

(No Model.)

2 Sheets—Sheet 1.

E. C. MYRICK & G. C. DOEG.
ELECTRIC STOP MOTION FOR ENGINES.

No. 541,287.

Patented June 18, 1895.

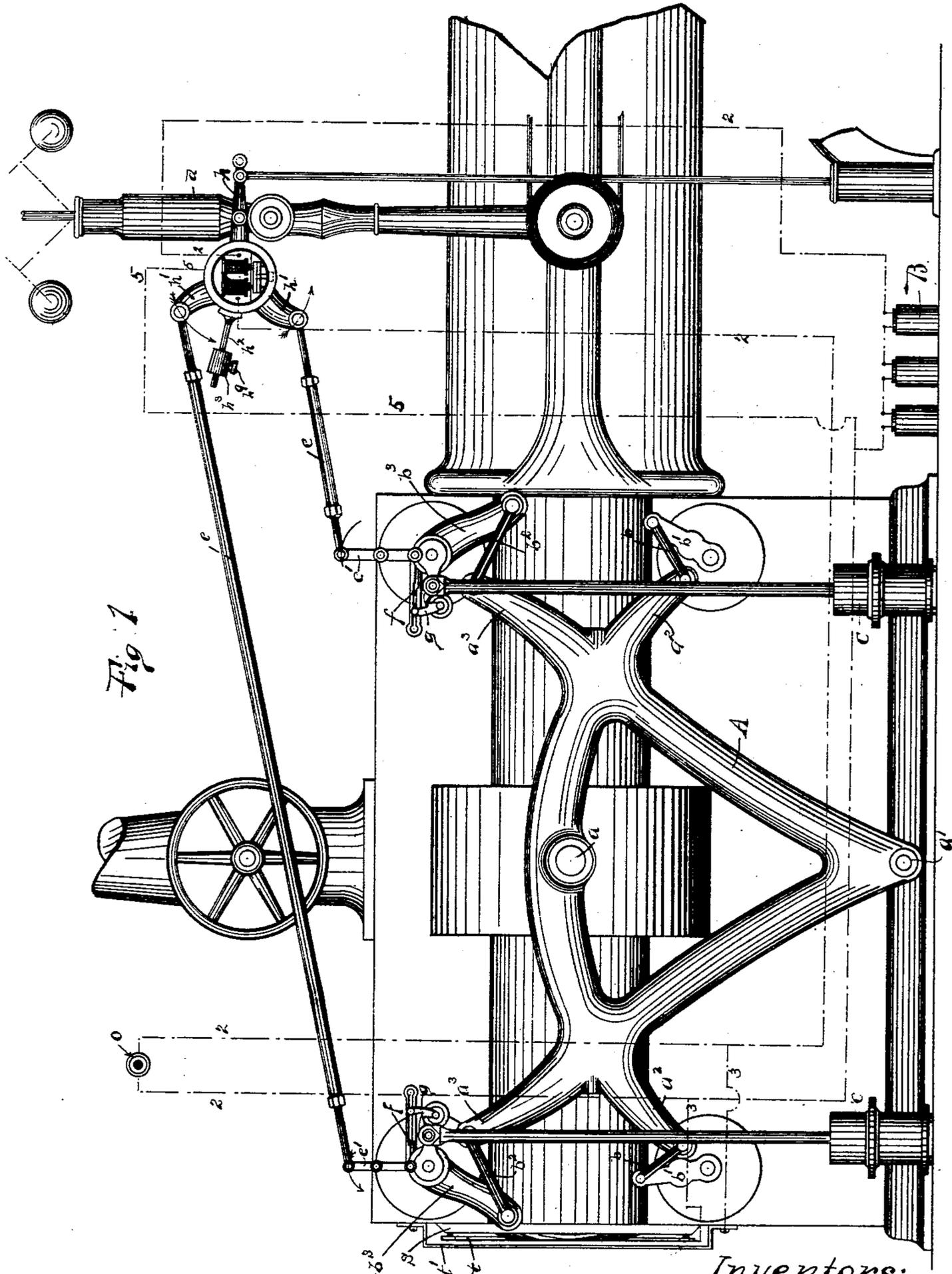


Fig. 1

Witnesses:
J. Murphy
John Arnsbaw

Inventors:
Eugene C. Myrick
George C. Doeg
per *Wilmer H. Thurston*
Attorney

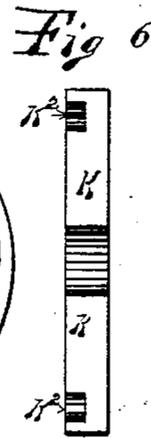
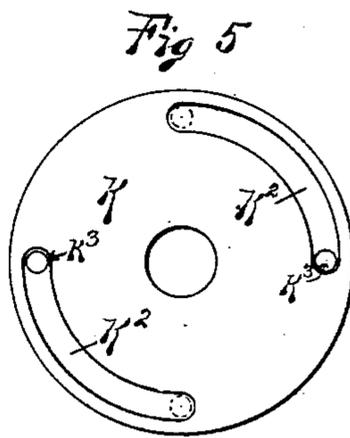
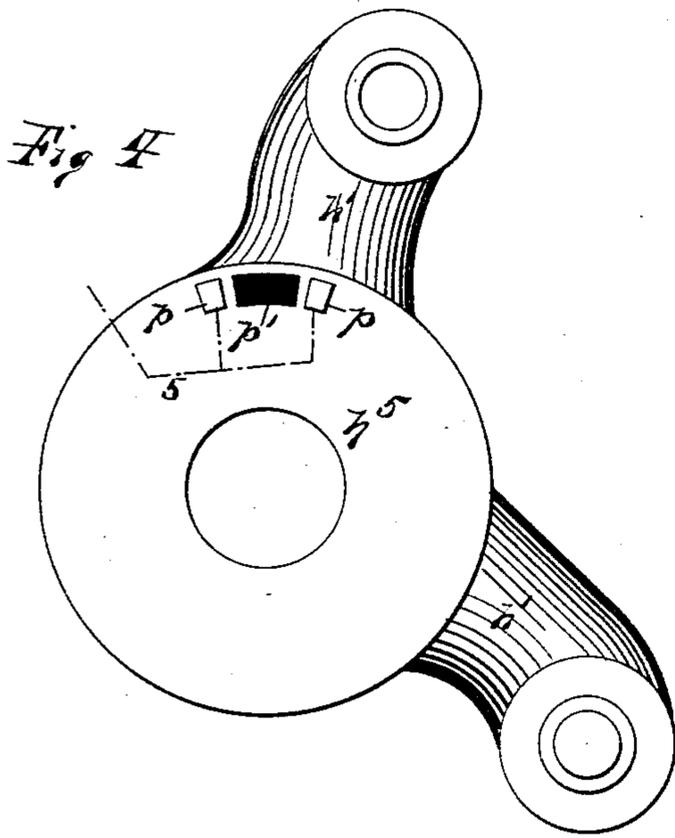
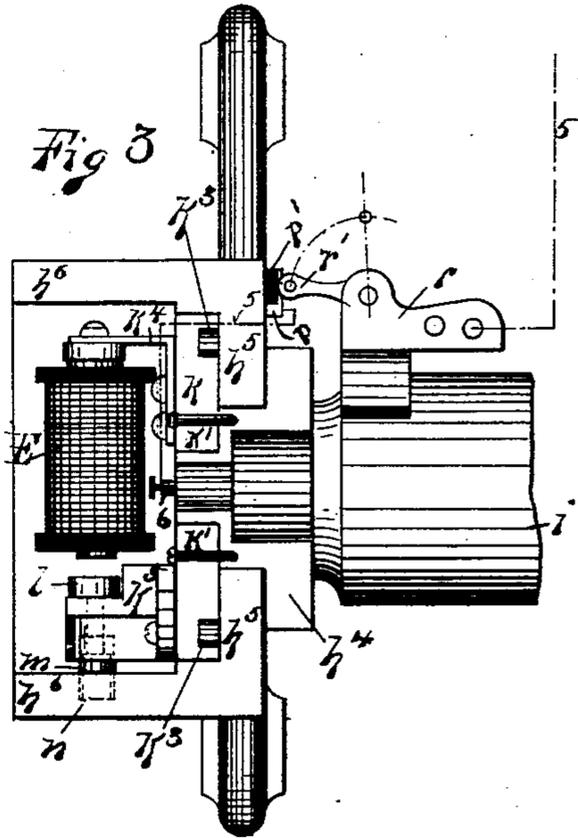
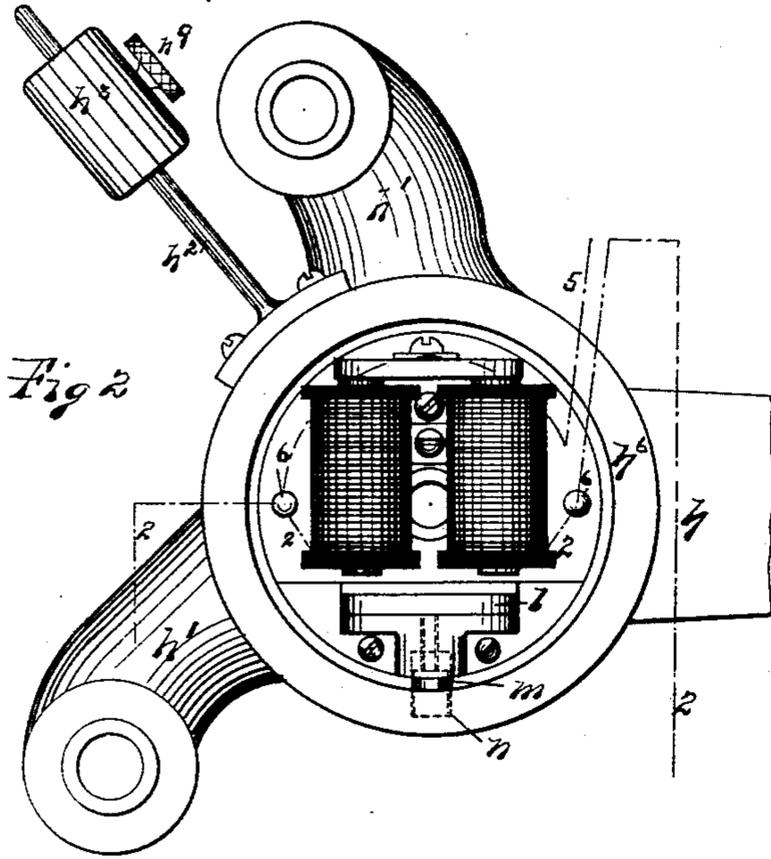
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2 Sheets—Sheet 2.

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Witnesses:
J. Murphy
John A. Benschaw

Inventors:
Eugene C. Myrick
George C. Doeg
 Per *Wilmarth H. Thurston*
 Attorney.

UNITED STATES PATENT OFFICE.

EUGENE C. MYRICK AND GEORGE C. DOEG, OF PROVIDENCE, RHODE ISLAND.

ELECTRIC STOP-MOTION FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 541,287, dated June 18, 1895.

Application filed May 23, 1893. Serial No. 475,276. (No model.)

To all whom it may concern:

Be it known that we, EUGENE C. MYRICK and GEORGE C. DOEG, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Electric Stop-Motions for Steam-Engines; and we do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The stop motion which forms the subject of the present invention is more particularly adapted for use upon steam engines which are provided with detachable valve gear and mechanism connected with and controlled by the governor for effecting the detachment of the valves.

The object of the invention is to provide efficient means for quickly stopping such a steam engine at a distance from the engine room, and also to provide efficient means for promptly stopping the engine automatically upon the happening of certain contingencies.

To that end one feature of invention consists in the combination, with the governor and the valve detaching mechanism, of mechanism connecting said governor and said valve detaching mechanism, said connecting mechanism being constructed in two parts detachably connected together, one of said parts being provided with an independently movable engaging device for engaging the other part, and carrying an electro-magnet and armature for operating said engaging device to disconnect the two parts of said connecting mechanism.

The invention further consists in the combination, with the governor and valve detaching mechanism, of mechanism connecting said governor and said valve detaching mechanism, said connecting mechanism being constructed in two parts detachably connected together, and means for automatically disconnecting the parts of said connecting mechanism through an electric circuit by the abnormal movement of some part of the engine, as for instance of the governor or of the cylinder head.

The invention further consists in certain other combinations and arrangements of parts hereinafter described.

Referring to the drawings, Figure 1 is an elevation of so much of a steam-engine as is necessary for an understanding of the present invention. Figs. 2 to 6, inclusive, are detail views, upon an enlarged scale, of certain of the parts which will be more fully hereinafter explained.

The engine shown in the drawings is of the Corliss type, embodying rotary cut-off valves and one of the more recent forms of the Corliss valve operating and detaching mechanism. It is to be understood, however, that the features of invention hereinafter described are not limited to any particular form or type of engine, but may be applied to any engine provided with detachable valve gear, whether horizontal or vertical, stationary or marine.

A represents an oscillating or swinging frame pivoted at a and to be operated in the usual manner by an eccentric upon the main shaft of the engine connected to said swinging frame at a' for giving the proper movements to the steam and exhaust valves of the cylinder. The arms a^2, a^2 , of the swinging frame A are connected by means of links b to the crank arms b' which operate the exhaust valves. The arms a^3, a^3 , of the swinging frame are connected by means of links b^2 to the crank arms b^3 which operate the steam valves. As will be understood, the crank arms b^3 are not permanently connected with the steam valves, but are detachably connected therewith through a suitable latch connection, and so that the valves may be unlatched and disconnected from the arms b^3 before the completion of their throw, and quickly closed by weights working in the dash-pots c . The time of unlatching and thus disconnecting the steam valves from the arms which operate them is automatically regulated by the position of the governor acting through proper connecting mechanism to vary the position of the detaching mechanism, or in some other suitable way.

Heretofore the mechanism connecting the governor with the cut-off mechanism in an engine of the type shown in the drawings has consisted of a T-lever suitably pivoted upon the frame-work, the long arm of which was connected with and operated by the governor sleeve d , and from the short arms of which extended connecting rods e, e , connecting said

short arms of said T-lever with the pivoted levers e', e' , the opposite ends of which were connected with the parts f, f , which serve to effect the unlatching of the latches g, g , the combination being such that as the governor-sleeve rose and fell under the action of the governor balls, the T-lever would be oscillated, and thereby through the connecting rods e the position of the parts f would be automatically regulated and determined.

In the present invention there is no change in the detaching mechanism, the latches g , the parts f , and the connecting rods e , being all constructed and arranged precisely as before. Instead, however, of connecting the rods e, e , to the governor sleeve d through the intervention of a T-lever constructed of a single part or piece with the three arms thereof formed integral, said T-lever is constructed in effect in two parts adapted to be detachably connected together, one of said parts embodying the long arm h , which is connected to the governor sleeve, and the other part embodying the two short arms h', h' , to which the rods e, e , are respectively connected. The two parts of said T-lever are normally connected together so as to in effect form one piece, and so as to operate in the same manner as the T-lever with its arms integral formerly employed. When the engine is to be stopped, however, in any of the ways hereinafter described, the two parts of the T-lever are to be disconnected as hereinafter explained.

To the part which embodies the short arms h', h' , is secured an arm h^2 upon which is adjustably mounted a weight h^3 which may be held in any adjusted position by means of the set-screw h^9 . Whenever the two parts of the T-lever are disconnected, the weight h^3 will act to turn the part embodying the arms h', h' , in the direction indicated by the arrows, Fig. 1. This movement of the arms h', h' will be by means of the rods e, e , and the levers e', e' , serve to move the parts f into such position that they will serve either to prevent altogether the engagement of the latches g, g , or to cause said latches to be disengaged before the lap of the valves has been overcome, in either of which cases the valves will not be opened, no steam will be admitted to the cylinder, and the engine will be stopped. The different ways for effecting the disconnection of the two parts of the T-lever will now be described. This disconnection is to be effected by the closing of an electric circuit, which circuit may be closed either by hand or automatically. That part of the T-lever which embodies the arm h is provided with a hub h^4 mounted upon the end of the fixed stud i so as to turn freely thereon, said stud i being secured to the frame of the engine. That part of the T-lever which embodies the arms h', h' , is provided with a hub h^5 which is mounted upon the hub h^4 so as to turn freely thereon when permitted to do so, said hub h^5 being provided with an annular flange h^6

forming a sort of cup or inclosure, all as shown in Fig. 3. In the bottom of the cup so formed is arranged a circular plate or disk k , said disk being mounted upon a prolongation of the hub h^4 and being secured to said lar pulleys 18^a . The pulleys on which the hub by means of screws k', k' , as shown in said Fig. 3. Said disk k is provided with grooves k^2, k^2 , to receive studs k^3 projecting from the hub h^5 , said grooves k^2 being arranged as shown in Fig. 5, said Fig. 5 being a face view, and Fig. 6 an edge view, of said disk. To the disk k is secured a bracket k^4 supporting an electro-magnet E , and also another bracket k^5 supporting the armature l of said electro-magnet. Secured to the armature l so as to be operated thereby is a bolt m arranged to slide in the bracket k^5 and adapted to enter a corresponding hole or recess n formed in the annular flange h^6 , all as indicated in Figs. 2 and 3.

As will be seen, when the bolt m is in engagement with the recess n , the two parts of the T-lever will be securely locked together, and will oscillate together under the action of the governor sleeve as the governor balls rise and fall, the same as though the several arms of the T-lever were formed integral as heretofore. When, however, the bolt m is withdrawn from the recess n , the two parts will be unlocked or disconnected, and so that the part embodying the arms h', h' , will be free to be turned upon the hub h^4 under the action of the weight h^3 , thereby moving the arms h', h' , the levers e', e' , and the parts f, f , into such position as to effect the stopping of the engine as above explained. The studs k^3 working in the slots k^2 of the disk k , serve to limit the motion of the parts.

It will be further seen that whenever the electro-magnet E is energized so as to attract its armature l , the bolt m will be withdrawn from the recess n . When the engine is to be stopped, therefore, all that is necessary is to energize said electro-magnet by the passage of a current through its coils by the closing of an electric circuit connected therewith. This circuit may be closed, as above stated, either by hand or automatically. From the coils of the electro-magnet E the wires $2, 2$, extend to the binding posts $6, 6$, secured to, but insulated from, the plate k , and from the binding posts $6, 6$, the wires $2, 2$, may be carried to any desired distance from the engine, the circuit including a battery B or other source of electricity, and a push-button or other circuit closing device o . If desired, branch circuits may extend to the different rooms of the establishment where the engine is located, each branch being provided with a push-button or circuit closing device, and so that if it be desired to stop the engine promptly from any of said rooms, it will only be necessary to push the button.

For the purpose of stopping the engine automatically when the governor balls shall rise or fall beyond predetermined limits, the fol-

lowing mechanism may be employed: Upon the rear of the hub h^5 of that part of the T-lever which carries the arms h', h' , are secured two contact plates p, p , insulated from said hub, and an intermediate plate p' of insulating material, such as a piece of hard rubber, as shown in Fig. 4. Secured to the pivot i , but insulated therefrom, is a bracket r , carrying a pivoted or swinging arm r' .

The swinging arm r' and the plates p, p , constitute an automatic circuit closing device. The circuit to be closed by said device may consist as before of a pair of wires $2, 2$, and the battery B. When, however, it is desired to employ said automatic governor-operated circuit-closing device in connection with the hand operated circuit-closing device o , the circuit for said automatic circuit closer is completed by the employment of an extra or additional wire 5 extending from one of the binding posts 6 to one pole of the battery, in a break in which said wire 5 the automatic circuit closer above described is located. Thus one section of the wire 5 extends from the battery B to the bracket r , while the other section of the wire 5 extends from one of the binding posts 6 to the contact plates p, p , as shown in Fig. 3, the bracket r and arm r' completing this portion of the circuit. The other side of the circuit is formed by one of the wires 2 extending from the other binding post 6 to the other pole of the battery.

The swinging arm r' is arranged, when in the position shown in Fig. 3, so as to be in contact with one or the other of the plates p, p , or with the piece of insulating material p' , as the case may be, the arrangement of the parts being such that as long as the governor balls do not rise or fall beyond the predetermined limits the arm r' will be in contact with the piece of insulating material p' , and so that the electric circuit will be open, and the two parts of the T-lever will remain locked together and operate to regulate the cut-off mechanism the same as though made in one piece. If, however, the governor balls should fall below the predetermined limit, as for instance, by reason of the breaking of the governor belt, the governor sleeve will descend so far as to cause, through the arm h , the connected parts of the T-lever to be turned or swung so far that the piece of insulating material p' will be carried out from under the arm r' and so that one of the contact pieces p will be carried under and into contact with the arm r' , thereby automatically closing the circuit and promptly stopping the engine. So also if the governor balls should rise beyond the predetermined limit, as for instance by the racing of the engine from any cause, the governor sleeve will rise so far as to cause the connected parts of the T-lever to be swung so far in the opposite direction that the piece of insulating material p' will likewise be carried out from under the arm r' and the other contact piece p carried under and into con-

tact with said arm, and thus automatically close the circuit and stop the engine.

It is very desirable to promptly stop the engine in case of any movement of the cylinder head. This may be readily accomplished automatically in the following manner: To the cylinder head s is secured an annular plate t , said plate being insulated from said cylinder head. To the cylinder casing is secured another annular plate t' arranged to extend over the plate t , as shown in Fig. 1. Branch wires $3, 3$, extending from the circuit wires $2, 2$, are connected one to the plate t and one to the plate t' . If now the cylinder head should at any time start from its seat, such movement of the cylinder head would serve to bring the plate t into contact with the plate t' , thereby closing the circuit and promptly stopping the engine.

As will be seen, the employment of the construction and arrangement of parts above described, in which the mechanism which connects the governor with the valve detaching mechanism embodies a T-lever constructed in two parts detachably connected together, necessitates very little change in that large class of steam engines in which the one-part T-lever is embodied in said connecting mechanism, involving only the substitution for the one-part T-lever heretofore employed of a two-part T-lever with its electric connection. By the employment of such two-part T-lever, also, our invention may be readily applied by the same simple substitution to any existing engine of the class referred to. While for these reasons we prefer the construction embodying such two-part T-lever, we wish it to be understood that we do not limit our invention to the employment of such two-part T-lever. Thus it is evident that other constructions and arrangements of parts may be employed which would still embody mechanism constructed in two parts detachably connected together, with one of said parts provided with an independently movable engaging device for engaging the other part, and carrying an electro-magnet and its armature for operating said engaging device to disconnect the two parts of said connecting mechanism, and which constitutes one of the features of our invention. So also it is evident that various constructions and arrangements of mechanism for connecting the governor and the valve detaching mechanism with the said connecting mechanism constructed in two parts detachably connected together may be employed in combination with an electric circuit and means for automatically closing the same to effect the disconnection of the parts upon the happening of some contingency, without departing from the spirit of that feature of our invention which consists in the combination with the governor and valve detaching mechanism of a two-part connecting mechanism and means for automatically disconnecting the parts of said connect-

ing mechanism through an electric circuit by an abnormal movement of some part of the engine, as for instance of the governor or of the cylinder head.

5 It will also be understood that the mechanism for automatically closing the electric circuit may be likewise varied, and we do not wish to limit ourselves to the particular mechanism shown and described.

10 What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with the governor and the valve detaching mechanism, of mechanism connecting said governor and said valve
15 detaching mechanism, said connecting mechanism being constructed in two parts detachably connected together, one of said parts being provided with an independently movable engaging device for engaging the other part
20 and carrying an electro-magnet and its armature for operating said engaging device to disconnect the two parts of said connecting mechanism, substantially as described.

2. The combination, with the governor and
25 the valve detaching mechanism, of mechanism connecting said governor and said valve detaching mechanism, said connecting mechanism being constructed in two parts detachably connected together, one of said parts being
30 provided with an independently movable engaging device for engaging the other part, and carrying an electro-magnet and its armature for operating said engaging device to disconnect the parts, an electric circuit for energizing
35 said electro-magnet, and a circuit closing device for closing said electric circuit, substantially as described.

3. The combination, with the governor and the valve detaching mechanism, of mechanism
40 for connecting said governor and said valve detaching mechanism, said connecting mechanism being constructed in two parts detachably connected together, and means for automatically disconnecting the parts of said
45 connecting mechanism through an electric circuit by the abnormal movement of some part of the engine, substantially as described.

4. The combination, with the governor and the valve detaching mechanism, of mechanism
50 connecting said governor and said valve detaching mechanism, said connecting mechanism being constructed in two parts detach-

ably connected together, an electric circuit the closing of which will serve to disconnect
55 the two parts of said connecting mechanism, means for moving the valve detaching mechanism independent of the governor when the parts of said connecting mechanism are disconnected, and a circuit closing device operated
60 by the governor for automatically closing said electric circuit when the governor is moved beyond a predetermined limit, substantially as described.

5. The combination, with the governor and the valve detaching mechanism, of mechanism
65 connecting said governor and said valve detaching mechanism, said connecting mechanism being constructed in two parts detachably connected together, an electric circuit the closing of which will serve to disconnect
70 the two parts of said connecting mechanism, and suitable electric connections whereby said electric circuit may be closed either by hand or automatically by the abnormal movement
75 of some part of the engine, substantially as described.

6. The combination, with the governor and the valve detaching mechanism, of a lever
80 connected to and operated by the governor, a second lever detachably connected to said first lever, and also connected to and adapted to operate the valve detaching mechanism,
85 one of said levers being provided with separated contact plates and an intermediate plate of insulating material, a contact piece secured to a fixed part of the engine, and an
90 electro-magnet and its armature secured to one of said levers, whereby as the detachably connected levers are oscillated under the action of the governor, said contact piece will,
95 as long as the movements of the governor are within predetermined limits, ride upon the plate of insulating material, but will, when the governor is moved in either direction beyond said limits, be brought into contact with
one or the other of said contact plates and thereby close an electric circuit to energize
said electro magnet to effect the disconnection
of the two levers, substantially as described.

EUGENE C. MYRICK.
GEORGE C. DOEG.

Witnesses:

W. H. THURSTON,
S. J. MURPHY.