No. 882,205.

PATENTED MAR. 17, 1908.

T. C. MASON.

MEANS FOR BURNING OIL.

APPLICATION FILED MAR. 7, 1907.

2 SHEETS—SHEET 1.

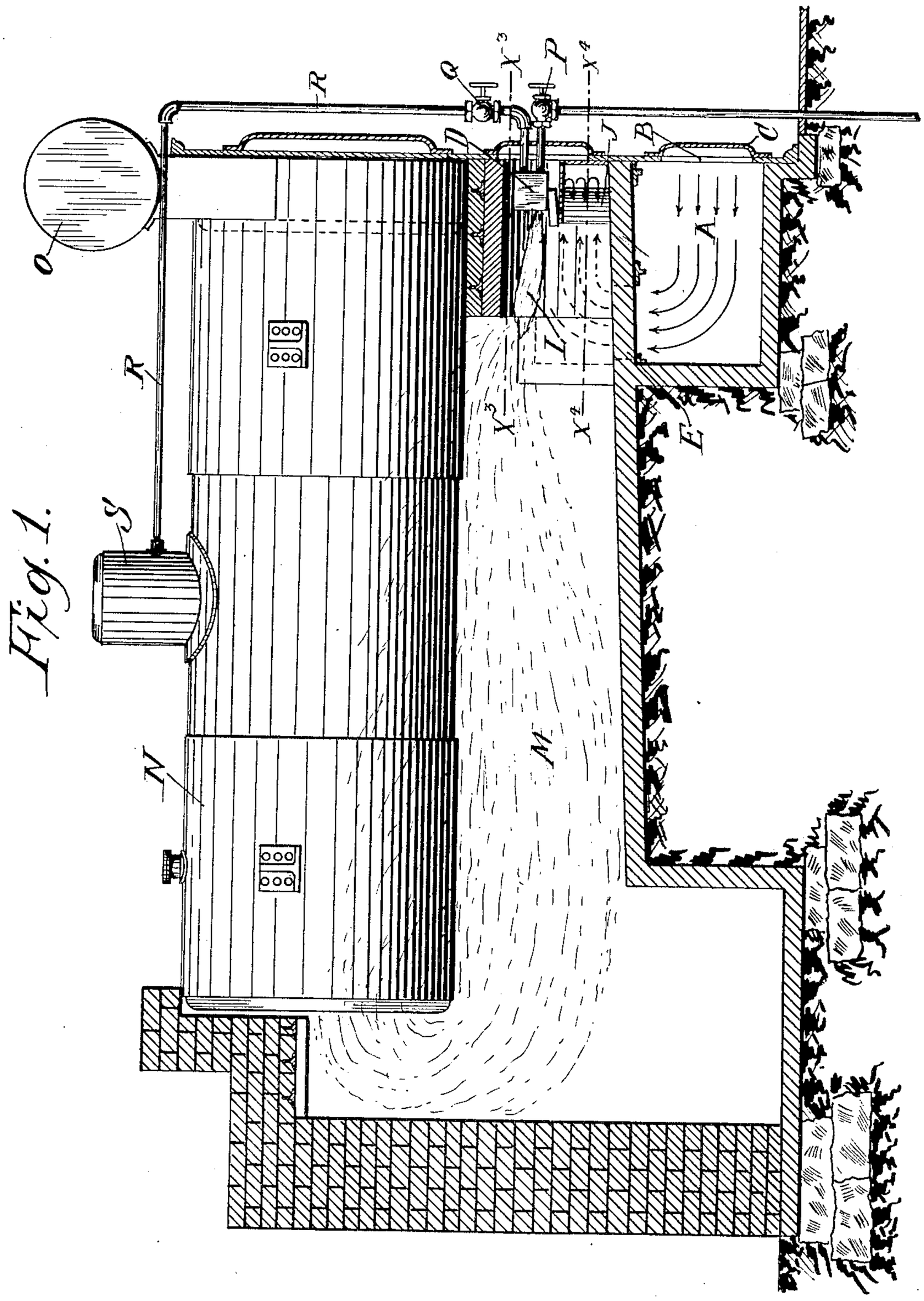

Fig. 1.

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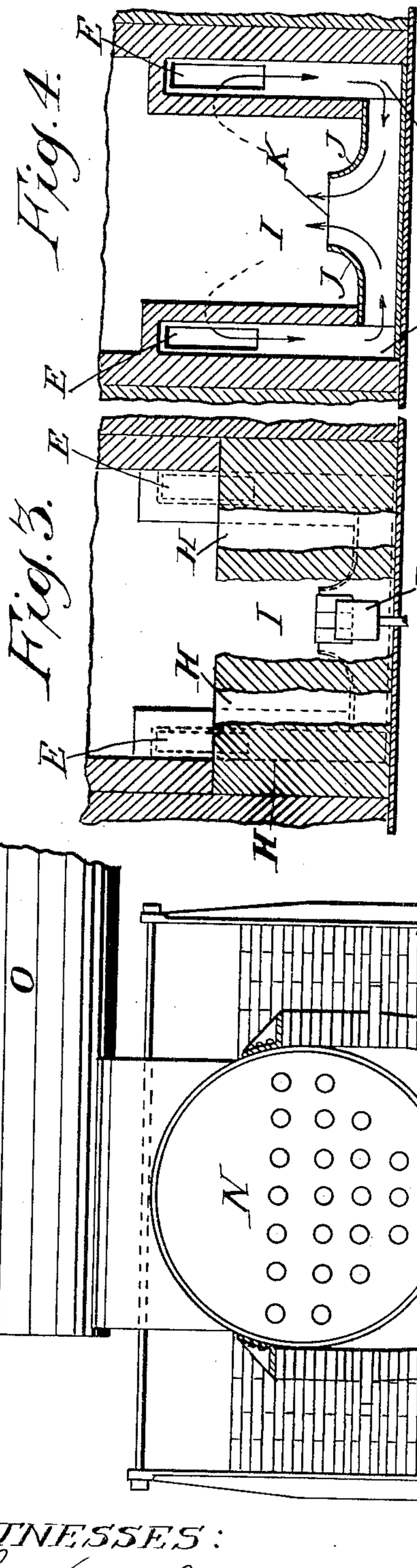

Fig. 4.

Fig. 3.

Fig. 2.

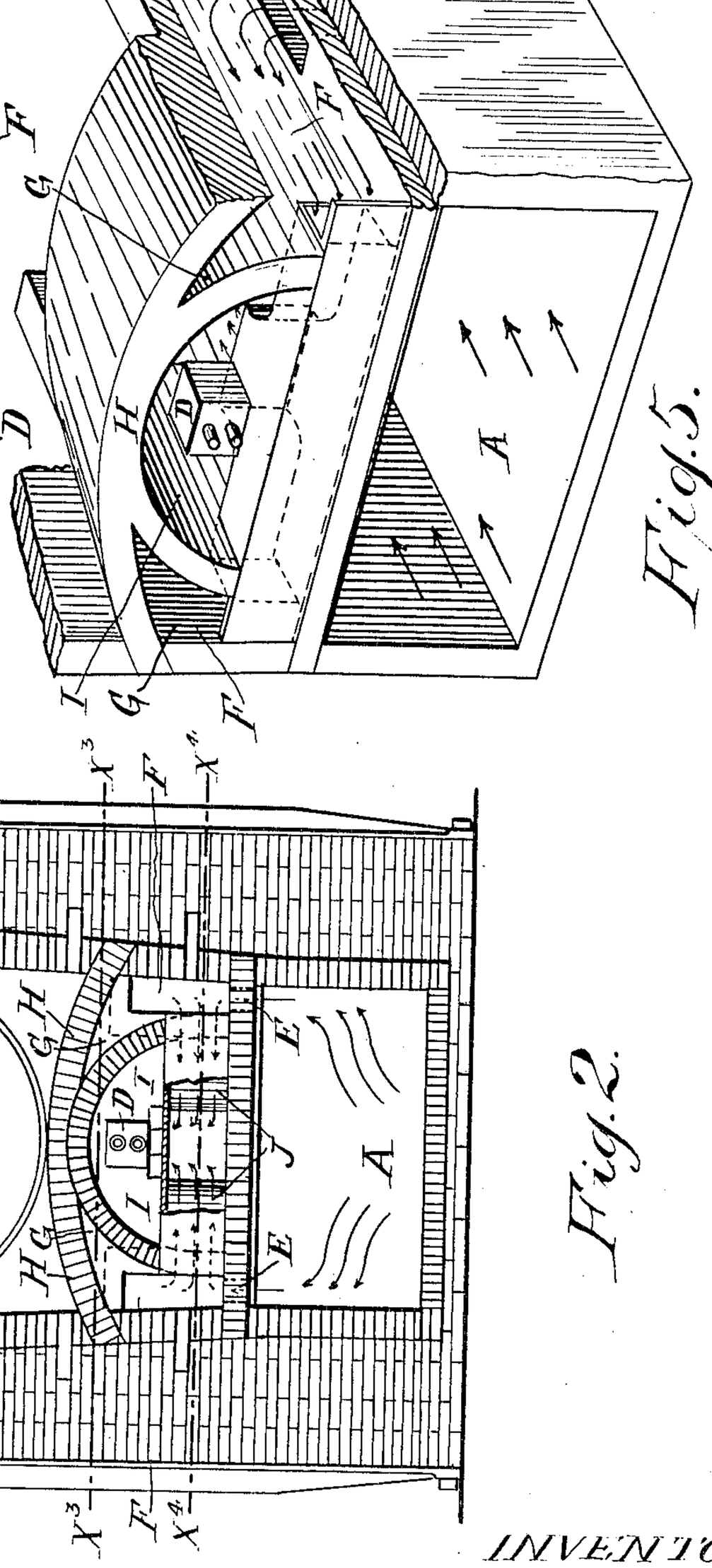

Fig. 5.

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UNITED STATES PATENT OFFICE.

THOMAS C. MASON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MASON SMOKELESS COMBUSTION COMPANY, OF CARSON CITY, NEVADA, A CORPORATION OF NEVADA.

MEANS FOR BURNING OIL.

No. 882,205. Specification of Letters Patent. Patented March 17, 1908.

Application filed March 7, 1907. Serial No. 361,143.

To all whom it may concern:

Be it known that I, THOMAS C. MASON, of the city of Los Angeles, in the county of Los Angeles, in the State of California, have invented a new or Improved Means for Burning Oil, of which the following is a full, clear, and exact specification, reference being had to the annexed drawings and to the figures and letters marked thereon.

My said invention relates to the burning of oil for generating heat, and to apparatus wherein the burning of such oil as fuel takes place.

My invention has for its primary object to effect combustion of oil so perfectly and with such rapidity, that there is obtained therefrom not only the maximum of heat which oil when perfectly burned is capable of generating, but my method or process is such that the combustion itself takes place as a short flame which constitutes the source of maximum calorific intensity, limited in dimensions, and as a flame occupying but a comparatively small volume of the capacity of a furnace, the products of combustion and the nitrogen separated from the air being immediately evolved from the flame into the heating chamber, flues and tubes as a clear transparent and almost invisible highly heated flux (not flame or combustible gas) in correspondence with the intensity of complete combustion, which is immediately and continuously imparted to the boiler body, tubes, boiler setting, or other surface to be heated; while the temperature in the chimney or stack is so much reduced because of the entire combustion taking place as a short flame in that part of the furnace farthest distant from the chimney or stack, and as the combustion is at once complete combustion and in that part of the furnace farthest from the chimney or stack, there is no matter of the oil left unburned in the heating chambers, tubes, or flues leading from the furnace into the chimney or stack, consequently there is no production of smoke.

A second object is to produce an oil burning furnace practically noiseless in its operation.

A third object of the invention is to provide such precise control of the air and oil passing through the apparatus which I use for complete combustion of the oil by my method or process of burning the same, and to heat the air to such an extent that it will supply to the oil fuel precisely the amount of heated air at such high temperature and velocity as is necessary to effect its perfect combustion as rapidly as the oil issues from the burner, without admitting cool air to pass into or through the furnace, the air used being heated as highly as possible before meeting the oil, being admitted through adjustable doors in the lower part of the furnace casing.

A fourth object of my invention is to prevent the formation of scale or incrustations on the outside of a boiler, or within the tubes, or flues thereof.

A fifth object of my invention is, to prevent the deposit of soot and flake carbon in the flues and tubes of boilers or other furnaces.

The sixth object of my invention is to avoid danger from explosions of oil in furnaces through lack of supply of the proper amount of rapidly moving highly heated air to effect the combustion.

The seventh object is to prevent the burning of the tubes and shells of boilers.

My invention consists in conducting the air after it has passed through regulating doors in the lower part of a furnace front into a chamber through the inner end of the sides of which it passes upwards into lateral flues, one at each side of a central heating chamber, also beneath an arch over the central heating chamber in the lateral flues, and in the spaces beneath the arch at each side of the central chamber. The air in passing through these flues and spaces becomes greatly increased in temperature, and therefore moves into the combustion chamber with a very high velocity, there being no other exit for the heated air excepting through the flues which lead from the space beneath the arch above the combustion chamber, and the lateral flues, by front flues into the contracted space through which this heated air enters into the combustion chamber.

The essential feature therefore of my invention, is the reverse of the ordinary methods of causing the air and oil fuel in the oil burning furnace to meet for the purposes of combustion, and the essential feature consists in this, that the air in passing through the contracting portions of the flues, and into the contracted combustion chamber, is passing continually through a space having a

reduced transverse section or area, so that the air not only is very highly heated by coming into closer contact with the heating surfaces inclosing this reduced area of passage, but is also moving at consequently increasing velocity through the furnace at the time the air and oil meet in the combustion chamber, whereby complete, as distinct from incomplete, combustion is immediately effected in the combustion chamber, so that a comparatively short but very intense flame is generated without smoke, with practically little noise, and with maximum evolution of heat which the entire contents of the oil are capable of yielding in the process of being completely burned in a confined or limited locality producing what is practically a large blow-pipe flame within the combustion chamber.

The apparatus by which I practically conduct the aforesaid method or process for effecting the complete combustion of oil fuelas it issues from a burner into a furnace, and confined in a limited portion of the entire volume of the furnace, varies in the shape and arrangement of parts according to the shape and character of the furnace wherein my method or process of burning oil as fuel is to be used, but the same essentially operative features are included in every form of apparatus necessary to adapt it to different shapes and dimensions of furnaces. For example, in the case of a horizontal boiler furnace, my apparatus consists of a highly heated and short combustion chamber wherein the oil burner is located, and provided with a steam pipe connecting it to the steam space of a boiler, and an oil pipe connecting it to a closed tank from which a pipe conveys the requisite quantity of oil under pressure to the burner, the pressure of the oil in the burner being produced by admitting compressed air into the tank above the oil or by placing the oil tank in such relationship of position to the burner that a sufficient head of liquid pressure is attained. When using a sufficient pressure of oil I may dispense with the use of steam.

In my apparatus a heated chamber situated towards the front of the boiler contains the burner.

By means of the process of heating and increasing the velocity of movement of the heated air by causing it to flow through heated passages of decreasing area, until it is discharged into the combustion chamber, I effect the several objects stated in the preceding parts of this specification, while I produce a short white fire by forming the oil into a gas directly at the burner in the presence of a continuous rapid flow of highly heated air, thereby confining the flame to a comparatively small volume, and by such complete combustion maintain the entire heating surface of the boiler or other furnace so clean that the heating surface absorbs almost the whole of the heat generated, without the presence of unburned carbonaceous matter. I obtain also a much lower stack or chimney temperature which in ordinary circumstances often reaches six hundred degrees Fahrenheit, and higher, as I find from the tests which I have made that the stack or chimney temperature when burning oil fuel according to my process, is often as low as two hundred and eighty three degrees Fahrenheit.

In my process the whole of the asphaltum and bituminous constituents of the oil are consumed, so that there is no carbonaceous product remaining unburned to attach itself to the shell or tubes of a boiler, as is the case when burning oil fuel in the methods hitherto used.

Upon the annexed drawings, Figure 1, is a longitudinal section showing the arrangement of a furnace wherein my process for effecting the complete combustion of oil as fuel is utilized for heating and generating steam in a horizontal tubular boiler. Fig. 2, is an end elevation of the brick work partly in section with the front metallic casing shown in Fig. 1, exposing to view the arrangement of the air chambers, and passages leading from the adjustable openings for cold air to the point of discharge of the air highly heated. Fig. 3, is a horizontal section on the line X^3, X^3, Figs. 1, and 2, particularly showing the arrangement of the air passages, combustion chamber, and burner. Fig. 4, is another horizontal section on the line X^4, X^4, Figs. 1, and 2, showing part of the flues and the contracted exit for the highly heated air into the combustion chamber. Fig. 5, is a perspective view of the apparatus wherein I carry out my process of complete combustion.

In the accompanying drawings the lower front chamber A, is that whereinto the air to be heated and gradually to be increased in its velocity of flow is admitted from the exterior atmosphere through the opening B, in the front of the metal casing of the furnace, which is provided with hinged doors C, of the ordinary kind, and which are partly opened or partly closed to regulate the quantity of air admitted through them corresponding with the regulated supply of oil discharged from the burner D.

The air entering into the chamber A, next passes upwards therefrom by two openings E, E, at the inner ends of the chamber A, one of which is shown in dotted lines in Fig. 1, both of which are shown dotted in Figs. 2, and 3, both of which are shown in full lines in Fig. 4, and one of which is shown in full lines in perspective in Fig. 5. From the openings E, E, the air passes through the side flues F, F, and into the curved spaces G, G, leading from the side flues F, F, beneath

the arch H, and therefore as much as possible around the combustion chamber I, from which the heated air thus passed from the side flues F, F, around the curved contracting surfaces J, J, into a discharge opening K, between the surfaces J, J, directly into the combustion chamber, and thus at the highest temperature to which the air is capable of being heated in passing through flues and passages it is directed to enter into the combustion chamber, at the highest temperature which it has acquired, and always at the highest velocity of movement which it has acquired, due to attaining increased temperature, and at a velocity corresponding with that temperature. The air in this condition of high temperature and rapid movement then flows beneath the oil issuing from the openings in the burner D, with which it at once enters into complete combustion, producing the short flame L, analogous as hereinbefore described to a blow-pipe flame and as shown at the part marked L, Fig. 1, which representing, as it does, a white body of flame beyond which there is no other flame or combustion whatever in the parts of the heated chamber M. The whole of this space beyond the end of the flame L, and the combustion chamber I, is filled with the flux of heat contained in the products of complete combustion, and the nitrogen passing from the locus of combustion through the heating chambers, flues and tubes of the boiler N, and without flame or combustible matter in admixture therewith. The result of this gradual raising of temperature and increasing velocity of movement of the heated air is, that while complete combustion is obtained in the combustion chamber I, the heated products of this complete combustion, and the nitrogen occupy the whole space between the termination of the end of the flame L, passing through the combustion chamber I, beneath the boiler N, and through the tubes of the boiler N, to the whole of which a higher heat temperature than usual hitherto is therefore imparted, the products of combustion and nitrogen after having parted with their contained high temperature, thence passing upwards into the breeching O, and thence into a chimney or stack not shown in the drawings. The final result of this arrangement and mode of operation or process is that no waste of fuel takes place, as not more oil than what can be completely burned in the combustion chamber I, is admitted in regulated quantity by the valve P, and such quantity of steam as may be necessary regulated by the valve Q, while the heat from this complete combustion being practically all absorbed by the boiler and furnace setting, leaves but a low temperature in the products of combustion and nitrogen to pass off into the breeching O, or chimney or stack connected thereto. The valve Q, is connected with the steam pipe R, preferably leading to the dome S, at the top of the boiler, or to any other convenient part of the steam space of the boiler.

I claim as my invention.

The apparatus for effecting the complete combustion of oil, consisting of a bottom chamber, doors at the front of said chamber, openings one at each side and at the inner end of the bottom chamber leading into lateral flues, one such flue on each side of the apparatus, a transverse flue uniting the lateral flues, the single central discharge flue having curved walls projecting inwardly to the lower part of the combustion chamber, the flue having curved walls being of gradually decreasing cross sectional area, a burner in the combustion chamber, pipes connecting the burner within the combustion chamber with sources of steam and oil, all operating to cause the air flowing through the flues to become highly heated and to be discharged at a high velocity beneath the oil burner in the combustion chamber in the manner and for the purposes substantially as hereinbefore set forth.

In testimony whereof, I have hereunto set my hand and seal at the city of Los Angeles, in the presence of two subscribing witnesses

THOMAS C. MASON. [L. S.]

Witnesses:

ST. JOHN DAY,

IDA M. DASKAM.