No. 872,102. PATENTED NOV. 26, 1907.

J. K. WRIGHT.

ELECTRIC STOP FOR ENGINES.

APPLICATION FILED FEB. 4, 1907.

3 SHEETS—SHEET 1.

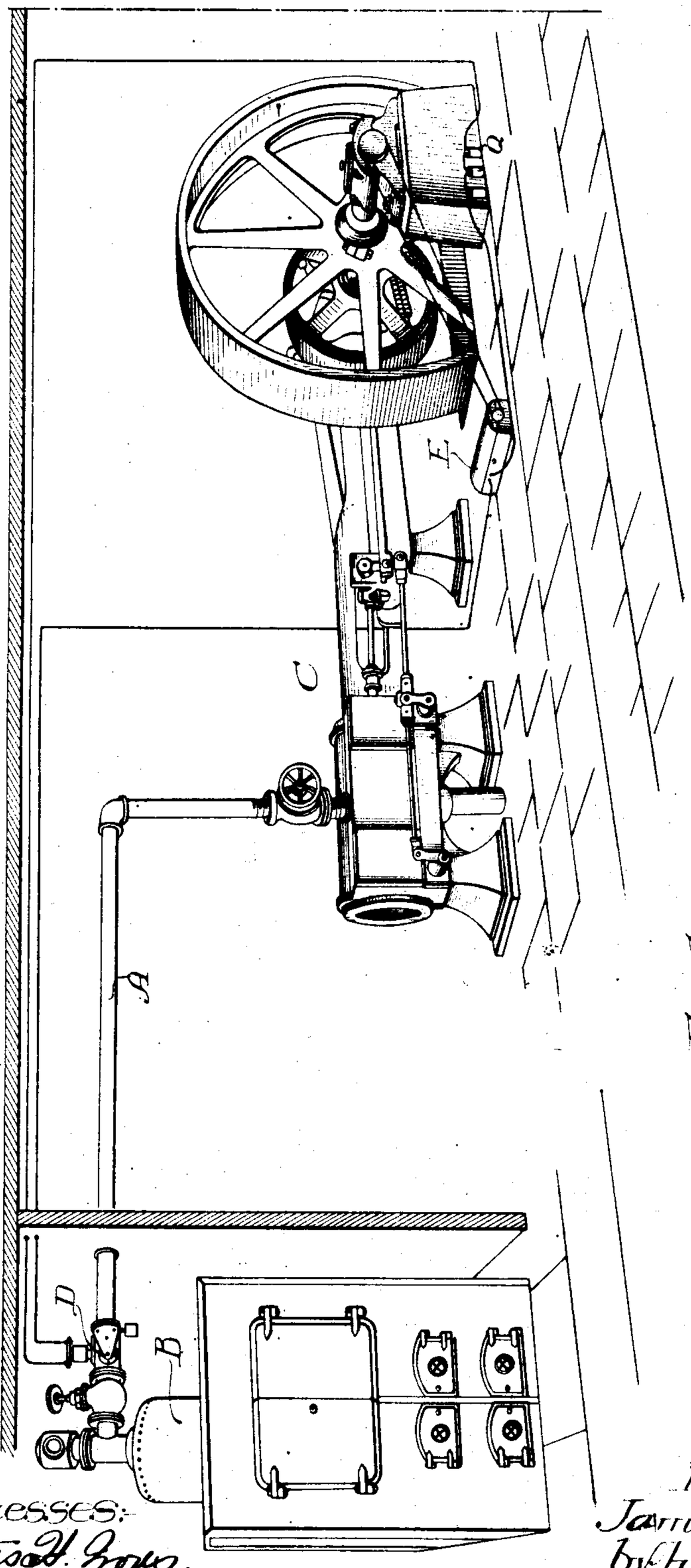


Fig. 1.

Witnesses:
Titus H. Howe.
William St. Rivoir.

Inventor:
James K. Wright.
by his Attorneys,
Howson & Howson

No. 872,102. PATENTED NOV. 26, 1907.

J. K. WRIGHT.

ELECTRIC STOP FOR ENGINES.

APPLICATION FILED FEB. 4, 1907.

3 SHEETS—SHEET 2.

Fig. 3.

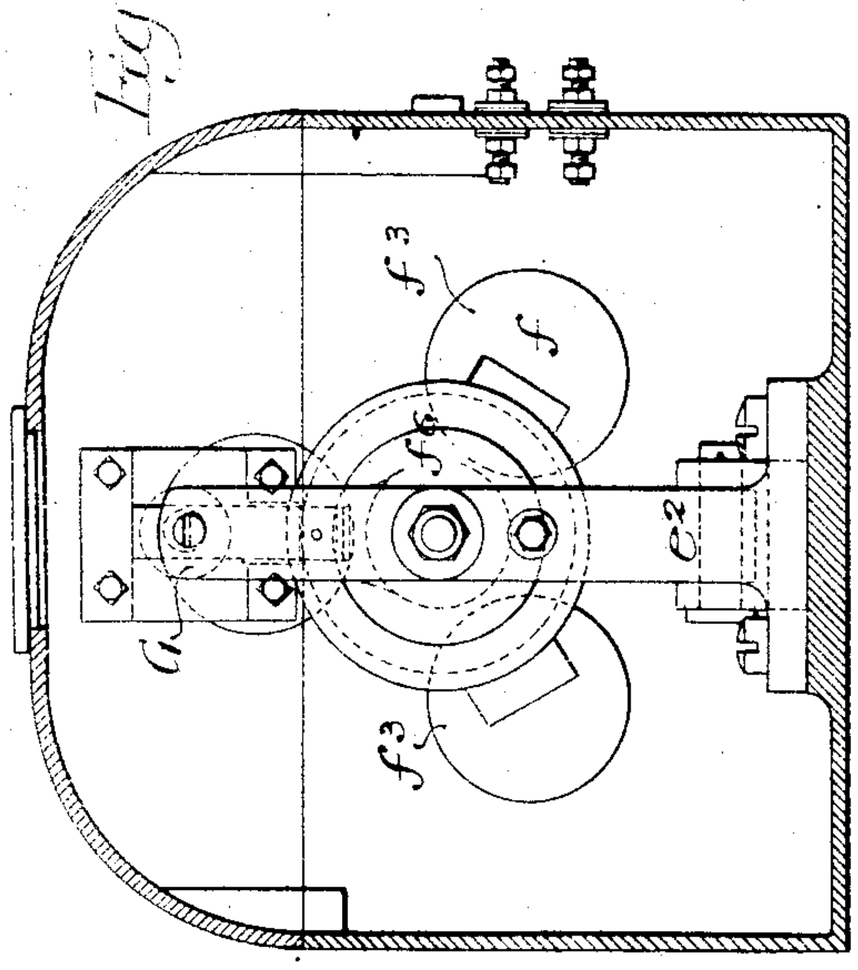
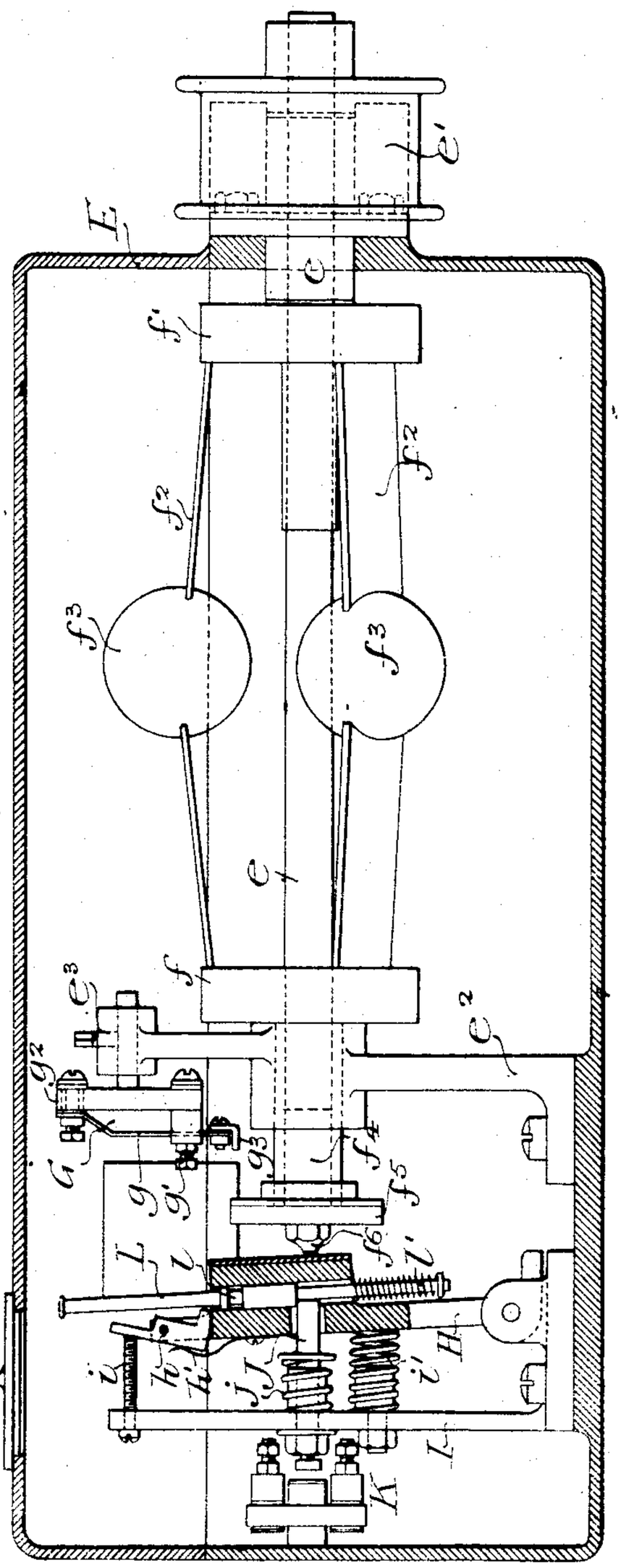


Fig. 4.

Fig. 2.



Witnesses:
William A. Rivoir.
Titus A. Howe.

Inventor:
James K. Wright.
by Louis C. Hanford.
Howson & Howson

No. 872,102. PATENTED NOV. 26, 1907.

J. K. WRIGHT.

ELECTRIC STOP FOR ENGINES.

APPLICATION FILED FEB. 4, 1907.

3 SHEETS—SHEET 3.

Fig. 7.

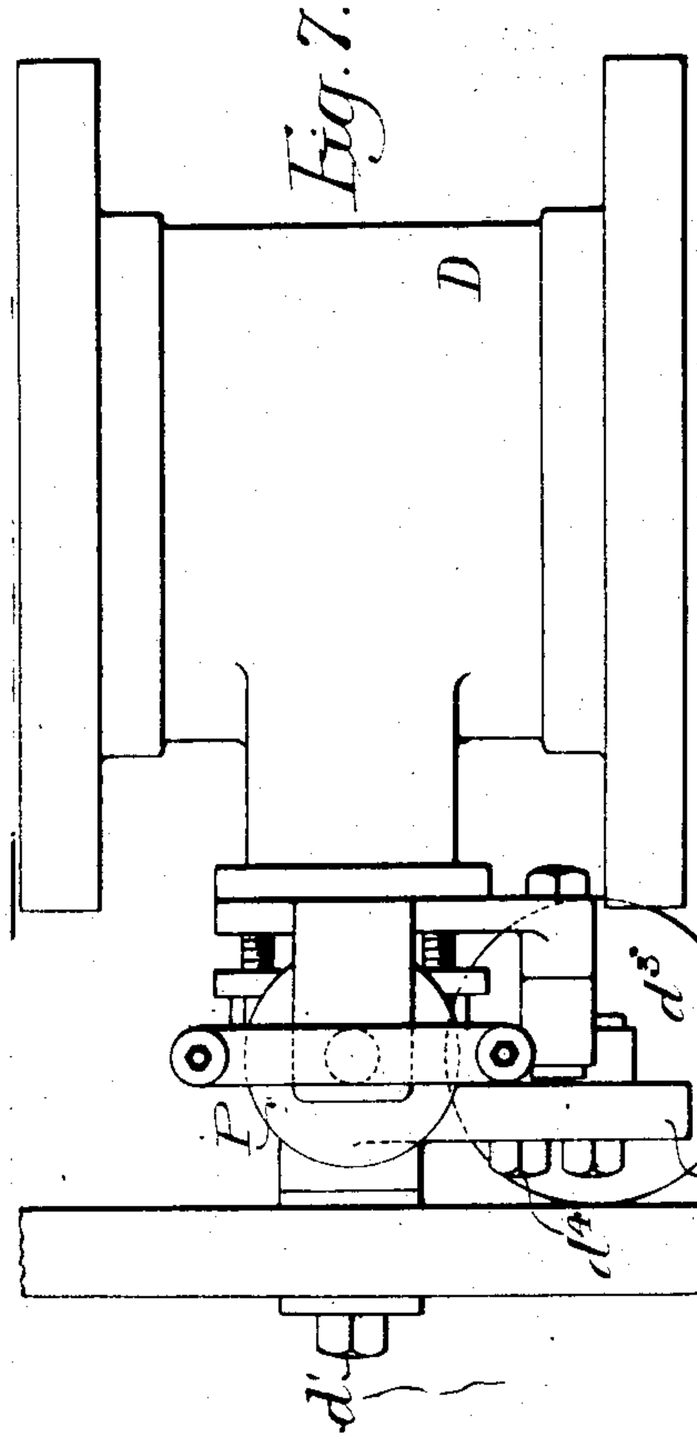


Fig. 6.

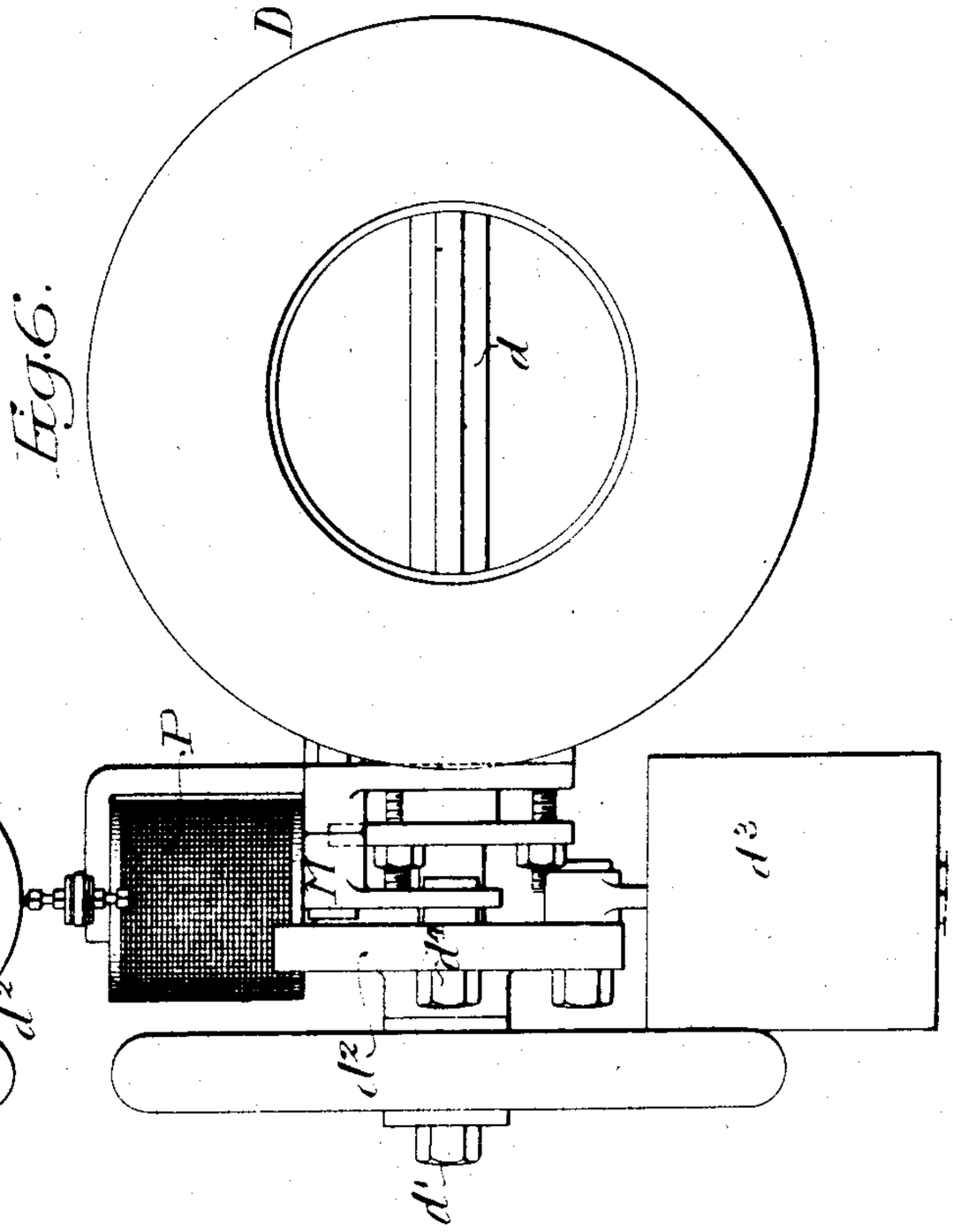


Fig. 8.

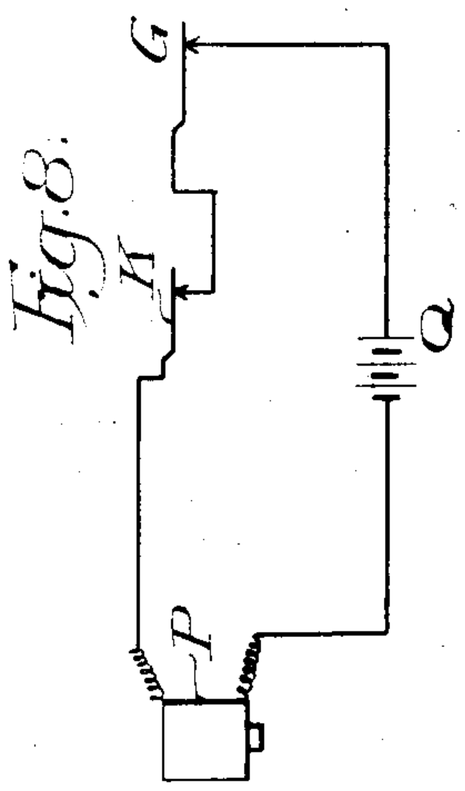
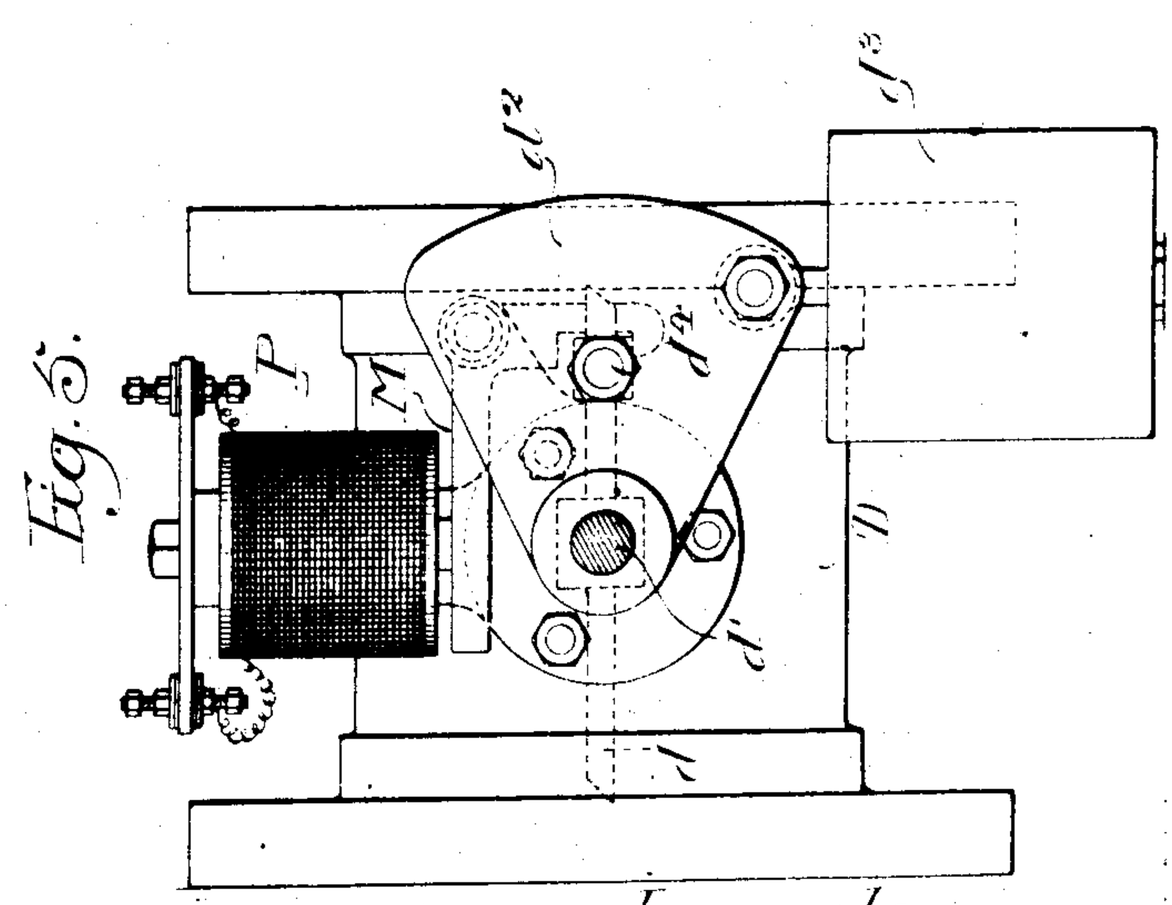


Fig. 5.



Witnesses:-
Titus B. Howe.
Williams & Pevoir.

Inventor:
James K. Wright.
by his Attorneys.
Howson & Howson

UNITED STATES PATENT OFFICE.

JAMES K. WRIGHT, OF NEW YORK, N. Y.

ELECTRIC STOP FOR ENGINES.

No. 872,102 Specification of Letters Patent. Patented Nov. 26, 1907.

Application filed February 4, 1907. Serial No. 355,596.

To all whom it may concern:

Be it known that I, JAMES K. WRIGHT, a citizen of the United States, residing in New York, N. Y., have invented certain Improvements in Electric Stops for Engines, of which the following is a specification.

My invention relates to that class of engine governing mechanism, whereby a valve is caused to operate to cut off the steam supplied to an engine whenever the speed of the latter varies in either direction beyond predetermined limits; the main object of the invention being to provide an assemblage of apparatus which shall be certain in its action and of such a nature that it cannot get out of order and become untrustworthy without shutting down the engine.

I further desire to provide apparatus of the general class above noted in which a valve in the main steam line supplying the engine, is provided with means tending to close it and controlled by a normally energized electromagnet; there being in circuit with said magnet a switch or switches designed to be opened by the engine whenever its speed exceeds or falls below predetermined limits.

I also desire to provide such apparatus as that indicated, with means whereby it is prevented from acting when the engine is being shut down under normal conditions, and also with means whereby it is automatically reset, ready for action.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which:—

Figure 1, is a perspective view, to some extent diagrammatic, illustrating my invention as applied to an engine and the steam pipe supplying the same; Fig. 2, is a side elevation, partly in section, illustrating the switch mechanism and apparatus for operating the same under predetermined conditions of speed variation; Fig. 3, is an end elevation of the device shown in Fig. 2; Fig. 4, is a plan of one end of the device illustrated in Fig. 2; Fig. 5, is an end elevation of the main steam valve, illustrating the device for automatically operating the same and the controlling magnet therefor; Figs. 6 and 7, are respectively an end elevation and a plan of the apparatus shown in Fig. 5, and Fig. 8, is a diagrammatic view illustrating the electrical connections of the various parts of the apparatus.

Referring to the above drawings, A represents the steam pipe connecting a boiler B to an engine C; there being in said pipe a main steam valve D designed to be automatically operated whenever the speed of the engine varies above or below predetermined limits. A casing E, which contains the apparatus illustrated in Figs. 2 to 4 inclusive, is provided, and a pulley e', carried on a spindle e projecting from said casing, is belted to the main shaft of the engine.

Referring to Figs. 2 to 4 inclusive, it will be seen that there is within the casing E a standard e^2, which with the end of said casing, provides suitable supporting bearings for the spindle e, and on this latter are mounted two collars f and f', of which the latter is immovably fixed in position, while the former is free to slide longitudinally. Said collar is however, compelled to turn with the spindle, by reason of the fact that it is connected to the fixed collar f' by springs f^2, which at their mid points carry governor balls f^3 in the manner common in centrifugal governors. Slidably mounted upon the spindle e, so as to project beyond the standard e^2, is a sleeve f^4, having a flange f^5, all connected to the slidable collar f.

Mounted on an arm e^3 of the standard e^2 is a switch structure G including a spring contact piece g and a screw g' with which said spring is normally in circuit and these two parts are mounted on the bar g^2 in such manner as to be insulated from one another. The contact g' is so placed that the end g^3 of the spring g may, under certain conditions of operation, be engaged by the flange f^5 of the sleeve f^4. Also mounted within the casing E is a bar or lever H pivotally mounted at one end so as to extend adjacent to the end f^6 of the sleeve f^4. A fixed bar I is also mounted in the casing so as to extend substantially parallel with the lever H when this is in its normal position, and said bar has at one end an adjustable screw i projecting toward the lever H and also carries a spring i' tending to press said lever away from it toward the spindle e. Further, there is a plunger J carried by the bar I so as to project toward and partially through the lever H, which plunger is normally maintained in a definite position by means of a spring j confined between a flange or collar and the bar I.

An electric switch structure K is fixed to the casing and has a spring arm k projecting adjacent to the end of the plunger J. This

spring arm is so constructed that it normally engages a contact piece k', which with the spring k, is provided with terminals for the attachment of conducting wires. The spring g and the screws g' of the switch structure G are likewise respectively provided with terminals for the attachment of conductors.

The lever H has at one end a pivotally mounted trigger h provided with a spring h', whereby its hooked end is normally pressed into such position as to engage a suitable notch l in a bolt L slidably mounted in the lever; there being a spring l' by which said bolt tends to move away from the position in which it is held by the trigger h. The end of said trigger opposite to that having the hook projects so as to be engaged by the screw i when the lever has been moved a predetermined distance away from the spindle e.

It will be noted that the bolt L is so proportioned that when it is engaged by the trigger h the lever H may be engaged by the end f^6 of the sleeve f^4 and turned on its pivot against the action of the spring i', without causing movement of the plunger J, while, on the other hand, if the bolt is in its released position, it may either rest upon the plunger—if this latter is projected as shown in Fig. 2—or it may rest in front of the plunger.

Referring now to Figs. 5, 6 and 7, the valve structure D has within it a pivoted valve d, shown in dotted lines in Fig. 5, and in full lines in Fig. 6, provided with a spindle d', which projects outside of the valve casing. To this spindle is fixed an arm or segment d^2 having attached to its lower end a weight d^3 and also having mounted on it a pin d^4. A bell crank lever M is pivotally mounted on the valve casing and one of its arms is notched so as to engage the pin d^4 and maintain the arm or segment d^2 so that it projects in a substantially horizontal direction in spite of the weight d^3, which tends to move it downwardly through an arc of about 90°. The valve d is so mounted upon the spindle that while it is open, the arm or segment d^2 is in the horizontal position shown, and will be closed when said arm is moved by the weight to its lower position.

The second arm of the bell crank lever M serves as an armature for a magnet P and is so proportioned that so long as the magnet is energized it maintains the second arm of the lever in engagement with the pin d^4. If however, it is released by the magnet, it is so designed as to cause the lever M as a whole to swing on its pivot and release the pin d^4 and hence the arm d^2.

The magnet P is connected in series with the two switches K and G, there being also included in the same circuit any suitable source of current, such as a battery Q. When the engine is operating under normal conditions, as to speed, the spindle e is turned and the governor balls f^3 move out to such a position that the sleeve f^4 and the collar f^5 occupy positions somewhere between that shown, and a position in engagement with the end g^3 of the contact spring g. If now, the speed of the engine for any reason increases beyond a predetermined point, the excessive outward movement of the governor balls f^3 will cause the flange or collar f^5 to engage the end g^3 of the contact spring g. As a result this spring is moved away from its contact piece g' and caused to break the circuit of the magnet P, thereby deënergizing the latter. As a result, the armature arm of the lever M falls by gravity and moves on its pivot thereby disengaging the pin d^4 so that the arm or segment d^2 is free to turn the valve spindle d' under the action of the weight d^3, so as to immediately cut off the flow of steam to the engine.

The bolt L under normal conditions is maintained with its body portion in front of the plunger K, so that if the driving belt connecting the pulley e' with the engine should break or if for any abnormal cause the engine should slow down below a predetermined point, the end f^6 of the sleeve f^4 would occupy the position shown in Fig. 2, and the plunger J would be moved against the action of its spring j into engagement with the contact spring k of the switch K. This would, therefore, be moved out of contact with the piece k' so that, as before, the circuit of the magnet F would be broken and the weight d^3 freed to close the valve d.

It will be understood that under ordinary conditions it would be undesirable for this valve to be automatically closed every time the engine was shut down at the end of a day's run, and for the purpose of preventing this and yet at the same time maintaining the device in condition to automatically assume its protective function when the engine is subsequently started, I have devised the particular arrangement shown in Figs. 2 and 4. Just before the engine is stopped, the bolt L is pulled outwardly by hand until its notch l is engaged by the hooked end of the trigger h, when it is held in such outer position by this device. When the engine slows down and the end f^6 of the sleeve f^4 turns the lever H on its pivot, the end of the plunger j enters the space normally occupied by the end of the bolt L and thereafter the trigger h comes in contact with the screw i. Said trigger is thereby turned on its pivot and made to release the bolt L, which, under the action of its spring l', is moved so as to rest upon the end of the plunger. Consequently, the plunger J is not moved outwardly and there is no breakage of the circuit of the magnet P, even though the engine comes to a full stop. If now, the engine be again started and the governor balls thereby caused to move outwardly, the sleeve f^4 is moved away from the

lever H, which is made to follow it by the spring *i'*. This movement of the lever causes the bolt L to be gradually moved away from the plunger J, so that the body of said bolt is finally drawn down in front of the end of the said plunger, thereby again making the device ready for operation in event of an objectionable variation in the engine speed.

I claim:—

1. Safety stop mechanism for an engine including a normally closed switch, means for automatically opening the same whenever the speed of the engine passes a predetermined limit, a normally energized electromagnet in circuit with the said switch, a valve in the main steam line of the engine, a weight constantly tending to close said valve, a device for normally preventing such closure, said device including a lever having an arm normally attracted to the magnet, substantially as described.

2. Safety stop mechanism for an engine, including a valve in the main steam line, a spindle for the valve, a weight operative on the spindle and constantly tending to close the valve, a bell crank lever having one of its arms constructed to maintain the weight in a raised position, an electromagnet placed to act on the other arm of the bell crank lever, a source of current, and a normally closed switch in circuit with the said magnet, with speed responsive means operated by the engine for operating the switch under abnormal speed conditions, substantially as described.

3. Safety stop mechanism for an engine including a revoluble spindle driven from the engine, a member slidably mounted on said spindle, speed responsive means driven from the spindle and operative upon the member, two normally closed switches, of which one is placed to be opened when said member is moved to an abnormal extent in one direction, and the other is placed to be opened when said member moves to an abnormal extent in the opposite direction, with means including a normally energized magnet in circuit with the switches for cutting off the supply of steam to the engine when either of said switches is operated, substantially as described.

4. Safety stop mechanism for an engine including an electric switch, means in circuit with said switch for causing cutting off of the steam supply to the engine when said switch is operated, and means actuated by the engine for operating said switch under abnormal conditions of speed, said latter means including a plunger, a pivoted lever, a bolt carried by the lever and movable into or out of a position of engagement with the plunger, means for holding the bolt out of said position, and means for causing automatic release of said bolt under predetermined conditions, substantially as described.

5. Safety stop mechanism for an engine including an electric switch, means in circuit with said switch for controlling the cutting off of steam to the engine, a device for automatically opening the switch when the engine speed falls below a predetermined point, means for preventing action of said device when the engine is shut down, with mechanism for resetting said device, substantially as described.

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

JAMES K. WRIGHT.

Witnesses:

D. D. LOVELACE,

A. C. HETHERLIN.