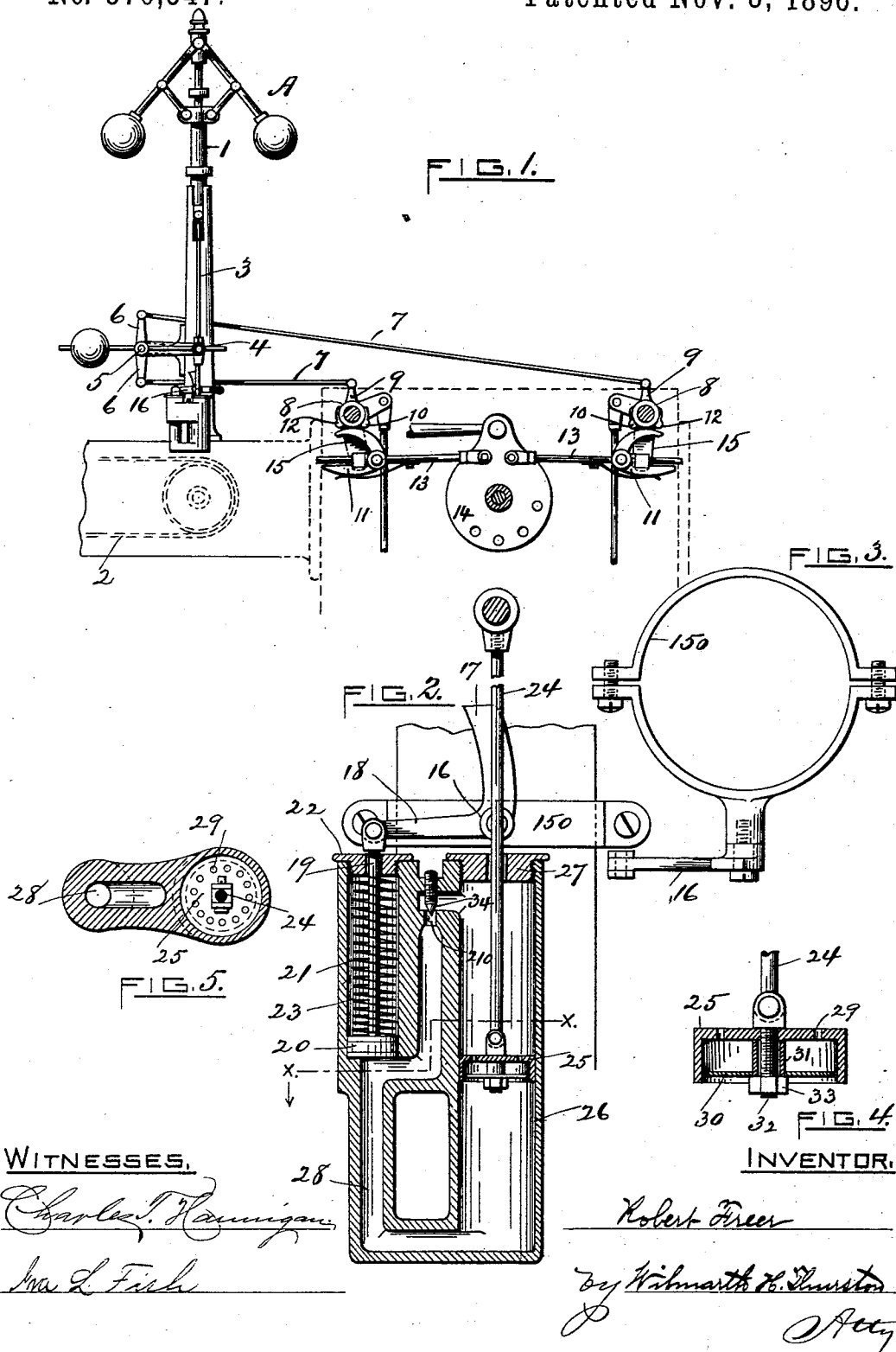


(No Model.)

R. FREER.
ATTACHMENT FOR STEAM ENGINES.

No. 570,547.

Patented Nov. 3, 1896.



WITNESSES,

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ATTACHMENT FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 570,547, dated November 3, 1896.

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To all whom it may concern:

Be it known that I, ROBERT FREER, of Providence, county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Attachments for Steam-Engines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming part of the same, to be a full, clear, and exact description thereof.

Many of the steam-engines now upon the market are provided with safety devices whereby the admission of steam to the cylinder is prevented in case of accident to the governor, or to the mechanism which actuates it, and in most, if not all, such engines the safety devices are thrown into operation by the falling of the governor-balls to their lowest position, and since the engine cannot be started with the safety device in operation, and since said devices are thrown into operation whenever the governor-balls fall to their lowest position, it is customary to provide a stop or dog, which can be set by the engineer before stopping the engine, for arresting the fall of the governor-balls and thus preventing the operation of the safety devices. The stop as above described, which is usually in the form of a pin inserted in the governor-standard, requires the attention of the engineer both when stopping and when starting the engine, for if the stop is not placed in position before stopping the engine the safety devices will be operated and the engine cannot be started until the said devices are moved out of operative position, and on the other hand, if the stop is not removed after starting the engine the governor-balls will not fall a sufficient distance to operate the safety devices in case of accident, and the safety devices are thus rendered useless.

It is the object of the present invention to provide a stop for use on engines of the class referred to which shall be perfectly automatic in action and therefore require no attention from the engineer, thus relieving him of the duty of adjusting said stop either in stopping or starting the engine, and avoiding all danger of accident due to his failure to remove the stop on starting the engine.

To that end the invention consists of a stop for arresting the fall of the governor and

means controlled by the governor for automatically moving said stop into and out of operative position.

The invention further consists in the features and combinations hereinafter described and claimed.

The present invention may be applied to any of the engines of the class referred to now in common use, and in the drawings one embodiment of the said invention is shown applied to one of the common forms of Corliss engines.

Referring to the drawings, Figure 1 is an elevation of so much of the governor mechanism of a Corliss engine as is necessary to illustrate the manner of applying the present invention. Fig. 2 is a sectional view of the means for operating the stop. Figs. 3 and 4 are detail views; and Fig. 5 is a section on line *x x*, Fig. 2.

A represents the governor, which is connected to the sleeve 1 in the usual manner, so that said sleeve is reciprocated by the rise and fall of the governor-balls, said balls being rotated by means of the belt 2 in the usual manner. The rod 3 connects the sleeve 1 to the end of an arm 4, secured to the rock-shaft 5, which also has secured to it the arms 6. The arms 6 are connected to the sleeves 8 by the rods 7, which are pivoted to the ends of said arms and to the ends of arms 9, extending from sleeves 8. The sleeves 8 carry the toes or cams 10, which regulate the detachment of the valves by acting on the latches 11 in the usual manner. The sleeves 8 also carry the usual safety toes or cams 12, which, when the governor-balls fall to their lowest position, are moved by the connections above described into position to hold the latches 11 out of operation, and thus prevent the opening of the valves. The latches 11 are pivoted to the rods 13, extending from the rock-plate 14, and operate the valves through the arms 15, secured to the valves in the usual manner.

In engines constructed as above described it has been usual to insert a pin in the governor-standard in the path of the arm 4 when the engine was to be stopped, so that the fall of the governor-balls would be arrested before the safety-toes were in position to engage the latches, and to withdraw this pin after the engine was started, so that the governor-

balls would be free to fall to their lowest position should any accident happen to the governor or its actuating means. The proper operation of the safety devices therefore depended on the attention of the engineer.

With the present invention the proper operation of the safety devices is insured without any attention on the part of the engineer, and this result is accomplished by the substituting for the stop or pin above mentioned a stop which is automatically thrown into and out of position, and one form of such stop will now be described.

Pivoted to a clamp 150, secured to the governor-standard, is a bell-crank lever 16, having the end 17 of one arm arranged in the path of the arm 4 and forming a stop for limiting the downward movement of said arm. The end of the other arm 18 of said lever 16 is pivotally secured to a rod 19, which is secured to a piston 20, working in a cylinder 21. The upper end of the cylinder 21 is closed by a screw-plug 22, through which the rod 19 works, and a spring 23 is inserted in said cylinder between said plug and the piston 20, and serves to hold said piston in the lower end of said cylinder, as shown in Fig. 2. Pivoted to the arm 4 is a rod 24, which is pivoted at its lower end to a piston 25, fitted in a cylinder 26, which has its upper end closed by a screw-plug 27, through which rod 24 passes. The piston 25 is provided with a series of openings 29, which are closed on the downward stroke of the piston by the valve-disk 30, which slides on a sleeve 31, depending from the piston and held in place by the bolt 32 and nut 33, said nut serving also to support the disk 30. The cylinders 21 and 26 communicate with each other through a passage 28, which enters said cylinders below the pistons 20 and 25.

If an escape for the fluid in front of the piston 25 were not provided, any downward movement of said piston would force the piston 20 upward and operate the stop 17; but since said stop should not be operated under normal conditions, an escape for the fluid in cylinder 26 is provided, and when a liquid is not used in cylinder 26 said escape may be located at any point forward of the piston 25 or in said piston. When a liquid is used, however, it is preferred to make said escape in the form of a passage, which communicates with the cylinder 26 on opposite sides of the piston 25, so that the liquid escaping through said passage may remain in or be returned to said cylinder. Said passage may be formed in the piston 25, as, for instance, by so constructing the disk 30 that it shall not cover one or more of the holes 29, but it is preferred to have said passage lead from one end of the cylinder 26 to the other end thereof, as shown in the drawings. It is also preferred to provide means for regulating the escape of fluid from the cylinder 26, as by the use of an adjustable valve. In the form shown the pas-

sage 28 is continued beyond the cylinder 21 and enters the end of cylinder 26 through an opening 210, and the escape of fluid through said opening is regulated by means of the adjustable valve 34. The cylinder 26 may be filled or partially filled with liquid, such as oil or water, or the action of the air in said cylinder may be depended on to operate the piston 20, and where the term "fluid" is used it will be understood to apply to either a gas or a liquid.

The operation is as follows: In the normal working of the engine the parts occupy substantially the position shown in the drawings, with the stop 17 in the path of arm 4. When the engine is stopped by closing the throttle-valve the governor-balls fall gradually as the engine slows down and the piston 25 moves slowly down in the cylinder 26, thus forcing the fluid in said cylinder through the passage 28, the valve 34 being so adjusted that the fluid will pass by said valve as fast as it is forced out of the cylinder 26, and the piston 20 will not, therefore, be raised against the tension of spring 23, and the stop 17 will remain in position to arrest the fall of the governor before the safety devices are moved into operative position. In case, however, of an accident to the governor or its operating mechanism, the governor-balls will drop at an abnormal speed, causing the piston 25 to force the fluid from cylinder 26 into the passage 28 more rapidly than it can pass the valve 34, and said fluid will, therefore, force up the piston 21 against the tension of the spring 23, thus removing the stop 17 out of the path of arm 4 and allowing the governor-balls to fall to their lowest position and operate the safety devices to prevent admission of steam to the cylinder. The fluid in cylinder 21 will be gradually forced past the valve 34 by the action of spring 22, so that the stop 17 will return to its usual position as soon as the arm 4 is raised above said stop. When the piston 25 rises, the fluid passes through the holes 29, but on the downstroke of said piston the disk 30 is forced up and closes said openings. If desired, the support for the stop 17 may be secured to or made integral with the cylinder 26, and it is also obvious that the cylinders 21 and 26 and the passage 28 may be formed separately or in a single casting, as shown.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with the governor, of a stop for arresting the fall of the governor, and means controlled by the governor for automatically moving said stop out of and into operative position, substantially as described.

2. The combination with the governor, of a stop for arresting the fall of the governor and means operated by the governor for moving said stop in one direction and means for returning said stop to its normal position, substantially as described.

3. The combination with the governor, of a stop for arresting the fall of the governor, and means operated by the fall of the governor at an abnormal speed for moving said stop out of operative position, substantially as described.

4. The combination with the governor, of a stop for arresting the fall of the governor, a cylinder, a piston in said cylinder for operating said stop, a second cylinder communicating with said former cylinder, a piston in said second cylinder operated by said governor, and an escape for the fluid in said second cylinder, substantially as described.

5. The combination with the governor, of a stop for arresting the fall of the governor, a cylinder, a piston in said cylinder for operating said stop, a second cylinder communicating with said former cylinder, a piston in said second cylinder operated by said governor, and means for controlling the escape of fluid from said second cylinder, substantially as described.

6. The combination with the governor, of a stop for arresting the fall of the governor, a cylinder, a piston in said cylinder for operating said stop, a second cylinder communicating with said former cylinder, a piston in said second cylinder operated by said governor, and a passage communicating with said second cylinder on opposite sides of the

piston in said cylinder, substantially as described.

7. The combination with the governor, of a stop for arresting the fall of the governor, a cylinder, a piston in said cylinder for operating said stop, a second cylinder communicating with said former cylinder, a piston in said second cylinder operated by the governor, a passage connecting the opposite ends of said second cylinder, substantially as described.

8. The combination with the governor, of a stop for arresting the fall of the governor, a cylinder, a piston in said cylinder for operating said stop, a second cylinder communicating with said former cylinder, a piston in said second cylinder operated by the governor, a passage connecting the opposite ends of said second cylinder and an adjustable valve in said passage, substantially as described.

9. The combination with the governor, of a stop 17, a cylinder 21, a piston 20 connected to said stop, a cylinder 26, a piston 25 connected to said governor, a passage 28 and a valve 34, substantially as described.

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Witnesses:

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