(No Model.) 3 Sheets—Sheet 1.

J. K. WRIGHT.

AUTOMATIC SAFETY STOP FOR ENGINES.

No. 602,385. Patented Apr. 12, 1898.

Fig. 1.

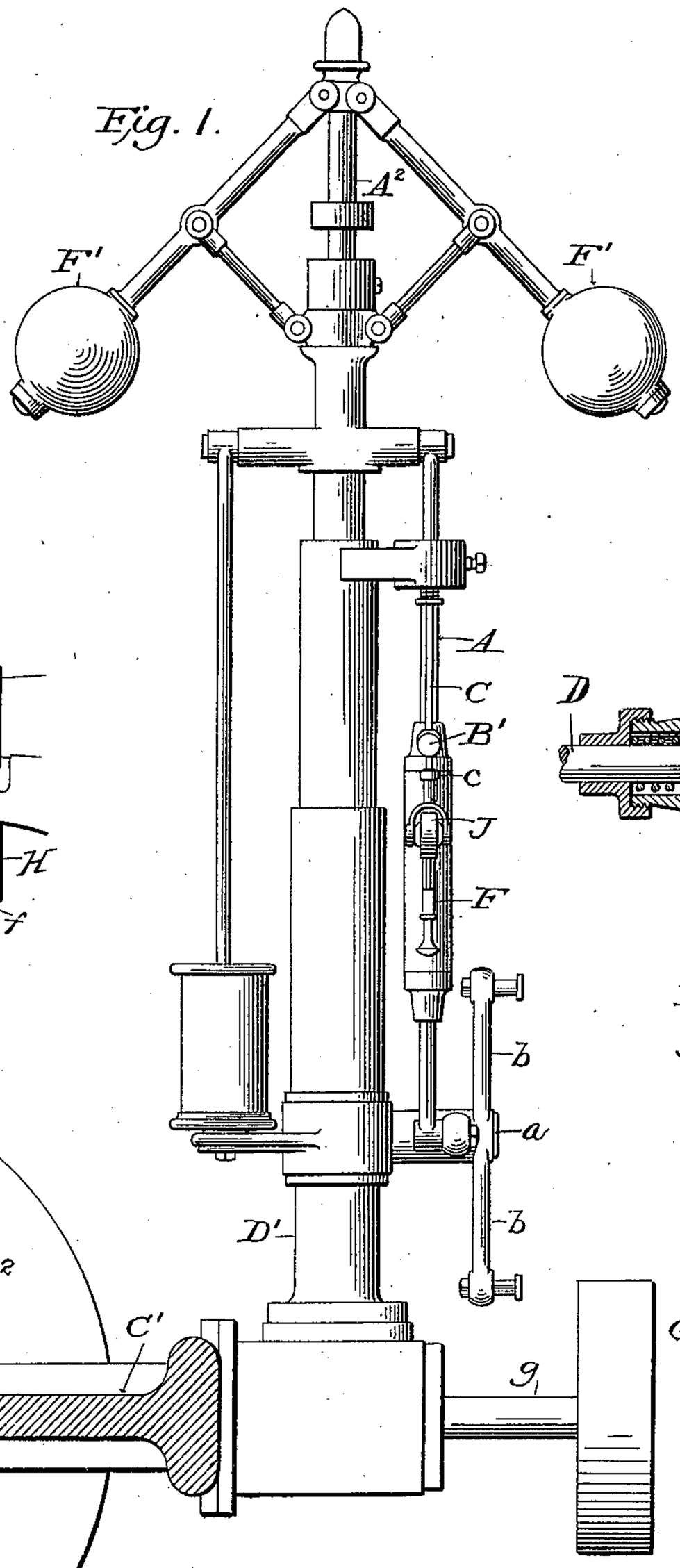


Fig. 6.

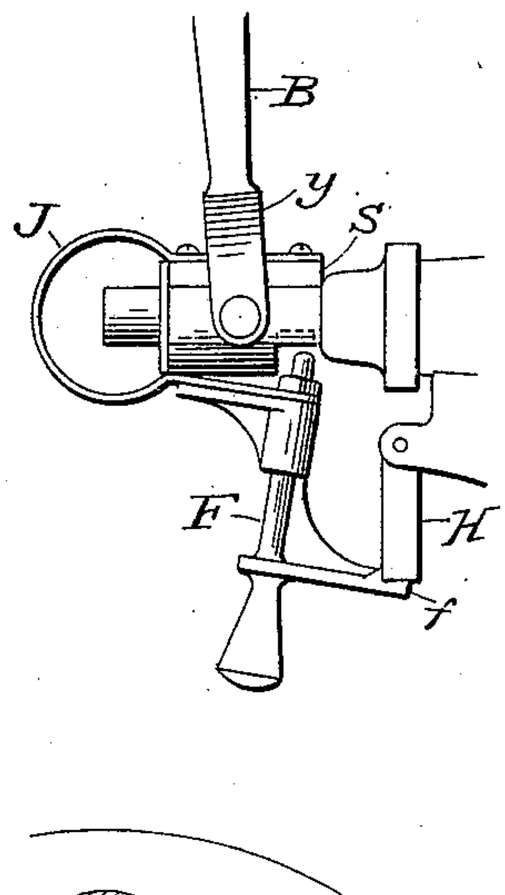
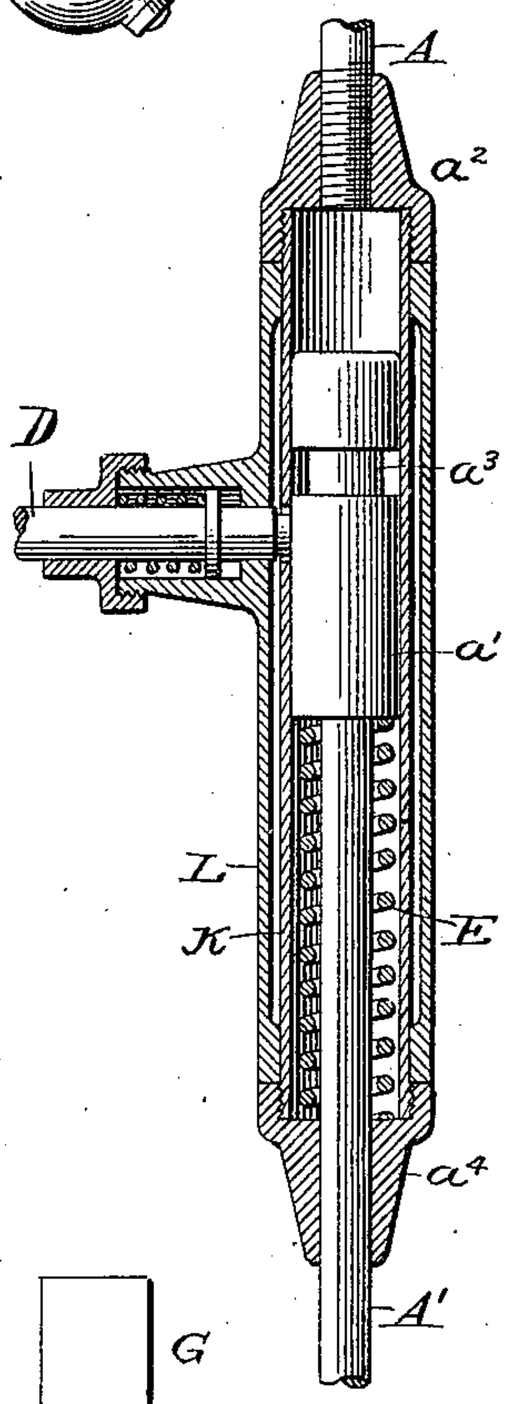


Fig. 7.



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his attorneys.

(No Model.)

3 Sheets—Sheet 2.

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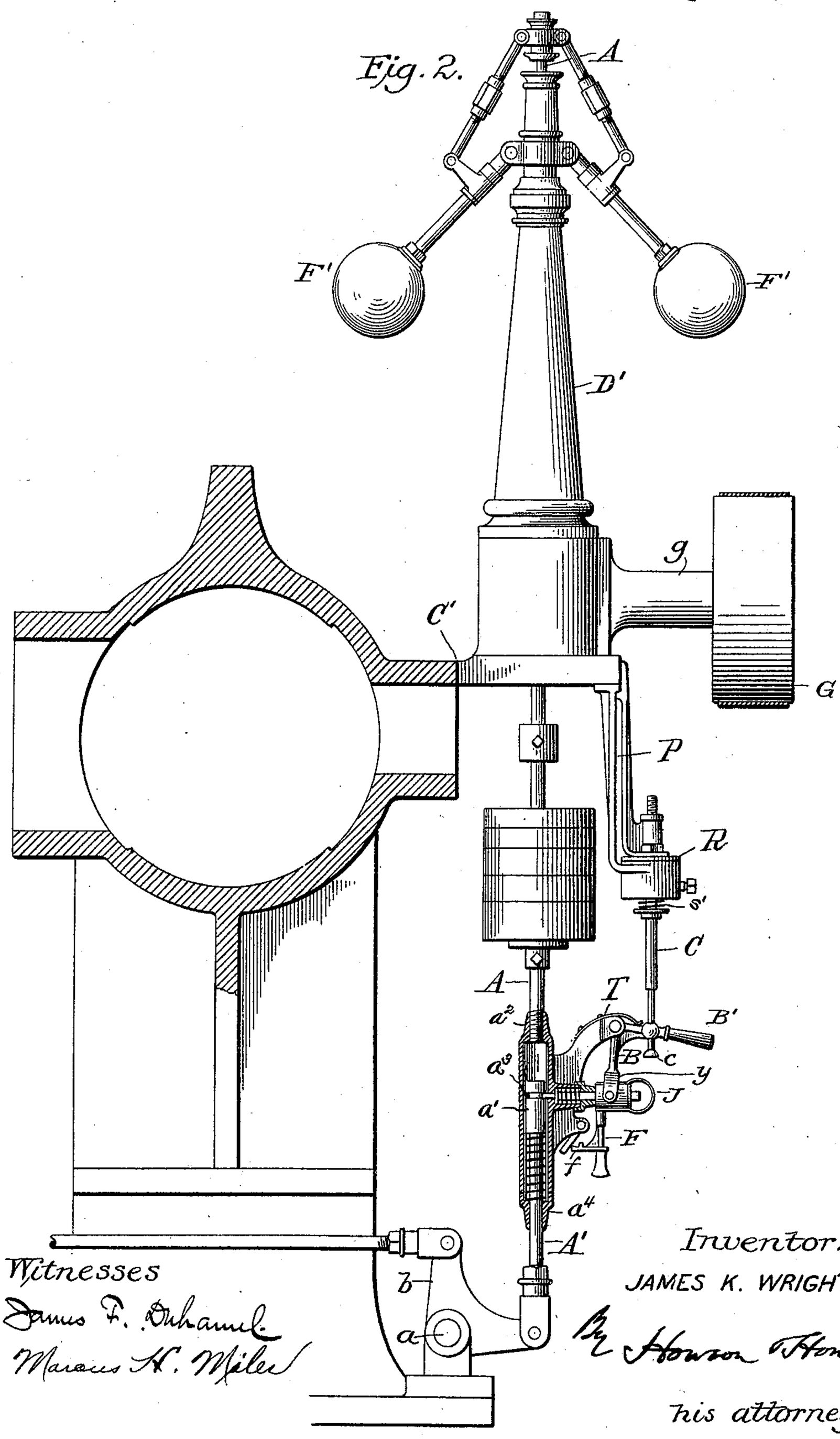
AUTOMATIC SAFETY STOP FOR ENGINES.

No. 602,385. Patented Apr. 12, 1898.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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AUTOMATIC SAFETY STOP FOR ENGINES.

No. 602,385. Patented Apr. 12, 1898.

Fig. 4.

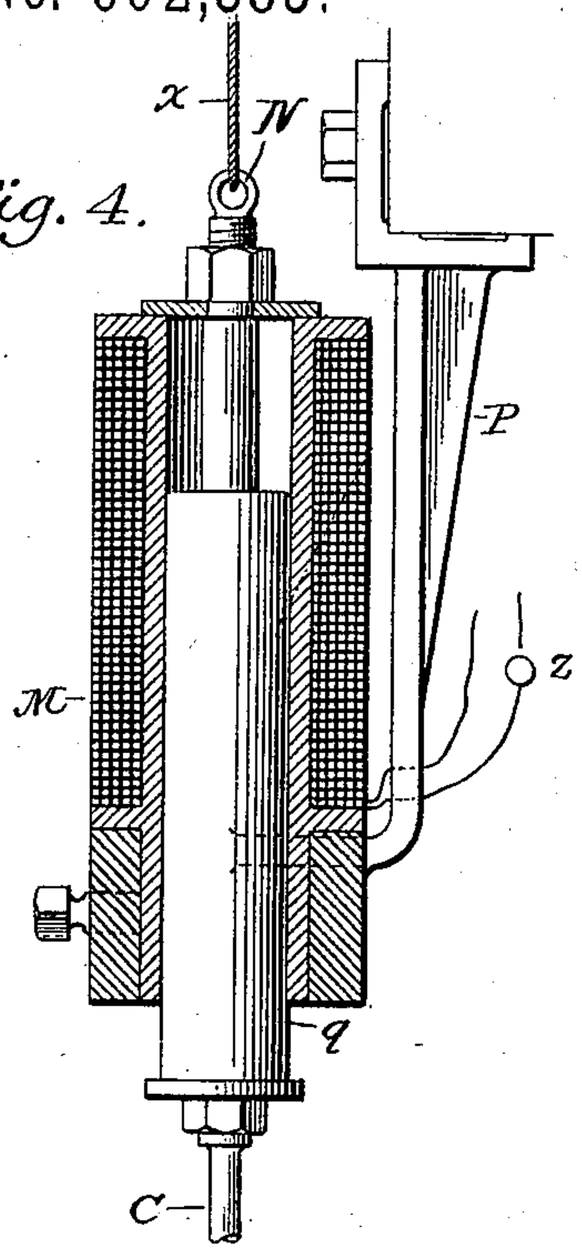


Fig. 3.

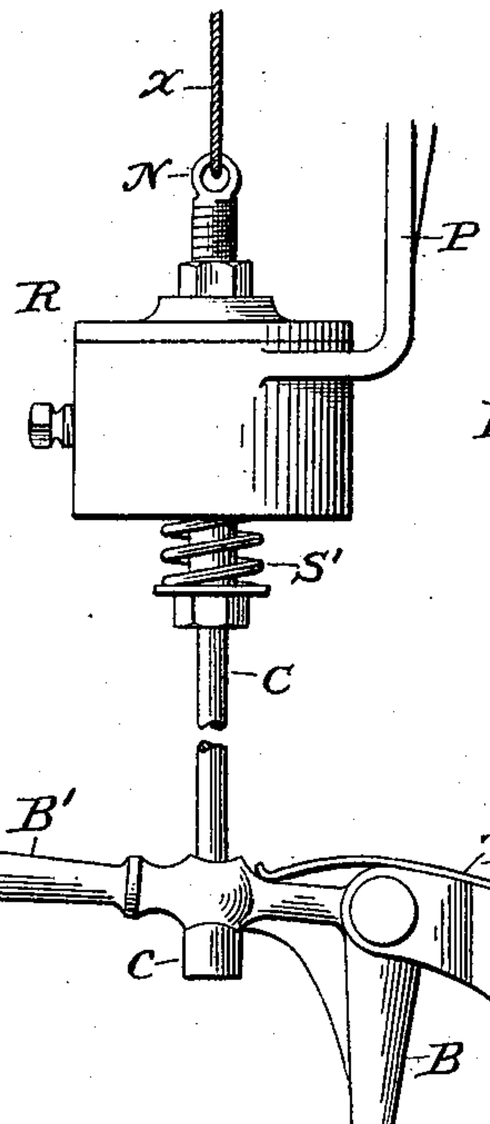
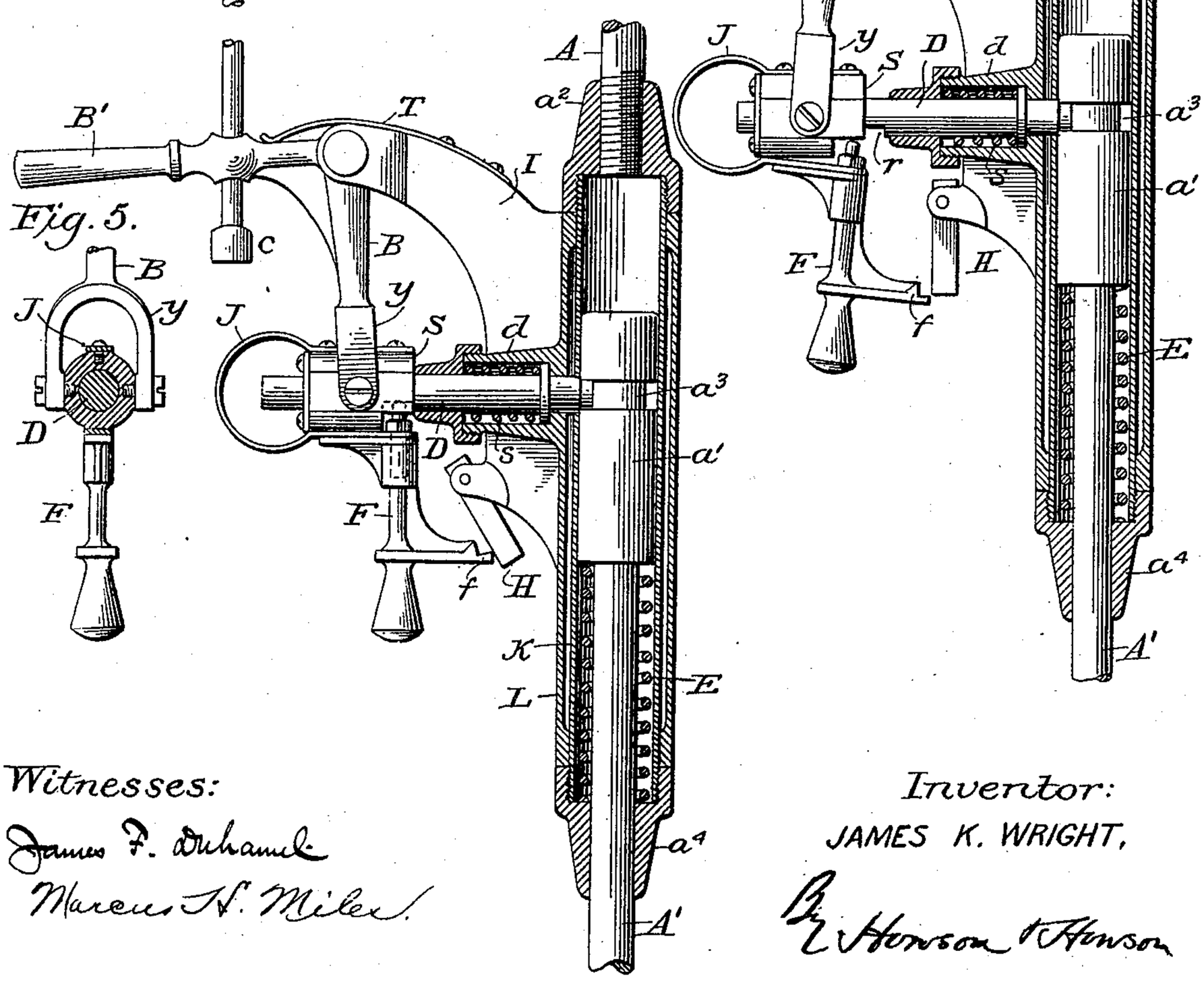


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

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

AUTOMATIC SAFETY-STOP FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 602,385, dated April 12, 1898.

Application filed December 3, 1897. Serial No. 660,659. (No model.)

To all whom it may concern:

Be it known that I, JAMES K. WRIGHT, a citizen of the United States, residing in New York, county and State of New York, have invented an Automatic Safety Stop Device for Engines, of which the following is a specification.

My invention relates to automatic safety stop devices for steam or other motive-fluid engines.

One object of my invention is to provide an automatic stop device for steam or other motive-fluid engines which will operate instantly to shut off the motive fluid through the medium of the governor mechanism when the governor becomes inoperative and the governor-balls fall below their normal plane of operation, my present invention being a modification of my invention as shown, described, and claimed in my pending application, Serial No. 673,913, filed March 15, 1898, in which said pending application I claim the generic features of my invention and that species which is adapted to be operated by governor rods or balls rising above their normal operating positions.

My further object is to provide a device of the character described with means for operating it by hand to shut off the steam, when desired, either at the engine or at some point remote therefrom, and to provide means for locking the device against operation, whereby the engine may be stopped and started by the operator, when desired, without causing the safety stop device to perform its intended function, and, further, to provide such locking means as will be automatically released, so as to set the stop device in operative condition when the engine is started.

My objects are, further, to provide a safety stop device which will be simple in construction and applicable to any engine controlled by a centrifugal ball or equivalent governor and which shall be effective in the performance of its work.

With these objects in view my invention consists in the novel construction and combination of parts and details thereof, as hereinafter described with reference to the accompanying drawings and hereinafter more particularly pointed out in the claims.

In the drawings, Figure 1 is an end elevation of part of a Corliss engine, showing the governor thereof with my invention applied thereto. Fig. 2 is an end elevation of a portion of a Wright engine, showing my invention applied thereto. Fig. 3 is an enlarged detail sectional view of my invention, showing position of parts when adjusted for automatically resetting the stop device for action upon starting the engine. Fig. 4 is a similar view showing the position of the parts when set for action upon starting the engine. Fig. 5 is a sectional detail view. Fig. 6 is a detail view showing position of the parts when set to prevent operation of the stop device when the engine is stopped under ordinary conditions. Fig. 7 is a detail view showing position of parts when stop device has operated to shut off steam or other motive fluid.

While I have shown my invention as applied to two types of engines, it will be understood that my invention is not limited thereto, since it may be applied to other forms of engines as well, and especially to those engines in which the governor-spindle or the governor side rod operates mechanism for controlling the valves to cut off the motive fluid whether such valves be lifting, sliding, oscillating, or rotary valves.

In constructions heretofore employed for shutting off steam from the engine by safety stop devices it has been usually necessary to reset the stop device by hand upon every starting of the engine; but in my construction I dispense with this necessity by the employment of means for automatically resetting the stop for emergencies upon starting the engine, thus dispensing with the intervention of the engineer or operator and avoiding the danger due to carelessness in omitting to set the device in operative condition after it has been thrown out of action. I do not, however, claim herein the broad features of this part of my invention, as they form the subject of claims in my pending application above noted.

Referring to the drawings, in which the same reference characters relate to the same or corresponding parts in all the views, my device is shown in Fig. 1 as applied to the governor side rod A of a Corliss engine, in which B^2 indicates a portion of the engine-frame or cross-head guide, from which ex-

tends a bracket C′, supporting a governor-standard D′, inclosing a governor rod or spindle A^2, carrying the balls F′, the said spindle being operated by the governor-belt passing around the pulley G, mounted on the operating-shaft *g*, which transmits motion to the spindle A^2 in the usual manner. In this form of engine the governor side rod A is usually in one piece, connected to a rock-shaft *a*, carrying arms *b*, operating the steam lifting-toes for the purpose of raising the steam-valves and releasing the same to cut off the steam. By my invention I make this rod divided into two parts or sections, the upper section A terminating in a shell or case L, to which the said upper section is secured. This shell is preferably made with a perforated screw-threaded cap a^2, to which the upper section is secured, and perforated cap a^4, through which the lower section A′ freely passes, and the interior of said shell is preferably provided with a bushing K, secured to the two caps by screw-threads, said bushing forming a guide for the enlarged head *a′* of the lower section.

The lower part or section of the side rod A′ preferably terminates in an enlarged head or plunger *a′*, against which a spring E, confined in the lower part of the case or shell, acts and normally tends to raise the lower section of the said rod and move the same independently of the upper section. The plunger-head is provided with a groove or recess a^3, and the shell or casing is provided with a perforation through which extends a spring-actuated clutch-pin D, projecting normally into the groove a^3 of the plunger-head, said pin being normally pressed into said groove by means of a spring *s*, confined in a recess in a bracket *d*, forming part of or secured to the shell or casing, as shown more fully in Figs. 3 and 4.

The lower section of the side rod is connected to the cut-off-valve-actuating mechanism through the medium of the rock-shaft *a* and its arms *b*, and when the two sections are locked together by the clutch-pin F entering the groove or recess a^3 the said two parts transmit the movements of the governor-spindle to the said cut-off-valve-operating mechanism under the ordinary conditions of working. When, however, the governor-balls become inoperative and fall below the normal plane of operation, the clutch-pin is withdrawn from the governor by means of the bell-crank lever B B′, fulcrumed on the bracket I, carried by the shell L, and moving with the governor-rod. The upper arm B of the said lever is provided with a perforation or projection or other suitable device adapted to engage a shoulder or nut *c*, carried by the stop-rod C, suitably supported from above or below, according to the construction of engine, the said stop-rod in the present case being shown as adjustably supported by screw-threaded attachment with a suitable bracket P from above. The stop-rod is adjusted in the desired position and normally held stationary in said position, so as to cause the arm of the bell-crank lever to engage the stop shoulder or nut on the lower end thereof when the governor-balls fall below the normal working plane.

The lower arm B of the bell-crank lever is connected with the clutch-pin D, so that when the governor-rod falls below the lowest position of normal working the bell-crank lever, coming in contact with the stop *c*, will be moved, thereby withdrawing the pin from the groove in the plunger-head, thus releasing the lower section of the side rod from the shell or casing and permitting the lower section of the side rod to move upward with respect to the upper section, thereby moving the cut-off mechanism so as to place the steam lifting-toes out of action, thus preventing the steam-valves from movement and instantly shutting off the supply of steam.

It will be understood that when the stop device has operated to cut off the steam and the sections of the rod or spindle have become separated these sections may be locked together again by moving the lower section so as to compress the spring E and bring the groove or recess a^3 in alinement with the clutch-pin D, which will enter said groove or recess under pressure of the spring *s*.

It will be observed that I have described a bell-crank lever B B′ as connected to the pin D, and such construction may be made directly with the pin, as will be readily understood; but in order to avoid the annoyance of having to reset the device every time the engine is stopped under ordinary running conditions I propose to make the connections between the bell-crank lever and the clutch-pin separable and controlled by an automatic catch in such manner that the connection between the bell-crank lever and the pin may be disengaged or released, so that the movement of said lever for stopping the engine will be effected without moving the pin, thus preventing the separation of the two sections of the governor side rod or spindle, and to insure the resetting of the device for emergencies, irrespective of the attention of the operator, I provide means that will automatically reset the device immediately upon the starting of the engine, thus guarding against the danger due to carelessness in omitting to set the device for operation. With this object in view I preferably connect the lower arm of the bell-crank lever with a sleeve S, slidably mounted upon the pin D, the said arm of the bell-crank lever being preferably provided at its lower end with a yoke *y*, pivotally connected to the sleeve.

Mounted on the sleeve is a locking-pin F, provided with a suitable handle, the said pin being yieldingly connected to the said sleeve by a suitable spring, such as the flat spring J, which normally tends to push the locking-pin toward the sleeve, through which said pin projects into contact with the clutch-pin D. The

clutch-pin itself is provided with a recess *r*, into which recess the locking-pin F projects for the purpose of connecting the sliding sleeve with the pin D. In this position the device is in its operative condition, so that any upward movement of the bell-crank lever will cause the pin D to be retracted from the groove in the lower section of the governor-rod against the pressure of the spring *s*, as shown in Fig. 7.

Pivotally supported on the bracket of the shell or casing L is a catch H, which is adapted to engage a notch in the end of a horizontal projection *f* on the locking-pin F when the latter is drawn out of engagement with the recess *r*, thus holding the locking-pin F free from the pin D and releasing the sliding sleeve from said pin, so that if the engine is stopped by the engineer under ordinary running conditions the governor-balls fall naturally to their lowest point and cause the upper arm of the bell-crank lever to come into contact with the stop, and the bell-crank lever will be moved, thereby sliding the sleeve S upon the pin D away from the case or shell without disturbing the clutch-pin D, and at the same time the locking-pin F will be moved away from and out of engagement with the catch H. When the engine is started again, the balls will rise, moving the side rod upward and thereby moving the bell-crank lever out of contact with the stop, whereupon the spring T, mounted on the bracket carrying the bell-crank lever and engaging the upper arm of said lever, will move said arm downward, causing the sliding sleeve S to be moved toward the shell or casing, carrying with it the locking-pin F, until it again engages the recess *r* in the locking-pin D under the action of the spring J, thus setting the device for operation.

It will be observed that the upper arm of the bell-crank lever is provided with a handle extension, so that the bell-crank lever may be instantly operated by a touch of the handle when it is desired to operate the device at the engine.

It will be seen that by interposing a device for resetting the releasing mechanism automatically upon the starting of the engine whenever the engine is stopped under ordinary conditions I insure greater certainty and safety in the operation of my device, and I regard this as an important feature of my invention.

In order to operate the device from any convenient point either in the engine-room or other accessible place, I provide means for raising the stop-rod C until it engages the bell-crank lever to release the clutch-pin from the rod-sections. This means may consist either of electrically-operating devices or a hand-operating device, the former of which I have shown in Fig. 4 and the latter in Fig. 3, or both such means combined together.

Referring to Fig. 4, it will be seen that I provide for electrically operating the device by the use of an electromagnet M of suitable construction, the coil of which is supported upon the bracket P and the core of which is formed by the upper portion of the stop-rod, which normally rests in its lowest position. This core may be formed separate from or integral with the stop, as desired, and I have shown it as a separate iron core *q*. The wires from the coil are led to the point desired, and the electrical circuit is made and broken by means of a suitable switch or push-button *z*, so that when the circuit is closed by said switch or push-button the magnetic coil is energized, thereby drawing the core upward into the magnetic field of force, raising the stop into contact with the bell-crank lever and lifting the same. The upper end of the stop-rod projects beyond the coil and may be provided with a ring N, which may be connected by chain or rope *x*, led to any suitable point, so that the stop can be raised by hand in the event of failure of the electrical device.

In Fig. 3 I have shown the stop-rod provided with a ring N and passing through a flanged bushing R, supported in a boss on the bracket P, and a spring S′ is confined between a shoulder on the stop-rod and said bushing, normally tending to push the stop-rod down to its lowest position. This spring is not needed when the electrical device is used, as the weight of parts in such construction is sufficient to keep the stop-rod normally stationary. A chain or rope *x* is led over suitable pulleys to the point desired and is provided at its end with a handle for operating the same.

In Fig. 2 I have shown my device as applied directly to the governor-spindle, the construction and mode of operation being exactly the same as in its application to the side rod of the governor and needs no other detailed description herein further than to mention the fact that this figure illustrates the application of the device to a Wright engine or any engine of the type in which the governor-spindle is connected directly to the mechanism for operating the cut-off-valve gear.

What I claim as my invention is—

1. In an automatic safety device, the combination with the governor, of a rod or spindle made in two sections, and independently movable with respect to each other, one of which sections is connected with the governor and the other with the valve-operating mechanism, means for connecting the two sections together, and mechanism operated by the falling of the governor-balls below the normal plane to release said connecting means, thereby separating the two sections of the spindle or rod, substantially as described.

2. The combination with a divided governor side rod, a shell or casing carried by the upper section thereof, the lower section freely moving within said shell, a clutch-pin normally locking the two sections together, a stationary stop, a connection between said stop and clutch-pin for retracting the pin

when the governor-balls fall below the normal plane, and separating the two sections of the rod, substantially as and for the purpose set forth.

3. The combination of a divided governor-rod, the upper section provided with a shell, and a lower section having an enlarged head working in said shell and provided with a recess or groove therein, a pin slidably mounted on the shell and normally in engagement with the said recess or groove, thereby locking the two sections together, a lever fulcrumed on the shell and connected to the pin, a stationary stop adapted to engage one arm of the lever to operate the same and withdraw the pin when the governor falls below the normal plane, substantially as described.

4. The combination with a governor rod or spindle, having an upper and a lower section movable in respect to each other, a clutch device normally locking the two sections together, means for causing the clutch device to release the sections when the governor-balls fall below the normal plane, and means for preventing the operation of said clutch device as the engine is stopped, when desired.

5. The combination with a governor rod or spindle, having an upper and a lower section movable in respect to each other, means for causing said clutch device to release the sections when the governor-balls fall below the normal plane, and means for preventing the operation of said clutch device upon stopping the engine under ordinary conditions, and means for automatically resetting the device for emergencies, upon starting the engine.

6. The combination with a divided governor-rod consisting of an upper section having a shell or casing, a lower section working freely therein, a spring mounted in the shell or casing and connected with the lower section and normally tending to raise the same upward, a clutch for locking the two sections together, a lever having one arm adapted to be connected to said pin, a stop adapted to engage the other arm of said lever when the governor-balls fall below the normal plane, and means for separately connecting the lever and clutch-pin so that they may be caused to move together or the pin allowed to remain stationary as the lever is moved.

7. The combination with a divided governor rod or spindle consisting of an upper section and a lower section, a pin for connecting the two together, a stop and connections between said stop and pin for operating the same when the governor-balls fall below the normal plane, and means for rendering said connections inoperative when desired to stop the engine under ordinary running conditions.

8. The combination with a divided governor rod or spindle consisting of an upper section and a lower section, a pin for connecting the two together, a stop and connections between said stop and pin for operating the same, when the governor-balls fall below the normal plane, means for rendering said connections inoperative when desired to stop the engine under ordinary conditions, and means for automatically resetting the device upon the starting of the engine.

9. The combination with the governor, and the valve-operating mechanism of a steam-engine, connections between said governor and valve mechanism, of mechanism for releasing said connections when the governor becomes inoperative, and locking devices interposed between said releasing mechanism and valve connections, whereby said connections may be locked against release, when it is desired to stop the engine under normal conditions.

10. The combination with the governor and the valve-operating mechanism of a steam-engine, connections between said governor and valve mechanism, of mechanism for releasing said connections when the governor becomes inoperative, a locking device interposed between the releasing mechanism and valve connections, and means for automatically releasing said locking device so as to set the releasing mechanism for action upon the starting of the engine.

11. In an automatic safety stop device for engines, the combination with the valve mechanism and governor, of a rod comprising two sections, one connected to the governor and the other to the valve mechanism, connections between said sections normally securing them together, means for releasing said connections to separate the sections when it is desired to cut off the steam, a stop-rod adapted to engage said releasing mechanism to effect the release of said connections, a magnetic coil around a portion of said rod, and means for closing an electric circuit through said coil to energize the same and draw the rod within the field of force of said coil, substantially as described.

12. In an automatic safety stop device for steam-engines, the combination with the governor and valve mechanism, of a rod comprising two sections, one connected to the governor and the other to the valve mechanism, connections between said sections normally securing them together, means for releasing said connections to separate the sections when it is desired to cut off the steam, a stop-rod having a rope or chain connected thereto at its upper end and adapted to engage said releasing means to effect the release of said connections, a magnetic coil around a portion of said rod, and means for closing an electric circuit through said coil.

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

JAMES K. WRIGHT.

Witnesses:
CHARLES S. KOHLER,
JOHN F. KOHLER.