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PRESSURE CONTROLLED MEANS FOR HYDROCARBON BURNERS.

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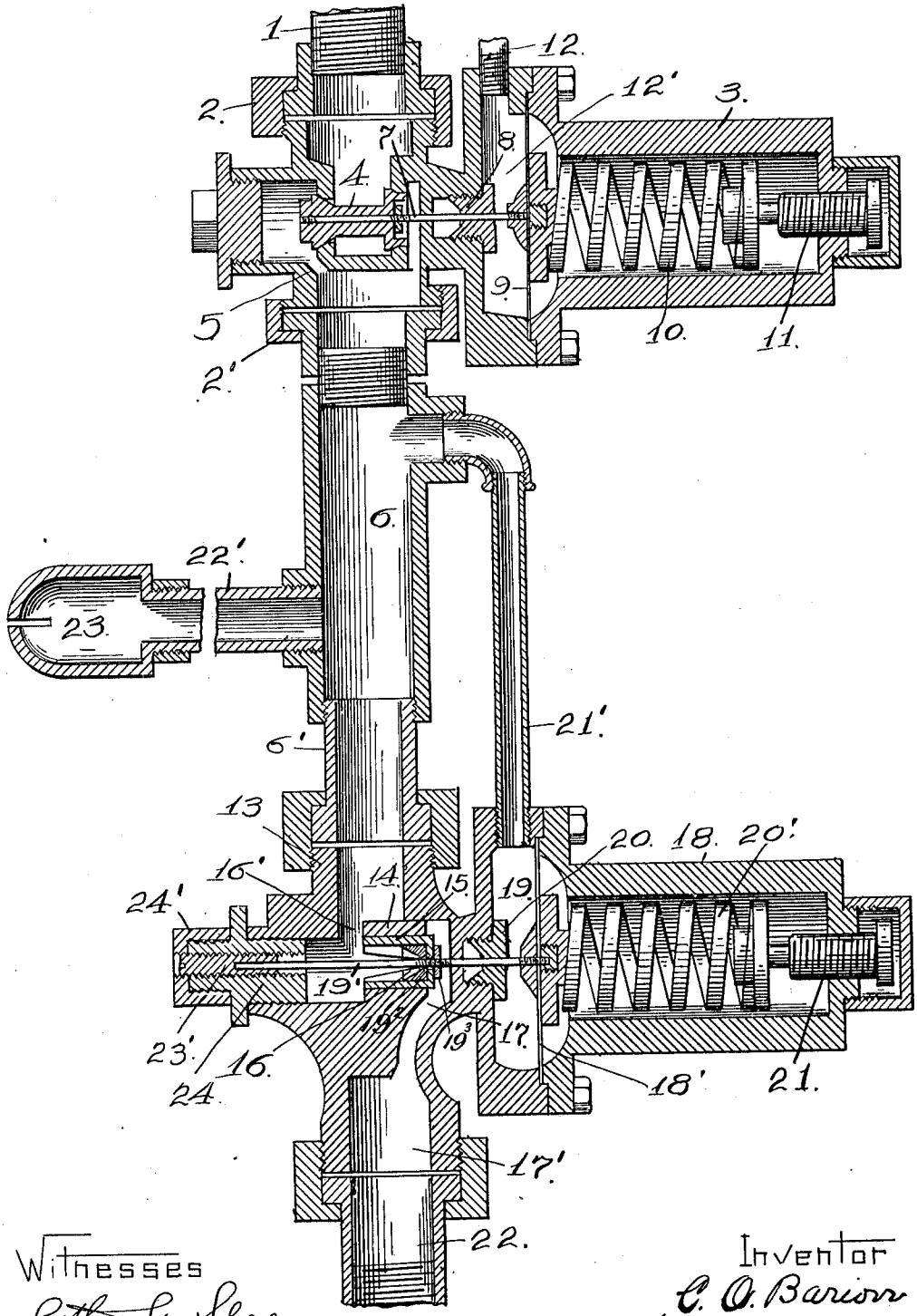

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PRESSURE-CONTROLLED MEANS FOR HYDROCARBON-BURNERS.

1,040,973. Specification of Letters Patent. Patented Oct. 8, 1912.

Application filed June 14, 1911. Serial No. 633,140.

To all whom it may concern:

Be it known that I, CHRISTIAN O. BARION, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Pressure-Controlled Means for Hydrocarbon-Burners, of which the following is a specification.

The hereinafter described invention relates to an improved pressure controlled means for regulating the flow of steam and oil to any suitable type of hydrocarbon burners; the object of the invention being the production of automatically operated mechanism thrown into action by increased and decreased, *i. e.* variable pressures of the inflowing steam in order to proportion the quantity of oil admitted to a pressure chamber in accordance with variation in the steam admitted thereto so that the oil supply will remain constant with the inflowing steam, thereby maintaining under all working conditions of the hydrocarbon burner the proper admixture of oil and steam.

To comprehend the invention reference should be had to the accompanying sheet of drawings, wherein is disclosed the invention as interposed between and connected with the steam supply pipes leading from the drum of a steam boiler, and the oil supply pipe leading from any suitable source of oil supply, the steam and oil regulators and the pressure chamber with which the hydrocarbon burner connects being in vertical section.

In the drawings, the numeral 1 is used to designate any well known form of a steam supply pipe for dry steam extended from the drum of a steam boiler, and connected to a valved-union 2, to which union is attached a pressure regulator 3 for controlling the action of the valve 4 within the union. The valve 4 is a balanced one and movable longitudinally within the valved union 2 for regulating the flow of steam from the supply pipe and through the port opening 5 into the pressure chamber 6 with which the union 2 is united at its upper end by means of a suitable connection 2′. The valve 4 is provided with a stem 7 which passes through a stuffing gland 8 within the regulator 3 and its free end is connected to a vertically disposed diaphragm 9, which is acted on by the pressure of a retained spring 10 situated in the said regulator, the pressure of the spring against the face of the diaphragm being increased or decreased as desired by means of the adjusting screw 11.

The steam pipe 12 leading direct from the drum of the steam boiler is connected to the regulator 3 for the discharge of steam into the chamber 12′ in advance of the diaphragm 9, the pressure of which balancing the pressure of the spring 10 acting against the diaphragm 9 serves to maintain the same in neutral position and the valve 4 balanced within the union 2 to maintain open the port 5 for the flow of steam into the pressure chamber 6, just so long as the pressure of the steam flowing therethrough is sufficient to equalize the steam pressure within the chamber 12′ of the regulator.

To the lower end of the pressure chamber 6 is united by a connection 6′ to a union 13 in which is a guide way 14 for a hollow cylindrical slide piston 15, which piston is open at its inner end. This slide piston is provided in its side wall with one or more angularly disposed or V-shaped cut out inwardly flared to form a tapered port 16 for the flow of pressure oil into and through the slide piston, so that as the piston is moved inwardly the area of the passage for the oil flow through said cut rapidly increases, allowing a greater quantity of oil to flow upwardly through the piston and port 16′ into the pressure chamber 6. Within the union 13 back of the slide piston is formed an oil chamber 17, into which oil enters through the conduit 17′.

To the valved union 13 is attached a regulator 18, provided with a fixed vertically disposed diaphragm 18′ which forms a steam chamber 19, and to said diaphragm is secured in any suitable manner the rod 19′ of the piston 15, the said stem passing through a stuffing gland 30. The piston 15 is held upon the rod 19′ as by suitable nuts 19^2 and 19^3 threaded to the rod 19′ and engaging respectively opposite surfaces of the end of the piston. Back of the diaphragm 18′ is located a spring 20′ which acts thereon, the pressure of which is adjusted by the

regulating screw 21. From the pressure chamber 6 steam is admitted into the steam chamber 19 of the regulator 18 by means of the direct by-pass connection 21′. Oil under pressure is supplied to the union 13 by means of a supply pipe 22, which leads from any suitable source of oil supply.

To the pressure chamber 6 is connected by a connection 22′ a suitable form of hydro-carbon burner 23, the oil and steam being supplied thereto under pressure from the said pressure chamber 6.

At times it is desirable that the regulating means be so adjusted as to keep a small flame burning within the furnace. For this purpose the oil supply should not be entirely cut off, and to accomplish this an adjustable stop 23′ is provided, which screws in a plug 24 screwed into the union 13, the said plug being protected by means of a cap 24′ screwed upon the externally threaded circumference of the plug or boss 24. Within a central bore in the adjustable stop 23′ is loosely extended the outer end of the piston rod 19′, the position of the adjustable stop 23′ limiting the stroke of the said rod 19′ and consequently the movement of the slide piston.

Under the described form of connections as the pressure of steam direct from the boiler varies, a change of pressure in the presure chamber 12 of the steam regulator 3 takes place, which variations in pressure cause a shifting of the valve 4 and the piston 15 in order to regulate the flow of steam and oil into the pressure chamber 6 in accordance with such variations in the steam pressure of the boiler. For instance, presuming the steam regulator 3 to be adjusted to a hundred pound boiler pressure, and the oil regulator 18 adjusted to coöperate therewith under such an adjustment, if the steam pressure in the boiler rises above a pressure of one hundred pounds, a corresponding increased steam pressure takes place in the chamber 12′ of the regulator 3, which acting against the diaphragm 12′ and overcoming the resistance of the spring 10, forces the said diaphragm inwardly, which carries therewith the valve stem 7, moves the slide valve 4 to reduce the flow of steam into the pressure chamber 6, thereby reducing the steam pressure therein. As the pressure within the said pressure chamber is reduced, the pressure within the steam chamber 19 of the oil regulator 18 drops, when the pressure of the spring 20′ acting against the diaphragm 18′ overcoming the reduced steam pressure within the chamber 19 forces outwardly the said diaphragm 18′, which carrying therewith the piston rod 19′ moves the piston 15 to reduce the area of the port 16 and by so doing throttling the flow of pressure oil through the piston and port or conduit 16′ into the pressure chamber 6, thus proportioning the flow of oil to the flow of steam into the said pressure chamber; conversely, if the steam pressure within the boiler drops for any reason, the spring 10, of the steam regulator, overcoming the pressure within the steam chamber 12′, forces outwardly the diaphragm 10, which, through its connection, moves the slide valve 4 to increase the flow of steam into the pressure chamber 6 and raises the pressure therein, which increased pressure is transmitted to the chamber 19 of the oil regulator 18. This increased pressure overcoming the pressure of the spring 20′ forces inwardly the diaphragm 18′ to move the slide piston 15 to expose an increased area of the port 16 for the admitting of an increased flow of the pressure oil through the said piston and the conduit 16′ into the pressure chamber 6, thereby proportioning the oil flow proportionately to the increased steam pressure admitted into the said pressure chamber. The flow of steam and oil into the pressure chamber is thus automatically controlled or regulated in accordance with either an increase or decrease in the steam pressure of the steam boiler, thereby automatically regulating the feed supply to the hydro-carbon burner for the maintenance of a proper fire beneath the furnace.

Having thus described the invention what is claimed as new and desired to be protected by Letters Patent is—

1. In an apparatus for the described purpose, the combination with a pressure chamber, of a valved steam inlet connected with one end and a controlled oil feed connected to the opposite end thereof, a pressure actuated regulator associated with the valved steam inlet for positioning the valve thereof for varying the steam supply to the pressure chamber in accordance with the rise or fall of the steam pressure within a boiler, a second pressure actuated regulator associated with the controlled oil feed for regulating the said oil feed on changes of pressure within the pressure chamber, a steam by-pass between the said pressure chamber and the second regulator for the oil feed, a steam supply connection between the valved steam inlet and a steam boiler, a direct steam connection from the boiler to the regulator for the valved steam inlet, a hydro-carbon burner connected to the pressure chamber, and a connection between the controlled oil feed and a source of supply for the pressure oil.

2. In an apparatus for the described purpose, the combination with an elongated tubular casing having intermediate its ends a pressure chamber, of a valved steam inlet

connected with the upper end of said casing, a steam pressure regulator associated with said inlet, a spring pressed diaphragm held therein, means for admitting steam direct from a boiler to one side of the diaphragm, connection between said diaphragm and the valve of the steam inlet, for shifting the position thereof on a change in steam pressure, a controlled oil feed connected to the lower end of the said casing to the opposite side of the pressure chamber, a ported slide piston for regulating the supply of oil through said feed to the pressure chamber, an oil pressure regulator associated with the oil feed, a spring pressed diaphragm within the regulator, a steam by-pass connection between the pressure chamber and the said oil pressure regulator for admitting steam pressure therein to one side of the diaphragm, connection between the said diaphragm and the slide piston for varying the position thereof in accordance with variations of pressure within the pressure chamber, and a hydro-carbon burner connected with the pressure chamber.

3. In an apparatus for the described purpose, the combination with a pressure chamber, of a valved steam inlet connected with one end thereof, a controlled oil feed connected with the opposite end thereof, a pressure actuated regulator for adjusting the valved steam inlet in accordance with variations of steam pressure, a second pressure actuated regulator for adjusting the controlled oil feed with variations of steam pressure within the pressure chamber, a steam by-pass connection between the said chamber and the second regulator for the oil feed, and a hydro-carbon burner connected with the pressure chamber for receiving oil and steam therefrom.

4. In an apparatus for the described purpose, the combination of an elongated tubular member forming a pressure chamber, a pressure regulated valved steam inlet connected to one end thereof and detachable therefrom as an independent unit, of an oil feed connection at the opposite end of the pressure chamber and detachable therefrom as an independent unit, a ported slide piston working in said oil inlet connection, a pressure actuated regulator for shifting the position of said piston in accordance with the variations in the steam pressure within the pressure chamber, a by-pass steam connection between said regulator and the pressure chamber, and a hydro-carbon burner connected with the said chamber for receiving steam and oil under pressure therefrom.

5. In an apparatus for the described purpose, the combination with a pressure chamber interposed between the steam supply from a boiler and the oil supply, of a valved steam inlet connected to one end portion of the pressure chamber and a controlled oil feed to the opposite end portion thereof, of a pressure actuated regulator for controlling the position of the valve of the steam inlet in accordance with variations in the boiler pressure, a pipe connection extended from the boiler to the said regulator, a slide piston within the controlled oil feed, a record pressure regulator for actuating said piston in accordance with the adjustment given the valve of the steam inlet, a by-pass steam connection between said second regulator and the pressure chamber, a hydro-carbon burner connected with the steam chamber for receiving steam and oil under pressure therefrom, and adjustable means for regulating the closing movement of the slide piston, independently of the valve of the steam inlet.

6. In an apparatus of the character described, the combination of an elongated casing forming intermediate its ends a pressure chamber, a conduit leading from the pressure chamber of the casing, a burner on said conduit, a valve controlled steam inlet connection adjacent one end of the casing, a steam supply connection between said inlet and a boiler, means associated with the valve for automatically adjusting the same in accordance with pressure variations in a steam boiler, a controlled oil feed connected to the opposite end of said casing, a diaphragm chamber positioned to one side of the casing adjacent said lower end, a diaphragm positioned in the chamber, a spring acting upon one side of the diaphragm, a steam conduit extending longitudinally of the casing to the side thereof, and having connection at one end with said diaphragm chamber to that side thereof opposite the spring, said steam conduit being connected at its opposite end with said pressure chamber, a slide valve in the oil inlet connection, and a rod connected to said diaphragm and valve respectively.

7. In an apparatus of the character described, the combination of an elongated casing forming intermediate its ends a pressure chamber, a conduit leading from the pressure chamber of the casing, a burner on said conduit, a valve controlled steam inlet connection adjacent one end of the casing, a steam supply connection between said inlet and a boiler, means associated with the valve for automatically adjusting the same in accordance with pressure variations in a steam boiler, a controlled feed connected to the opposite end of said casing, a diaphragm chamber positioned to one side of the casing adjacent said lower end, a diaphragm positioned in the chamber, a spring acting upon

one side of the diaphragm, a steam conduit extending longitudinally of the casing to the side thereof, and having connection at one end with said diaphragm chamber to that side thereof opposite the spring, said steam conduit being connected at its opposite end with said pressure chamber, a slide valve in the oil inlet connection, and a rod connected to the diaphragm and to said valve intermediate its ends, and an adjustable abutment for the opposite end of said rod.

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

CHRISTIAN O. BARION.

Witnesses:
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