E. M. JONES.

FUEL OIL REGULATOR.

APPLICATION FILED OCT. 19, 1910.

990,744.

Patented Apr. 25, 1911.

2 SHEETS—SHEET 1.

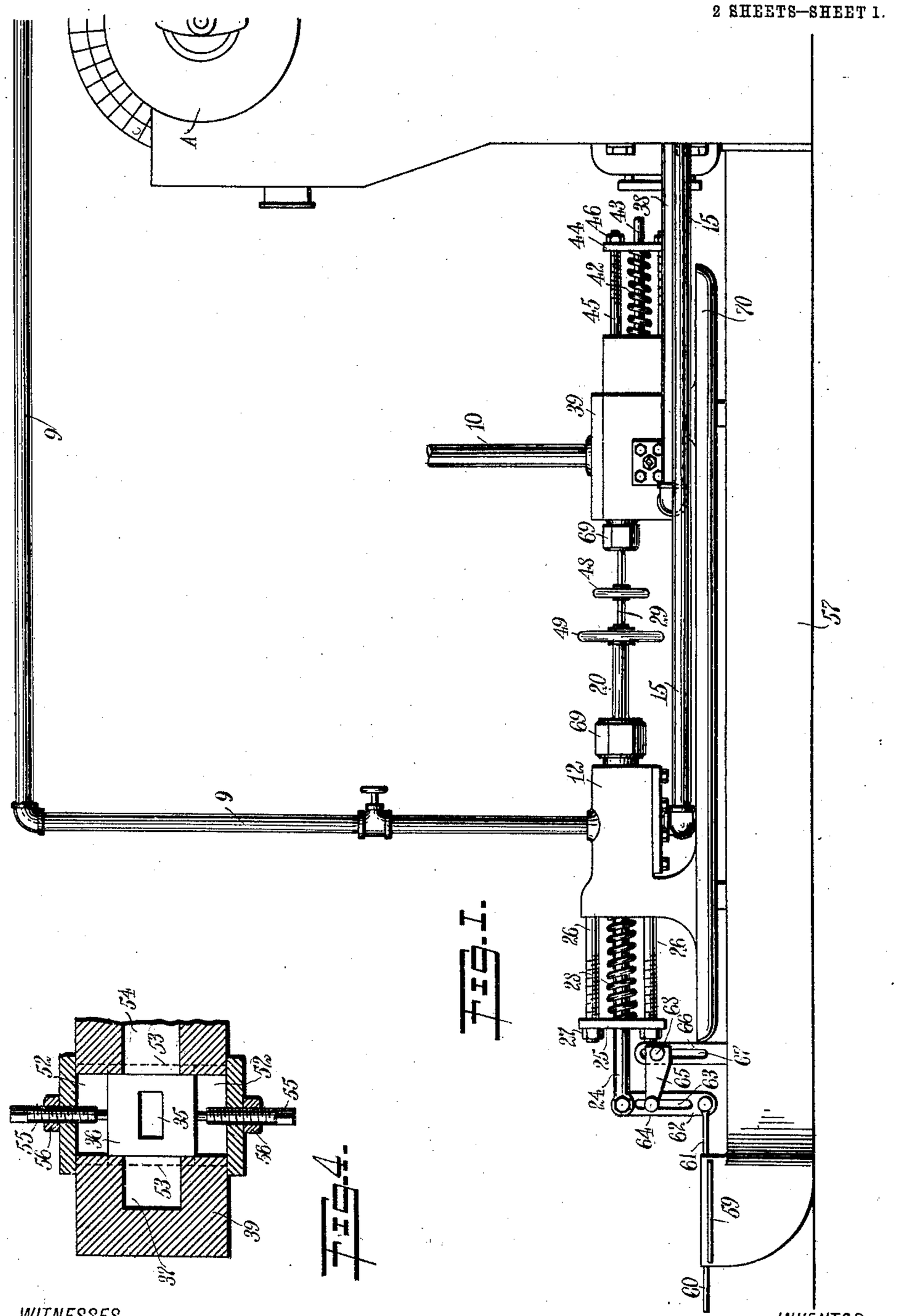

FIG. 1.

FIG. 4.

WITNESSES

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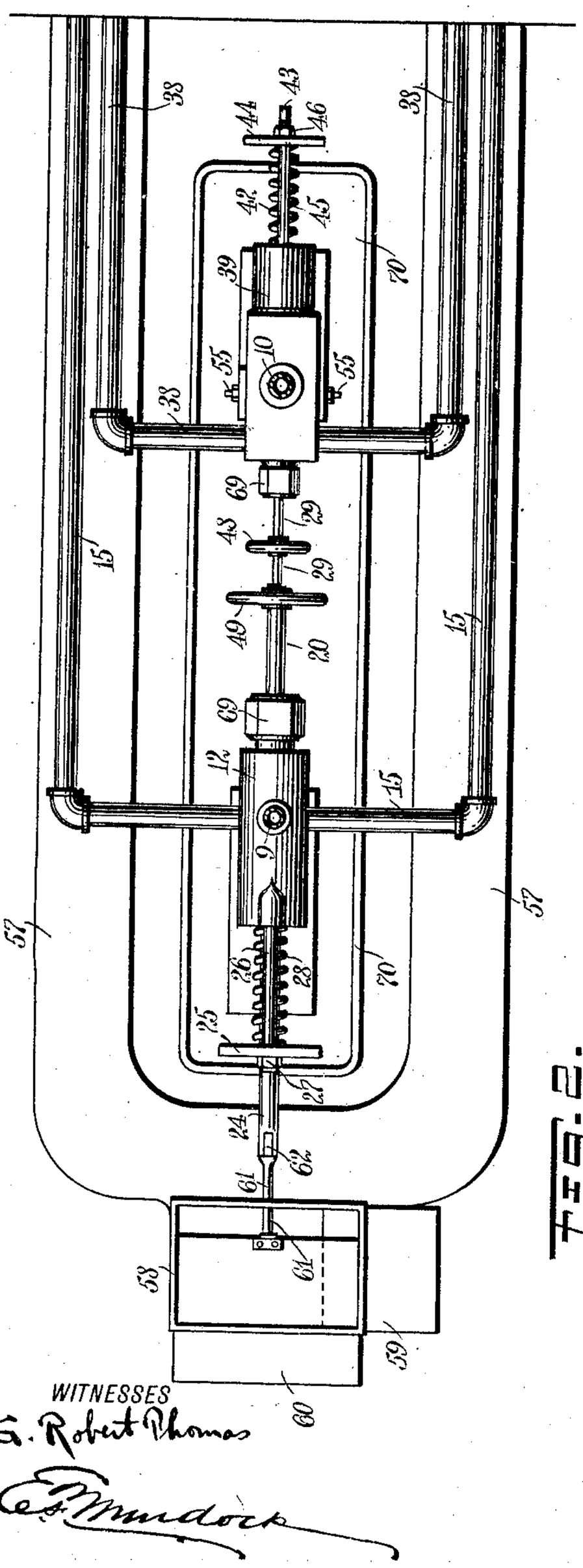

FIG. 2.

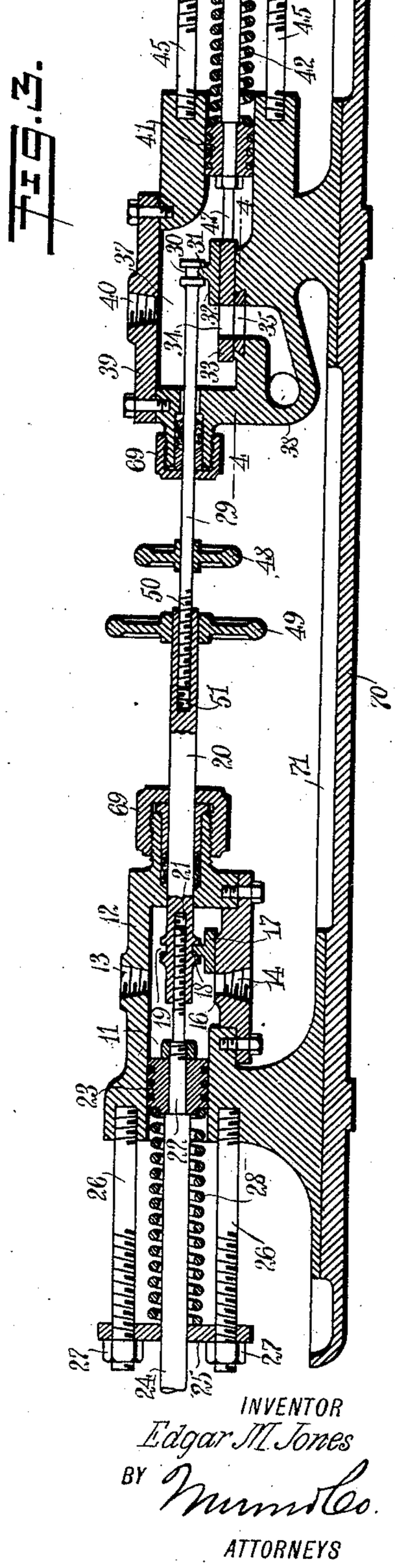

FIG. 3.

WITNESSES

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FUEL-OIL REGULATOR.

990,744. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed October 19, 1910. Serial No. 587,863.

To all whom it may concern:

Be it known that I, EDGAR M. JONES, a citizen of the United States, and a resident of Morenci, in the county of Graham and Territory of Arizona, have invented a new and Improved Fuel-Oil Regulator, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide an apparatus for regulating the supply of oil in an oil furnace proportioned to the pressure produced by the heat within said furnace; to provide an apparatus constructed and arranged to be operated by the pressure medium to produce which the oil fuel is furnished; to provide means for manually fixing the relative ratio of the elements forming the fuel; and to provide a construction for an apparatus of the character mentioned which is simple and efficient.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a side elevation of an apparatus constructed and arranged in accordance with the present invention; Fig. 2 is a plan view of the same; Fig. 3 is a longitudinal vertical section, on an enlarged scale, of the oil and steam valve casings and base plate therefor, constructed and arranged in accordance with the present invention; and Fig. 4 is a detail view in section, taken on the line 4—4 in Fig. 3, showing the valve seat plate and means for adjusting the same to limit the valve passage.

The present machine is intended for employment in connection with furnaces using gas as a fuel. The gas employed is combined steam and heavy oil. It becomes necessary to regulate the proportions of steam and gas to form the best mixtures, or mixtures best adapted to the uses in which the oil is employed. The important element in such a furnace is the proper supply of air to support combustion. In the present apparatus the regulation of the supply of steam, oil and air is constant.

When the proportions of the gas and air have been determined and provided for, it is deemed further advantageous to regulate the supply of fuel and air for supporting combustion therein, the said regulation being controlled by the pressure of the expanding medium formed by the heat of the furnace.

From suitable supplies, and by way of supply pipes 9 and 10, are delivered steam and oil respectively. When the steam is delivered through the pipe 9 the regulator is employed in conjunction with a steam boiler A. The steam is delivered by the pipe 9 to a chamber 11 in the valve casing 12, the pipe 9 being screwed into an orifice 13 in the outer wall of the said casing 12. The casing 12 is provided preferably in the lower wall with a second orifice 14, to which is connected a steam delivery pipe 15. The orifice 14 is extended through a valve seat 16. Upon the valve seat 16 rides a sliding valve 17. The valve 17 is of the usual sliding type, and is provided with a flange 18 which extends into a groove 19 formed in the plunger rod 20.

The plunger rod 20 is provided with a perforation 21, which is screw threaded to receive the threaded end of a valve stem 22, as shown best in Fig. 3 of the drawings. Mounted upon the valve stem 22 is a solid piston head 23, adapted to slide in a cylindrical bore provided in the end of the casing 12. The piston head 23 is provided, as shown in the drawings, with any approved and usual type of packing rings. The valve stem 22 is elongated to extend outward from the casing 12 beyond the piston 23 to form a guide plunger 24. The plunger 24 is slidably mounted in a guide plate 25, which guide plate is supported by screw threaded rods 26, 26. By manipulating the nuts 27 27, the plate 25 may be advanced to or retracted from the face of the casing 12. Between the plate 25 and the piston head 23 is extended a spiral spring 28, the normal action of which is to dispose the piston head 23 and valve 17 connected therewith in position to maintain the opening of the orifice 14, as shown substantially in Fig. 3.

When in the operation of an apparatus of the character described in conjunction with a steam boiler, the pressure in the boiler rises above the normal or designed pressure, this pressure is imparted to the steam in the chamber 11, and acting against the piston 23, compresses the spring 28, moving the said piston outward from the chamber 11. The movement of the piston 23 outward from the

chamber 11 draws the valve 17 over the orifice 14, limiting in this manner the quantity of steam which may pass through the orifice 14 into the delivery pipe 15, and in this manner reducing the supply of fuel to the furnace.

As the fuel consumed in the furnace is composed of both steam and oil in the proportion provided, the quantity of oil supplied must be reduced in the same ratio as that of the steam, and therefore the rod 20 is connected by screw thread connection with the valve stem 29, the inner end of which is provided with a groove 30 to engage the flange 31 formed on the valve 32. The valve 32 is slidably mounted on a movable seat plate 33, the orifice 34 whereof equals in length the orifice 35 of the seat plate 36. The two seat plates 33 and 36, when normally adjusted, regulate the passage opening for the oil from the chamber 37 to oil delivery pipes 38, 38. The operation, however, of the valve 32 is independent of the orifice opening of the two seat plates, and operates to close the passage formed in the upper plate 33 simultaneously with and by reason of the action of the steam pressure in the chamber 11 upon the piston head 23. In other words, as and in proportion to the limitation of the steam delivered from the chamber 11, so the oil delivered from the chamber 37 is limited.

The oil chamber 37 is formed in the valve casing 39, as seen best in Fig. 3 of the drawings. The oil delivery pipe 10 opens into the chamber 37 through a screw threaded orifice 40.

The seat plate 33 is provided to form an independent and automatic regulation for the oil supply, this being limited in accordance with the pressure on the oil, which pressure varies. The oil in the chamber 37 being in communication with the supply is under the same pressure as the supply. When the pressure increases in the chamber 37 above the normal, the piston head 41 mounted in the cylindrical bore in the rear of the casing 39 is moved outward from the chamber 37, compressing the spring 42 in such movement. The spring 42 is mounted around the plunger 43, which plunger is guided in a guide plate 44. The guide plate 44 is supported by screw threaded rods 45, 45. The tension of the spring 42 is regulated by manipulating the nuts 46, 46. The plate 33 is connected by means of a stem section 47 with the piston head 41.

Under normal conditions the spring 42 maintains the plate 33 so that the orifice 34 therein alines with the opening of the passage connected with the delivery pipes 38. When, however, during the operation the pressure of the oil increases, it will be seen that the piston head 41 and plate 33 connected therewith are moved outward, the said plate and orifice thereof passing over the orifice in the plate 35, and partially closing or constricting the passage opening into the delivery pipes 38. In this manner the supply of oil is regulated independently of the fixed ratio of steam and oil for which the apparatus may have been set.

It will be seen that so far as the oil and steam are concerned the regulation of the mixture is automatic both as to the pressure of steam produced in the boiler, and to any pressures not calculated produced in the oil supply.

As stated, the ratio of steam to oil is manually fixed. This is accomplished by means of hand wheels 48 and 49. The wheel 48 is fixedly mounted on the stem 29, the screw threaded end 50 whereof is in thread engagement with a tapped bore 51 formed in the rod 20. By turning the wheel 48 it is obvious that the stem 29 and valve 32 connected therewith are moved to or from the casing 12, and the position of the valve 32 is changed with relation to the seat plate 33 and the orifice 34 formed therein. In this manner, and under normal conditions, the ratio of oil to the volume of steam may be varied.

By manipulating the wheel 49, and holding the wheel 48, it will be seen that the rod 20 is moved longitudinally on the stem 22, carrying the valve 17 therewith to dispose the same over or remove the same from the orifice 14. In this manner the valve 17 may be manipulated to constrict or expand the normal steam passage from the chamber 11 without disturbing the relation of the valve 32 to the orifice 34. When manually set the valves 17 and 32 operate in unison, and by reason of the steam pressure in the chamber 11.

As shown in Fig. 4 of the drawings, the casing 39 is further provided with oil delivery regulating means consisting in the plate 36. The plate 36 is mounted in an elongated transverse passage 52, the sides whereof are undercut to receive the bevel edges 53, 53 of the plate 36. As described, the plate 36 is provided with an elongated orifice 35. In the transverse dimension the orifice 35 coincides with the opening of the orifice 34 in the superposed plate 33. The plate 33 is guided to move in a longitudinal passage 54 formed in the casing 9. When, therefore, the plate 36 is moved transversely, the arrangement of the parts results in a restriction of the oil passage opening through the orifices 34 and 35. To move the plate 36 there are provided set bolts 55, 55. The bolts 55, 55 are provided with lock nuts 56, 56 which may be manipulated to set the adjusted position of the bolts 55, 55. The manual adjustments thus provided for prove to be a great advantage in adapting a regulator constructed as shown in the accompany-

ing drawings to the demands arising in the use of oils of different nature, character and pressure.

As stated above, the air supply for supporting combustion in the furnace is an essential element to the perfect regulation of the combustion. In the present apparatus the air is delivered to the furnace through ducts 57, 57. The ducts 57, 57 are fed from the outside air through an intake opening 58. The opening 58 is provided with a slide valve 59, which valve is manually operated to move transversely across the opening 58 to reduce the passage opening therein. Above the slide valve 59 is provided guide ways for a flat gate valve 60. The valve 60 is connected by means of a rod 61 with a rocking lever 62. The lever 62 is pivotally connected to the rod 61 and the plunger 24, as shown best in Fig. 1 of the drawings. The lever 62 is provided with a slot 63 through which is extended a pivot bolt 64. The bolt 64 is mounted in the ends of a bracket 65, which bracket is adjustably secured upon a standard 66, the slot 67 formed therein being provided to receive a clamping bolt 68.

By adjusting the bracket 65 vertically in the standard 66 and lever 62 the center of rotation of the said lever 62 is changed, and the extent of movement of the rod 61 and valve 60 is varied. When once set to produce the desired movement of the valve 60, the bracket 65 is stationarily fixed by manipulating the nut on the bolt 68 to hold the bracket rigid in adjusted position on the standard 66.

With the valve 60 thus connected to the plunger 24 it will be seen that as the piston 23 and the valves 17 and 32 are moved, by the same action the said valve 60 is also and simultaneously moved. The movement of the valves 17 and 32 to close the orifices 14 and 34 results, by reason of the interposition of the lever 62, in the closure of the valve 60 over the intake opening 58, thereby limiting the supply of air to the ducts 57, 57.

The casings 12 and 39 are provided with stuffing boxes 69, 69 of any approved and suitable construction. The said casings are mounted on a base plate 70, likewise constructed in any approved manner, that shown in the drawings having an upturned flange 71, the object of which is to hold any leakage which may occur from the casing 39 or parts connected therewith.

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

1. A fuel oil regulator, comprising a steam casing having an inlet and an outlet orifice; an oil casing having an inlet and an outlet orifice; slide valves mounted in said casings and arranged to close said outlet orifices; a connecting rod uniting said valves; a piston head mounted in a steam chamber in open communication with the pressure chamber connected with the furnace to which fuel is being supplied through the said regulator; an air duct for supplying air to said furnace; an intake valve for said duct; and means for operatively connecting said intake valve with said piston head to operate in unison with the said first mentioned valves.

2. A fuel oil regulator, comprising a steam casing having an inlet and an outlet orifice; an oil casing having an inlet and an outlet orifice; slide valves mounted in said casings and arranged to close said outlet orifices; an extensible connecting rod connecting said valves; a piston head mounted in a steam chamber in open communication with the pressure chamber connected with the furnace to which fuel is being supplied through the said regulator; an air duct for supplying air to said furnace; an intake valve for said duct; and means for operatively connecting said intake valve with the piston head to operate in unison with said slide valves.

3. A fuel oil regulator, comprising a steam casing having an inlet and an outlet orifice; an oil casing having an inlet and an outlet orifice; slide valves mounted in said casings and arranged to close said outlet orifices; a connecting rod uniting said valves; manually operated means for varying the maximum opening of said outlet orifices; a piston head mounted in a steam chamber in open communication with the pressure chamber connected with the furnace to which fuel is being supplied through the said regulator; an air duct for supplying air to said furnace; an intake valve for said duct; and means for operatively connecting said intake valve with the piston head to operate in unison with said slide valves.

4. A fuel oil regulator, comprising a steam casing having an inlet and an outlet orifice; an oil casing having an inlet and an outlet orifice; slide valves mounted in said casings and arranged to close said outlet orifices; a connecting rod uniting said valves; a piston head mounted in a steam chamber in open communication with the pressure chamber connected with the furnace to which fuel is being supplied through the said regulator; an air duct for supplying air to said furnace; an intake valve for said duct; means for operatively connecting said intake valve with said piston head to operate in unison with the said slide valves; and manually operated means for varying the normal intake opening of said duct.

5. A fuel oil regulator, comprising a steam casing having an inlet and an outlet orifice; an oil casing having an inlet and an outlet orifice; slide valves mounted in said casings and arranged to close said outlet orifices; an extensible connecting rod connecting said valves; a piston head mounted

in a steam chamber in open communication with the pressure chamber connected with the furnace to which fuel is being supplied through the said regulator; an air duct for supplying air to said furnace; an intake valve for said duct; means for operatively connecting said intake valve with said piston head to operate in unison with said slide valves; and manually operated means for varying the normal intake opening of said duct.

6. A fuel oil regulator, comprising a steam casing having an inlet and an outlet orifice; an oil casing having an inlet and an outlet orifice; slide valves mounted in said casings and arranged to close said outlet orifices; a connecting rod uniting said valves; manually operated means for varying the maximum opening of said outlet orifices; a piston head mounted in a steam chamber in open communication with the pressure chamber connected with the furnace to which fuel is being supplied through the said regulator; an air duct for supplying air to said furnace; an intake valve for said duct; means for operatively connecting said intake valve with said piston head to operate in unison with said slide valves; and manually operated means for varying the normal intake opening of said duct.

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

EDGAR MAWER JONES.

Witnesses:
J. M. ERICKSON,
C. A. CASALEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."