operating device and the said brake-lever, to normally apply the brake on stopping the engine and to release the brake on starting the engine, and means for disconnecting the said connection from the said weighted brake-lever, to allow the latter to apply the brake.

10. An elevator-engine provided with an operating device for controlling the motive agent, to stop and start the engine, a brake for the engine, having a weighted brake-lever, a connection between the said operating device and the said brake-lever, to normally apply the brake on stopping the engine and to release the brake on starting the engine, a swing-arm engaging the said connection, for moving the latter out of engagement with the brake-lever, a flier device on the shaft of the hoisting-drum, and a connection between the flier device and the said swing-arm.

11. An elevator-engine provided with an operating device for controlling the motive agent, to stop and start the engine, a brake for the engine, having a weighted brake-lever, a connection between the said operating device and the said brake-lever, to normally apply the brake on stopping the engine and to release the brake on starting the engine, a swing-arm engaging the said connection, for moving the latter out of engagement with the brake-lever, a flier device on the shaft of the hoisting-drum, a connection between the flier device and the said swing-arm, and an auxiliary device for shutting off the motive agent and controlled by the said swing-arm.

12. An elevator-engine provided with an operating device for controlling the motive agent, to stop and start the engine, a brake for the engine, having a weighted brake-lever, a connection between the said operating device and the said brake-lever, to normally apply the brake on stopping the engine and to release the brake on starting the engine, a swing-arm engaging the said connection, for moving the latter out of engagement with the said brake-lever, a weight connected with the said swing-arm, a bell-crank lever engaging the said swing-arm, and a flier on the shaft of the hoisting-drum, connected with the said bell-crank lever.

13. An elevator-engine provided with an operating device for controlling the motive agent, to stop and start the engine, a brake for the engine, having a weighted brake-lever, a connection between the said operating device and the said brake-lever, to normally apply the brake on stopping the engine and to release the brake on starting the engine, a swing-arm engaging the said connection, for moving the latter out of engagement with the said brake-lever, a weight connected with the said swing-arm, a bell-crank lever engaging the said swing-arm, a flier on the shaft of the hoisting-drum, and an arm on the frame of the flier and having a loose connection with the said bell-crank lever.

14. An elevator-engine provided with an operating device, a heart-shaped cam on the rock-shaft of the said operating device, a lever connected with the said cam, a rod hung on the said lever, and a brake for the engine, having a weighted brake-lever engaged by the said rod, to actuate the brake in unison with the said operating device.

15. An elevator-engine provided with an operating device, a heart-shaped cam on the rock-shaft of the said operating device, a lever connected with the said cam, a rod hung on the said lever, a brake for the engine, having a weighted brake-lever engaged by the said rod, to actuate the brake in unison with the said operating device, a locking device for locking the said rod to the said brake-lever, and means, engaging the said locking device, to unlock the rod from the said brake-lever.

16. An elevator-engine provided with an operating device, a heart-shaped cam on the rock-shaft of the said operating device, a lever connected with the said cam, a rod hung on the said lever, a block supported loosely on the rod, a spring pressing the block, an en-

gine-brake having a brake-lever through which extends the block, and a locking-arm fulcrumed on the brake-lever and engaging the said block, to lock the latter to the brake-lever.

17. An elevator-engine provided with an operating device, a heart-shaped cam on the rock-shaft of the said operating device, a lever connected with the said cam, a rod hung on the said lever, a block supported loosely on the rod, a spring pressing the block, an engine-brake having a brake-lever through which extends the block, a locking-arm fulcrumed on the brake-lever and engaging the said block, to lock the latter to the brake-lever, and means for throwing the locking-arm out of engagement with the said block, to release the brake-lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. HOFFMAN.

Witnesses:
THEO. G. HOSTER,
EVERARD BOLTON MARSHALL.