

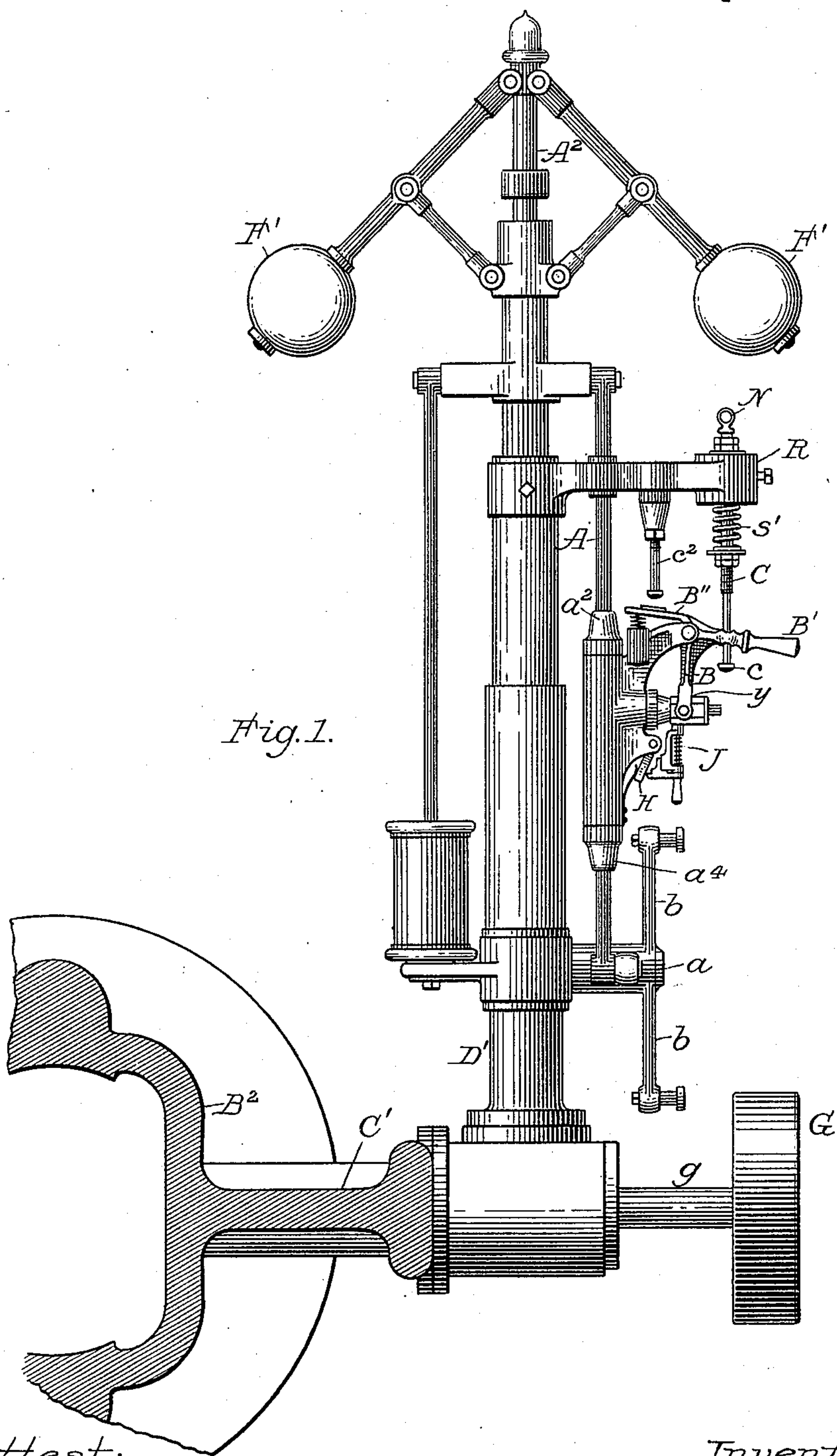
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3 Sheets—Sheet 1.

J. K. WRIGHT.
AUTOMATIC SAFETY STOP DEVICE.

No. 602,384.

Patented Apr. 12, 1898.



Attest:
M. H. Miles.
Grenville Lewis, Jr.

Inventor:
James K. Wright.
By Howson & Howson,
his Attys

(No Model.)

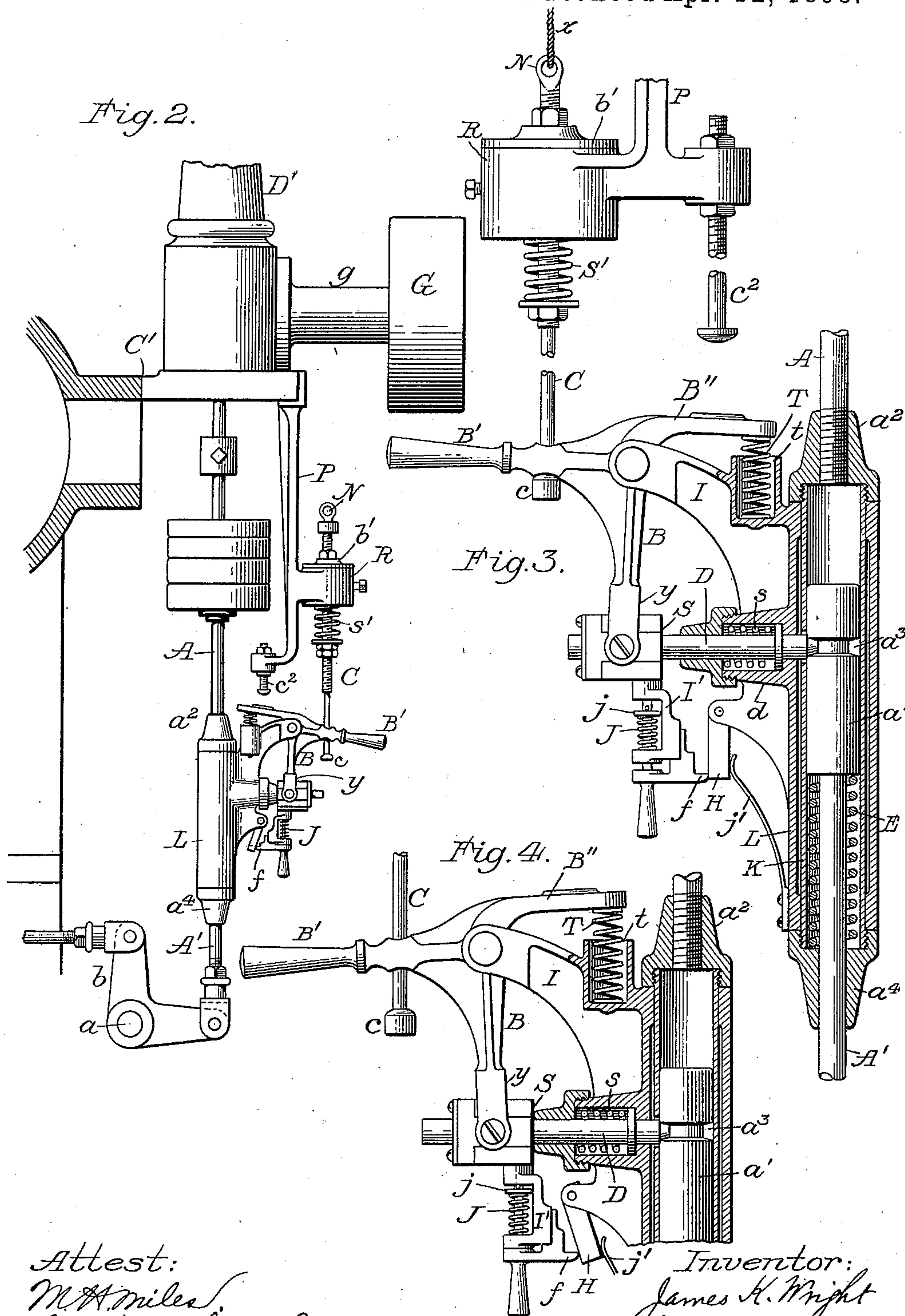
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Fig. 2.



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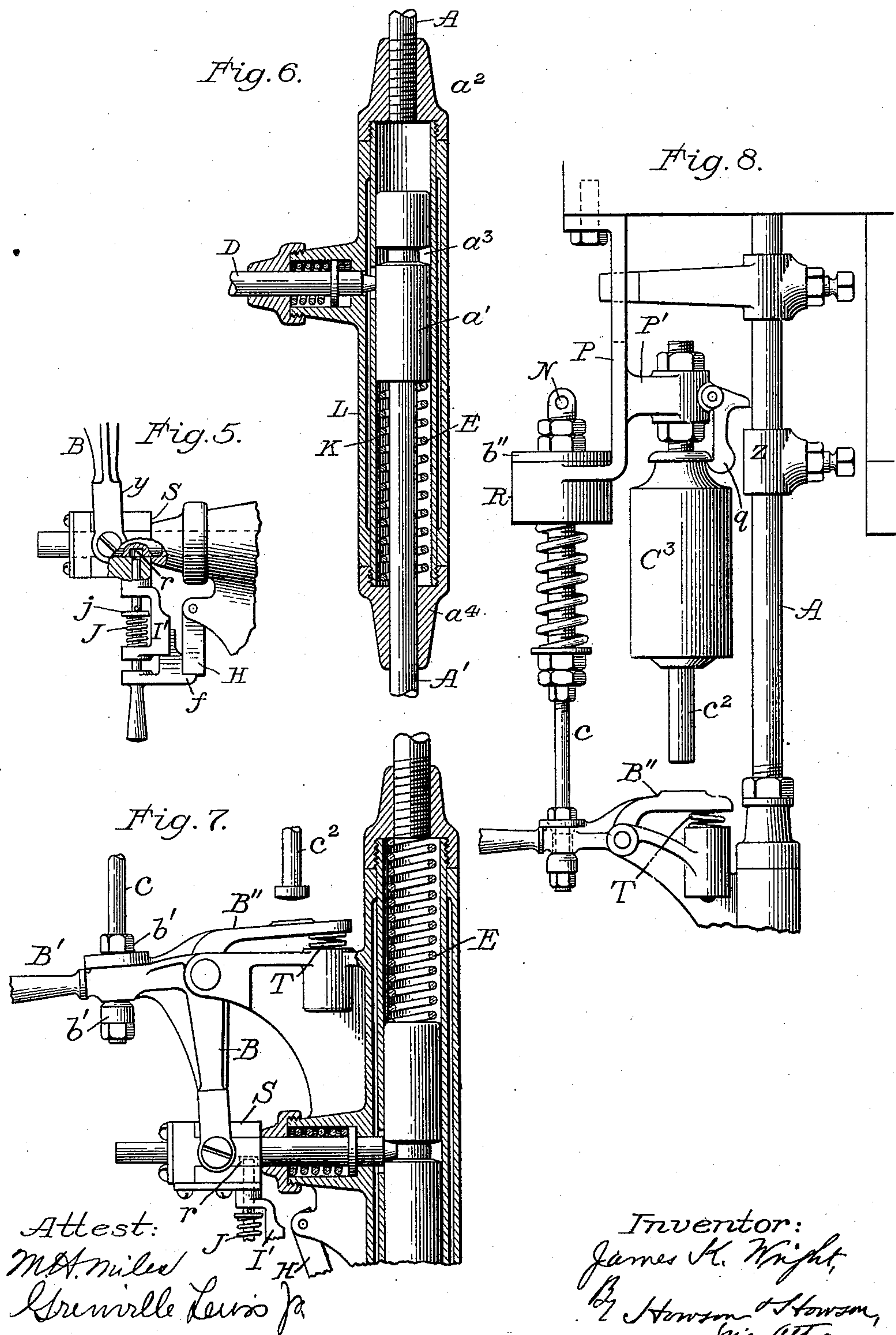
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UNITED STATES PATENT OFFICE.

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

AUTOMATIC SAFETY STOP DEVICE.

SPECIFICATION forming part of Letters Patent No. 602,384, dated April 12, 1898.

Application filed March 15, 1898. Serial No. 673,913. (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 certain new and useful Improvements in Automatic Safety Stop Devices, 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-engines which will operate instantly to stop the engine either whenever the speed of the engine is increased beyond the regulated speed or limit of safety or when the governor becomes inoperative to further control the speed of the engine, so that the steam will be instantly shut off whenever the governor-balls move away from the normal operating planes, causing the governor-spindle to rise or fall abnormally.

Further objects of my invention are to provide means for locking the device against operation when desired and means for automatically releasing such mechanism on starting the engine, so that the stop device may always be in operative condition when the engine is running.

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 either upon the rise or fall of the governor-spindle beyond its normal working points.

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 a similar view 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 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. 6 is a detail view showing position of parts when the stop device has operated to shut off steam or other motive fluid. Fig. 7 is a sectional view of a modification. Fig. 8 is a similar view of a further modification.

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.

It has been usually necessary in constructions heretofore employed for shutting off motive fluid from the engine by safety stop devices to reset the stop device by hand, but by my invention I dispense entirely with this necessity by the employment of automatically-operated means for this purpose, thus dispensing entirely with the intervention of the engineer or operator and avoiding an element of danger.

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-rod A of a Corliss engine, in which B² indicates a portion of the engine-frame or cross-head guide, from which extends a bracket C', supporting a governor-standard D', inclosing a governor rod or spindle A², 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 A² 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 arm b , and when the two sections are locked together by the clutch-pin 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 or rise above the plane of operation for the maximum speed, the clutch-pin is withdrawn from the governor-rod by means of the three-armed bell-crank lever B B' B'', fulcrumed on a bracket I, carried by the shell L and moving with the governor-rod. One of the upper arms 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, while the other upper arm B'' extends in the opposite direction from the fulcrum of the lever and is normally pressed upward by a suitable spring T, preferably seated in a socket t in the bracket I, and is adapted to engage the stop-rod C² whenever the balls rise above their normal plane, thus causing the governor rod or spindle to rise, carrying with it the bell-crank lever and bringing the arm B'' into contact with the stop C², whereby the said arm B'' is moved downwardly against the pressure of the spring T and causing the withdrawal of the clutch-pin D, as before described.

The rod C is 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 or provided with a nut

or flanged washer b'' , seated on the bushing R, supported in the boss on the bracket P, as shown in the drawings. This stop-rod is adjusted in the desired position and normally held stationary in said position, so as to cause the arm B' 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, as before indicated, and the rod C² is similarly adjusted, so as to operate the lever when the governor-rod rises. The rod C or C² may have a ring N on its upper end for the attachment of a chain or rope leading to any convenient point for hand operation.

Various changes in the location and arrangement of the stop may be made without departing from the spirit of my invention. For example, instead of permitting the rod to play loosely through the arm B', as shown in Fig. 3, the said rod may be made fast to the said arm by suitable nuts B', so that when the governor-rod moves up and down the stop-rod similarly moves, and the nut or washer b'' on the top of the rod coming in contact with the bushing R as the rod falls below its normal position of working will operate the lever B B' B'', so as to withdraw the clutch-pin. This form may be advantageously used in case of long range of governor when the end of stop-rod might otherwise interfere with the clutch mechanism when the governor-spindle is at its highest point.

In Fig. 8 I have shown a further-modified form which it is desirable to use on engines when the cut-off mechanism requires more power than ordinarily required, thereby necessitating the employment of a very stiff operating-spring for the clutch mechanism. In such cases the clutch-pin requires more force to move it for liberating the two sections, and if this be required of the governor-spindle while it is rising an increased speed of governor, and hence of the engine, is necessary before sufficient force is exerted to liberate the sections of the rod. This increase is, however, obviated by making the stop in the form of a suitable weight C³, supported in place on a bracket P' by a catch q , which is adapted to be engaged by the tappet-arm z on the upper section A of the governor-rod as the latter rises, thereby permitting the weight to fall just before the arm B'' reaches it, the impact of the weight against said arm being sufficient to instantly effect the proper movement of the lever-arm to release the clutch-pin.

The lower arm B of the bell-crank lever is connected with the clutch-pin D, so that when the governor-rod moves away from the position of normal working the bell-crank lever, coming in contact with the stop c or C², 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' 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 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 in a bracket I' 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 J, acting against a collar j on the pin, which spring 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 to be retracted from the groove in the lower section of the governor-rod against the pressure of the spring s.

Pivotally supported on the bracket of the shell or casing L is a spring-actuated catch H, which is adapted to engage a notch in the end of a horizontal projection f on the locking-pin F, toward which the said catch is pressed by a spring j' 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 in 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.

In the modification Fig. 7 I have shown a spring E' above the lower governor-rod section, the purpose of which is to cause the lower rod-section to fall farther down, when the device operates, than usual, thus rendering this form specially applicable to those engines employing special cams for releasing the valve mechanism.

I do not claim in this application the specific form of my invention as applied to a governor falling below the normal plane of action, as that forms the subject of my pending application, filed December 3, 1897, Serial No. 660,658; but I do claim herein the broad features of my invention, consisting of a governor rod or spindle made in two sections, with means for connecting the two sections together and means for releasing said sections when the governor moves away from the normal planes of action either by rising or falling governors, and, further, I claim herein the specific application of this broad feature to a rising governor-rod, whereby the stop device is operated to shut off the motive fluid when the speed of the engine is increased beyond the limit of safety, and I also claim, broadly, herein the mechanism for preventing the operation of the device when desired, with the mechanism for automatically resetting the stop device upon starting the engine, as set forth in the claims following this description, my pending application above specified being limited solely to the specific form of my invention as applied to a falling governor-rod when the governor itself becomes inoperative as the balls fall below their normal planes.

In this specification and in the claims appended by the term "movement away from the normal planes of action and operation" I mean to include those cases, first, when the governor-balls become inoperative and fall below the point where they are effective to control the speed, and, second, when the governor-balls, owing to increased speed approaching to or beyond the regulated limit of safety, rise above their normal point for maximum speed, no matter what may be the cause.

I claim as my invention—

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 movement of the governor-balls away from the normal plane to release said connecting means, thereby separating the two sections of the spindle or rod, substantially as described.

2. 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 rising of the governor-balls above the normal plane of operation for maximum speed to release said connecting means, thereby separating the two sections of the spindle or rod, substantially as described.

3. The combination with a divided governor-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 stop, a connection between said stop and clutch-pin for retracting the pin when the governor-balls rise above the normal plane of operation for the maximum speed, and separating the two sections of the rod, substantially as and for the purpose set forth.

4. 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 stop adapted to engage one arm of the lever to operate the same and withdraw the pin when the governor rises above the normal plane of operation for the maximum speed, substantially as described.

5. 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 move away from the normal planes of operation, and means for preventing the operation of said clutch device as the engine is stopped, when desired.

6. 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 move away from the normal planes of operation, 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.

7. 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 and casing and connected with the lower section and normally tending to separate the sections, 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 move away from the normal planes of operation, and means for separably 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.

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, two stops, and connections between said stops and pin for operating the same, when the governor-balls move away from the normal planes of operation, and means for rendering said connections inoperative when desired to stop the engine under ordinary running conditions.

9. 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, two stops and connections between said stops and pin for operating the same, when the governor-balls move away from the normal planes of operation, 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.

10. The combination with the governor, and the valve-operating mechanism of the steam-engine, connections between said governor and valve mechanism, of mechanism for releasing said connections when the governor-balls move away from the normal planes of operation, 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.

11. 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-balls move away from the normal planes of operation, 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.

12. In an automatic stop device for engines, the combination with the governor, of a divided rod consisting of two sections, one section being connected to the governor and the other section to the valve-operating mechanism of the engine, a clutch-pin for locking the sections together, a sleeve slidably mounted on said pin, a lever having an arm connected to said sleeve, a stop with which said arm is adapted to engage, a locking-pin for locking the sleeve and clutch-pin together, and a catch adapted to engage and hold said pin out of engagement with the clutch-pin, substantially as described.

13. In an automatic safety stop device for engines, the combination with the governor, of a rod consisting of two sections, one of said sections being connected with the governor and the other to the valve mechanism, a clutch-pin for locking the two sections together, a sleeve slidably mounted on said clutch-pin, a lever having an arm connected to said sleeve, a stop with which said arm is adapted to engage, a locking-pin for locking the sleeve and clutch-pin together, a catch for holding said locking-pin out of engagement with the clutch-pin, and means for causing the locking-pin to engage the clutch-pin when the engine is started, substantially as and for the purpose set forth.

14. In an automatic safety stop device for engines, the combination with the governor, of a rod consisting of two sections, one of said sections being connected with the governor and the other with the valve mechanism, a clutch-pin for locking the two sections together, a sleeve slidably mounted on said clutch-pin, a lever connected to said sleeve, a spring normally pressing one arm of said lever upward, thereby normally locking the two sections of the rod together, and a stop adapted to engage said arm when the governor-balls rise above the plane of maximum speed, and thereby cause the clutch-pin to release the two sections, substantially as described.

15. In an automatic safety stop device for engines, the combination with the governor, of a rod consisting of two sections, one of said sections being connected with the governor and the other with the valve mechanism, a clutch-pin for locking the two sections together, a sleeve slidably mounted on said pin, a lever having one arm connected with said pin, a spring normally engaging the other arm of said lever and normally causing the clutch-pin to lock the two sections of the rod together, a stop-weight located above said spring-actuated arm, and means for releasing said weight as the rod rises above its normal position, whereby the weight falls upon said arm, 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:

CHAS. W. MILLARD,
FREDERICK KELLER.