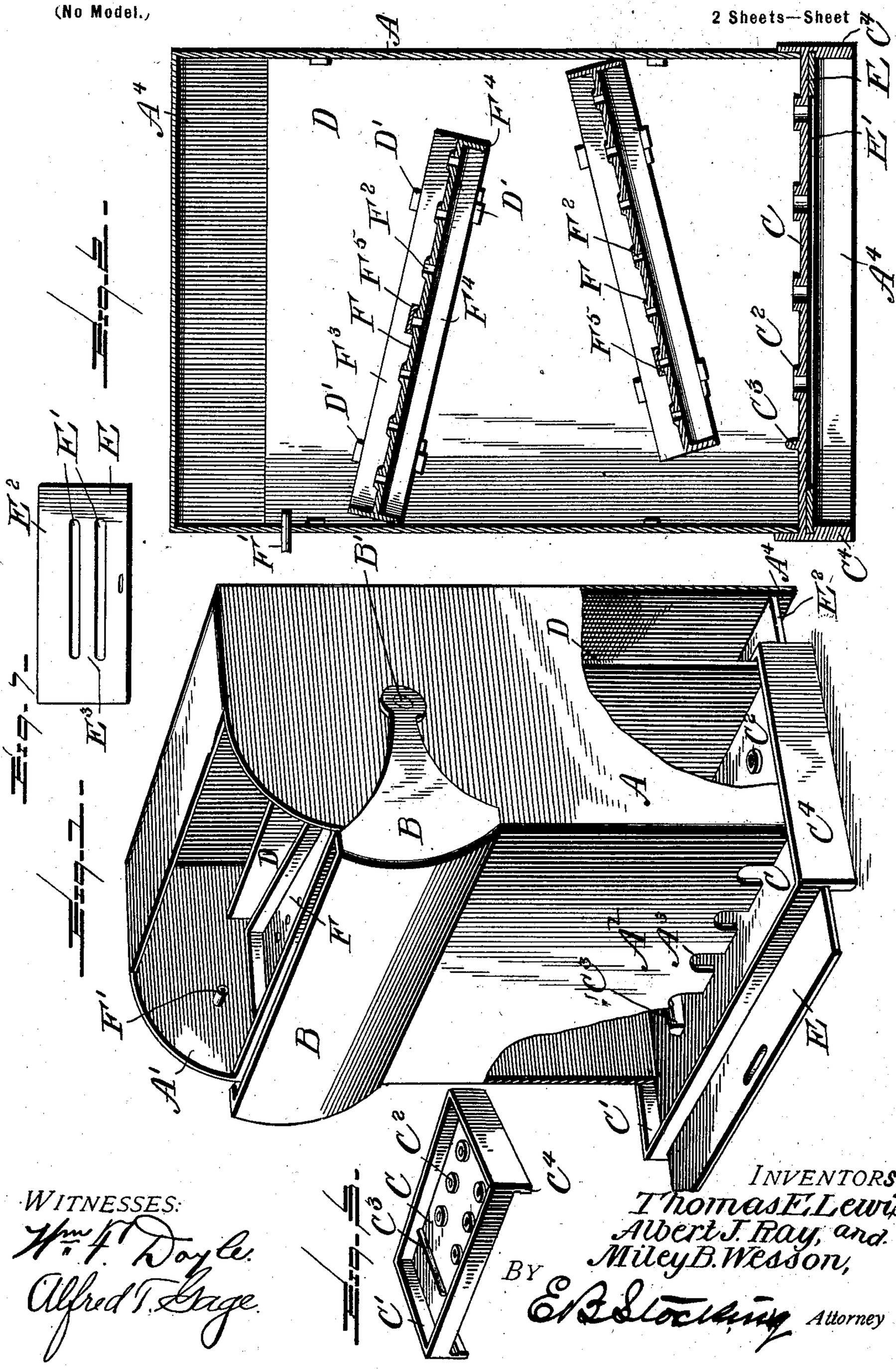
No. 701,902. Patented June 10, 1902.

T. E. LEWIS, A. J. RAY & M. B. WESSON.

BURNER FOR CRUDE OIL.

(Application filed Aug. 10, 1901.)

(No Model.) 2 Sheets—Sheet 2.



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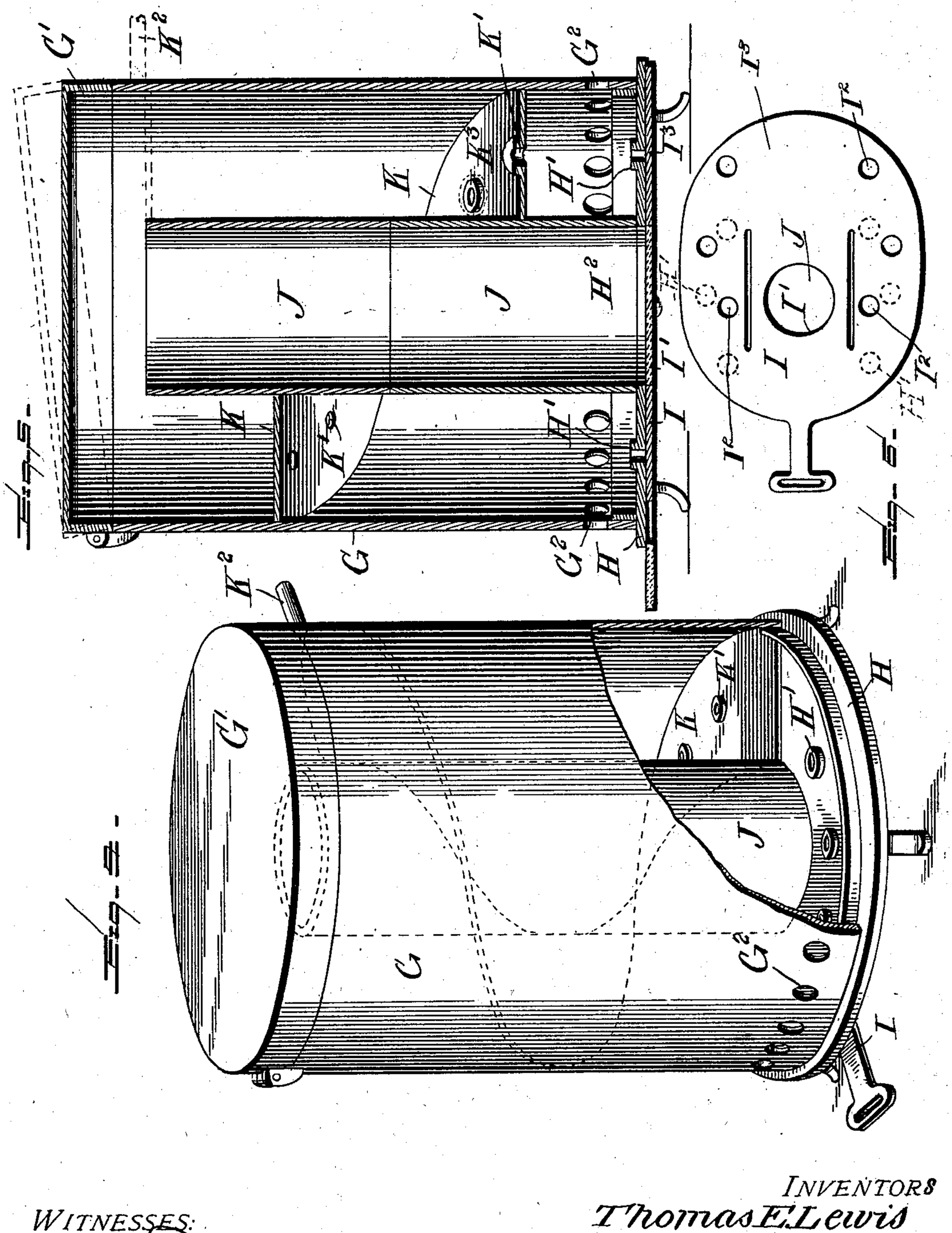

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UNITED STATES PATENT OFFICE.

THOMAS E. LEWIS, ALBERT J. RAY, AND MILEY B. WESSON, OF FORT WORTH, TEXAS.

BURNER FOR CRUDE OIL.

SPECIFICATION forming part of Letters Patent No. 701,902, dated June 10, 1902.

Application filed August 10, 1901. Serial No. 71,656. (No model.)

To all whom it may concern:

Be it known that we, THOMAS E. LEWIS, ALBERT J. RAY, and MILEY B. WESSON, citizens of the United States, residing at Fort Worth, in the county of Tarrant, State of Texas, have invented certain new and useful Improvements in Burners for Crude Oil, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a burner for crude oil, and particularly to a construction by means of which a direct or indirect draft may be utilized in the burning of the oil.

The invention has for an object to provide a structure of casing through which the oil passes adapted to provide a direct draft for the burning of the oil therein of an indirect draft for a similar purpose.

A further object of the invention is to provide a structure of perforated plate having a raised flange about the perforation and over which the oil is adapted to flow in its passage from the upper to the lower portion of the casing.

Another object of the invention is to provide an improved construction of bottom plate having apertures for the admission of a direct upward draft therethrough and a damper device for controlling said apertures.

Other objects and advantages of the invention will hereinafter appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective of one form of the invention with parts of the casing broken away. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a detail perspective of the bottom plate. Fig. 4 is a perspective, with parts broken away, of a modified form of the invention. Fig. 5 is a vertical cross-section through Fig. 4. Fig. 6 is a plan of the damper-slide used with the modified form of the invention, and Fig. 7 is a similar view of the damper-slide used with the structure shown in Figs. 1 and 2.

Like letters of reference indicate like parts throughout the several figures of the drawings.

The letter A designates a casing which may be of any desired formation—for instance, as shown in Figs. 1 and 2, where it is illustrated as of rectangular shape and provided at its upper portion with an opening A′, adapted to be closed by a pivoted damper or plate B, mounted at B′ upon the side walls of the casing. The lower portion of the casing is open, and the front wall A^2 thereof is provided at its lower portion with a series of openings A^3. This front wall is adapted to rest upon a bottom plate C, while the rear wall A^4 of the casing is extended at a greater length to pass below the surface of the bottom plate C. Within the case a flue-wall D is supported by any desired means and is adapted to rest upon the surface of the bottom plate C, thus forming a flue-passage between said wall and the rear wall A^4 of the casing.

As shown in Fig. 3, the bottom plate C is provided with a peripheral flange C′, adapted to retain the oil to be burned thereon, and a series of flanged openings C^2 are formed in said plate, said flanges preventing the passage of oil through the plate and retaining a body of fluid thereon. At one end of the plate a partition C^3 is formed, which serves to direct the oil received at that end of the plate toward the front thereof, as shown in Fig. 1. At the opposite ends of the bottom plate downwardly-projecting flanges C^4 extend and are provided with means for slidably retaining the damper-plate E in position. This plate is provided with openings E′, adapted to lie beneath the flanged apertures C^2 in the bottom plate, and with a solid portion E^2, adapted to close the draft-passage between the flue-wall D and the rear wall A^4, while the solid body E^3 of the plate adjacent to the openings E′ closes the apertures C^2 when the plate is shifted to open a draft-passage at the rear of the bottom plate.

Suitably supported within the casing—for instance, by lugs D′, carried by the flue-wall D—is a conducting-shelf F, which may be of any desired construction, for the purpose of feeding the oil from the inlet-pipe F′ downward to the lower portion of the casing, where the bottom plate C is located, for the purpose of burning the oil. As showing a desirable construction of this plate, we have illustrated in Fig. 2 a reversible form thereof, in which the plate is provided with a series of flanged

apertures F^2, and in the position there shown the flanged portions are upon the upper face of the plate. This upper face of the plate is provided with a flange or wall extending about the two sides thereof and one end, the opposite end being adapted to discharge the oil from the plate onto a lower plate. The reverse or under side of the plate shown in Fig. 2 is provided with flanges F^4, extending on both sides and both ends of the plate when reversed, so as to confine thereon the oil which falls upon the plate and cause the same to pass through the apertures F^2 and to be there commingled with the draft of air through said apertures. It will be obvious that by changing the position or reversing the plates shown in Fig. 2 the oil may be fed through the apertures onto the lower plate instead of from the lower end of the plate, as shown in said figure. It will be understood that any ordinary and usual means of connecting the several parts together when assembled may be used and that suitable absorbent material may be placed in the space in front of the wall A^2 of the casing for absorbing the oil to be burned, and these non-essential details have not been specifically illustrated or described in connection with the invention.

In the modified form of the invention (shown in Figs. 4, 5 and 6) a cylindrical casing G is employed, which is provided at its upper end with a pivoted cover or closure G′ and at its lower portion with a series of apertures G^2, while the lower open end of the casing is adapted to rest upon a bottom plate H, provided with flanged apertures H′. Upon the under surface of this bottom plate a draft-slide I is suitably mounted to reciprocate, while centrally of the cylinder a draft-flue J extends upward and is provided upon its outer face with a spiral or inclined plate K. This flue and the plates carried thereby may be formed in sections, or the plate K may be applied between the flue and casing and independently thereof. The bottom plate H is provided with a central aperture H^2, over which the flue-tube J is adapted to rest, while the damper-slide I is provided with a central aperture I′, adapted to permit an upward draft through the flue J. This plate is also provided with apertures I^2, adapted to register with the flanged openings H′ in the bottom plate H. When the damper-plate is shifted to bring the apertures into alinement, the solid portion I^3 thereof closes the lower end of the flue J, as shown by dotted section-lines in Fig. 5, while when the flanged openings of the bottom plate are closed the central draft is open, as shown by the full-line sectioning in Fig. 5.

The inclined or spiral plates K are provided with a series of flanged apertures K′ for a similar purpose as described in connection with the apertures F^2 of the plates F, (shown in Figs. 1 and 2,) while the feed of oil to said plates is through a suitable intake-pipe, as shown at K^2. The spiral plates are the equivalent in function to the inclined plates shown in Figs. 1 and 2 and produce substantially the same operation of the invention.

Under some conditions it has been found desirable to close the apertures in the plates, so as to render the same of a substantially solid character, and this is accomplished by any desired means—for instance, a cap or cover adapted to fit over the flange of the aperture, as shown at F^5 in Fig. 2 and by dotted lines at K^3 in Fig. 5. This cap when applied produces substantially the results of a solid plate, although under ordinary conditions it is desirable to use plates having the flanged apertures, and the flanges to these apertures may be formed in any desired manner.

In the operation of this class of inventions it has been found that with an open direct draft of air through the burner much of the combustible material is carried off by the draft and in the form of smoke, so that little or no cinder remains, while with an indirect draft much more cinder is deposited upon the plates, as all of the combustible material is consumed, and the cinder remaining is of a hard character. Under this latter condition all the heat is extracted from the fuel and only the unconsumable residue remains. Under these conditions it is desirable to regulate the character of draft for different fuels or characters of oils, so as to thoroughly consume all of the combustible material therein, thus securing the greatest amount of heat and the consequent economy of the fuel consumed. When a direct draft is desired through the burner shown in Fig. 1, the damper-slide is pushed inward to close the flue at the rear of the casing while the pivoted damper B is open at the upper portion thereof, and the slide-damper E permits an upward draft through the flanged apertures C^2 in the bottom plate C, which is the desirable condition of parts when starting the burner. The oil is then fed by any suitable means upon the upper plate F and discharged therefrom upon another similar plate supported beneath the same. The number of these plates employed may be altered at will and is entirely dependent upon the character of burner to be constructed and the material to be burned therein. The discharge from the lower plate is at the left of the rib C^3 upon the bottom plate C, which causes the oil to flow into the space in front of the wall A^2 of the casing, where it is ignited, and the continued flow of oil passes back into the casing through the openings A^3 and is ignited about the flanged openings C^2 of the bottom plate C. The result of the burning oil is to heat the plate F, thus causing a direct upward draft through the apertures F^2 of the plates and the opening A′ at the upper portion of the casing. Under these conditions the air and oil are thoroughly commingled by their passage from the plates, so as to be in the best possible condition for burning. If

it be desired to feed the oil through the apertures in the plate, the plate may be reversed in position, when the oil will pass through the flanged apertures therein and drip or fall through the upward draft of air onto the plate next below the same, while if it be desired under other conditions to cut off the passage of air through these plates any one or all of the apertures F^2 may be closed by means of the caps F^5, as shown Fig. 2. It will thus be seen that the flanged apertures upon the plate are essential and important for securing a feed of oil over the plate without passage through the apertures and for providing a feed of air through the plate. It has been found that in burning the oil the best results are secured at the edges or margins of the plate, and the use of these apertures provide an increased area of this character. When an indirect draft is used, the pivoted slide B is closed and the damper E shifted to close the apertures C^2 of the bottom plate and open the rear flue, which causes the air to pass beneath the bottom plate upward through the flue, thence over the top of the flue-wall D and downward over and through the plates F to the apertures A^3 at the front of the casing, where the oxidized oil or the admixture of oil and air is ignited and burns at the front of the casing. When the direct upward draft is used, the oil is burned upon all of the plates except when the plates have been raised to such a degree of heat as to convert the oil into vapor or gas before it reaches the plate below. The casing as well as the plates become intensely heated and contribute to vaporize the crude oil as it enters the casing. When the indirect downward draft is used, the tendency is to confine the flame to the lower portion of the casing, and the flame is principally confined to the lower plate and issues from the openings in the casing, so as to heat the same to a high degree. In the illustration of the invention here given the oil is shown as fed upon the upper plate; but in some applications of the invention, such as for locomotive-boilers, it is found desirable to feed the crude oil upon a lower plate, so that the products of combustion passing over the upper heated plates will be converted into a clear-burning gas before leaving the casing.

The operation hereinbefore described in connection with Figs. 1 and 2 applies with equal force to the modified form shown in Figs. 4 and 5, wherein a direct draft is secured by raising the cover or closure G′, as shown by dotted lines in Fig. 5, and adjusting the damper-slide I to permit an upward draft through the openings H′ in the bottom plate, which passes through the apertures upon the spirally-inclined plates K and over said plates, so as to become thoroughly mixed with the oil which is flowing downward over the surface of the plates. When the indirect draft is used with this form of the invention, the cover G is closed and the damper-plate I shifted to close the apertures H′ and open the cylindrical flue J, (see dotted lines, Fig. 6,) so that the air passes upward through said flue, thence downward over the spiral plates K, and the mixture is ignited at the apertures G^2, so as to maintain a body of burning oil upon the plate H.

It will be obvious that changes may be made in the details of construction and configuration of the several parts, as it is not intended to confine this invention specifically to either form herein disclosed, as the scope thereof is capable of numerous different applications without departing from the spirit of the invention as defined by the appended claims.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a burner for crude oil, a casing having apertures at its upper and lower portions, a wall for forming a flue within said casing, a closure for said upper opening therein, a liquid-conveying surface within said casing, and means for controlling the passage of air through said flues; substantially as specified.

2. In a burner for crude oil, a casing having openings at its upper and lower portions, a wall for forming a flue within said casing, a closure for said upper opening therein, a liquid-conveying surface within said casing, means for controlling the passage of air through said flue, and a perforated burner-plate at the lower portion of said casing; substantially as specified.

3. In a burner for crude oil, a casing, a reversible oil-conducting plate having edge flanges upon opposite faces and apertures therethrough flanged upon one face, and means for removably supporting said plate within said casing; substantially as specified.

4. An oil-conducting plate for a crude-oil burner having side flanges and one end flange upon one face, and flanged apertures upon the same face in said plate; substantially as specified.

5. An oil-conducting plate for a crude-oil burner having side flanges and one end flange upon one face, flanged apertures upon the same face of said plate; and a flange upon both sides and ends of the opposite side of said plate; substantially as specified.

6. In a burner for crude oil, a casing provided with openings at its upper and lower portions, a flue-wall therein to form a flue, a burner-plate at the lower portion of said casing having apertures therethrough, and means for controlling the passage of air through said plate and flue; substantially as specified.

7. In a burner for crude oil, a casing provided with openings, at its upper and lower portions, a flue-wall therein to form a flue, a burner-plate at the lower portion of said cas-

ing having apertures therethrough, and a damper-plate adapted to alternately open or close the openings in said burner-plate or said flue; substantially as specified.

8. In a burner for crude oil, a casing provided with openings at its upper and lower portions, a flue-wall therein to form a flue, a burner-plate at the lower portion of said casing having apertures therethrough, a damper-plate adapted to alternately open or close the openings in said burner-plate and said flue, and an inclined conducting-plate extending from the upper portion of said casing to said burner-plate; substantially as specified.

9. In a burner for crude oil, a casing provided with openings at its upper and lower portions, a flue-wall therein to form a flue, a burner-plate at the lower portion of said casing having apertures therethrough, a damper-plate adapted to alternately open or close the openings in said burner-plate and said flue, and a perforated inclined conducting-plate having flanges surrounding the perforations thereof; substantially as specified.

10. In a burner for crude oil, a casing provided with openings at its upper and lower portions, a flue-wall therein to form a flue, a burner-plate at the lower portion of said casing having apertures therethrough, a damper-plate adapted to alternately open and close the openings in said burner-plate and said flue, a perforated inclined conducting-plate having flanges surrounding the perforations thereof, and a ridge or partition upon said burner-plate at the delivery end of the lowermost conducting-plate; substantially as specified.

11. In a burner for crude oil, a casing provided with openings at its upper and lower portions, a flue-wall therein to form a flue, a burner-plate at the lower portion of said casing having apertures therethrough, a damper-plate adapted to alternately open and close the openings in said burner-plate and said flue, a perforated inclined conducting-plate having flanges surrounding the perforations thereof, a ridge or partition upon said burner-plate at the delivery end of the lowermost conducting-plate, and a pivoted damper for the opening in the upper portion of said casing; substantially as specified.

12. In a burner for crude oil, the combination with a casing, an oil-conducting means therein, of a burner-plate having flanged perforations therethrough, depending flanges at the opposite portions of said burner-plate, and a slide-damper located therein to control the openings in said plate; substantially as specified.

13. A burner for crude oil, a casing provided with openings at its upper and lower portions and having a rear wall extended below its front wall, a flue-wall within said casing, a perforated burner-plate having a flanged edge and adapted to receive the front and flue walls of said casing, means for conducting oil from the upper portion of said casing to said plate, and a damper carried by said plate for controlling the openings therein and the flue within the casing; substantially as specified.

14. In a burner for crude oil, a casing provided with openings at its upper and lower portions and having a rear wall extended below its front wall, a flue-wall within said casing, a perforated burner-plate having a flanged edge and adapted to receive the front and flue walls of said casing, means for conducting oil from the upper portion of said casing to said plate, a damper carried by said plate for controlling the openings therein and the flue within the casing, a lateral rib or partition carried by the upper face of said plate for directing the oil received from the conducting means to the front of said plate beyond said casing; substantially as specified.

15. In a burner for crude oil, the combination with a casing, of an oil-conducting plate therein having flanged apertures therethrough, and a cap or cover for said apertures; substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS E. LEWIS.
ALBERT J. RAY.
MILEY B. WESSON.

Witnesses:
M. C. BILLINGS,
PAUL KELLER.