

(No Model.)

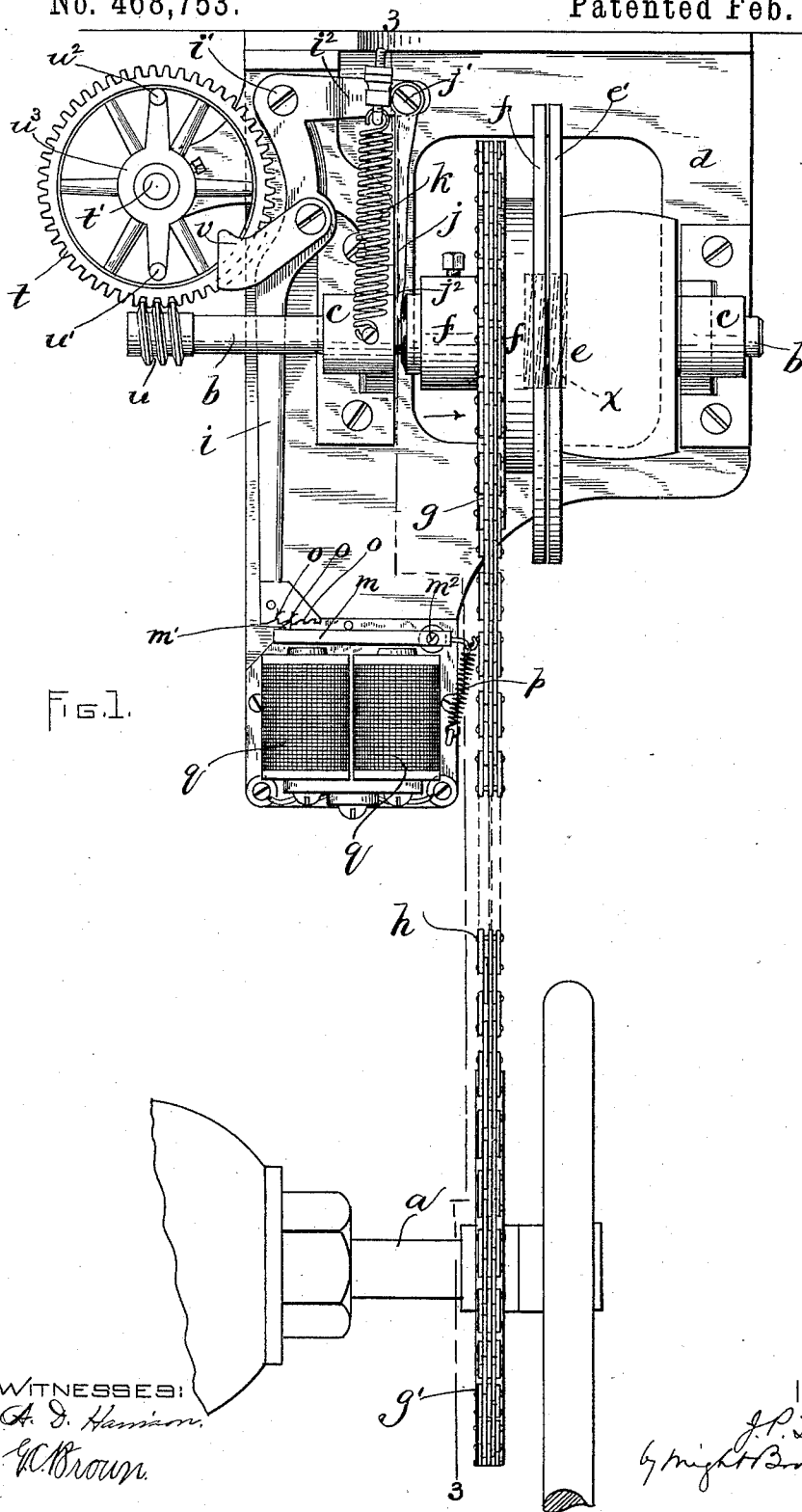
2 Sheets—Sheet 1.

J. P. TIRRELL.

APPARATUS FOR STOPPING ENGINES OR OTHER MOTORS.

No. 468,753.

Patented Feb. 9, 1892.



WITNESSES:

A. J. Harrison.

G. C. Brown.

INVENTOR:

J. P. Terrill

by Night Brown & Co. Atty.

Atty.

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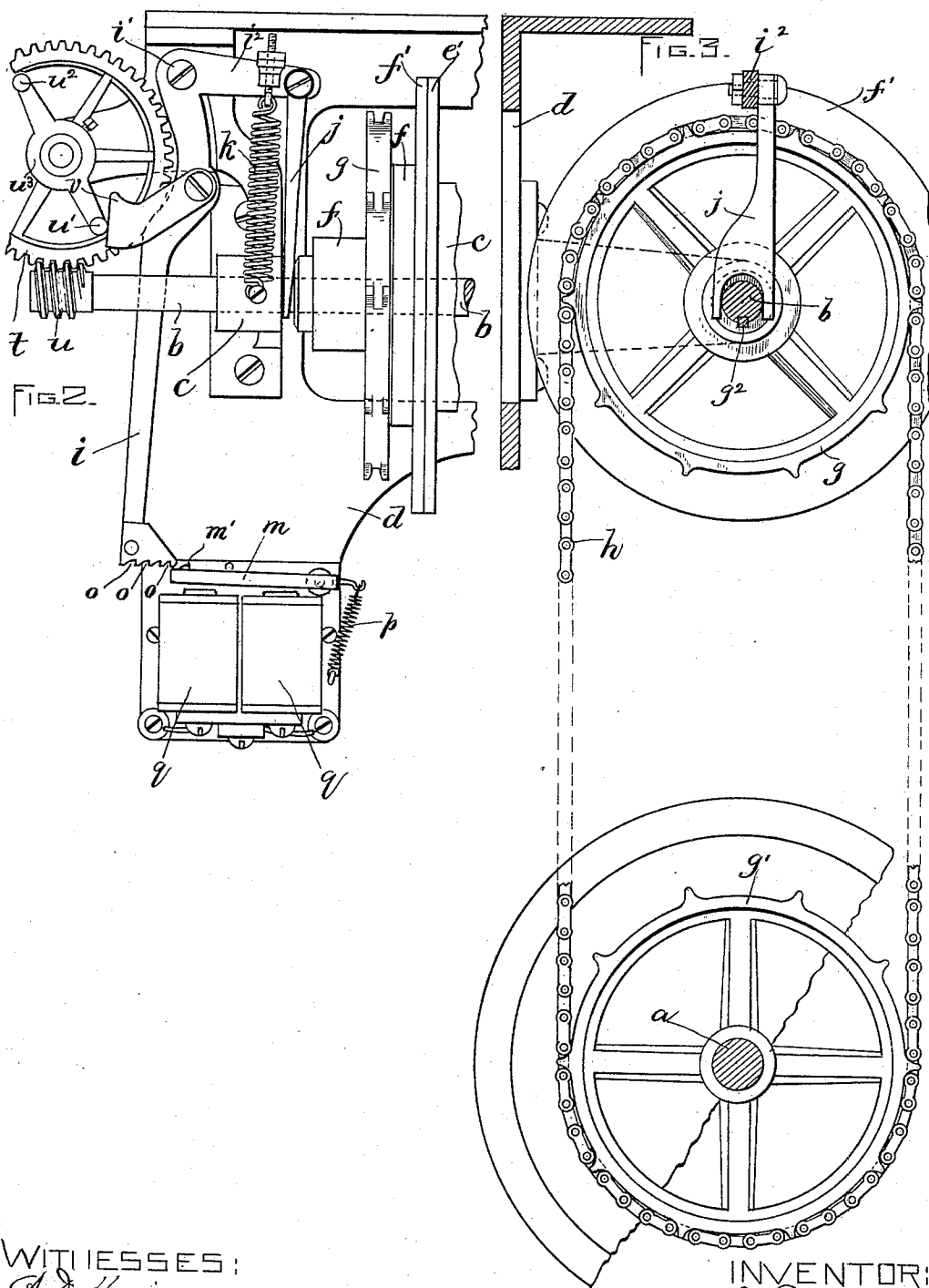
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UNITED STATES PATENT OFFICE.

JACOB P. TIRRELL, OF BOSTON, ASSIGNOR TO WASHINGTON H. KILBOURN,
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APPARATUS FOR STOPPING ENGINES OR OTHER MOTORS.

SPECIFICATION forming part of Letters Patent No. 468,753, dated February 9, 1892.

Application filed May 11, 1891. Serial No. 392,362. (No model.)

To all whom it may concern:

Be it known that I, JACOB P. TIRRELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Stopping Engines or other Motors, of which the following is a specification.

This invention relates to an apparatus or means whereby the operation of a steam-engine or other motor—such as a water-wheel, &c.—may be quickly stopped from various parts of the building or establishment in which it is located by the closing (or, if preferred, the breaking) of an electric circuit, which controls mechanism whereby when the circuit is closed (or broken) a throttle-valve or other device controlling the engine or motor is closed.

My invention has for its object to provide an electrically-controlled mechanism of such construction that upon the closure (or breaking) of an electric circuit said mechanism will be automatically engaged with a moving part of the engine, so as to receive power therefrom, and will first transmit the power received to the throttle-valve, thereby closing the same and stopping the engine, and will be then automatically disconnected from the engine and reset for another operation, leaving the throttle free to be opened by the engineer when it is desired to again start the engine. These results I attain by the improved mechanism which I will now proceed to describe.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a stem of a throttle-valve and controlling mechanism therefor embodying my invention, said mechanism being in its inoperative condition. Fig. 2 represents a similar view, the throttle-valve and parts of the mechanism being omitted, the mechanism being shown in its operative condition as it appears during the operation of closing the throttle-valve. Fig. 3 represents a section on line 3 3, Fig. 1, looking toward the right.

The same letters of reference indicate the same parts in all the figures.

I have shown and hereinafter described my apparatus as controlled by an electric circuit which is normally open and is made operative when closed; but the operation may be effected by breaking a normally-closed circuit, as will be readily understood by those skilled in the art.

In the drawings, *a* represents the stem of the throttle-valve of a steam-engine, which valves may be of any suitable construction, adapting it to be closed and opened by rotary movements of said stem. I do not show the construction of the valve because the same is well known. Moreover, my invention hereinafter described is not limited to use in connection with the throttle-valve of a steam-engine, but may be applied to the corresponding controlling devices of other motors, such as water-wheels, windmills, &c., the adaptation of my improvements to such motors requiring only the exercise of ordinary mechanical skill and judgment.

b represents a short shaft journaled in fixed bearings *c c*, which are here shown as supported by a fixed bracket or frame *d*.

e represents a pulley loosely mounted on the shaft *b* and adapted to be rotated by a belt connecting it with a pulley driven by the engine or motor. Said pulley has a flange *e'*, which constitutes one member of a friction-clutch.

f represents a hub or collar, which is mounted on the shaft *b* and is adapted to slide thereon lengthwise of the shaft, having a groove in its shaft-receiving socket which engages a spline or feather *g*, Fig. 3, affixed to the shaft, said hub being thus engaged with the shaft, so that while free to slide in the direction of the length of the shaft it is obliged to rotate therewith. On one end of the hub *f* is formed a flange *f'*, which is arranged, when the hub is moved in the direction indicated by the arrow in Fig. 1, to bear against the flange *e'*, said flange *f'* constituting the other member of the friction-clutch above referred to. When the two flanges or clutch members are in contact with each other, a frictional connection is established, whereby the hub *f* is caused to rotate with

the pulley *e*. Said hub has a sprocket-wheel *g*, which is connected by a sprocket-chain *h* with a sprocket-wheel *g'* on the valve-stem *a*.
i represents a lever, which is pivoted at *i'* to the supporting-frame *d*, and has an arm *i²*, to which is pivoted at *j'* a wedge-shaped slide *j*, which extends downwardly and is interposed between the outer end of the hub *f* and one of the fixed bearings *c*. The slide *j* has an inclined surface *j²*, which when the slide is depressed exerts pressure on the hub *f* in the direction required to move the flange *f'* into contact with the pulley-flange *e'*. The depression of the slide *j* is effected by a spring *k*, attached at one end to a fixed support and at the other end to the arm *i²*, said spring acting when the lever *i* is released, as presently described, to move the lever *i* and its arm *i²* from the position shown in Fig. 1 to that shown in Fig. 2, thus depressing the slide *k* and causing it to move the hub *f*, as above described.

When the engine or motor is in operation, the arm *i* is held in the position shown in Fig. 1 by the engagement of a tooth or detent *m'* on an armature *m* with one of a series of notches *o* in the swinging end of lever *i*. Said armature is pivoted at *m²*, and is held in the position shown in Fig. 1 by its retracting-spring *p*. The said armature is arranged in suitable relation to the poles of an electro-magnet *q*, which is included in an electric circuit having push-buttons or other circuit-closing devices located in various parts of the building or establishment in which the engine or motor is located. When the electro-magnet is energized by the closing of the circuit, it attracts the armature, thus disengaging the detent *m'* from the lever *i*, and permitting the spring *k* to move the wedge *j* and engage the clutch members *f'* and *e'*, the hub *f* and sprocket-wheel *g* being thus caused to rotate with the driven pulley *e*. The rotation of said sprocket-wheel causes the rotation of the valve-stem *a* through the chain *h* and wheel *g'* until the throttle-valve is closed, the engine or motor being thus cut off from the source of its power, so that its operation ceases until the throttle-valve is again opened by the engineer or other attendant.

It will be seen that the engine-driven loose pulley and the laterally-movable clutch member, adapted to be engaged with said pulley and carrying a sprocket-wheel engaged with another wheel on the stem of the throttle-valve, constitute a simple, durable, and reliable means for imparting motion to the throttle-valve from the engine, these being important features of my invention and capable of use in connection with any other suitable means for effecting the lateral movement of the movable clutch member.

My invention also includes as another important feature means for automatically separating the laterally-movable clutch member *f'* from the pulley-driven member *e'* after the throttle-valve has been closed, and the re-

locking or setting of said clutch member *f'* in its inoperative position, so that the stem of the throttle-valve is free to be rotated to open the valve, and will not be operated by the above-described mechanism until the circuit is again closed through the electro-magnet. This result is accomplished by the devices next described.

t represents a work-gear affixed to a shaft *t'*, which is journaled in a fixed bearing on the frame *d*. Said gear meshes with a worm *u* on the shaft *b*, and is therefore rotated with said shaft when the clutch member *f'* is engaged with the member *e'*.

u³ represents a collar affixed to the shaft *t'* and provided with an arm *u'*, which is formed to strike a projection or face *v* on the lever *i*, said face being here shown as the outer end of an arm affixed to said lever and standing in the path in which the arm *u'* moves when the wheel *t* is being rotated. The arm *u'* is so adjusted on the shaft *t'* that it will be separated from the face *v* when the clutch *f'* is in its inoperative position and will be moved toward said face by the rotation of the wheel *t*, and during the latter part of its movement will strike the face *v*, as shown in Fig. 2, and thus move the lever *i* back to the position shown in Fig. 1, the lever being thus engaged by the detent *m'*, the circuit being at this time broken, so that the armature is released and free to engage the lever. This movement of the lever *i* operates to raise the wedge *j* and withdraw its inclined surface from between the bearing *c* and hub *f*, thus releasing the latter, so that a light spring *x*, (shown in dotted lines in Fig. 1,) interposed between the pulley *e* and hub *f*, presses said hub and its clutch member *f'* out of contact with the member *e'*. The pulley *e* is thus made loose on the shaft, so that when the engine is again started the rotation of said pulley has no effect on the throttle-valve until the circuit through the magnet *q* is again closed.

When the valve-stem *a* is rotated to open the throttle, the rotary movement of the stem is transmitted to the shaft *b* through the chain *h* in the direction required to move the arm *u'* away from the face *v*, on which it impinges to move the lever *i*. It will be seen, therefore, that the apparatus is reset for its next operation by the operation of opening the throttle, no special act on the part of the engineer or other attendant being required excepting that of opening the throttle. Hence the apparatus is sure to be in operative condition after the engine has started.

The arm *u'* may be adjusted on the shaft *t'*, so that it may stand at any distance from the face *v* that may be required to give time for the closing of the throttle-valve. I prefer to employ a second arm *u²*, constructed like the arm *u'* and projecting in the opposite direction, so that in case it is desirable to rotate the shafts *b* and *t'* in the directions opposite to those indicated by the foregoing descrip-

tion the arm u^2 will operate to reset the apparatus.

It will be seen that the essential features or groups of elements of the apparatus are as follows:

First, a connection between the throttle-valve and a moving part of the engine, this connection being in the present case the sprocket chain and wheels, the pulley e and the belt that connects said pulley with a shaft forming a part of or driven by the engine or motor. Said shaft must be separable or of such nature that it can be made alternately operative and inoperative, so that when operative it enables the momentum of the engine to close the throttle, and when inoperative the operation of the engine has no effect on the throttle, this result being accomplished by the two clutch members, one of which is laterally movable.

Secondly, a mechanical coupling device adapted to operatively connect the divisions of the said connection and make the same operative to transmit motion from the engine to the throttle, a coupling device adapted to accomplish this result being included in the movable clutch member f' , the sliding wedge j , and the spring which exerts pressure on said wedge.

Thirdly, an electrically-controlled detent adapted to prevent said coupling from operating when the engine is in operation excepting when it is desired to stop the engine, said detent being embodied in the electromagnet, its armature having the tooth m' and the pivoted lever i , supporting the sliding wedge j . When the apparatus is constructed to automatically make the connections between the engine and throttle inoperative after the closing of the throttle, a final essential feature is a resetting device, which restores the coupler to its inoperative condition and makes the detent operative, so that the apparatus is again in condition to be electrically operated. This resetting device comprises the shaft b , its worm u , the worm-wheel t , and the arm u' , attached to the worm-wheel and adapted to be brought by the rotation of said shaft into contact with the lever i of the detent device, and thereby move said lever to both retract the wedge j and its operating-spring and engage the armature m with said lever.

I believe that these features or groups of elements have never before been combined in an organized apparatus. Hence I do not limit myself to the particular devices composing the several features or groups herein shown and described, and may variously modify the organization and details of each feature or group without departing from the spirit of the invention.

It will be understood that my use of the term "throttle-valve" is generic, and is intended to cover any device that controls the admission of the motive power to an engine or other motor.

I claim—

1. In an apparatus for stopping an engine or other motor, a power-controlling device, such as a throttle-valve, separable connections between the same and the engine or motor through which the power-controlling device may be operated by the momentum of the engine to shut off the source of power, a mechanical device or coupler which normally makes the connections between the throttle and engine or motor operative, and an electrically-controlled detent whereby said coupler may be prevented from operating, as set forth.

2. In an apparatus for stopping an engine or other motor, a power-controlling device, such as a throttle-valve, separable connections between the same and the engine or motor through which the power-controlling device may be operated by the momentum of the engine to shut off the source of power, a mechanical device or coupler which normally makes the connections between the throttle and engine or motor operative, an electrically-controlled detent, whereby said coupler may be prevented from operating, and a resetting device which sets the coupler in its inoperative position and makes the detent operative, as set forth.

3. As a means for stopping an engine or other motor, a shaft journaled in fixed bearings, a loose pulley on said shaft adapted to be rotated by a connection with the engine and provided with a clutch member, a laterally-sliding clutch member rotatively engaged with said shaft and adapted to be engaged with the clutch member on the pulley, said sliding member having a device to communicate motion from it to a throttle-valve, a spring and devices controlled thereby, whereby the sliding clutch member may be operatively engaged with the other member, and an electrically-controlled detent which normally retains said spring and prevents its clutch-engaging operation, as set forth.

4. As a means for stopping an engine or other motor, a shaft journaled in fixed bearings, a loose pulley on said shaft provided with a clutch member, a sliding clutch member keyed to the shaft, a sprocket-wheel affixed to said sliding member and connected with a sprocket-wheel on a throttle-valve or other controlling device, a spring-pressed wedge which when free to operate engages the sliding clutch member with the pulley member, and an electrically-controlled detent which normally retains said spring and prevents its clutch-engaging operation, as set forth.

5. An engine-stopping apparatus comprising in its construction a shaft journaled in fixed bearings, a loose pulley thereon having a clutch member, a sliding clutch member rotatively engaged with the shaft, a rotary device, such as the stem a , for shutting off the motive power, a connection between the sliding clutch member and the stem a , whereby the said stem and sliding clutch are caused to

rotate in unison, a pressure device, such as the spring-pressed wedge *j*, adapted to force the sliding clutch into engagement with the pulley, a pivoted lever connected with said pressure device, an armature having a detent arranged to engage said lever and prevent the action of the pressure device, and an electro-magnet arranged to attract said armature and thereby make the detent inoperative, as set forth.

6. In an engine or motor stopping apparatus, a shaft journaled in fixed bearings, a loose pulley thereon having a clutch member, a sliding clutch member rotatively engaged with the shaft, means for imparting motion from said sliding member to the stem of a throttle-valve or other power-controlling device, a pressure device, as the spring-pressed wedge *j*, adapted to force the sliding clutch into engagement with the pulley-clutch, a pivoted lever engaged with said pressure device, a movable detent adapted to hold the pressure device through said lever in its operative position, and an automatic resetting device actuated by the backward rotation of the said shaft to move said pressure device to its inoperative position and re-engage the detent with the lever that holds said pressure device, as set forth.

7. In an engine or motor stopping apparatus, a shaft journaled in fixed bearings, a loose pulley thereon having a clutch member, a sliding clutch member rotatively engaged with the shaft, means for imparting motion from said sliding member to the stem of a throttle-valve or other power-controlling device, a pressure device, as the spring-pressed wedge *j*, adapted to force the sliding clutch into engagement with the pulley-clutch, a piv-

oted lever engaged with said pressure device, a movable detent adapted to hold the pressure device through said lever in its operative position, a vibratory arm, such as *u'*, arranged to strike a face or projection on said lever, and connections between said arm and the shaft, whereby when the shaft is rotated in one direction to close the throttle the said arm *u'* is caused to displace said lever and make the pressure device inoperative, and when the shaft is rotated in the opposite direction the arm *u'* is retracted and prepared for the next stopping operation, as set forth.

8. In an engine or motor stopping apparatus, a shaft journaled in fixed bearings, a loose pulley thereon having a clutch member, a sliding clutch member rotatively engaged with the shaft, means for imparting motion from said sliding member to the stem of a throttle-valve, a pressure device, as the spring-pressed wedge *j*, adapted to force the sliding clutch into engagement with the pulley-clutch, a pivoted lever engaged with said pressure device, a movable detent adapted to hold the pressure device through said lever in its inoperative position, a worm on the said shaft, a worm-gear meshing with said worm, and an arm *n'*, secured to said worm-wheel and arranged to strike a face or projection on said lever, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 8th day of May, A. D. 1891.

JACOB P. TIRRELL.

Witnesses:

C. F. BROWN,
A. D. HARRISON.