

No. 694,179.

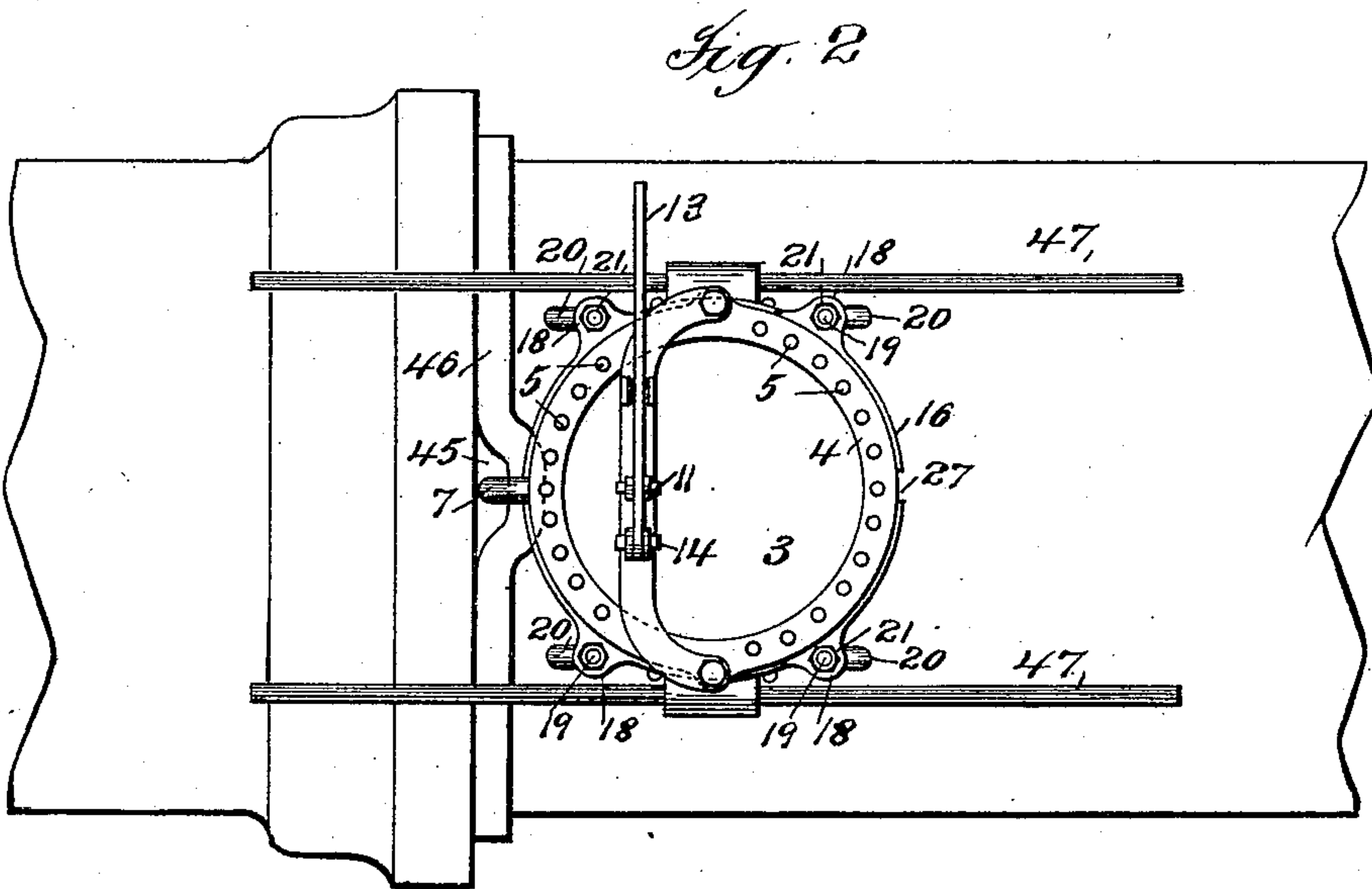
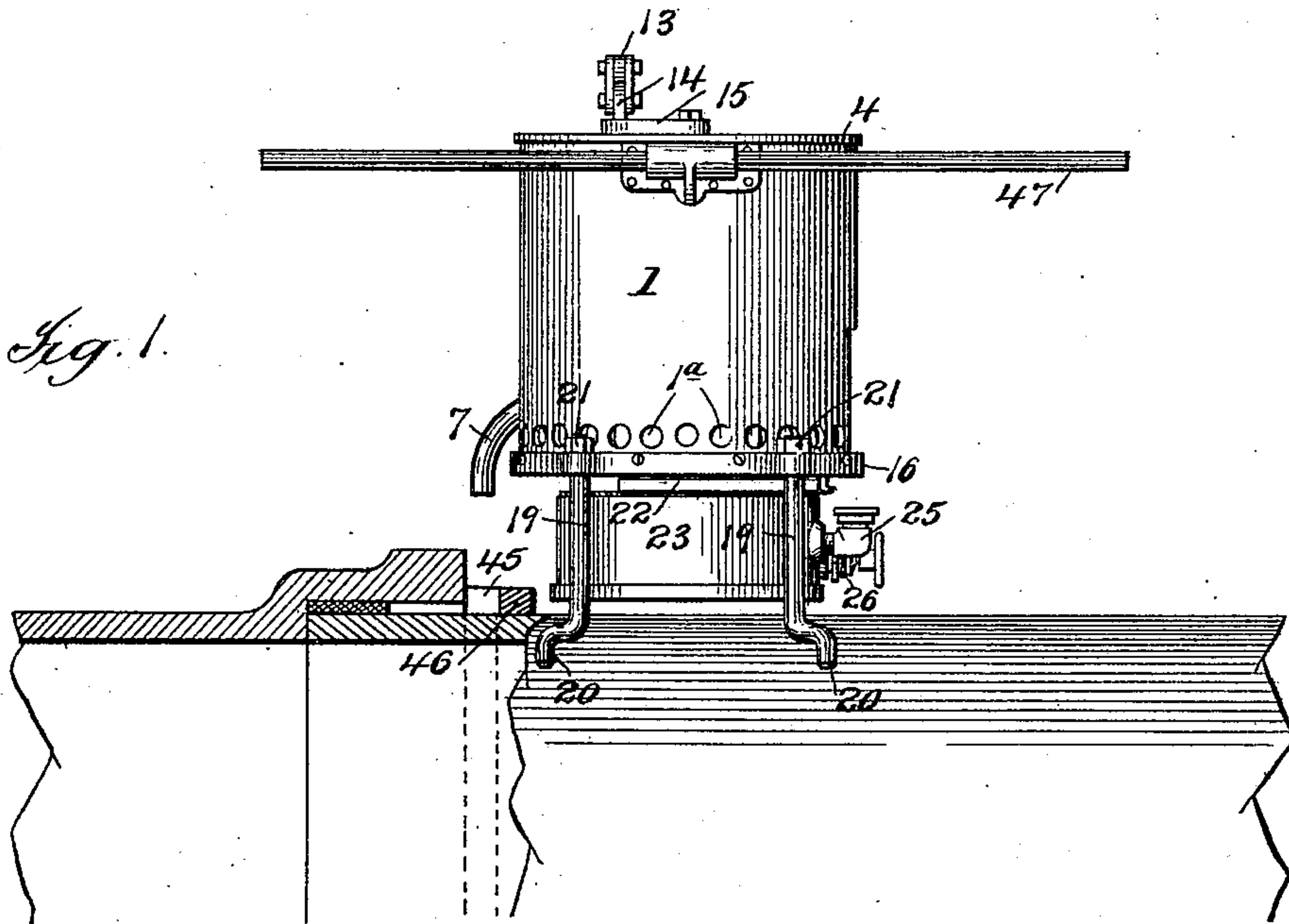
Patented Feb. 25, 1902.

D. F. O'BRIEN,  
HYDROCARBON APPARATUS.

(Application filed Mar. 15, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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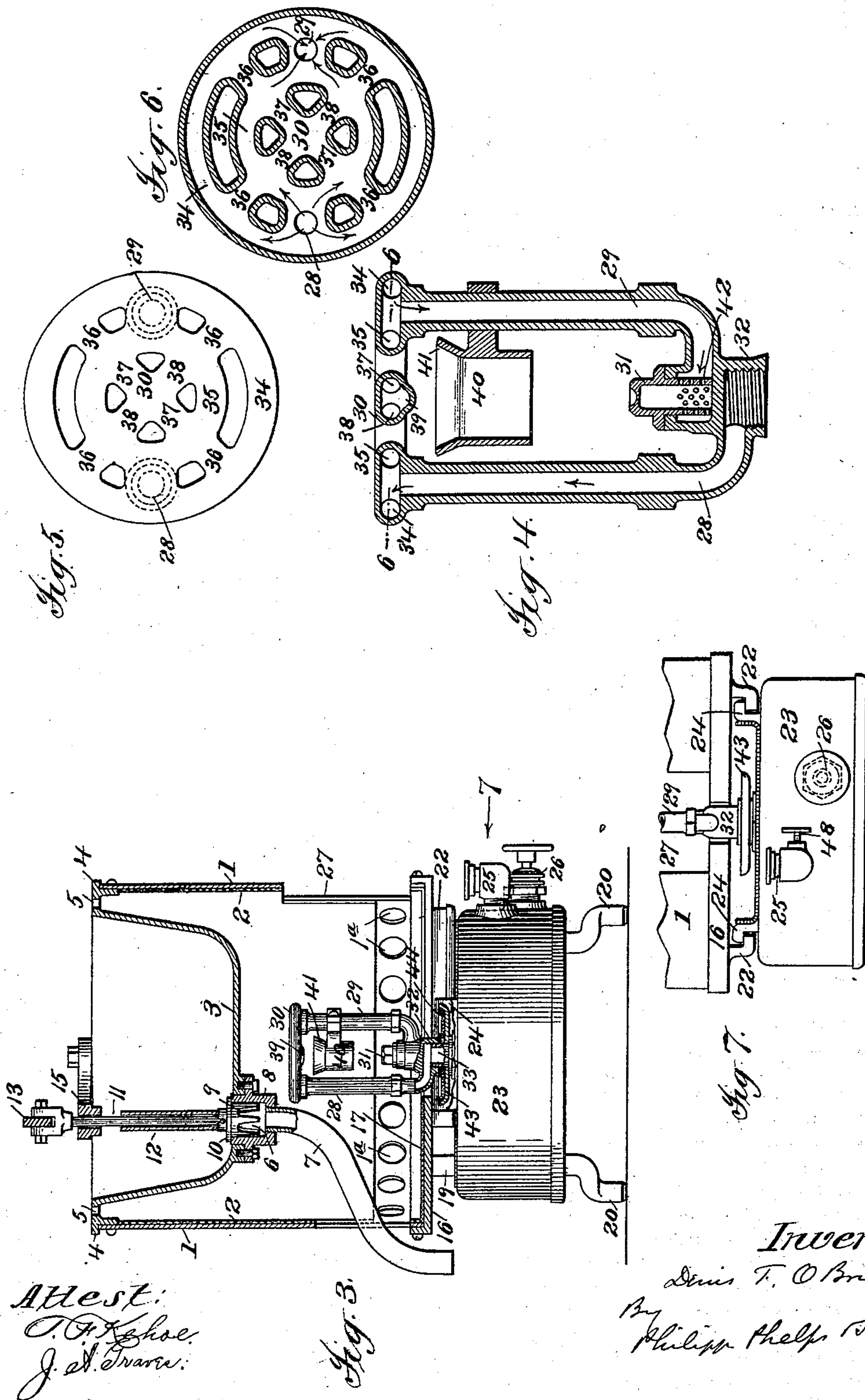
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

DENIS F. O'BRIEN, OF NEWARK, NEW JERSEY.

## HYDROCARBON APPARATUS.

SPECIFICATION forming part of Letters Patent No. 694,179, dated February 25, 1902.

Application filed March 15, 1899. Serial No. 709,137. (No model.)

*To all whom it may concern:*

Be it known that I, DENIS F. O'BRIEN, a citizen of the United States, residing at Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Hydrocarbon Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to improvements in apparatus for pouring pipe-joints in water-main and other piping, the pipe-joint pouring apparatus to which the improvements of the present invention have particular reference being those which are designed to be moved from joint to joint along the line of piping and which include a melting-pot for the lead, with means for controlling the discharge of lead therefrom and for delivering it to the joint, a tank for hydrocarbon, a vaporizer to which the hydrocarbon is delivered therefrom, and burners beneath the pot to which the vapor is thence delivered and at which it is ignited.

25 In this connection it is the object of the present invention to provide a compact apparatus of this character in which the several parts thereof above enumerated are connected together, so as to move as one, so that the apparatus may be readily and quickly transported from joint to joint in the line of piping as required and without disturbing any of the parts relatively to the others during such movement and in which the liability of injury to the piping or explosion of the tank is entirely avoided.

40 It is also the object of the present invention in this connection to provide apparatus of this character with adjustable legs or supports for supporting the apparatus upon piping of varying diameters.

45 It is also the object of the present invention in this connection to provide a pipe-joint pouring apparatus having a combined vaporizer and burner of such high efficiency that with one such burner the very high degree of heat necessary for melting lead may be attained, whereas in prior constructions in order to attain such high degree of heat beneath the melting-pot it was necessary to employ many of such burners. This I accomplish by combining with the burner used in such ap-

paratus a vaporizer consisting of a network of intercommunicating vaporizing-tubes, providing a series of circuitous paths for the hydrocarbon from the inlet-pipe to the burners, these several tubes being closely grouped together above and in line with the flame and the outer walls thereof being so formed as to deflect the flame from one to the other, so that all portions of the vaporizer are equally exposed to the flame from the burner proper and equally heated thereby. By means of this construction I secure a vaporizer of large capacity and am thus enabled to rapidly vaporize a large quantity of the hydrocarbon, and thus to increase the size of the outlet-orifice of the burner many times over the burners heretofore employed and to thus correspondingly increase the size of the flame.

70 The invention further relates to certain details in the apparatus, which will be hereafter pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a pipe-joint pouring apparatus embodying the several features of the present invention, the same being shown in operative position upon a water-main or other piping. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged view, partly in section, of the apparatus. Figs. 4, 5, and 6 are details, on an enlarged scale, of the combined vaporizer and burner, Fig. 4 being a vertical section of the same, Fig. 5 a plan view, and Fig. 6 a horizontal section taken on the line 6 of Fig. 4 or through the vaporizer proper. Fig. 7 is an end view of the hydrocarbon-tank, illustrating the means for connecting it with the body of the apparatus.

Referring to said drawings, 1 represents a suitable cylindrical casing, preferably lined with asbestos 2, and 3 a melting-pot for lead, which, as shown in Fig. 3, is provided with a flange 4, resting upon and bolted to the upper edge of the casing 1. The flange 4 of the melting-pot is provided between the walls of the casing 1 and the melting-pot 3 with draft-openings 5 for the escape of the products of combustion from the casing. The melting-pot 3 is designed for containing lead used for pouring joints between the abutting ends of two pipes in a main or other line of piping, the end of one of such pipes being usually bell-shaped and the end of the other fitting



therein, as illustrated in Fig. 1. In the bottom of the melting-pot 3 is provided an outlet-port 6 for the discharge of the molten lead, which is delivered therefrom to the joint to be poured by means of a delivery-pipe 7. Heretofore delivery-pipes, as 7, have usually been made of wrought-iron sections threaded together. With such pipes difficulties have been encountered, owing to the liability of the lead sticking to the inner sides of the delivery-pipe and finally clogging it, so as to entirely prevent the flow of lead therethrough. This I have discovered is due to the presence of joints and roughness inside the pipe, at which the lead accumulates at each pouring operation, the accumulation of lead finally choking the pipe, and I have discovered that this difficulty is entirely obviated by the employment of a jointless and smooth-bore pipe, preferably of bendable metal, as brass. The connection between the pipe 7 and pot 3 preferably is such as shown in Fig. 3, the pot 3 having bolted to it a centrally-bored plug 8, into the lower threaded end of which the pipe 7 is screwed. The discharge of the melted lead from the melting-pot 3 is controlled by a valve 9, the sides of which closely fit the discharge-port 6 and which is provided with a flanged collar 10, seating against the upper edge of the plug 8. The valve 9 is connected to the lower end of a rod 11, partially inclosed by a sleeve 12 and connected at its upper end to a hand-lever 13, fulcrumed at 14 in a bridge or bracket 15, extending across the melting-pot, as illustrated in Fig. 2. As will be readily understood, by moving the hand-lever 13 up and down the valve 9 is raised and lowered from the port 6 and the flow of molten lead from the pot 3 thus controlled.

Heretofore the casings in apparatus of this character have been provided with open bottoms for the ingress of air, with the result that there was considerable loss of heat and the piping being operated upon, which was exposed to the escaping heat, was liable to damage or injury by melting therefrom of its varnish, paint, or other coating. With such an open heater also when the tank is located beneath the casing, as in the present case, there is danger of explosion of the tank. To avoid this, the casing 1 in the present case is provided with a bottom plate 16, closing the bottom of the casing, the upper face of which plate is preferably lined with asbestos 17 for the purpose of protecting it from the heat. To provide for the ingress of air to the casing, the latter is provided near the bottom thereof with openings 1<sup>a</sup>, so disposed as to secure a uniform admission of air to all points.

The bottom plate is provided with four ears 18, each of which is in turn provided with a supporting-leg 19, having an outwardly-bent foot 20. These legs are rotatable in the ears 18, so as to be adjustable to pipes of different diameters and are secured in the positions to which they are adjusted by means of nuts 21, threaded to their ends on the upper sides

of the ears. Each of the legs when in position on the pipe bears against it at two points—namely, the extremity of the leg proper and the downwardly-bent portion of the foot—thus supporting the apparatus firmly in position.

The bottom plate 16 is provided on its under surface with a pair of lugs 22, turned inwardly toward each other for supporting an asbestos-covered tank 23, containing the hydrocarbon, such tank for the purpose of connecting it to the bottom plate 16 being in turn provided with a pair of corresponding lugs 24 for engagement with the lugs 22. By reason of this connection between tank 23 and casing 16, provided by the lugs 22 24, the tank may be readily and quickly slid into and out of position in the casing, as desired. Such connection at the same time furnishes a secure and steady support for the tank, insuring the retention of the latter in proper position during transportation of the pouring device from one place to another, the lugs 22 24 being of considerable length, so as to provide a broad bearing or support for each other, and thus prevent any tendency on the part of the tank to vibrate or move otherwise relatively to the casing. The tank 23 is provided with an orifice closed by a cap 25, through which the tank is supplied with hydrocarbon, and is also provided with an air-pump 26, by which it is supplied with air for forcing the hydrocarbon from the tank to the combined vaporizer and burner, as will hereinafter appear.

To the upper side of the tank 23 is connected the combined vaporizer and burner, which when the tank is in position in the bottom plate of the casing is directly beneath the melting-pot 3. To permit the movement of the vaporizer and burner into and out of the casing with the tank, the bottom plate 16 and the walls of the casing (at 27) are cut away. The combined vaporizer and burner consists generally of an inlet-pipe 28 and an outlet-pipe 29, with a vaporizing portion 30, consisting of a network of intercommunicating tubes between them, the inlet-pipe 28 communicating with the interior of the tank 23 and with the vaporizer 30, while the outlet-pipe 29 communicates at one end with said vaporizer and at its opposite end with the burner proper, 31. The base of the combined vaporizer and burner is provided with a hub 32, with which the inlet-pipe 28 communicates, said hub being interiorly threaded for attachment to a correspondingly-threaded tube 33 from the hydrocarbon-tank 23, though the connection may be made in any other desired manner.

It will be readily understood from the foregoing that the hydrocarbon forced from the tank 23 by the air therein supplied by pump 26 enters the inlet-pipe 28, passes upwardly through the same, thence through the vaporizer 30, where it is vaporized, the vapor thus generated passing downwardly through the outlet-pipe 29, and finally through the burner 31, where it is ignited and burned. It will



be observed that the vaporizing portion 30 of the burner is located above the burner proper and in the path of the flame therefrom, so as to be heated thereby for the purpose of vaporizing the hydrocarbon.

Heretofore in combined vaporizers and burners the vaporizers have been of such small effective area and otherwise of such character and so related to the flame from the burner as to be incapable of vaporizing rapidly but a very small quantity of hydrocarbon for each burner, a small vaporizer being sometimes provided for each burner or a large vaporizer for several burners, the effective vaporizing-surface in either case being of small extent. In the vaporizers and burners of this character the burner proper has of necessity, because of the small quantity of hydrocarbon vaporized, been provided with a very small discharge-orifice for the vapor and produced but a very small flame, a single burner being inefficient in apparatus, such as those for pouring pipe-joints, where a very high degree of heat was required. To obtain such high degree of heat with such vaporizers and burners as heretofore constructed, it has been found necessary to employ either a number of such combined vaporizers and burners or a large vaporizer and a plurality of burners or jets. This rendered such apparatus expensive, both in first cost and in the making of repairs. In such vaporizers, moreover, the vaporization is often so imperfect that the carbon separated from the hydrogen chokes the orifice in the burner.

The combined vaporizer and burner provided by the present invention, however, is by reason of certain peculiarities, which will now be described in detail, in the construction of the vaporizer and its arrangement relatively to the burner proper, of largely increased capacity over the old type of vaporizers and burners and capable of more perfectly vaporizing hydrocarbon, the capacity of the combined vaporizer and burner provided by the present invention being such that with one such burner may be developed the high degree of heat required in pipe-joint pouring and other apparatus. Referring to Figs. 4, 5, and 6, it will be observed that the vaporizer portion 30 of the burner consists of a network of tubes, two of which, the annular tubes 34 35, may be termed the "main tubes," which are connected by branch tubes 36 and intersecting tubes 37 38, inclosed by and communicating with the tube 35. The inlet-pipe 28 and the outlet-pipe 29, as will be observed, communicate directly with the main tubes 34 35, so that the hydrocarbon issuing from the inlet-pipe 28 may pass therefrom into the vaporizer in four different directions, as indicated by the arrows in Fig. 6, and each thence by a plurality of circuitous paths to the outlet-pipe 29. These various tubes are closely grouped together, as shown, and in such position relatively to the burner proper that all portions of each tube,

including the upper sides thereof, will be exposed to the flame therefrom and all portions of the vaporizer thus maintained equally at the high degree of heat necessary for perfect vaporization of the hydrocarbon. The under surfaces of the tubes are rounded, as shown, so that the wall of each tube will deflect the flame impinging upon it toward the walls of the contiguous tubes. For this purpose also that portion of the under surface of the vaporizer which is directly in line with the discharge-orifice in the burner—i. e., the point of intersection of the tubes 37 38—is additionally provided with a rounded protuberance 39. For the purpose of mixing air with the vapor from the burner and for the purpose of concentrating the flame upon the vaporizer and the pot 3 there is provided between the burner proper and such vaporizer a tubular mixer 40, which is adjustably connected as shown, with the inlet or outlet pipe 28 or 29, the operative position of such mixer being substantially that illustrated in the drawings—namely, in somewhat close proximity to the vaporizer. At its upper end the mixer 40 is provided with an upwardly and outwardly projecting flange 41 for guiding the flame radially outward, so as to envelop all portions of the vaporizer. By reason of the large number of tubular passages presented to the incoming hydrocarbon and their arrangement relatively to the flame large quantities of hydrocarbon are rapidly vaporized and at the same time perfectly vaporized, and I am thus enabled to provide the burner with an outlet-orifice of large size, thus securing a large flame. Between the outlet-pipe 29 and the discharge-orifice in the burner I interpose a strainer 42, formed by perforating the wall of the burner near its base, as shown in Fig. 4, for a purpose hereinafter referred to. Beneath the burner is provided a pan 43, covered with asbestos 44, for containing a quantity of hydrocarbon, which is burned therein for the purpose of heating the vaporizer 30 preliminary to supplying hydrocarbon thereto from the tank.

The manner of using the apparatus is as follows: Before starting up—i. e., heating the vaporizer to the high degree necessary for perfect vaporization—it is necessary, in order to secure the best results, that the vaporizer should be freed from hydrocarbon and maintained in that condition until properly heated. To accomplish this, all that is necessary to be done is to keep the petcock 48 open during the heating of the vaporizer, thus permitting the air to escape from the tank and confining the hydrocarbon therein and causing the return to the tank of any hydrocarbon which happens to be in the vaporizer. As soon as the vaporizer has been thus heated the petcock 48 is closed and the piston of the pump 26 given a few strokes to supply the tank with air for forcing oil therefrom into the vaporizer, so that the latter may be tested in order to determine that the vaporizer has



been properly heated for perfect vaporization. When this is determined, additional strokes are given to the pump-piston to increase the pressure up to a high working pressure. The oil thus supplied to the vaporizer is vaporized therein, the vapor passing therefrom to the burner and thence through the outlet-orifice in the latter, where it is mixed with air and ignited, the flame passing upwardly through the mixer 40, where a perfect mixture of vapor and air is obtained and by which it is directed against the vaporizer and against the under side of the pot 3, the flange 41 of the mixer guiding the flame outwardly, so as to envelop all portions of the vaporizer, and the under sides of the several tubes of the latter directing the flame from one to the other, so that all portions of the vaporizer are equally exposed to the flame and equally heated thereby. When the lead in the pot 3 has been melted, it is permitted to escape therefrom into the delivery-pipe 7 and thence to the joint to be poured by raising the valve 9, the lead issuing from the pipe 7 entering a pocket 45 in a dam 46, embracing the joint to be poured, in the usual way. When a joint is completed, the apparatus is transported by means of the handles 47 to the next joint to be poured. When it is desired to extinguish the flame, all that is necessary to be done is to open the petcock 48 in the tank 23, thus permitting the escape of air confined in the tank, and consequently arresting the supply of hydrocarbon to the vaporizer and burner.

It sometimes happens that users of hydrocarbon apparatus are not always careful in starting up to see that the vaporizer is free from hydrocarbon and the supply of hydrocarbon thereto from the tank cut off during the heating of the vaporizer. In such cases the hydrocarbon is imperfectly vaporized, the carbon separated from the hydrogen forming into flakes which are collected in the burner and obstruct the outlet-orifice therein, thus rendering the apparatus temporarily inoperative and necessitating removal and cleansing of the burner. This difficulty is avoided in the present case by the provision of the strainer 42 and the peculiarities in the construction and arrangement of the vaporizer by reason of which a very high pressure is generated in the vaporizer sufficient to force the carbon should any collect in the burner outwardly through the outlet-orifice in the latter. Should flakes of carbon form in the vaporizer in the present case, therefore, due to imperfect vaporization resulting from neglect on the part of the user, such carbon will be arrested by the strainer 42 and prevented from entering the discharge-orifice in the burner, it being afterwards forced out of the strainer and through the outlet-orifice in the burner by the high pressure of the vapor generated in the vaporizer. The formation of flakes of carbon which obstruct the outlet-orifice in the burner and render the appa-

tus temporarily inoperative occurs in prior constructions not only in case of neglect by the user to free the vaporizer from hydrocarbon, but frequently in the ordinary operation of the apparatus, because of the small capacity of the generator and the low pressure of the vapor generated. It can only occur in the burner of the present apparatus, however, in case of neglect, as the vaporizer in the present case is, as before pointed out, of such capacity and so related to the burner that very large quantities of hydrocarbon are rapidly and at the same time perfectly vaporized during the operation of the apparatus, so that the formation and deposit of flakes of carbon within the vaporizer and burner is entirely avoided.

It will be understood that the apparatus when in use upon piping will be supported in position thereon by the legs 19, which thus support not only the body or casing of the apparatus and its melting-pot, but also the hydrocarbon-tank and its pump and other attachments, thus providing a very compact apparatus which may be readily transported from place to place, the several parts of the apparatus by reason of the connections between them heretofore described being retained in proper position relatively to each other during such movement and held steadily against any tendency to vibrate relatively to each other while the apparatus is operating. It will be understood, moreover, that when the apparatus is placed in position on the piping the legs 19 will, if necessary, be rotated in their supports to proper position to engage the piping and retained in such adjusted position by tightening the nuts 21, these legs, as before stated, being adjustable to fit piping of different diameters.

The combined hydrocarbon vaporizer and burner heretofore described is not claimed herein *per se*, as it forms the subject-matter of a separate application, filed by me on May 21, 1901, Serial No. 61,223.

What I claim is—

1. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank beneath the pot removably connected to and supported by the casing, and a combined vaporizer and burner between the tank and pot and borne by the former, substantially as described.

2. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank beneath the pot removably connected to and supported by the casing, a combined vaporizer and burner between the tank and pot and borne by the former, and supporting-legs connected with the casing and projecting below the tank, substantially as described.

3. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank beneath the pot removably connected to and supported by the casing, a combined vaporizer and



burner between the tank and pot and borne by the former, and laterally-adjustable supporting-legs connected with the casing and projecting below the tank, substantially as described.

4. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank beneath the pot removably connected to and supported by the casing, a combined vaporizer and burner between the tank and pot and borne by the former, and means interposed between the burner and tank for protecting the latter against the heat of the flame from the former, substantially as described.

5. In a pipe-joint pouring apparatus, the combination of a suitable casing having a closed bottom, a melting-pot and delivery-pipe therefor, a tank beneath the bottom of the casing removably connected to and supported by the casing, and a combined vaporizer and burner projecting upwardly from the tank into a position beneath the pot through an opening in the bottom of the casing, substantially as described.

6. In a pipe-joint pouring apparatus, the combination of a suitable casing having a closed bottom, a melting-pot and delivery-pipe therefor, a tank beneath the bottom of the casing removably connected to and supported by the casing, a combined vaporizer and burner projecting upwardly from the tank into a position beneath the pot through an opening in the bottom of the casing, and means interposed between the bottom of the casing and the tank for protecting the latter against the heat of the flame from the burner, substantially as described.

7. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank beneath

the pot having a sliding connection with and supported by the casing, and a combined vaporizer and burner between the tank and pot and borne by the former, substantially as described.

8. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank beneath the pot and supported by the casing, said tank being provided with lugs adapted to slide upon and interlock with corresponding devices upon the casing, and a combined vaporizer and burner between the tank and pot and borne by the former, substantially as described.

9. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank beneath the pot and supported by the casing, said tank being provided with lugs adapted to slide upon and interlock with corresponding devices upon the casing, a combined vaporizer and burner between the tank and pot and borne by the former, and supporting-legs on the casing projecting below the tank, substantially as described.

10. In a pipe-joint pouring apparatus, the combination of a suitable casing, a melting-pot and delivery-pipe therefor, a tank provided with lugs 24, corresponding lugs 22 on the casing, and a vaporizer and burner borne by the tank beneath the pot, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DENIS F. O'BRIEN.

Witnesses:

G. M. BORST,  
A. A. V. BOURKE.