

(No Model.)

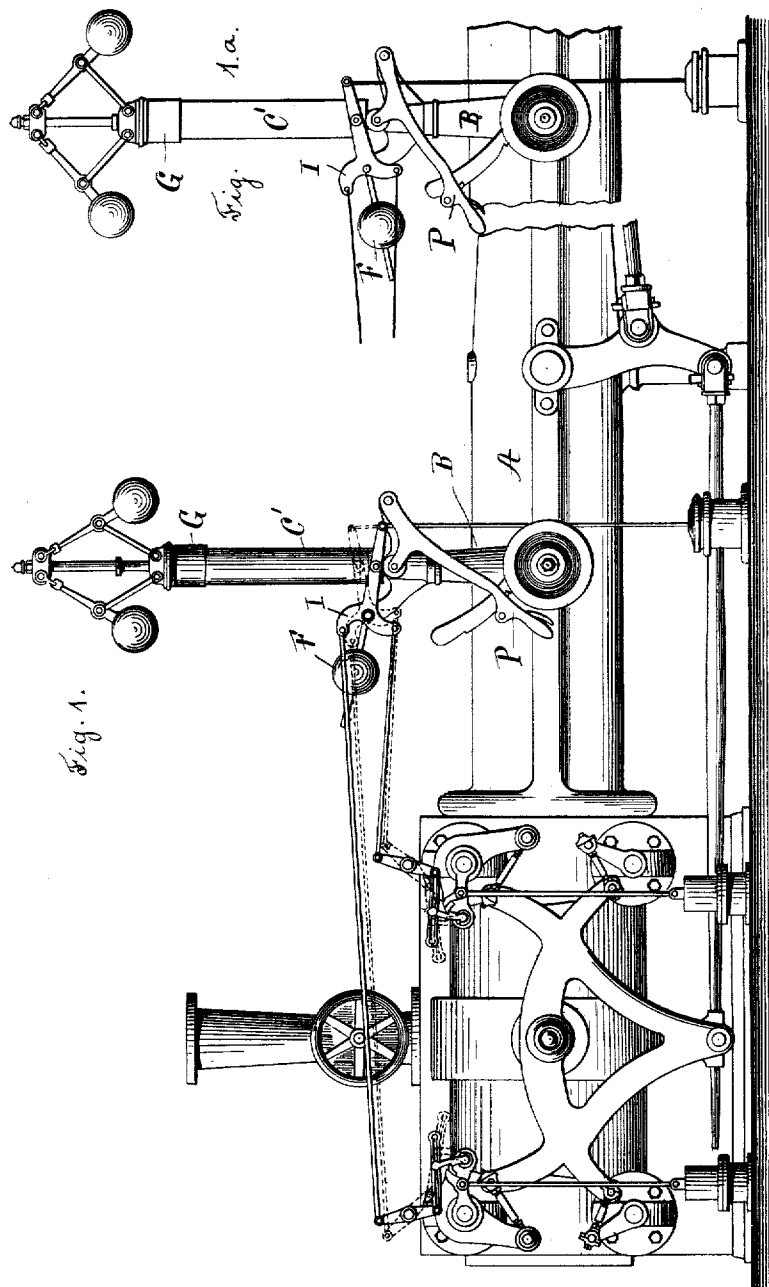
2 Sheets—Sheet 1.

G. F. CORLISS & L. H. WATTLES.

GOVERNOR FOR STEAM ENGINES.

No. 466,488.

Patented Jan. 5, 1892.



Witnesses

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Henry March for
Wm. B. Surin as

Wm. B. Surman

Inventors

George F. Corlies
Luther H. Wattle

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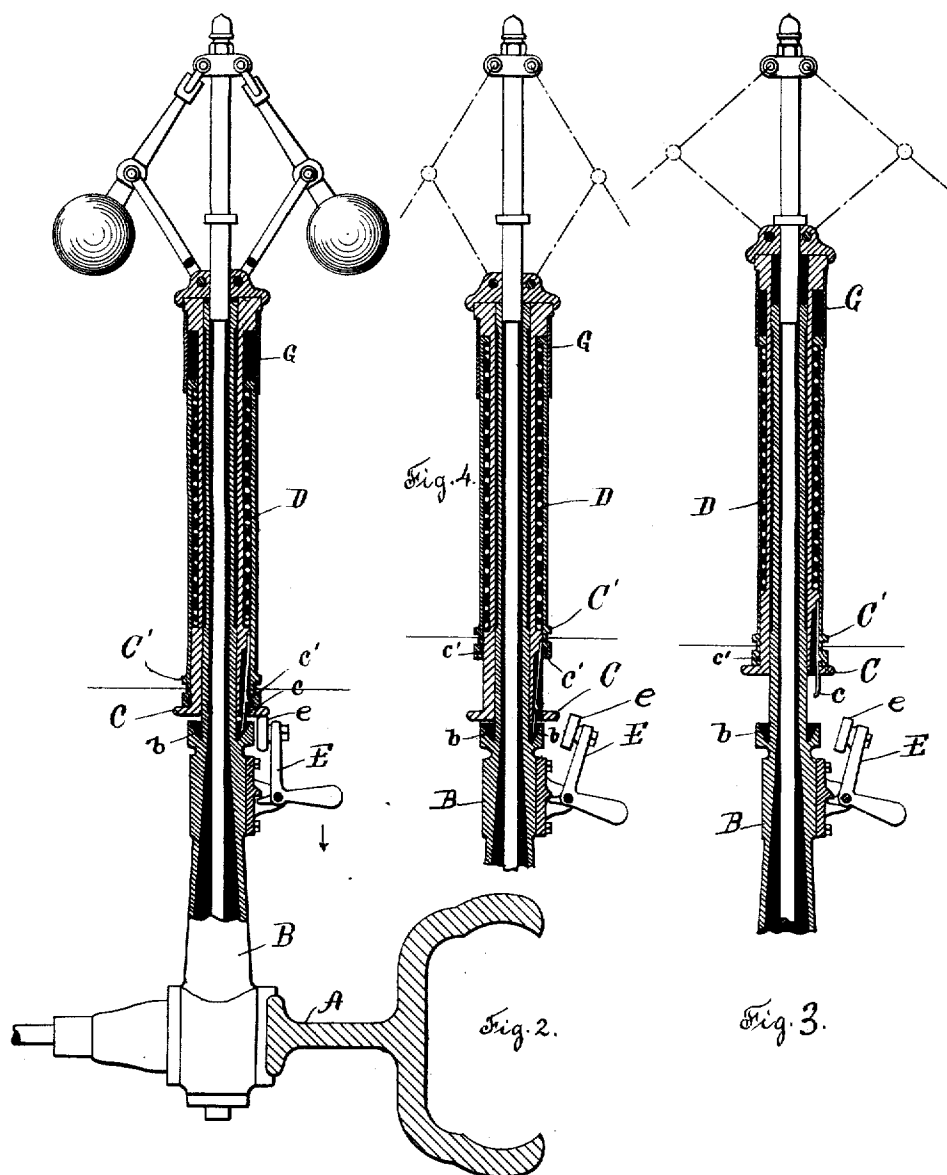
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GOVERNOR FOR STEAM ENGINES.

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Witnesses

Henry Black
Wm. B. Sherman

Inventors

George F. Corliss
Luther H. Wattle

UNITED STATES PATENT OFFICE.

GEORGE F. CORLISS AND LUTHER H. WATTLES, OF PROVIDENCE, RHODE ISLAND.

GOVERNOR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 466,488, dated January 5, 1892.

Application filed October 1, 1891. Serial No. 407,383. (No model.)

To all whom it may concern:

Be it known that we, GEORGE F. CORLISS and LUTHER H. WATTLES, both citizens of the United States, residing in the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements Relating to Governors for Steam-Engines and other Motors, of which the following is a specification.

The purpose of the invention is to provide means for automatically stopping the engine in case of breakage of the regulator-belt or any similar accident. We have combined with the steam-engine governors shown in the patents to George H. Corliss, No. 333,835, dated January 5, 1886, and No. 344,249, dated June 22, 1886, means for automatically releasing the valves of the engine in case of failure of the regulator-operating mechanism to act.

In all other forms of fly-ball governor known to us, in case of disaster to the regulator-belt or operating mechanism of the governor, the fly-balls will drop, thereby holding the steam-valves in an open position, admitting steam to the cylinder and causing the engine "to race" or "runaway." In our invention means are provided, in case of accident to said regulator-belt or operating mechanism, to cause the external sleeve of the governor to rise to its extreme highest point and thereby operate the valve-cut-off mechanism to allow the valves to close and remain closed to the admission of steam, and so to stop the engine, notwithstanding the fallen position of the balls. A counterpoise acting in conjunction with the water or steadying dash-pot affords means for regulating the position of the governor. Under normal working conditions this governor acts in the same manner as do the governors described and claimed in the above-named patents to George H. Corliss.

The accompanying drawings form a part of this specification and represent what we consider the best means of carrying out our invention.

Figure 1 shows in elevation the governor and the method of attaching it to the engine and connecting it to the valve-gear. Fig. 1^a is an elevation of the governor detached from the valve-gear. Figs. 2, 3, and 4 show in vertical section details of the parts.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A represents the bed of the engine.

B represents the regulator-stand, upon which slide the internal sleeve C and external sleeve C', the latter having a sliding motion upon said sleeve C and independently thereof as actuated by a helical spring D. Means, as a latch-spring *c*, secured to said sleeve C and adapted to engage a suitable annular slot or groove *c'*, interiorly located in the sleeve C', serve to lock the two sleeves together resistingly against the compressed spring D. The said spring *c* projects sufficiently downward from the sleeve C to engage an annular recessedly-tapered recess *b* in the stand B to disengage the spring from the slot *c'* and allow the sleeve C' to be thrown upward by the action of the spring D when the balls of the governor sink too low.

The action of the self-removing holder E will be evident as we more fully describe the operation of the sleeve mechanism.

F is the counterpoise attached to the sleeve.

The inner sleeve C, to which the links of the regulator-balls are secured, is free to slide up and down to a limited extent on the stand B, and the exterior sleeve C' is free to slide up and down upon the said inner sleeve to a corresponding extent. The helical spring D is compressed by drawing the outer sleeve downward until the latch *c* engages the annular slot *c'*. The compound lever I affords a means of drawing the said outer sleeve downward. The helical spring D may likewise be compressed by raising the inner sleeve C by means of the cut-off lever P until the latch *c* engages the slot or groove *c'*. When the outer and inner sleeves are thus locked together, they serve in the ordinary manner as if they were a single slide; but some provision is necessary to retain them in this position until the engine has taken steam and the regulator-balls have begun to act to raise the sleeves. Otherwise the balls and sleeves would be carried downward by their own weight, and the said outer sleeve, released by the action of the latch *c* engaging the recess *b*, would rise, as already described, with the result that the valves could not be opened to

admit steam. It is also essential that any means employed to attain this end should be automatic—*i. e.*, self-removable. Too much stress cannot be laid upon the fact that any form of holder or stop dependent for its removal upon the action of the engineer is liable to be overlooked and left in position to nullify the entire action of the safety mechanism in the emergency sought to be provided for.

In our invention we provide a self-removing holder E, pivoted to the stand B and provided with an anti-friction wheel *e*, adapted to receive the combined weight of the locked sleeves and balls, and thereby prevent the latch *c* from engaging the recedingly-tapered recess *b* to release the valve-gear. When sufficient momentum is imparted to the regulator-balls to cause them to rise and lift the locked sleeves, the holder E falls of its own weight into the position indicated in Figs. 3 and 4 and leaves the course free for the locked sleeves to fall to the point where the said latch *c* will engage with the recess *b*, whereupon by the action of the spring D the outer sleeve is carried upward and the steam-valves thereby automatically released to close and remain closed. A hood G, secured to the upper part of the inner sleeve, serves to prevent the entrance of foreign matters into the working parts of the mechanism. The compound lever I, which actuates the valve-releasing gear in the well-known manner, is attached in our invention to the outer sleeve in a similar manner to the attachment of the compound lever to the single sleeve of the governor described in the said Letters Patent No. 344,249 and operates substantially as therein described.

Fig. 2 shows the parts in the condition for starting the engine, the inner sleeve C and outer sleeve C' being locked together by the spring-catch *c*, both being held up by the holder E.

Fig. 3 shows the governor-balls and connections raised by an increased velocity of the engine and the holder as having been turned by the gravity of the horizontal arm into such position that it will no longer prevent an extreme descent of the governor-balls and their connections. So long as this condition obtains the governor performs its usual functions, cutting off shorter when the governor-balls rise high and following farther when the governor-balls descend, and Fig. 4 shows the condition when the governor-belt has broken or otherwise failed. The governor-balls have been allowed to descend so low as to cause the spring-catch *c* to strike the inclined inner surface of the recess *b*, which has deflected it inward and set the outer sleeve *c'* free, and it has been thrown upward by the helical spring D. In this condition of the parts the lever I, being controlled by the outer sleeve alone, is held in such position as to prevent any steam entering the cylinder, and the engine stops.

Modifications may be made in the details

without departing from the principle or sacrificing the advantages of our invention. For example, the relative positions of the spring and sleeves may be changed. The holder E may be made automatically removable by means of a spring instead of by gravity.

Some form of volute spring may be substituted for the helical spring and differently located with reference to the sleeves. The latch *c* and recess *b* may be changed relatively and absolutely in the points of their application.

We claim and desire to secure by Letters Patent—

1. In a steam-engine having steam-valves with gear for operating them at uniform periods and closing them at variable periods, a governor having weights arranged to shift their positions by the changes in centrifugal force as the speed is varied, in combination with each other and with a constant force, as the helical spring D, and mechanism, as the two slides C and C', arranged to be actuated thereby to throw such valve-gear into condition to stop the engine, and a device, as the spring-catch *c*, for holding such stopping mechanism out of action so long as the governor performs its duty, all arranged for joint operation substantially as herein specified.

2. In a steam-engine having steam-valves with gear for opening them at uniform periods and closing them at variable periods, a governor having weights arranged to shift their positions by the changes in centrifugal force as the speed is varied, in combination with each other and with a constant force, as the helical spring D, and mechanism, as the two slides C and C', arranged to be actuated thereby to throw such valve-gear into condition to stop the engine, and a device, as the spring-catch *c*, for holding such stopping mechanism out of action so long as the governor performs its duty, and means, as the conical recess *b*, for liberating such force and allowing it to instantly shift the valve-gear into such condition as to stop the engine so soon as the governor fails, all substantially as herein set forth.

3. In a steam-engine having steam-valves with gear for opening them at uniform periods and closing them at variable periods, a governor having weights arranged to shift their positions by the changes in centrifugal force as the speed is varied, in combination with each other and with a constant force, as the helical spring D, and mechanism, as the two slides C and C', arranged to be actuated thereby to throw such valve-gear into condition to stop the engine, and a device, as the spring-catch *c*, for holding such stopping mechanism out of action so long as the governor performs its duty, and means, as the conical recess *b*, for liberating such force and allowing it to instantly shift the valve-gear into such condition as to stop the engine so soon as the governor fails, and a support or holder adapted to hold the governor out of

action and to prevent the liberation of the safety mechanism during the period of starting the engine, with provisions for removing automatically and allowing the governor and the safety mechanism to control the engine so soon as a proper speed has been once attained, all arranged for joint operation substantially as herein specified.

4. In a steam-engine, the combination, with a governor and valve-operating gear controlled thereby, of two concentric sleeves with a spring-compressor between them, and a trip mechanism constructed and arranged to hold the sleeves for joint movement and to be actuated to disconnect the sleeves, substantially as and for the purposes herein specified.

5. In a safety-governor for steam-engines

and analogous engines, a safety mechanism, in combination with a support or holder having an anti-friction roller arranged to engage the governor and support it in starting and a gravity-actuated arm for automatically releasing it when relieved by the attainment of a sufficient speed in the engine, as herein specified.

In testimony whereof we have hereunto set our hands, at Providence, Rhode Island, this 29th day of September, 1891, in the presence of two subscribing witnesses.

GEORGE F. CORLISS.
LUTHER H. WATTLES.

Witnesses:

HENRY MARSH, Jr.,
WM. B. SHERMAN.