

No. 871,656.

PATENTED NOV. 19, 1907.

B. L. WORTHEN.
HYDROCARBON BURNER FOR FURNACES.

APPLICATION FILED NOV. 12, 1904.

2 SHEETS—SHEET 1.

Fig. 2

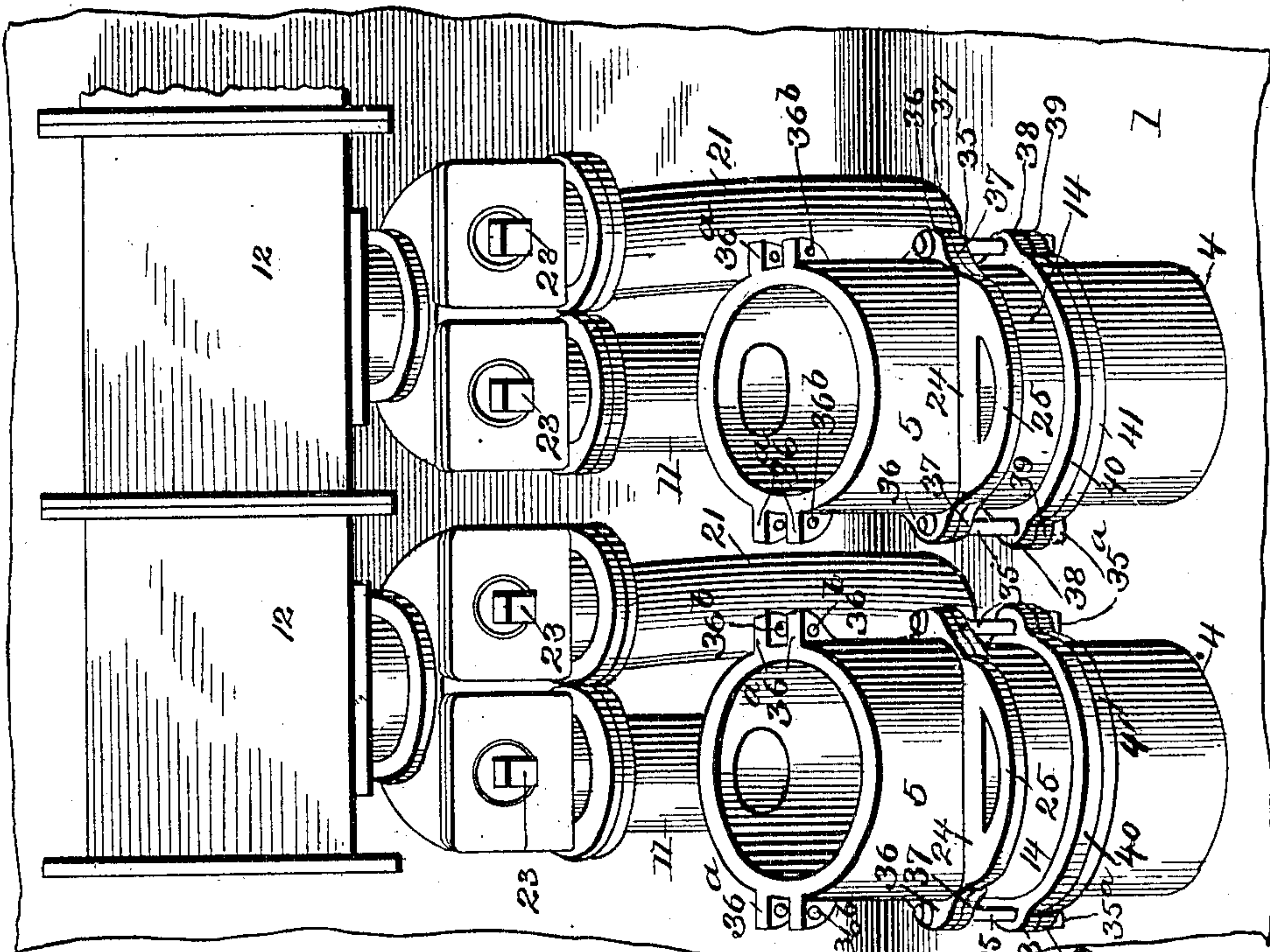
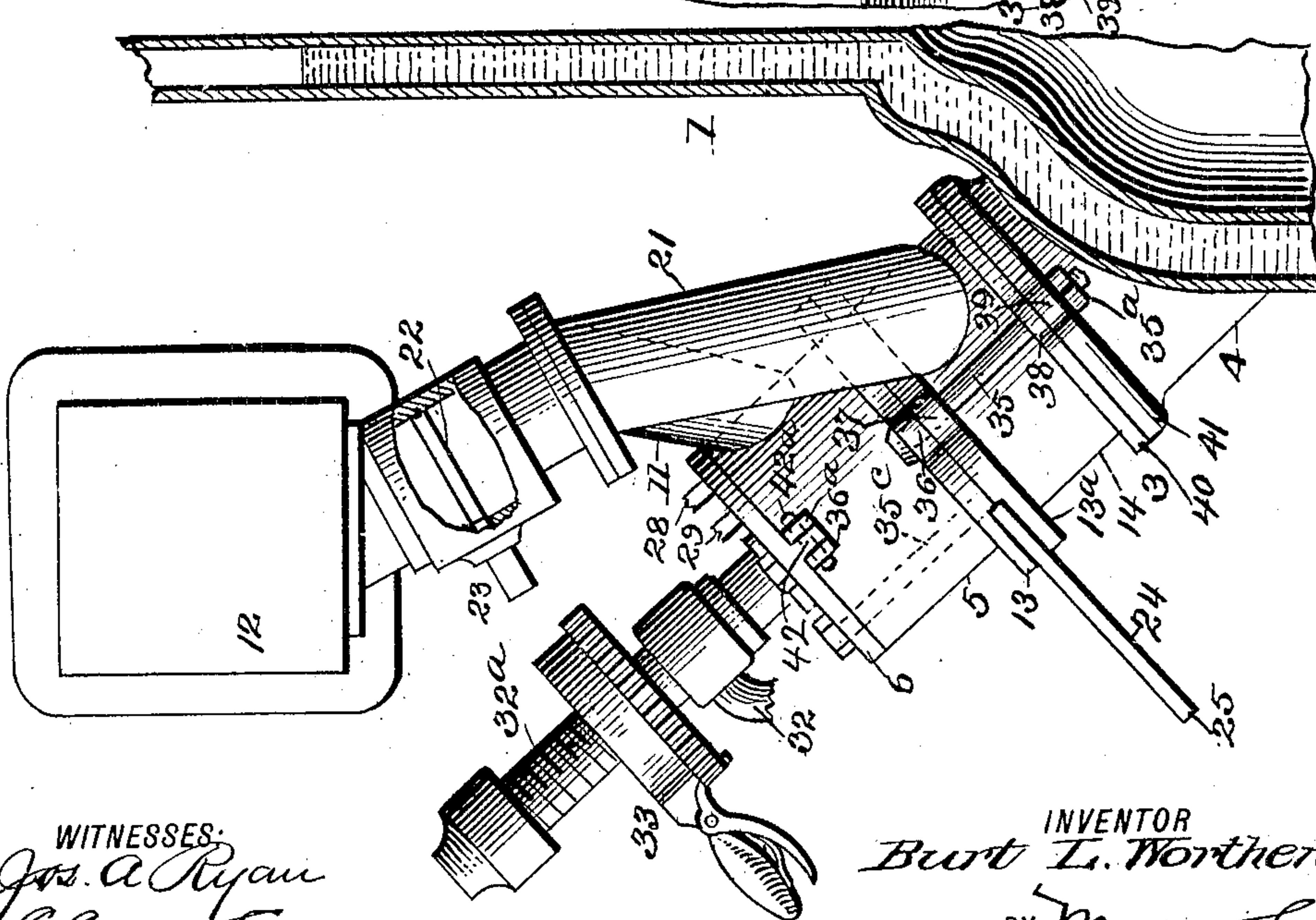


Fig. 1.



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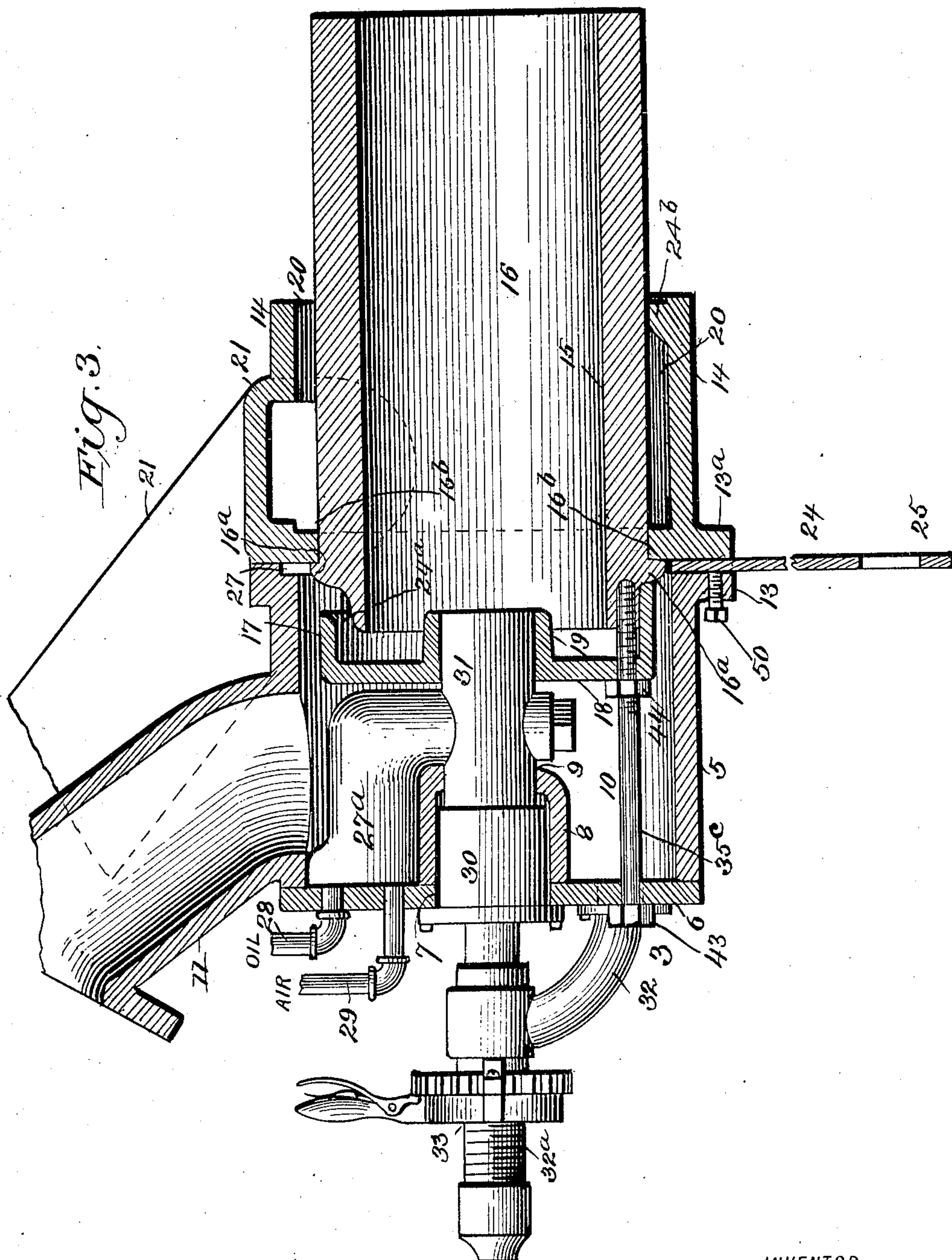
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UNITED STATES PATENT OFFICE.

BURT L. WORTHEN, OF TUCSON, ARIZONA TERRITORY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE KEMP HYDRO-CARBON FURNACE COMPANY, A CORPORATION OF NEW YORK.

HYDROCARBON-BURNER FOR FURNACES.

No. 871,656.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed November 12, 1904. Serial No. 232,485.

To all whom it may concern:

Be it known that I, BURT L. WORTHEN, a citizen of the United States, and resident of Tucson, in the county of Pima and Territory of Arizona, have made certain new and useful Improvements in Hydrocarbon-Burners for Furnaces, of which the following is a specification.

This invention relates to hydrocarbon burners, and it consists substantially in the improvements hereinafter particularly described.

In the reduction or smelting of metallic ores it is usual in some instances to employ a plurality of hydrocarbon burners within the walls of the smelting or reducing chamber of the furnace, for the purpose of projecting oxidizing desulfurizing flames into or against the mass of ore within the chamber, but with such installations it frequently happens that the smelting or reducing operations are seriously interfered with or delayed, due to the collapse or burning out of one or more of the burners, which causes a material reduction of working pressure within the smelting chamber, with consequent evil results.

One of the principal objects of the present invention is to overcome the above mentioned and numerous other disadvantages which have been found to exist with many forms of hydrocarbon burners hitherto devised for ore reducing and other purposes, all substantially as will hereinafter more fully appear, when taken in connection with the accompanying drawings, in which

Figure 1 is a side elevation showing the application of the burner to a furnace. Fig. 2 is a front elevation thereof, showing a plurality of casings as mounted within the wall of the furnace, minus the burner-structures proper. Fig. 3 is an enlarged longitudinal sectional view of the entire burner-structure, showing the entire organization of the parts or elements thereof more clearly, the position of the structure being horizontal instead of inclined as in Figs. 1 and 2.

Before proceeding with a more detailed description, it may be stated that in the form of my improvements herein shown, I preferably employ a hydrocarbon burner possessing the general characteristics of the burner illustrated and described in my co-pending application, Serial No. 232,486 with certain

additions, however, as will presently appear. Special means are employed for delivering 55 air between the walls of a specially constructed combustion-chamber and the walls of a casing inclosing said first-named walls, the two said walls extending into a twyer-opening of a furnace. I still further employ 60 suitable means, as a gate, for instance, for entirely shutting off communication between the reducing-chamber and the atmosphere, whenever desired, so as to enable the burner proper to be readily removed, in the event of 65 collapse or burning out of the same, without at all interfering with the working of the furnace with which the burner may be associated. Thus, in the use of a plurality of the burners, for introducing flames into the reducing chamber of the furnace, should one or more of the burners be rendered useless from any cause, the same may be easily and quickly removed, and substitution therefor 70 made without materially altering the working pressure within the furnace, or otherwise interfering with the reducing operations of the latter.

While I have herein represented my present improvements in a certain preferred 80 embodiment, it will be understood, of course, that I am not limited to the precise details thereof in practice, since immaterial changes therein may be made, coming within the scope of my invention. 85

Reference being had to the accompanying drawings by the designating characters marked thereon, 1 represents a portion of preferably a water-jacketed wall of an ore reducing or other furnace, and 3 represents, as 90 an entirety, a hydrocarbon burner comprising my present improvements, it being noted from Fig. 1 that the principal elements of each burner-structure proper, are disposed at an inward and downward inclination, with 95 the inner extremities thereof located within the walls 4, of an ordinary twyer opening (not shown), in the furnace wall, such inclination being desirable in some instances, although, as shown in Fig. 3, the burner-structure proper may be disposed horizon- 100 tally, if desired. The burner-structure proper comprises substantially a cylindrical casing 5, open at its forward end, and closed at its rearward end, by means of a head 6, 105 having a central opening 7, from the edge of

which, at the inner side of the head 6, projects forwardly a cylinder 8, having the forward edge thereof turned inwardly a suitable extent to form a flange 9. The interior of said casing 5, constitutes a chamber 10, for air which is admitted thereto from a conducting pipe 11, leading from an air main 12, suitably supported in position exteriorly of the wall of the furnace, as shown. The forward end of the casing 5, is flanged outwardly at 13, and, fitted thereto, and forming a practical extension thereof is the corresponding flange 13^a at the rearward end of another casing 14, which is open at its forward end, as shown. Extending within the said casing 14, is the rearward portion of the walls 15, of a combustion chamber 16, said portion having an outer flange 16^a engaging behind a corresponding inner flange 16^b at the said rearward end of casing 14. The extreme inner end of said combustion chamber extends somewhat beyond the forward edge of a collar or flange 17, projecting from an inner head 18, having a central opening from the edge of which, at the outer or forward side of said head, forwardly projects a collar or flange 19, attention being called to the fact that the external diameter of the said walls 15, of the combustion chamber, is less than the internal diameter of the walls of the said casing 14, thus forming an annular space or chamber 20, between the two said walls. Communicating with this space or chamber is the lower end or extremity of an air conducting pipe 21, leading from the air main 12, it being observed that each of the air conducting pipes 11 and 21, is provided with a closing or regulating valve or gate 22, operated from without by means of a stem 23, see Figs. 1 and 2. Working between the said flanges 13 and 13^a of the casings 5 and 14, in a suitable recess or opening therefor is a sliding gate or valve 24, preferably of a length to project outwardly at one end when closed, and also preferably formed or provided at such end with a grip or handle 25, to be taken hold of by the operator for manipulating said gate or valve. The latter is of a width to completely close the interior of the casings 5 and 14, when pushed inwardly, a groove 27 being provided to receive the inner edge of said gate or valve when the latter is closed or pushed inwardly to its fullest extent.

Located within the upper part of the air-chamber 10, is a mixing-chamber 27^a, for oil-vapor and air, a pipe 28 for oil under pressure being supported in the head 6 of the casing 5, and a similar pipe 29 for air under pressure being also supported in said head, these pipes having communication with the interior of the mixing-chamber, the latter being constructed substantially as shown in my other pending application referred to, and an exact description of which is not deemed necessary for the purposes of the present invention.

Passing through a stuffing-box 30, fitted within the cylinder 8, is a burner-tube 31, to which the mixture from the mixing-chamber may be delivered in any suitable manner, the forward end-portion of said tube being supported within the collar 19, of the inner head 18, and the outer or rearward portion thereof being supported by an air-trunk 32, having communication with both the air-chamber 10 and burner-tube 31, and supplying the latter with air from said chamber. The rearwardly projecting portion of the burner-tube is threaded at 32^a, and has applied thereto suitable devices 33, for adjusting the tube either forwardly or rearwardly, a detailed description of said devices being unnecessary herein, since they form no part of the present invention.

From the foregoing it will be seen that in the employment of a plurality of my improved hydrocarbon burners, in connection with an ore reducing furnace, for instance, should one or more of the burners collapse or become burned out during the working of the furnace, the burner-structure may be readily removed and substituted by another or others, without at all interfering with the ore reducing operation, it being simply necessary to subsequently close the gate for each burner-structure thus removed, to shut off communication between the furnace-chamber and the atmosphere. While the gate or gates are thus in closed position, it is apparent that air will still be supplied to the interior of the furnace from the pipe 21, the valve in pipe 11 being closed meanwhile, and thus the pressure within the working chamber of the furnace will not be altered, nor will the ore reducing operation be interfered with or delayed in any way. As a means for securing each gate or valve 24 in either of its positions, I may form either of the flanges 13, 13^a with a threaded opening in which works a set-screw 50 (see Fig. 3) which may be adjusted to bear against said gate, as is apparent.

In applying the burner-structure within the walls 4, securing bolts 35, having tightening nuts 35^a, are passed through correspondingly perforated lugs 36 and 37 of the flanges 13 and 13^a, on the adjacent ends of the casings 5 and 14, respectively, said bolts being also passed through correspondingly perforated lugs 38 and 39, integral with flanges 40 and 41, which may be formed on the adjacent ends of casing 14, and walls 4, see Fig. 1. The head 6 is secured to the rearward end of the casing 5, by means of diametric lugs 42 on the head, fitting between pairs of corresponding ears 36^a on said casing, having coinciding openings 36^b, through which, and registering openings (not shown) in said lugs, are inserted fastening pins 42^a, see Fig. 1. The walls 15 of the combustion chamber are rigidly secured in place by

means of a bolt (one or more) 35^c, passing through corresponding or alining openings therefor in the heads 6 and 18 (see Fig. 3) the inner threaded portion thereof screwing in a threaded aperture in the inner end of said walls 15. From this it will be seen that to remove the burner-structure from the casings 5 and 14, it is simply necessary to take out the fastening pins 42^a, it being noted that bolt 35^c is provided with suitable tightening and jam nuts 43 and 44. The heads 6 and 18, and the walls of the combustion-chamber, all being rigidly connected by the bolt 35^c, it is apparent that on removing the said fastening pins 42^a, the said heads and combustion-chamber, together with the burner, may all be taken out together or simultaneously, after which the gate 24 is closed in the manner and for the purpose already stated. The combustion-chamber has communication with the chamber 10, by means of an air passage 24^a, see Fig. 3, and, in some instances, I may employ a supporting lug 24^b, for the walls of the combustion-chamber, located in the lower part of the annular space 20, said lug assisting to maintain said walls centrally in place, and the walls riding thereon both on insertion and removal of the same.

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

1. A hydrocarbon burner, comprising a casing, forming an air-chamber and flanged at one end, another casing forming a separate air-chamber and flanged at its adjacent end, the two flanges being secured together, a combustion-chamber within the second-named chamber, with the walls thereof less in external diameter than the internal diameter of the walls of said second-named chamber, the inner end of the combustion-chamber having a head formed with an opening, a burner-tube fitted within this opening, means for supplying air to each of the air chambers, having controlling devices, and means for closing the interior of the said second-named casing on removing the said tube and combustion-chamber.

2. A hydrocarbon burner, comprising a casing, forming an air-chamber, and flanged at one end, another casing forming a separate air-chamber and flanged at its adjacent end, the two flanges being secured together, a combustion-chamber within the second-named chamber, with the walls thereof less in external diameter than the internal diameter of the walls of said second-named chamber, the inner end of the combustion-chamber having a head provided with an opening, a burner-tube within this opening, means for supplying air to each of the air-chambers, having controlling devices, and a

gate working in an opening formed within said flanges for closing the interior of the said second-named casing on removing the said tube and combustion-chamber.

3. A hydrocarbon burner, comprising a casing, forming an air-chamber, a second casing united thereto, forming a second air-chamber, a combustion-chamber within the said second air-chamber, with the walls thereof less in external diameter than the internal diameter of the walls of said second-named air-chamber, the inner end of said combustion-chamber having a head formed with an opening, a burner-tube fitted within this opening and communicating with the combustion-chamber, an air main, and air supply pipes leading therefrom to each of the air-chambers, said pipes each having a controlling valve, and means for closing the interior of the second-named casing on removing said burner-tube and combustion-chamber.

4. A hydrocarbon burner, comprising a casing, forming an air-chamber, a second casing united thereto, forming a second air-chamber, a combustion-chamber within the said second air-chamber, with the walls thereof less in external diameter than the internal diameter of the walls of said second-named air-chamber, the inner end of said combustion-chamber having a head formed with an opening, a burner-tube fitted within this opening and communicating with the combustion-chamber, an air main, and air supply pipes leading therefrom to each of the air-chambers, said pipes each having a controlling valve, and a sliding gate for closing the interior of the second-named casing on removing said burner-tube and combustion-chamber.

5. A hydrocarbon burner, comprising a casing provided at one end with a removable head, and having a flange at its other end, another casing having a flange at its adjacent end, said flanges being secured together, and said second-named casing also having an inner flange, a combustion-chamber having the walls thereof less in external diameter than the internal diameter of the walls of the second-named chamber, said inner flange closing the space between the two said walls, a burner tube leading to the combustion-chamber, means for supplying each of the casings with air, means for securing the walls of the combustion-chamber to said removable head, and a device for closing the interior of the second-named casing on removing the combustion-chamber and burner-tube.

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Witnesses:

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T. F. SEAMAN.