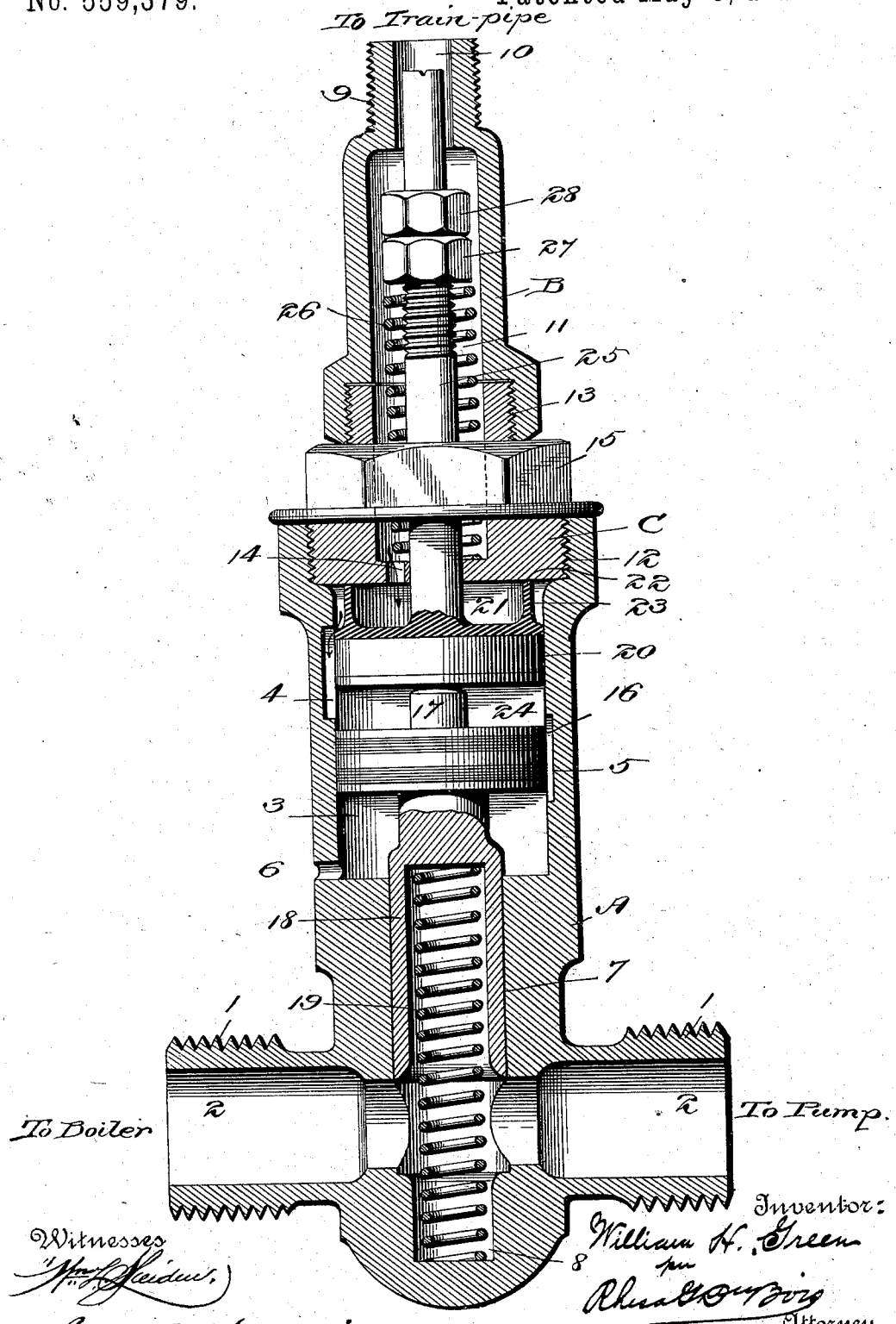
(No Model.)

W. H. GREEN.

AIR PUMP GOVERNOR.

No. 559,379. Patented May 5, 1896.



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AIR-PUMP GOVERNOR.

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To all whom it may concern:

Be it known that I, WILLIAM HENRY GREEN, a citizen of the United States, residing at Streator, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Air-Pump Governors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters and figures of reference marked thereon, which forms a part of this specification.

My invention relates to automatic governors for the air-pumps of air-brake systems.

The object of the present invention is the provision of an improved governor of the class described which, owing to its peculiar construction and simplicity, will be extremely sensitive to the slightest variation in air-pressure and immediately act to correct such variation, thereby more satisfactorily accomplishing its purpose than has heretofore been possible.

The lubricants commonly employed in the air-pumps of air-brake systems vaporize very rapidly when mixed with the air constantly being compressed and together with it frequently pass in the vaporized state from the air-pump to the air-pump governor. The governor being raised to a higher temperature than the air by virtue of the steam constantly passing through it causes a precipitation of this vaporized lubricant in the form of gum on the various operating valves and parts of the governor. The constant accumulation of this gum often causes the valves to adhere to their seats. As a consequence, the governor does not respond to the variations in air-pressure, and it often happens that an abnormal pressure is rapidly pumped up, and when the brakes are applied the car-wheels slide on the rails, which causes a material shortening of the life of both wheels and rails, as is well known. I accomplish the objects heretofore mentioned and obviate this difficulty generally incident to air-pump governors by the employment of a peculiar form of valve or piston having a small seat-area and a comparatively large pressure-surface, together with an improved cut-off or regulating valve or piston and other improved features and combinations, as will appear hereinafter.

The accompanying drawing illustrates by longitudinal sectional elevation, partially in full lines, an air-pump governor embodying the present improvements.

The inclosing body of the governor consists of three sections or parts—namely, a main or lower shell A, an upper or secondary shell B, and an intermediate connection C. The lower shell A is provided with screw-threaded pipe-couplings 1 and a straightway steam-passage 2, through which steam from the locomotive-boiler passes *en route* to the air-pump. The upper portion of this shell is provided with a main air-chamber 3, in which the principal movable parts of my governor operate, as will appear later. Air is admitted to this chamber through an upper elongated delivery-port 4 and after performing its office is permitted to exhaust through a relief-port 5, preferably located on a side of the chamber opposite the delivery-port, and an exhaust-port 6 at or near the bottom of the chamber. This lower shell is also provided with a plug-valve seat 7 and a pocket 8, whose office will appear hereinafter.

The upper shell B is provided with a screw-threaded coupling 9 for connection to piping leading to the train-pipe, and a receiving-opening 10 in the coupling leads to an auxiliary or secondary air-chamber 11.

The intermediate section C affords connection between the upper and lower shells A and B by means of respective screw-threaded joints 12 and 13. This intermediate section is bored out for nearly its entire length to provide a continuation of the chamber 11, the purpose of this construction appearing hereinafter. An induction-port 14 affords the sole means of communication between the secondary air-chamber 11 and the main air-chamber 3. The intermediate section is provided with an integral nut 15 midway of its length, so that connection of the parts may be readily effected.

Having given the construction of the relatively-fixed or stationary parts of the present invention, reference is now to be had to those which are movable.

A main or pressure piston is shown at 16.

Its upper face is provided with a limiting-abutment 17, and a plug-valve 18, projecting from its lower face, is adapted for movement in the seat 7 and operates across the steam-passage 2 to regulate the steam-pressure supplied to the air-pump. This plug-valve is chambered out for the reception of a counterbalancing-spring 19, whose lower end is seated in the pocket 8. This spring is of sufficient strength to keep the plug-valve and piston 16 raised, so that the flow of steam will be unrestricted when the air-pressure is at the requisite point.

My improved auxiliary piston is shown at 20. Its upper pressure-face is hollowed out to form the cup-shaped concavity 21, and the piston is peripherally recessed, so that a narrow seat 22 is provided and an outer peripheral space 23 formed between the piston and the sides of the shell A. The many advantages of such a construction will be apparent to one skilled in such matters, for by this arrangement a piston of large pressure-area and small seat-area is provided, whereby it is rendered extremely sensitive to variations in air-pressure and is not liable to become stuck to its seat from the constant precipitation of gummy matter, as set forth more in detail heretofore. The cup-shaped concavity forms the receptacle for the gum precipitated from the compressed air. By peripherally recessing this piston from its upper end to the point where it meets the delivery-port 4 it is obvious how the slightest downward movement of the former will allow compressed air to be delivered via said port to the main pressure piston to operate the latter. The office of the abutment 17 of the main pressure piston is now obvious, for it limits the upward movement of the said piston, thereby leaving a pressure-space 24 to permit the quick action of the air on the piston.

The piston-rod 25 of the auxiliary piston passes upward through the intermediate section C into the secondary air-chamber 11 and has its upper end reduced and passed freely into the receiving-opening 10, so that the whole rod is allowed vertical play. An open retracting coil-spring 26 encircles the piston-rod and is seated at the base of the secondary air-chamber 11 on that portion of the intermediate section C which forms the bottom of the chamber. The piston-rod is provided with screw-threads for engagement with an adjusting-nut 27 and a jam-nut 28, whereby the tension of the spring may be regulated to keep the auxiliary piston properly seated. Let it be assumed that the parts have been adjusted to operate when the normal air-pressure is exceeded and that steam is passing freely from the locomotive-boiler through steam-passage 2 to operate the air-pump. Should the normal air-pressure in the train-pipe be exceeded, auxiliary piston 20 would be forced from its seat, thereby allowing the compressed air to escape from the cup-shaped concavity 21 and, passing via the annular chamber 23 and delivery-port 4 to the pressure-space 24, exert its force on the main pressure-piston 16. The latter piston would then be forced downward against the action of counterbalancing-spring 19, closing or partially closing relief-port 5 and projecting plug-valve 18 across or partially across the steam-passage 2 to regulate the supply of steam to the pump. When the air-pressure becomes normal, the retraction-spring 26 draws auxiliary piston 20 upward and reseats it, thereby cutting off the supply of air to main piston 16. Air-pressure having been removed from the upper face of the latter piston, the counterbalancing-spring 19 forces it upward, allowing the steam to flow unrestricted through the passage 2 and on to the pump. Simultaneous with the upward movement of the piston any surplus air in the pressure-space 24 is allowed to vent through relief-port 5 and exhaust-port 6. Should steam leak through the valve-seat 7 from the passage 2 up into the main air-chamber 3, it is immediately vented through the exhaust-port without exerting back pressure.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an air-pump governor, provided with the usual steam-passage, the combination with a main pressure-piston of an auxiliary piston, both of which operate in a single air-chamber, said auxiliary piston being adapted to act in response to variations in air-pressure and permit the delivery of air to the main pressure-piston to actuate the latter, and means controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage.

2. In an air-pump governor, provided with the usual steam-passage, the combination with a main pressure-piston of an auxiliary piston, both of which operate in a single air-chamber, being so disposed and related that an air-space is constantly maintained between them, said auxiliary piston being adapted to act in response to variations in air-pressure and permit the delivery of air to the air-space to actuate the main pressure-piston, and means controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage.

3. In an air-pump governor, provided with the usual steam-passage, the combination with a spring-balanced main pressure-piston, of a spring-balanced auxiliary piston, both of which operate in a single air-chamber, said auxiliary piston being adapted to act in response to variations in pressure and permit the delivery of the air to the main pressure-piston, whereby the latter may be actuated, and means controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage.

4. In an air-pump governor provided with the usual steam-passage, and having an air-chamber and air-receiving passage commu-

nicating therewith, the combination with a main pressure-piston of an auxiliary piston, both of which operate in the air-chamber, and a valve controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage, the aforesaid auxiliary piston being adapted to act in response to abnormal air-pressure to permit the delivery of air to the main pressure-piston to actuate the latter.

5. In an air-pump governor provided with the usual steam-passage, and having an air-chamber and air-receiving passage communicating therewith, the combination with a spring-balanced main pressure-piston operating in the air-chamber, and of a spring-retracted auxiliary piston also operating in the air-chamber and governing the admission of air-pressure thereto, being adapted to act in response to variations in the air-pressure and control the delivery of the latter to the main pressure-piston, and means controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage.

6. In an air-pump governor, the combination of a main piston and steam-valve, of a piston having a concaved pressure-face and being peripherally recessed from said face inwardly along its length.

7. In an air-pump governor provided with the usual steam-passage, the combination with a main pressure-piston operating in an air-chamber, of an auxiliary piston having a concaved pressure-face normally seated over the induction-port of the air-chamber, and being adapted to act in response to variations of air-pressure to permit air to be delivered to the main pressure-piston, and means controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage.

8. In an air-pump governor provided with the usual steam-passage, the combination with a main pressure-piston operating in an air-chamber, of an auxiliary piston also operating in the air-chamber and so disposed and related to the main pressure-piston that a pressure-space is constantly maintained between the two pistons, said auxiliary piston having a concaved pressure-face normally seated over the induction-port of the air-chamber, and adapted to respond to variations in air-pressure to permit air to be delivered to the pressure-space to operate the main pressure-piston, and means controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage.

9. In an air-pump governor provided with the usual steam-passage, the combination with a main pressure-piston operating in an air-chamber, of an auxiliary piston having a concaved pressure-face normally seated over the induction-port of the air-chamber, and also being peripherally recessed from said concaved face inwardly along its length, said auxiliary piston being adapted to act in response to variations of air-pressure and open the induction-port and a delivery-port, thereby permitting air to be delivered to the main pressure-piston, and means controlled by the main pressure-piston and adapted to regulate the flow of steam in the steam-passage.

In witness whereof I affix my signature in presence of two witnesses.

WILLIAM HENRY GREEN.

Witnesses:

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