E. C. JACOBSEN.

FUEL BURNING APPARATUS.

APPLICATION FILED DEC. 3, 1919.

1,361,263.

Patented Dec. 7, 1920.

2 SHEETS—SHEET 1.

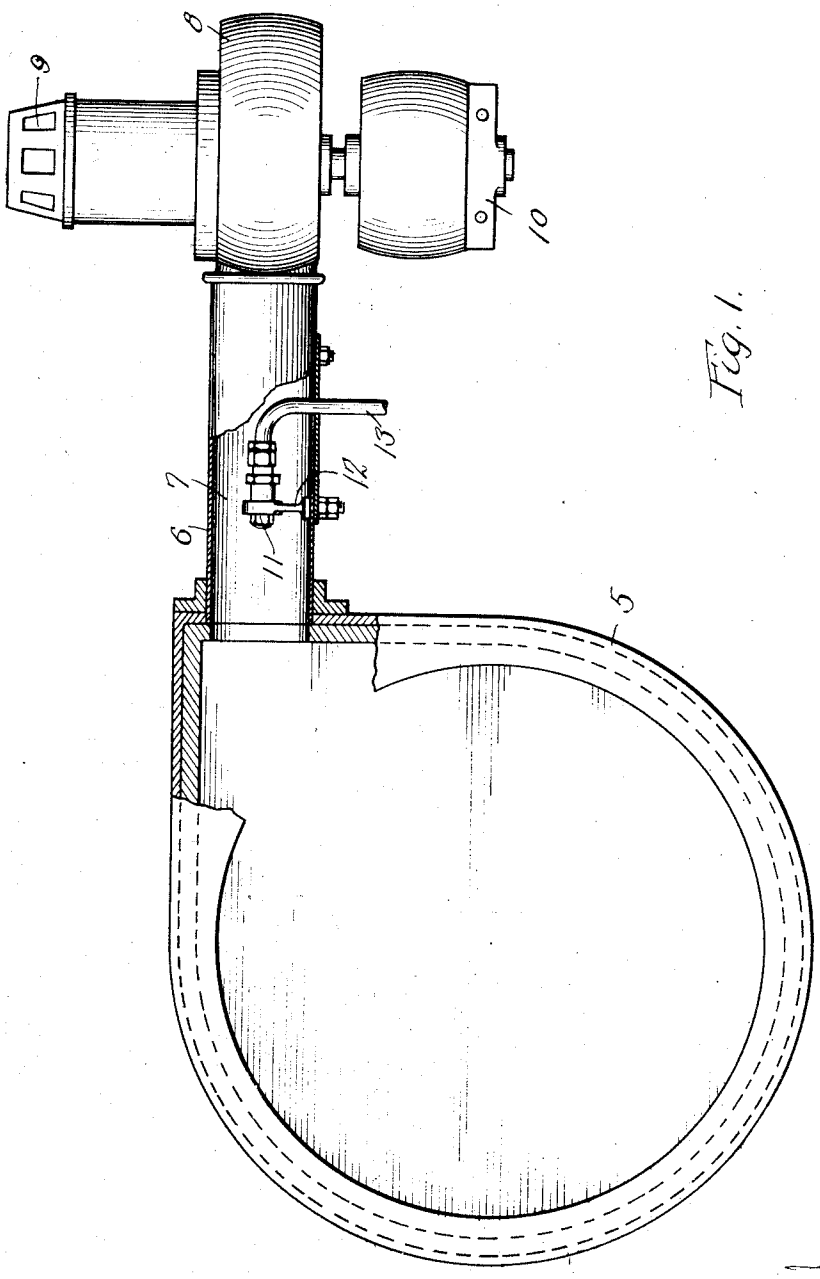


Fig. 1.

Witness:
A. C. Olson

Inventor:
Era C. Jacobsen,
By Brown & Wessel
Atty's.

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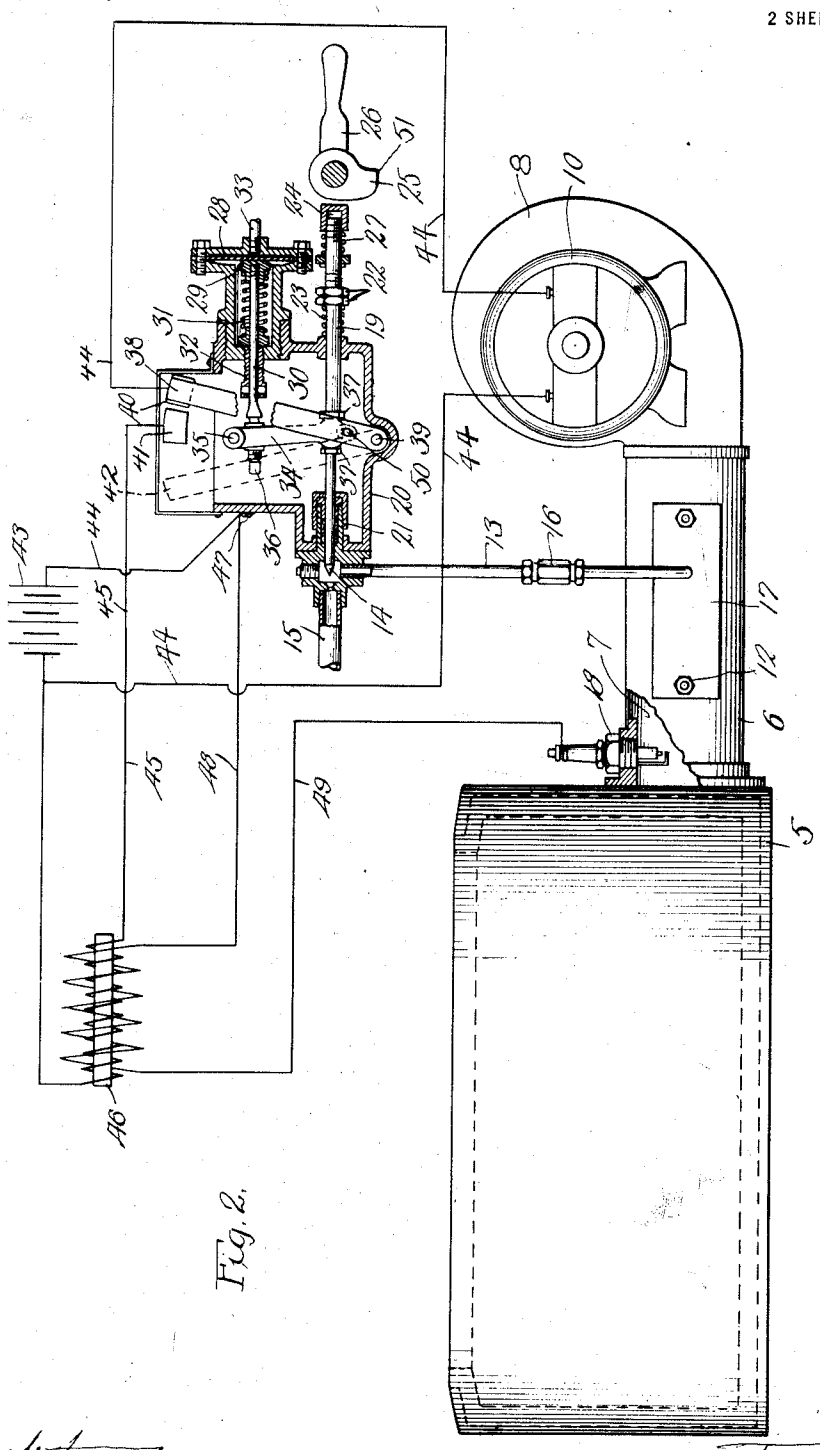


Fig. 2.

Witness:
A. C. Olson

Inventor:
Era C. Jacobsen,
By Browne & Rossar
Atty's.

UNITED STATES PATENT OFFICE.

ERA C. JACOBSEN, OF OAK PARK, ILLINOIS.

FUEL-BURNING APPARATUS.

1,361,263. Specification of Letters Patent. Patented Dec. 7, 1920.

Application filed December 3, 1919. Serial No. 342,261.

To all whom it may concern:

Be it known that I, ERA C. JACOBSEN, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fuel-Burning Apparatus, of which the following is a specification.

My invention relates to fuel burning apparatus and has for one of its objects the provision of simple and efficient means for starting and controlling the burning of fuel for tubular boilers, and the like.

A further object is the provision of a simple and efficient fuel burning apparatus in which all of the fuel can be introduced from a single fuel dispensing member.

A further object is the provision of simple and efficient means for first turning on the fuel, then igniting the fuel, and finally starting a blower for blowing the fire.

A still further object is the provision of simple and efficient means for controlling the burning of the fuel.

Other objects will appear hereinafter.

An embodiment of my invention is illustrated in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a plan view of a fuel burning apparatus embodying my invention with portions broken away to show underlying parts; and

Fig. 2 is a side elevation of a device embodying my invention, being partly in section to show underlying parts and partially diagrammatically.

Referring more particularly to the drawings I have indicated a combustion chamber or fire-box 5 substantially cylindrical in form with a housing 6 inclosing a fuel and air passage 7. The passage 7 is preferably arranged tangentially to the interior of the fire-box 5 so that the fuel and air passing from passage 7 into the fire-box turns around the fire-box and meeting other fuel and air entering the latter produces a very intense fire and a combustion with maximum efficiency. Other forms of fire-box will work efficiently with my controlling and feeding means, but I find that this form heats the boiler very evenly and prevents localizing the fires which causes burning out of some of the tubes or portions of the boilers.

At one end of the passage 7 I provide a blower 8 which may be of any preferred form. The form indicated is of the centrifugal type in which the air enters through a damper arrangement 9 and is discharged into the passage 7. An electric motor 10 may be directly connected to the blower, or in any other desirable manner caused to operate the blower. Other sources of power will also operate the blower effectively, but the electric motor is particularly adaptable owing to the ease of controlling its operation.

In the passage 7, at a convenient position, I mount a nozzle 11 which may be of any preferred or desired type. The nozzle 11 is indicated as having a bracket 12 which holds it substantially centrally of the passage 7. A tube 13 connects the nozzle 11 with a suitable controlling valve 14 which is connected by a suitable pipe 15 with a source of fuel under pressure, which is not shown. The tube 13 may be provided with a union 16 when so desired. It will also be apparent that the tube 13 may be formed in any desired length so that the controlling means to be described later may be positioned in any convenient position. I have indicated the bracket 12 and tube 13 as being mounted in a plate 17 secured to the side of housing 6 and it will be apparent that the nozzle 11 may be mounted in other desirable manners.

Adjacent the end of passage 7 near the fire-box 5 I mount an ignition device 18, which in the present instance is an ordinary jump-spark spark plug. The plug 18 is disposed at a point where it can ignite fuel issuing from nozzle 11 and after the fuel is ignited, the air coming through passage 7 is sufficient to keep the fire from burning the plug and also for maintaining the plug cool so that the latter will not be injured when not in use.

The valve 14 is provided with a stem 19 and the latter is slidably mounted in a housing 20. A stuffing box 21 is preferably provided to prevent leakage of the fuel into the housing 20. Threaded on the stem 19 are two nuts 22 which form a shoulder against which a light spring 23 engages. The spring 23 is sufficiently strong to move the valve stem 19 to unseat the valve 14 normally. By having the nuts 22 threaded on the stem 19 the tension of spring 23 may be adjusted as desired. Threaded on the end of stem 19 is a member 24 and engaging

the member 24 is a cam 25 adapted to be manually operable by a handle 26. The arrangement is such that upon operating handle 26 cam 25 will engage member 24 and move the stem 19 so that valve 14 will be seated, cutting off the passage of fuel to the jet 11. Upon moving handle 26 back to the position shown in Fig. 2, the spring 23 will automatically open valve 14. A spring 27 is shown as engaging member 24 for frictionally holding the latter in its adjusted positions.

In the housing 20 is mounted a diaphragm 28 against which a member 29 attached to the end of a stem 30 presses. The member 29 is pressed by a strong spring 31. The other end of spring 31 engages an adjustable member 32 which is threaded and can be adjusted in the housing 20 for varying the tension of spring 31. A steam pipe 33 coming from a boiler, not shown, is fitted in the housing 20 and opens against the diaphragm 28. The tension of spring 31 is such that when the steam pressure in pipe 33 is below a predetermined pressure, spring 31 will hold the member 29 and diaphragm 28 in the position indicated in Fig. 2, and when the pressure in pipe 33 increases above such predetermined pressure, the steam pressure flexes diaphragm 28 moving the stem 30 toward the left-hand side of the figure, as shown in Fig. 2.

In the housing 20 is a lever 34 pivoted as at 35. Threaded in the lever is a set screw 36 which engages an end of stem 30 so that movement of the latter will move lever 34. The free end of lever 34 is disposed between two shoulders 37 on valve stem 19 so that operation of stem 30 moves valve stem 19. When the pressure in steam pipe 33 is greater than a predetermined pressure then valve stem 19 is moved to close valve 14, shutting off the supply of fuel until the steam pressure in pipe 33 again falls below said predetermined pressure.

A switch arm 38 is pivoted as at 39 in the housing 20 and adapted to register with contact points 40 and 41 and a neutral point 42. An electric battery 43 is connected in a circuit comprising a suitable wiring 44, the contact 40, switch lever 38, housing 20, and electric motor 10 for operating the blower. The battery 43 may also be utilized to energize the ignition circuit and when so arranged the battery 43 is connected by means of a part of wire 44 with housing 20, as at 47. One lead of the primary winding of an induction coil 46 is attached to contact 41 and the other lead attached to the battery 43 so that when switch arm 38 is engaging contact 41 an electric current will pass through the primary winding of induction coil 46. One lead 48 of the secondary winding of induction coil 46 is preferably grounded to some part of the device, such as under screw 47, and the other lead 49 of the secondary winding connected to spark plug 18 so that when the primary circuit is energized a curernt will produce a spark in spark plug 18 for igniting fuel.

The lever 34 is connected with the switch arm 38 by a slot and pin connection 50 so that movement of the lever 34 will operate said switch arm.

When the device is not in use cam 25 is to be moved against the member 24 with its flat face 51 engaging the member 24, thus locking the device in inoperative position. When the valve 14 is closed switch arm 38 will be in neutral position 42 so that both of the electrical circuits will be broken. When it is desired to start the device the operator moves handle 26, thus withdrawing cam 25 from member 24, permitting spring 23 to open valve 14. As the valve 14 begins to open fuel passes through tube 13 and nozzle 11 into passage 7 and toward the firebox 5. As the valve stem 19 continues to move under the influence of spring 23 switch arm 38 is brought into engagement with contact 41 causing an electric circuit to produce sparks in spark plug 18 to ignite the fuel. Then as the stem 19 continues to move under the influence of spring 23 switch arm 38 engages contact 40 closing the blower electric circuit and starting the blower for fanning the flame produced by the spark. It will be apparent that as the blower starts the switch lever 38 will be in contact with both contacts 41 and 40 causing the sparks to continue in spark plug 18 until after the blower has begun to operate. Then as switch arm 38 passes out of engagement with contact 41 the ignition circuit is broken and the blower only continues to operate. As long as the pressure in pipe 33 is weaker than the spring 31 the device will thus continue to operate, but upon the pressure in pipe 33 exceeding the strength of spring 31 stem 30 will be moved to operate lever 34 thereby closing valve 14 and moving switch arm 38 over to neutral position. As soon as the steam pressure in pipe 33 again becomes weaker than spring 31 valve 14 is again opened, the fuel ignited and the blower started, as already described. This provides means for automatically starting the fire and continuing its operation upon movement of the cam 25 by the operator.

While I have illustrated and described the preferred form of my invention I do not desire to be limited to the precise details set forth, but desire to avail myself of such variations and changes as come within the scope of the appended claims.

I claim:—

1. In combination, a casing; a fuel jet in the casing; a valve connected with the fuel jet; an ignition circuit associated with the casing; a blower attached to the casing;

a blower electrical circuit associated with the blower; and means for successively opening said valve, closing the ignition circuit and closing the blower circuit.

2. In combination, a combustion chamber; an ignition device; a source of fuel associated with the combustion chamber; a blower associated with the combustion chamber; and means for successively turning on the fuel from said source of fuel supply, igniting the fuel and operating the blower to blow the fire.

3. In fuel burning apparatus the combination of an electrical ignition circuit; an electrical blower circuit; and means for first closing the ignition circuit and then closing the blower circuit.

4. In fuel burning apparatus the combination of an electrical ignition circuit; an electrical blower circuit; a switch contact in each of said electrical circuits; a switch lever common to both electrical circuits; and means connected with the switch lever for moving the latter first into engagement with the contact in the ignition circuit and then over on the contact in the blower circuit.

5. In fuel burning apparatus the combination of a fire-pot; a passage leading to said fire-pot; a single fuel jet in said passage adapted to direct fuel toward said fire-pot; means for admitting and controlling the passage of fuel to said fuel jet; ignition means for igniting said fuel; and blowing means adapted to blow the fire after the fuel is ignited by said ignition means.

6. In fuel burning apparatus the combination with a fuel valve; a steam operated diaphragm; a connection between the diaphragm and fuel valve for automatically closing the latter upon steam against the diaphragm exceeding a predetermined pressure; electrical ignition and blowing circuits associated with the aforesaid elements; and means connected with said connection for first closing said ignition circuit then closing said blower circuit.

7. In combination, a fuel valve; a spring tending to hold the valve open; a steam operable diaphragm; an operative connection between said diaphragm and the fuel valve; an ignition circuit; a blower circuit; and a switch arm operatively associated with said operable connection and adapted to be moved into each of said circuits upon movement of the valve.

8. In combination, a fuel valve; a resilient member of predetermined strength tending to hold the valve open; a fluid under pressure operable diaphragm; an operable connection between said diaphragm and the fuel valve; a source of fluid under pressure supply associated with the diaphragm so that when pressure of the compressed fluid on the diaphragm exceeds the strength of said resilient member the valve will be moved against the influence of said resilient member; an ignition circuit; a blower circuit; and a switch arm operatively associated with said operable connection and adapted to be moved from one of said circuits to the other upon movement of said valve.

9. In combination, a fuel valve; a spring tending to hold said valve open; a diaphragm; a spring-pressed stem attached to the diaphragm; a lever operatively associated with said valve and the stem of said diaphragm; an ignition circuit having a contact therein; a blower circuit having a contact therein; a switch arm connected with said lever and adapted to pass from one of said contacts to the other upon movement of said valve; and manually operable means associated with the valve for moving the latter and said switch arm independently of the movement of the diaphragm.

10. In fuel burning apparatus the combination of an electrical ignition circuit; an electrical blower circuit; a switch contact in each of said electrical circuits; a switch lever common to both electrical circuits; a fuel valve; a connection between the fuel valve and switch lever; and a spring tending to open said fuel valve and move the switch lever for first closing the ignition circuit then closing the blower circuit and opening the ignition circuit.

11. In fuel burning apparatus the combination of an electrical ignition circuit; an electrical blower circuit; a switch contact in each of said electrical circuits; a switch lever common to both electrical circuits; a fuel valve; a connection between the fuel valve and switch lever; a spring tending to open said fuel valve and move the switch lever for first closing the ignition circuit then closing the blower circuit and opening the ignition circuit; and steam operable means connected with said fuel valve for closing the latter and moving said switch lever to a position for breaking both the ignition and blower circuits.

In testimony whereof I have signed my name to this specification on this 22d day of November, A. D. 1919.

ERA C. JACOBSEN.