

S. ELLIOTT.
FUEL CONTROLLING DEVICE FOR STEAM BOILERS.
APPLICATION FILED JULY 29, 1909.

993,666.

Patented May 30, 1911.

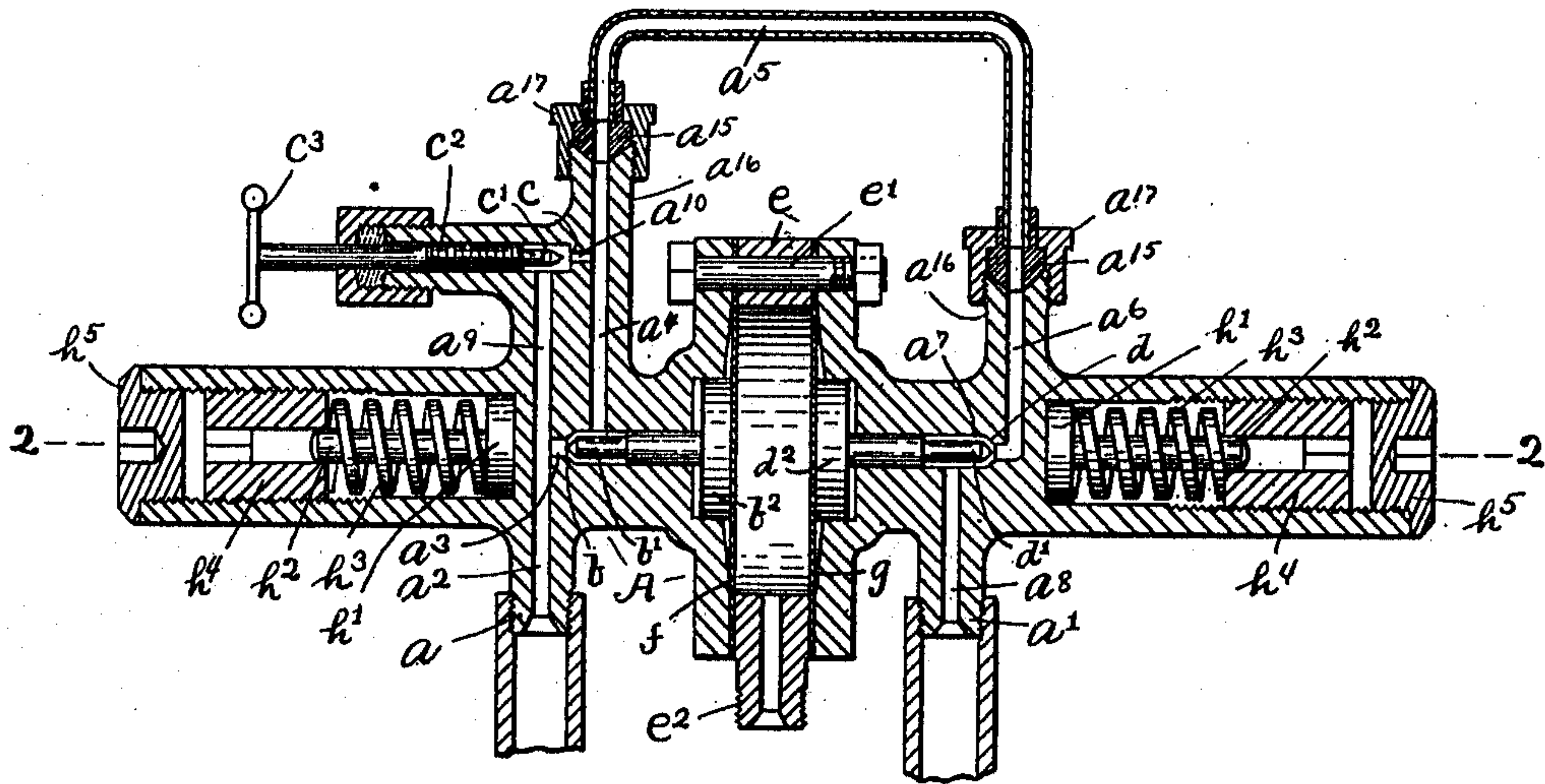


Fig. 1.

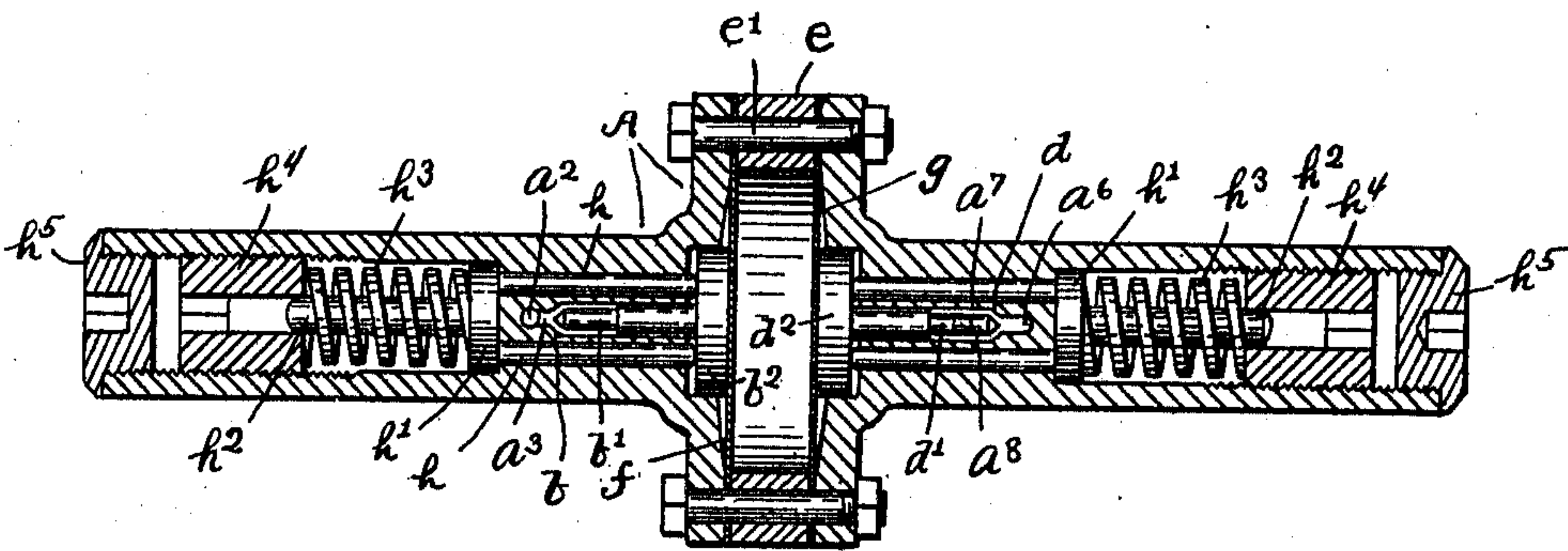


Fig. 2.

Witnesses:

H. B. Davis.
Cynthia Doyle.

Inventor:

Sterling Elliott.
By Vayer & Hariman
attys.

UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF NEWTON, MASSACHUSETTS.

FUEL-CONTROLLING DEVICE FOR STEAM-BOILERS.

993,666.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed July 29, 1909. Serial No. 510,248.

To all whom it may concern:

Be it known that I, STERLING ELLIOTT, of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Fuel-Controlling Devices for Steam-Boilers, of which the following is a specification.

This invention relates to fuel controlling-devices for steam-boilers, and has for its object to construct an automatic controlling-device having the capability of delivering to the vaporizer or burner of the boiler a full supply of fuel, or a partial supply, (which is adapted to be regulated manually,) or of entirely shutting off the supply; said controlling-device being adapted to be operated by the steam pressure of the boiler to reduce the full supply of fuel when the pressure reaches a point considerably less than maximum, and to shut off the entire supply when the pressure reaches the maximum point.

Oftentimes it is possible to run a boiler on much less than its full supply of fuel and still maintain a pressure sufficient to meet the demands, and the controlling-device embodying this invention is designed to automatically control the supply of fuel in such manner that the boiler is at all times ready to meet ordinary demands upon it, yet needless waste of fuel is prevented.

Figure 1 is a longitudinal vertical section of an automatic fuel controlling-device embodying this invention. Fig. 2 is a horizontal section of the device taken on the dotted line 2—2, Fig. 1.

The case or frame A, is of suitable shape and construction to support the working parts. It is composed essentially of two parts bolted together. It has two screw-threaded nipples a , and a' , adapted to be connected, respectively, by pipes leading to the source of fuel supply and to the vaporizer or burner of the boiler. It also has a continuous conduit for the fuel, extending from the nipple a to the nipple a' . Said conduit consists of a passage a^2 in the case and extending through the nipple a , a passage a^3 leading from said passage a^2 , a passage a^4 leading from said passage a^3 , a pipe a^5 connected with the case at both ends, leading from said passage a^4 , a passage a^6 in the case leading from said pipe a^5 , a passage a^7 leading from said passage a^6 , and a passage a^8 leading from said passage a^7 and extending through the nipple a' . A by-pass

is also provided in the case, which is connected at its ends with said fuel conduit, it being herein represented as a passage a^9 , leading from the passage a^2 , and a passage a^{10} leading from said passage a^9 , to the passage a^4 . As here shown each end of the pipe a^5 has a conical-ended plug a^{15} , secured to it, and said plugs enter recesses formed at the extremities of nipples a^{16} , a^{16} , on the case, and are held securely in place by caps a^{17} , a^{17} , engaging them and screwed onto said nipples. The passage a^3 is provided with a valve-seat b , with which coöperates a needle-valve b' , arranged in the case, and adapted to open and close said passage. The passage a^{10} is provided with a valve-seat c , with which coöperates a needle-valve c' , arranged in the case and adapted to be adjusted by hand toward and from its seat, and thereby vary the area of the passage. The passage a^7 is provided with a valve-seat d , with which coöperates a needle valve d' , arranged in the case and adapted to open and close said passage. The valve b' is thus arranged between the ends of the by-pass a^9 , a^{10} , so that when closed the fuel will pass through said by-pass, or in other words the by-pass is arranged around and connected with the conduit at opposite sides of the closing valve.

The closing-valves b' and d' are designed to be operated automatically by the pressure of the steam of the boiler, and the valve c' is designed to be operated by hand. When all the valves are open the full supply of fuel passes through the conduit and is delivered to the vaporizer or burner; when the valve b' is closed a partial supply of fuel passes through the conduit, which is regulated by the valve c' , and when the valve d' is closed the supply is entirely shut off. The valve c' is attached to a screw-threaded stem c^2 , which extends through a suitable stuffing-box, and is provided with a hand-piece c^3 , by which it may be turned, whereby the valve c' may be adjusted to occupy different positions with respect to its seat, and thereby regulate the amount of fuel which shall go through the passage a^{10} when the valve b' is closed. The needle-valves b' and d' are made alike, each having a stem to which a head b^2 , d^2 , is secured preferably made as a flat disk, and contained in a suitably shaped recess in the case. Said needle-valves are arranged respectively in the two parts of the case, in line with

each other, and extend in opposite directions, so that their heads are oppositely and adjacently disposed.

The two parts of the case have interposed
 5 between them a ring e , and the bolts e' , by which said parts are secured together and which pass through holes in said ring. The interposition of the ring between the parts of the case results in forming a chamber be-
 10 tween said parts. Two diaphragms f and g are arranged in said chamber, at opposite sides of it, and, as here shown, the edges of said diaphragms are placed between the ends of the parts of the case and the ring, and are
 15 thereby held in place. The ring e has a nipple e^2 projecting from it, which is connected by a pipe with the boiler, and a passage extends through said nipple to the interior of the chamber, so that said chamber is in open
 20 communication with the boiler and is filled with water or steam from the boiler. The diaphragms f and g are thus arranged to be acted upon by the pressure of the boiler, and are adapted to be moved in opposite ways or
 25 outwardly in a direction from each other when the pressure reaches a point at which they are adjusted to be moved. The heads b^2 and d^2 of the needle-valves respectively bear against or may be connected with the dia-
 30 phragms f and g , so that said valves are moved by said diaphragms to close the passages which they control.

Adjusting-devices are provided for the diaphragms, whereby they are adapted to be
 35 moved by different pressures, the diaphragm f being moved by a pressure, which is considerable less than the maximum pressure, and the diaphragm g being moved by the maximum pressure. Like adjusting-devices
 40 are provided for the two diaphragms. The adjusting-device for the diaphragm f , as here shown, consists of two pins h , engaging the head b^2 of the needle-valve, which are connected to a disk h' , contained in a recess
 45 in the case, and attached to a stem h^2 , encircled by a spring h^3 , bearing on said disk h' , and a nut h^4 , turning in an internally screw-threaded portion of the recess, which bears upon said spring and forces it against the
 50 disk with a yielding pressure. The pressure of the pins of the head b^2 may be varied by turning said nut h^4 . The upper end of the recess is closed by a plug h^5 . The adjusting-device will be set to exert its pressure on the
 55 head and thereby on the diaphragm, and such pressure is sufficient to hold the diaphragm against movement until the pressure on the diaphragm reaches a point considerably less than maximum when it will be
 60 moved against the action of the adjusting-device and the valve closed on its seat. A similar adjusting-device is provided for the diaphragm g , which is adapted to exert a
 65 pressure on the head d^2 of the valve and thereby on the diaphragm g , and said ad-

justing-device is set so that said diaphragm g will not be operated until the pressure reaches the maximum, when said diaphragm will be moved against the action of the ad-
 justing-device, and the valve d' closed on its
 70 seat. It will thus be seen that when pressure rises to a point considerable less than maximum, the diaphragm f will be moved to close the valve b on its seat and thereby close the
 75 conduit at this point. The supply of fuel, however, may then pass through the by-pass a^9 , a^{10} , and the amount may be regulated by the valve e' . Thus a partial supply of fuel will be delivered. When the pressure
 80 reaches the maximum the diaphragm g will be moved to close the valve d' on its seat and thereby shut off the entire supply of fuel.

In lieu of constructing the case as herein shown, and using the pipe a^5 as a part of the
 85 conduit for the delivery of fuel, said case may be otherwise constructed to provide a conduit through it for the fuel, which will be controlled by the valves b' and d' , adapted to be operated respectively by the dia-
 90 phragms f and g , at different pressures, one to reduce the fuel supply and the other to entirely shut off said supply. Furthermore, I do not desire to limit my invention to the
 95 employment of any particular form of adjusting-devices for the diaphragms.

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

1. A fuel controlling-device for steam-boilers consisting of a case having a deliv-
 100 ery-conduit for the fuel and a by-pass connected with said conduit, a valve for closing the conduit between the ends of the by-pass, a regulating-valve for said by-pass, a valve
 105 for closing the conduit beyond the by-pass, a diaphragm for operating one of said closing-valves adapted to be operated by a pressure of the boiler less than maximum, and another diaphragm for operating the other
 110 closing-valve adapted to be operated by the maximum pressure of the boiler, substantially as described.

2. A fuel controlling-device for steam-boilers consisting of a case having a deliv-
 115 ery-conduit for the fuel and a by-pass connected with said conduit, a valve for closing the conduit between the ends of the by-pass, a regulating-valve for said by-pass, a valve for closing the conduit beyond the by-pass,
 120 two diaphragms arranged in a chamber communicating with the boiler and connected, respectively, with said closing-valves and adjusted to operate said valves at different pressures, substantially as described.

3. A fuel controlling-device for steam-boilers consisting of a case having a deliv-
 125 ery-conduit for the fuel, and a by-pass connected with said conduit, a valve for closing the conduit between the ends of the by-pass, a regulating-valve for said by-pass, a valve
 130

for closing the conduit beyond the by-pass, two diaphragms for operating said closing-valves, respectively, adapted to be operated by the pressure of the boiler, and independent adjusting-devices for said diaphragms, whereby they are adjusted to operate at different pressures, substantially as described.

4. A fuel controlling-device for steam-boilers consisting of a case having a delivery-conduit for the fuel and a by-pass connected with said conduit, a valve for closing the conduit between the ends of the by-pass, a regulating-valve for said by-pass, a valve for closing the conduit beyond the by-pass, said closing-valves each having a head, two diaphragms against which the heads of said closing valves bear, adapted to be operated by the pressure of the boiler, and independent adjusting-devices for engaging said heads, whereby the diaphragms are set to operate at different pressures, substantially as described.

5. In a fuel controlling-device for steam-boilers, a case having a conduit connected with a fuel-supply, and having a single pressure-chamber connected with the boiler, two valves in said case for controlling the passage of fuel through the conduit, each having a head, two diaphragms arranged in said pressure-chamber and respectively engaged by the heads of said valves, and means for adjusting said diaphragms to operate at different pressures and move the valves, substantially as described.

6. In a fuel controlling-device for steam-boilers, a two-part case, a ring interposed between the parts thereof, and means for securing said parts together with the ring between them, thereby forming a chamber within the case, said chamber having means adapting it to be connected with the boiler and said case having a conduit adapted to be connected with the fuel-supply, two valves arranged in said case and controlling the passage of fuel to said conduit, and two diaphragms arranged in said chamber and adapted to operate said valves, said diaphragms being adjusted to move at different pressures to operate said valves, substantially as described.

7. In a fuel controlling-device for steam-boilers, a case having a conduit connected with the fuel-supply, and valves controlling the passage of fuel therethrough, whereby the supply is partially or wholly shut off,

and two diaphragms arranged in a single pressure-chamber connected with the boiler for operating the valves, said diaphragms being adjusted to move at different pressures, substantially as described.

8. In a fuel controlling-device for steam-boilers, a case having a conduit connected with a fuel-supply, a by-pass connected with said conduit, a regulating-valve for said by-pass, two valves for closing the conduit at different points with respect to the by-pass, whereby the fuel-supply is partially or wholly shut off, and two diaphragms arranged in a pressure-chamber connected with the boiler for operating said valves, respectively, said diaphragms being adjusted to move at different pressures, substantially as described.

9. A fuel-controlling-device for steam-boilers consisting of a case having a delivery-conduit for the fuel, two closing-valves for said conduit, automatic means for operating said closing-valves respectively, at different pressures to close upon their seats, a by-pass connected with said conduit around one of said closing-valves, and a regulating-valve for said by-pass, substantially as described.

10. A fuel-controlling device for steam-boilers consisting of a case having a delivery-conduit for the fuel, two independently adjustable closing-valves for said conduit, automatic means for operating said closing-valves respectively, at different pressures to close upon their seats, a by-pass connected with said conduit around one of said closing-valves, and a regulating-valve for said by-pass, substantially as described.

11. A fuel-controlling device for steam-boilers, consisting of a case having a delivery-conduit for the fuel, two closing-valves for said conduit, automatic means for operating said closing-valves respectively, at different pressures to close upon their seats, and a by-pass connected with said conduit around one of said closing-valves, substantially as described.

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

STERLING ELLIOTT.

Witnesses:

B. J. NOYES,
H. B. DAVIS.