

(No Model.)

3 Sheets—Sheet 1.

J. H. CARY.
ENGINE STOP MECHANISM.

No. 583,326.

Patented May 25, 1897.

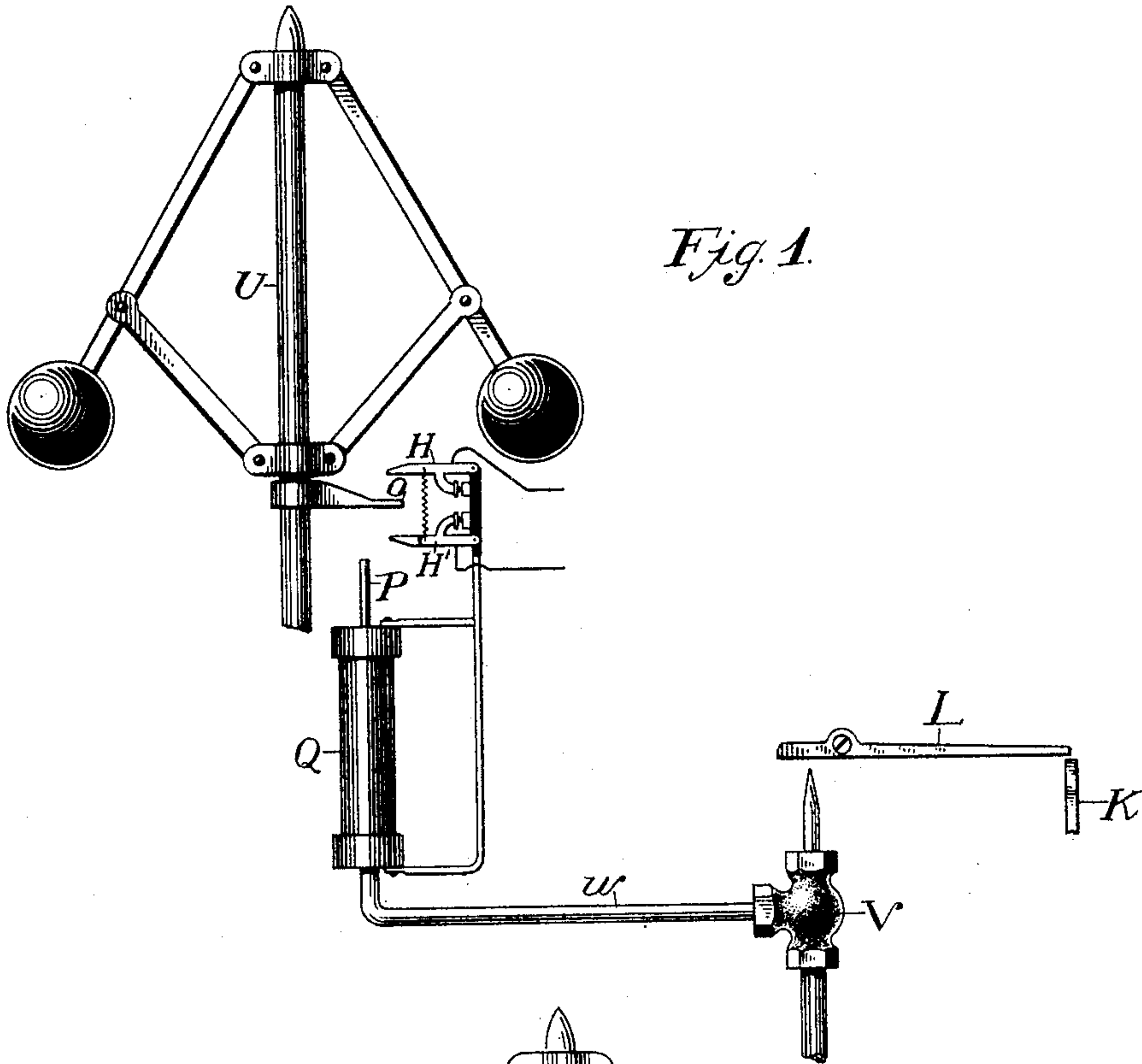
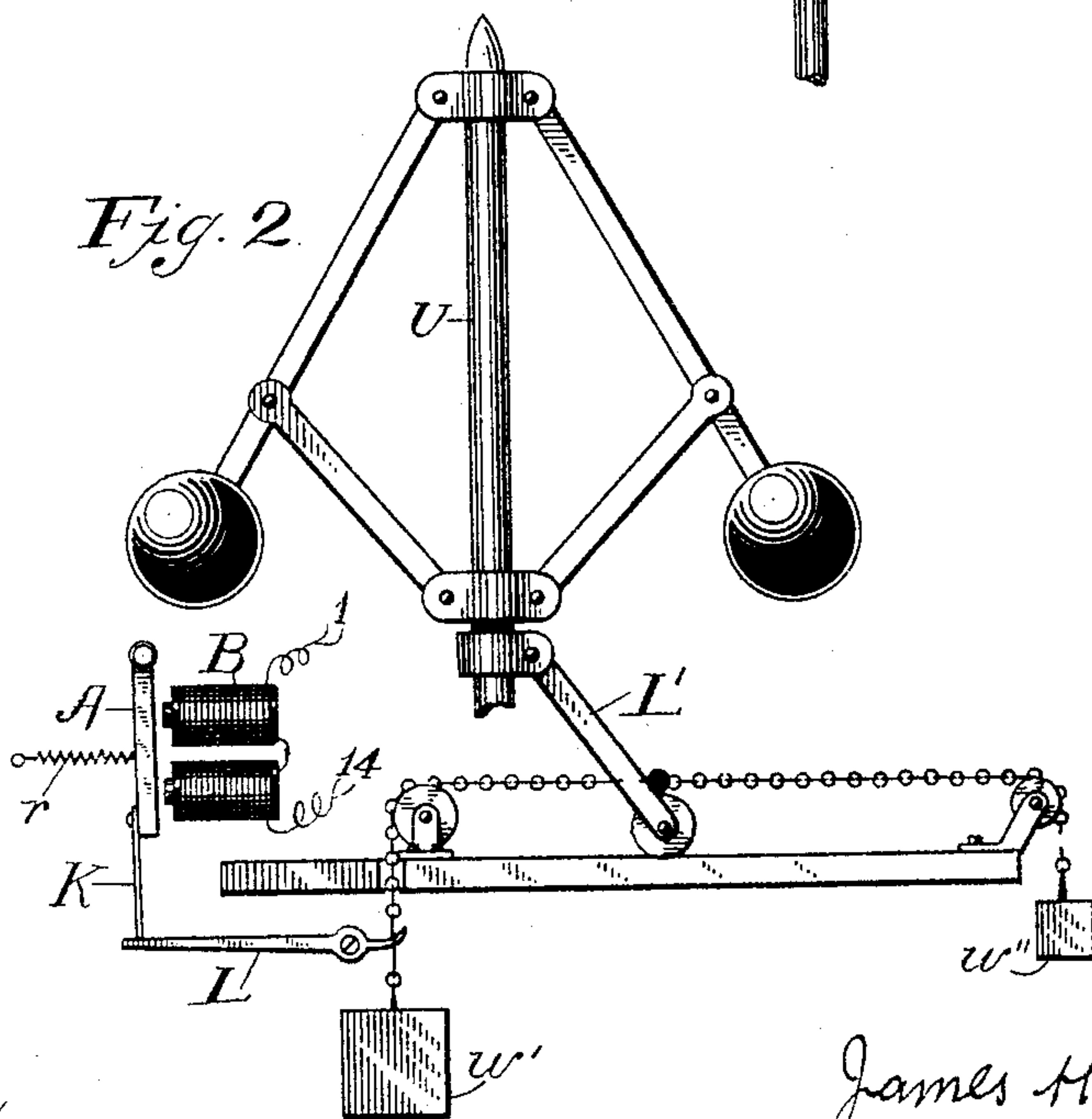


Fig. 2.



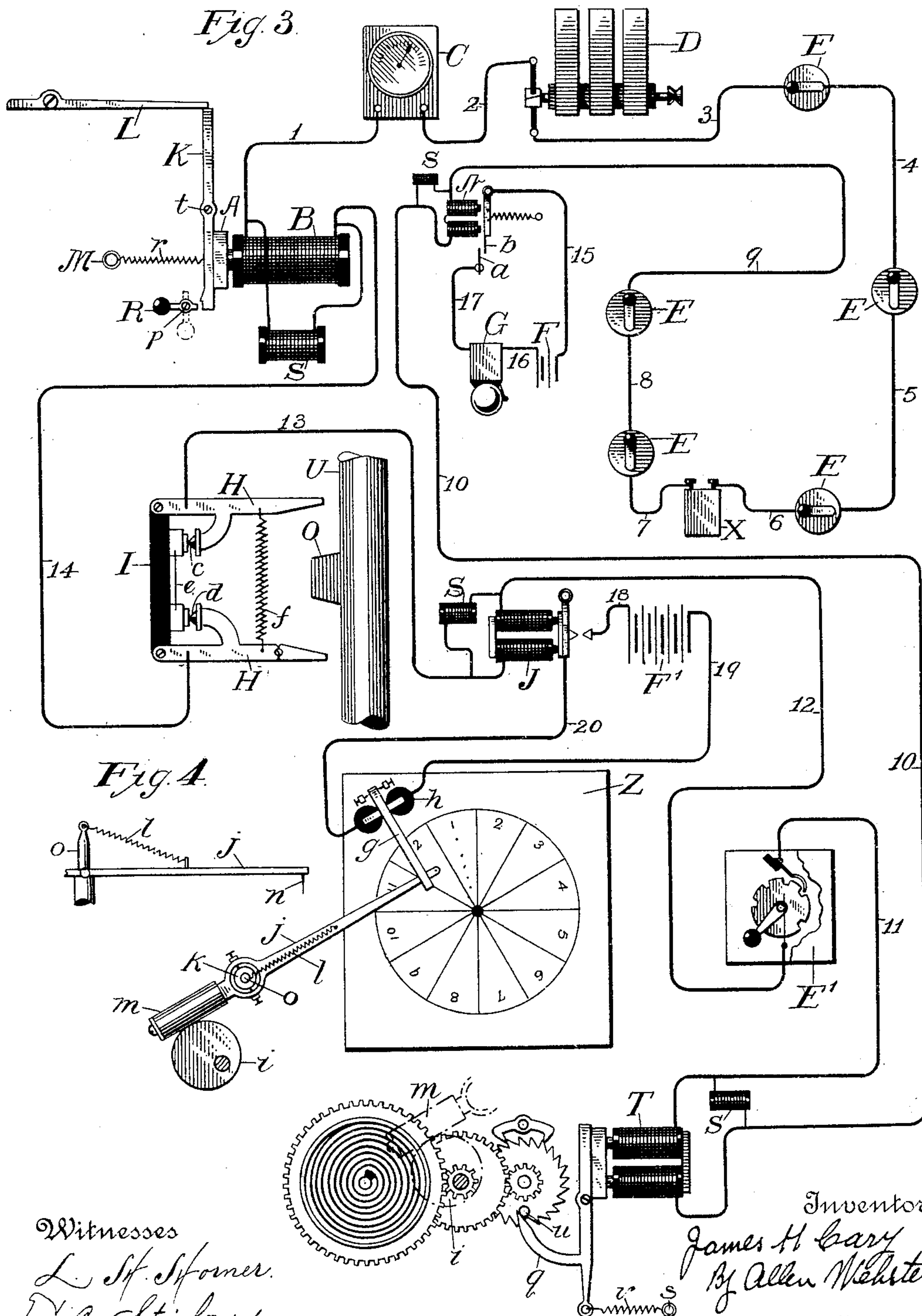
Witnesses
L. S. Sforner.
E. C. Stickney.

Inventor
James H. Cary
By Allen Webster
Attorney

J. H. CARY.
ENGINE STOP MECHANISM.

No. 583,326.

Patented May 25, 1897.



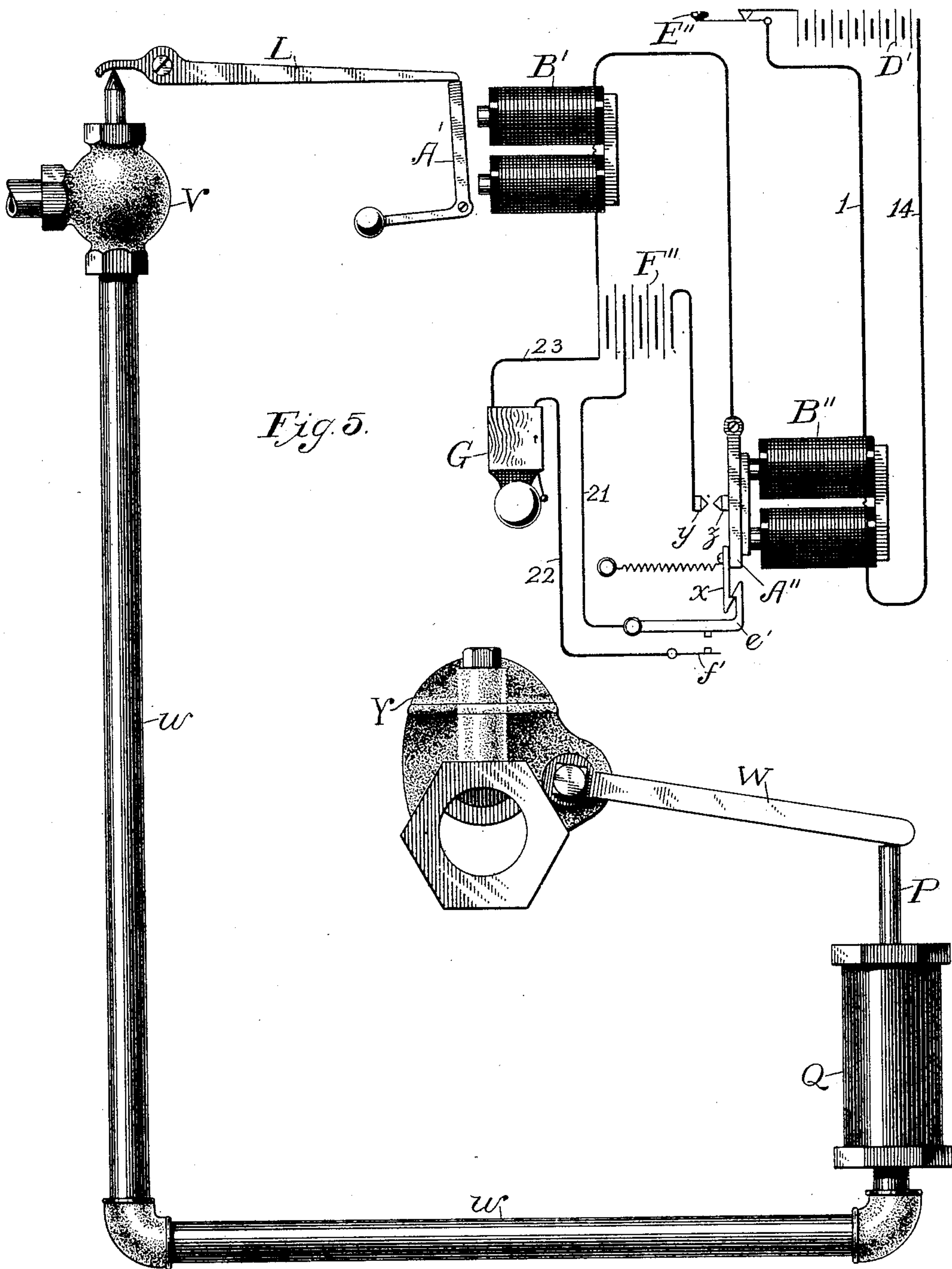
Witnesses
L. St. Sforner.
C. L. Stickney.

Inventor
James H. Cary
By Allen Webster
Attorney

J. H. CARY.
ENGINE STOP MECHANISM.

No. 583,326.

Patented May 25, 1897.



Witnesses
L. H. Storer.
C. C. Stickney.

Inventor
James H. Cary
By Allen Webster
Attorney

UNITED STATES PATENT OFFICE.

JAMES H. CARY, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR OF ONE-THIRD TO THE SPRINGFIELD ENGINE STOP COMPANY, OF MAINE.

ENGINE STOP MECHANISM.

SPECIFICATION forming part of Letters Patent No. 583,326, dated May 25, 1897.

Application filed May 9, 1896. Serial No. 590,834. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. CARY, a citizen of the United States of America, residing in Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Devices for Stopping Engines or other Moving Machinery, of which the following is a specification, reference being had to the accompanying drawings and letters and figures of reference marked thereon.

My invention relates to devices for actuating electromechanical apparatus located at considerable distance from the point where it is desirable to operate the same by means of electromagnetic apparatus placed in a closed circuit, said circuit being constantly charged with a current of the proper predetermined intensity and quantity so long as the machinery to be controlled is in operation.

I do not seek to claim, broadly, the use of electric energy as a means of stopping moving machinery, but the use of apparatus herein referred to in connection with a closed or live circuit.

It will be obvious to those versed in the art that there are many conditions wherein a closed circuit is preferable to an open circuit when used as a means for protection or safety. For instance, a closed circuit properly arranged will give notice of its own derangement should such accident occur, whereas a similar trouble on an open circuit would probably be unknown until the critical moment arrived when it is most essential that the apparatus should be operative.

The invention consists in the construction and arrangement of parts in combination with valves and valve-operating mechanism of engines, as herein set out.

In the accompanying drawings, in which like letters and figures indicate like parts, Figure 1 illustrates a simple ball-governor adapted to shut off the steam from an engine or the water from a wheel when caused to operate, illustrating the arrangement of a cylinder in operative connection with the governor and an inlet-valve controlled by a lever. Fig. 2 is a like view of a similar device especially adapted for water-wheels or other motors requiring considerable power to operate the shut-off. Fig. 3 is a diagrammatic

view showing the relation of the several parts of the mechanism, showing also a recording apparatus, switches, contact-points, indicator, alarm-bell, conducting-wires, &c. Fig. 4 is a detail of the lever which carries the stylus which makes a record on the dial placed in the recording apparatus for that purpose. Fig. 5 illustrates a modification of my device, wherein I illustrate the employment of a gate lever-valve to be used as a throttle in the main steam-supply pipe to the engine instead of operating upon the governor, as before illustrated. I also illustrate therein the employment of a magnet in a local open circuit to control the stop mechanism, the same magnet being controlled by a relay in the main line and normally a closed circuit, and in connection with the relay I show an alarm-bell in the local circuit thereof for the purpose of giving an audible alarm to the engineer.

In detail, A, A', and A'' indicate armatures; B and B', electromagnets; B'', a relay; C, a circuit-indicator; D, a generator; D', a closed-circuit battery; E, switches; E', a circuit-breaking wheel; E'', a closed contact-key; F, F', and F'', local batteries; G and G', signal-bells; H and H', speed-limit arms; I, insulating-support for same; J, relay; K, retaining-lever; L, lever to control steam-valve; L', lever to push up the rod U; M, adjusting-screw; N, a relay-magnet; O, contact-point on governor-rod; P, piston-rod; Q, steam-cylinder; R, retaining-lever; S, shunt-coils; T, electromagnet for recording mechanism; U, governor-rod; V, steam-valve; W, valve-lever; X, resistance-coil; Y, gate-valve, and Z recording-dial; *a* and *b*, contact-points of relay N; *c* and *d*, electrical contact-points of speed-limit; *e*, wire connecting point *c* to point *d*; *e'*, contact-lever to close circuit of bell G'; *f*, spiral spring; *f'*, contact-spring to close circuit of bell G'; *g*, lever fastened to armature of magnet *h*; *h*, electromagnet for operating stylus; *i*, eccentric; *j*, lever carrying stylus; *k*, sleeve on which lever *j* is mounted; *l*, spiral spring; *m*, loose sleeve on lever *j*; *n*, stylus; *o*, stud holding lever *j*; *p*, pivot for lever R; *q*, detent controlling escapement; *r*, retractile spring; *s*, adjusting-screw; *t*, pivot for armature A; *u*, stop-pin; *v* and *v'*, retractile springs; *w*, steam-pipe connecting valve with

cylinder; w' , weight to operate the governor-rod U in Fig. 2. w'' is a counterweight to take slack out of chain to governor-rod lever; x , detent on armature A'; y and z , contact-points for relay B'.

Numerals 1 to 14, inclusive, indicate the main-line circuit-wires; 15, 16, and 17, the circuit-wires of alarm-bell N; 18, 19, and 20, local circuit of the recording mechanism; 21, 22, and 23, local circuit of alarm-bell G'.

In Fig. 1, L represents the end of the lever which, when in its normal position for action, holds down by pressure the valve which is placed under the end beyond the fulcrum opposite to the end which engages the lever K, which extends upward from the armature A, being pivoted at t and held up to the electromagnet B so long as the current is on the line designed to energize the same.

M is an adjusting-screw to regulate the tension of the retractile spring r .

R is a lever with weight at the end pivoted on the stud p and designed to engage the lower end of the lever K. The object of this lever is to hold the levers K and L in their proper engagement, should it be desirable to do so when there is no current on the line. As soon as the proper current is thrown to the line, however, the armature A will be attracted sufficiently toward its magnet B to disengage the lever K from the lever R, which will permit it to assume a vertical position, thus leaving the lever K free to act to the full limit of its designed backward movement.

This is sufficient to disengage it from lever L.

C is a current-indicator placed in the line to determine the strength of the current sent to line from the generator D. Parts lettered E are single-point switches designed to open the line when required.

X is a resistance-coil placed at the extreme end of the circuit, designed to limit the amount of current upon the line while in its normally-acting condition.

N is a relay placed in circuit for the purpose of controlling the alarm-bell G, placed in local circuit with the relay, whose armature is so adjusted by the retractile spring as to remain normally open; but if a short circuit should occur on a part of the line, thus shunting the resistance X, the increase of the electromotive force in the magnet of N would attract its armature, closing the local circuit at points a and b through battery F and bell G, and ring the bell G, thus giving notice of the trouble on the line.

H and H' are metallic arms which act as speed-limits, between which plays the contact-point O, which projects from the governor-rod U. H' is hinged at the end, so as to allow the free backward passage of the governor-rod if it should pass below the lower limit owing to any accident to the governor mechanism. The arms H H' are pivoted to the insulating-block I, the points c and d on the same being connected together by the wire e .

Parts S represent shunt-coils around the

electromagnets, the object of the same being to reduce the sparking effect which might occur from inductive action upon a separation at the points c or d while a current was on the line.

E' represents a box containing a circuit-breaking wheel which is actuated by the recoil of a heavy spring which operates a train which conveys motion to the break-wheel, which opens and closes the circuit a definite number of times during each revolution or partial revolution, thus providing a means for indicating the point from which the alarm was sent in. I do not describe the mechanism of this call-box, as it is one of the well-known forms in general use on district-messenger or watch-clock circuits.

J represents a relay designed to control the action of the recording apparatus shown in connection with dial Z.

The train and actuating-spring, retaining-lever, and magnet of the recording apparatus are represented in the figure below the dial Z separated from their actual position in relation to the dial for the purpose of more fully showing the relation of the various parts. The object of the recording apparatus is to make a record upon a paper dial placed over the dial Z when the current is sent to or interrupted upon the lines connected with the same.

h is an electromagnet, to the armature of which is attached the bar, pivoted at its upper end.

j is a lever pivoted at k , carrying a stylus at its end near bar g .

o is a sleeve which moves freely on the stud holding the same, permitting the lever j to make a lateral movement while making a record on the dial.

i is an eccentric which is caused to rotate by the action of its accompanying train and motive power, either a spring or weight. The eccentric i during its rotation presses against the end of the lever j , causing the point of the same to change its position in relation to the dial, which it punctures or marks.

m is a sleeve adjusted to revolve freely on the end of the lever j , the purpose of the same being to reduce the friction between the lever j and the eccentric i incident to its vibratory movement while making a record on the dial.

T represents an electromagnet, the armature of which controls the movement of the train which actuates the recording apparatus. At the lower end of the bar carrying the armature projects the detent q , which intervenes in the path of the pin u in the escapement-wheel of the train, preventing the forward movement of the same except at such times when the action of the current upon the line allows such movement to take place.

v is a retractile spring controlled by the adjusting-screw for the purpose of withdrawing the armature from the magnet T upon the interruption of the current upon the line.

Fig. 5 represents the valve-controlling ap-

pliances in a local circuit which is rendered operative by the action of the relay B'', the armature A'' of which is released by interruption of the current on the main line allowing it to close contact-points *y* and *z*, thus closing the normally open circuit through its local battery and the magnet B' drawing toward it the armature A' held open by the action of the weighted lever at its lower end, said armature acting as a retaining-lever to hold up the lever L. This will allow the release of the lever L, which will permit the operation of the power which will stop the engine. In connection with the relay B'', I show a detent *x*, attached to the armature A''. The detent has a hook upon the end adjusted so as to engage the hook on the end of the lever *e'*, the lever *e'* being so arranged as to make contact with point *f'* and so close a local circuit through the battery F'' and alarm-bell G', thus giving an audible alarm to the engineer.

Y represents a sliding gate-valve to be placed in main supply-pipe, which furnishes steam for the operation of the engine.

Q represents a steam-cylinder; P, the piston-rod of the same which upon the admission of steam is forced upward, pushing up the lever W closing the gate of valve Y.

The method of operation of the whole apparatus is to keep the main line constantly charged by either a dynamo or magneto-electric generator or closed-circuit battery, so that when the line is broken at any point an impulse shall be transmitted to the various acting parts to stop the engine and the dependent machinery. Upon the breaking of the circuit the armature A will be drawn away from the magnet B, allowing the release of the lever L, which will permit the immediate operation of the designated power which shall stop the machinery. Upon an undue increase of the speed of the engine the point on the governor-rod would be thrown against arm II, breaking contact at *c*, stopping the machinery as before. The same result will be obtained should the governor, owing to accident, fall from its normal limit, contact then being broken at *d*.

The method of operation of the recording apparatus is to turn the crank E' down to its extreme limit, which will immediately break the circuit and cause the stopping of the machinery. The break-wheel will continue its movement, however, sending to line a definite number of electric impulses and finally automatically close the circuit again.

The passage of the current over the line during its movement will actuate the magnets *j*, *h*, and T and their coöperative mechanism, causing to be registered on the dial the number of the station from which the alarm was sent in.

I do not limit myself to the use of the particular mechanism shown in the recording-clock, as a number of the well-known watchman's clock-movements would accomplish the same result.

The method and operation of the apparatus shown in Fig. 2 is to break the flow of the current upon the line, which will release the armature A, which will be drawn back by the spring *r*. This will withdraw the lever K from the path of lever L, allowing it to fly upward and drop the weight *w'* from its lower end, which will in turn, through the means of the chain attached, pull forward the lever L', thus thrusting up the governor to its highest limit, and by this means stop the engine and such machinery as may be connected thereto.

Having, therefore, described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a shut-off apparatus the combination of a steam-cylinder with a piston and piston-rod, a pipe connecting the cylinder to a pressure-valve, said valve being connected with the main steam-supply, a pivoted lever to control the action of the pressure-valve, a lever extending from and rigidly-fastened to the armature of an electromagnet, a current-indicator, a dynamo-electric or magneto-electric generator or battery, a speed-limiting attachment, a governor having a projection attached to the governor-rod to engage and operate said speed-limit, a relay including an alarm-bell and its operating-battery in local circuit, a resistance-coil to regulate the amount of effective current upon the line, shunt-coils to reduce the reactionary inductive effect upon the line, incident to breaking the circuit, switches or keys or a break-wheel for normally opening the circuit and recording apparatus for registering a break in the circuit, substantially as described.

2. The combination of a steam-cylinder having a piston and piston-rod the latter arranged to engage a lever which operates to close a gate-valve, a steam-pipe connected with the cylinder to convey steam to the same, a pressure-valve adapted to admit or prevent the admission of steam to the cylinder according to its position, a lever adjusted to control the action of the pressure-valve, an electromagnet whose armature is arranged to arrest the downward movement of the retaining-lever, the said electromagnet being arranged to operate in open circuit, a battery in said local circuit, a relay connected with a main line which is operated as a closed circuit, a battery or generator to energize the main circuit which in turn controls the aforesaid open or local circuit, contact keys or switches arranged to permit the main line to be opened at will, an alarm-bell placed in circuit with a local battery and arranged to operate by the action of the main-line relay, a detent on the armature of the relay, a lever arranged to engage with the detent on the armature, and to fall upon a contact-point beneath and complete the circuit through the alarm-bell and its accompanying battery when a break upon the main line permits the release of the armature of the main-line re-

lay, all substantially as and for the purposes described.

3. In combination with an engine the combination of a steam-cylinder Q, piston-rod P, lever W, valve Y, steam-pipe *w*, pressure-valve V, lever L, electromagnet B', armature A, relay B'' armature A'', battery D', key E'', alarm-bell G', battery F'' detent, hooked lever *e'*, contact-spring *f'* and connecting-wires therewith, substantially as and for the purposes described.

4. In a shut-off apparatus the combination of a governor with a lever for elevating the same, a weight and chain arranged to actuate said lever, a counterweight to take slack out of said chain, a retaining-lever to sustain the motive weight, an electromagnet whose armature is provided with an arm or lever extending therefrom to engage the retaining-lever, an electric generator, a current-indicator, switches or keys to open the circuit, a speed-limit, an alarm-bell to indicate the improper condition of the main circuit, a resistance-coil to limit the amount of current on the circuit, a relay to control the action of a recording apparatus included in its local circuit, an electromagnet in the said local circuit to control the action of the recording mechanism and an electromagnet to control through the action of its armature the movements of the recording-mechanism train, substantially as and for the purposes described.

5. In a shut-off apparatus the combination of a governor-rod U with a lever L' weight *w*, lever L, lever K, armature A, electromagnet B, generator D, current-indicator C, switches E, call-box E', relays J, and N, electromagnet T, batteries F' F' and F'', alarm-bells G and G', recording-magnet *h*, levers *g* and *j*, sleeves *k* and *m* spring *l*, stud *o* and stylus *n*, detent *q*, stop-pin *u*, eccentric *i* and dial Z, all as and for the purposes described.

6. In combination with a motor, shut-off

mechanism consisting essentially of a shut-off cylinder with its piston-rod arranged to shut off the supply of steam or other power to the motor, a conduit extending from the shut-off cylinder to the boiler or other reservoir of power, a valve arranged in said conduit and means to operate said valve at a point remote therefrom consisting of an electromagnet having its armature held in position against the cores by the continuous energizing of the electromagnets, a spring arranged to move the armature from its normal position when the magnet ceases to be energized by the breaking of the current whereby the valve-operating mechanism is released and allowed to operate whenever the armature is moved as aforesaid, and a circuit and an alarm-bell arranged to be put in operation by a like movement of the armature whenever the main circuit is broken, substantially as shown.

7. The combination with a motor of a stop mechanism consisting of a governor having a projection whose position is governed by the speed of the motor, two arms arranged in the path of said projection, a shut-off adapted to be put in operation by the release of an armature, a magnet and armature, the latter held in normal position by a continuous current passing through the magnet and means to move the armature from its normal position when the current is broken and the magnet thereby ceases to be energized, said armature being arranged to prevent the operation of the shut-off when held against the magnet and to release and allow it to operate when moved from the magnet, the projection on the governor being arranged to break the circuit when brought against either of said arms, substantially as shown.

JAMES H. CARY.

Witnesses:

J. D. MILLER,

ALLEN WEBSTER.