No. 791,931. PATENTED JUNE 6, 1905.

E. G. MUMMERY & W. J. BEST.

HYDROCARBON BURNER.

APPLICATION FILED JAN. 8, 1904.

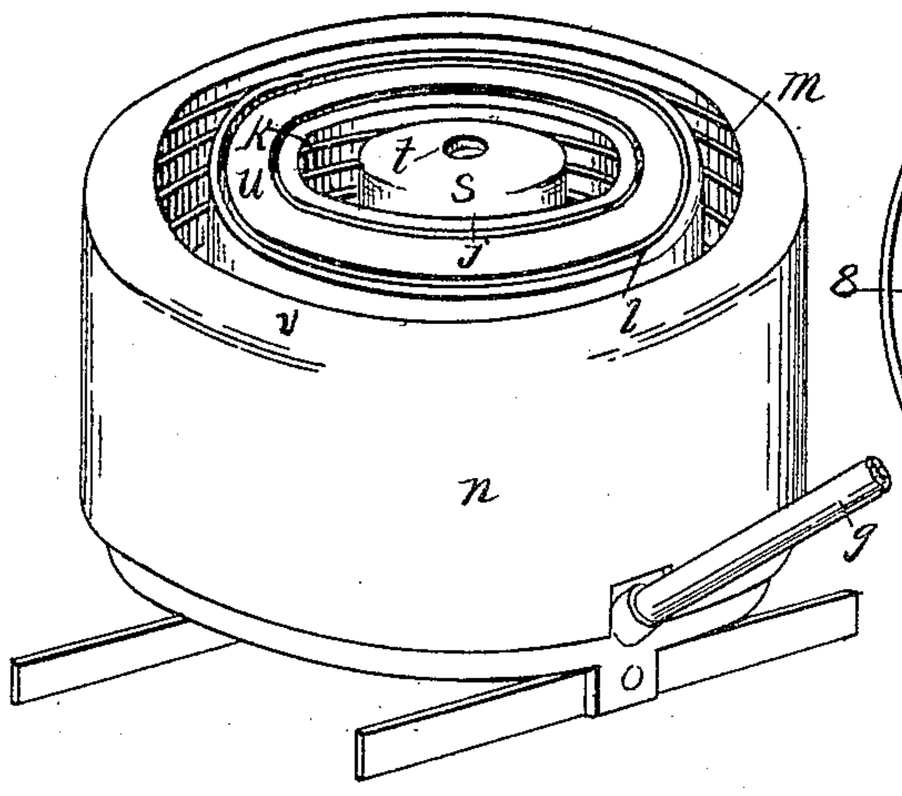

Fig. 1.

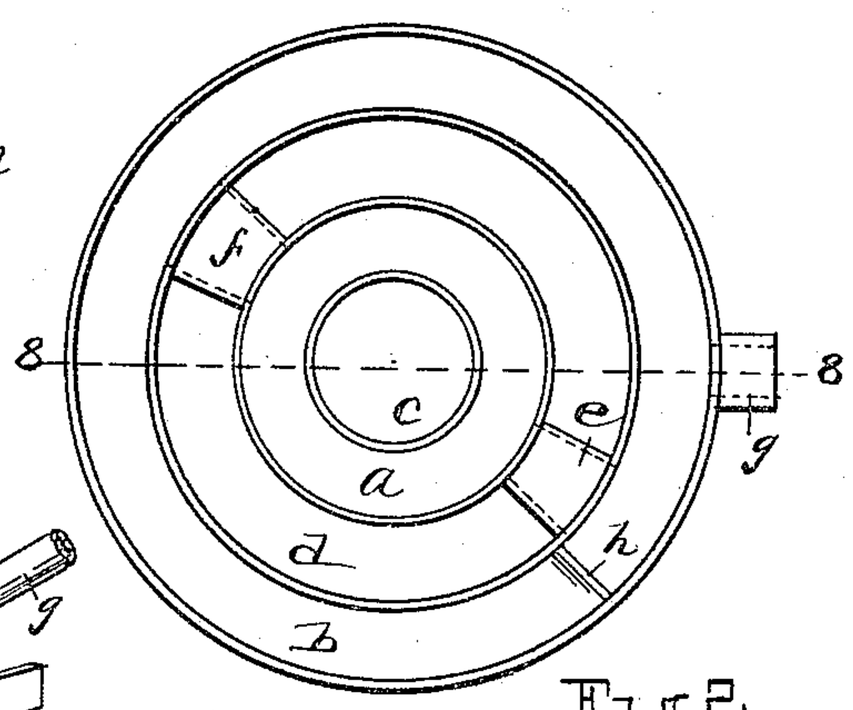

Fig. 2.

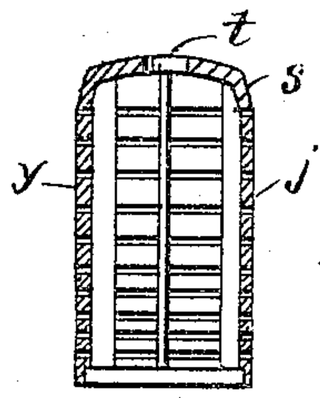

Fig. 4.

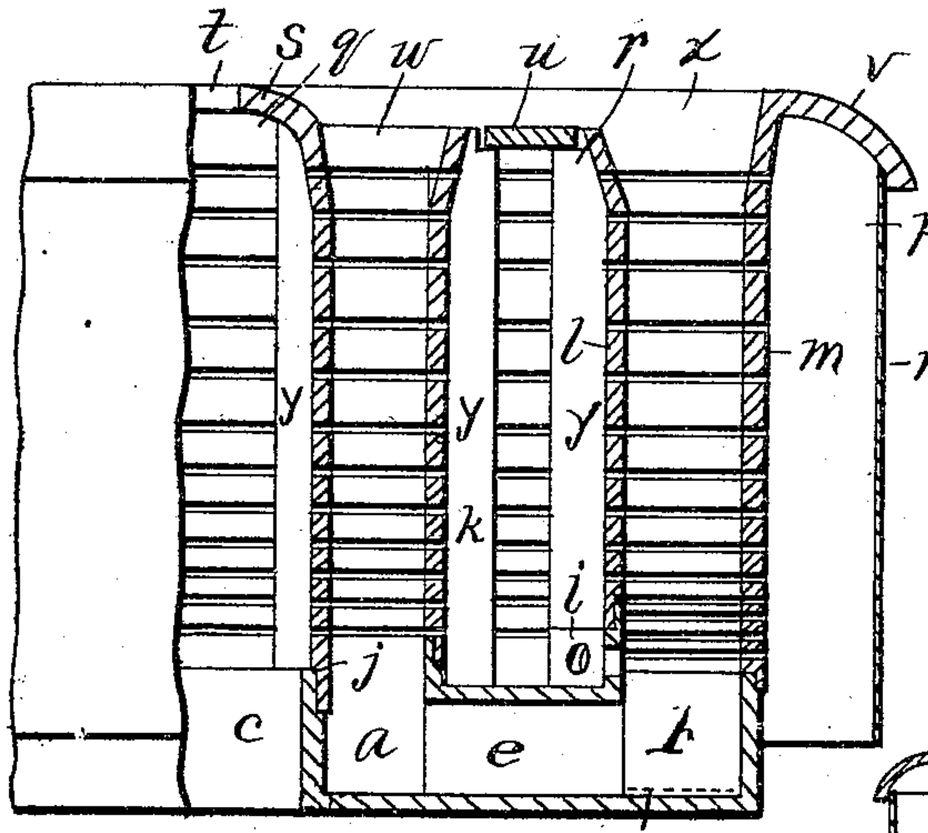

Fig. 3.

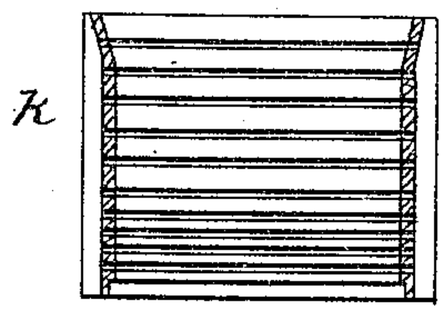

Fig. 5.

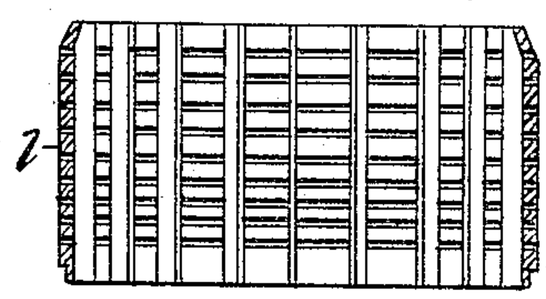

Fig. 6.

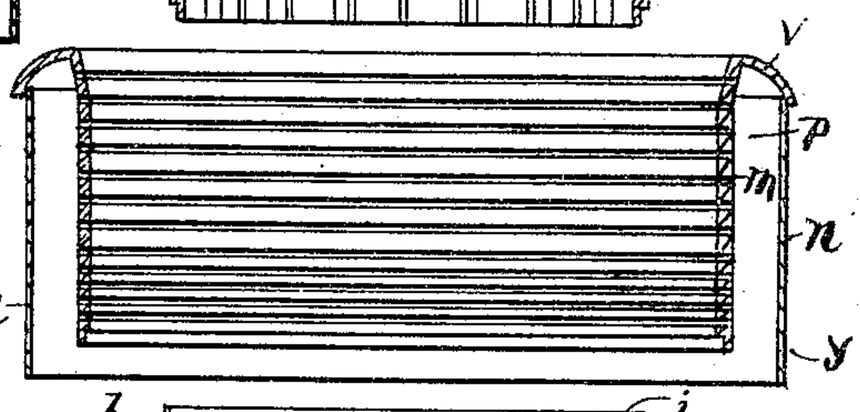

Fig. 8.

Fig. 7.

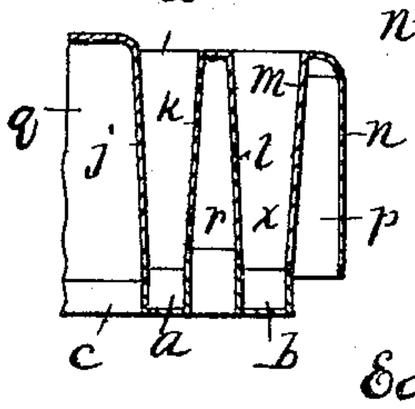

Fig. 9.

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No. 791,931. Patented June 6, 1905.

UNITED STATES PATENT OFFICE.

EDWIN G. MUMMERY AND WILLIAM J. BEST, OF DETROIT, MICHIGAN; SAID BEST ASSIGNOR TO AMERICAN VAPOR STOVE COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 791,931, dated June 6, 1905.

Application filed January 8, 1904. Serial No. 188,240.

To all whom it may concern:

Be it known that we, EDWIN G. MUMMERY and WILLIAM J. BEST, citizens of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Hydrocarbon-Burners, of which the following is a specification, reference being had to the accompanying drawings, which form a part of this specification.

Our invention has for its object certain new and useful improvements in a hydrocarbon-burner; and it consists of the construction, combination, and arrangement of devices hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in perspective illustrating our invention. Fig. 2 is a plan view of the base. Fig. 3 is a vertical section showing parts of the device. Fig. 4 is a view in vertical section of the interior foraminous wall. Fig. 5 is a view in vertical section of the outer foraminous wall of the interior combustion-chamber. Fig. 6 is a view in vertical section through the inner foraminous wall of the outer combustion-chamber. Fig. 7 is a view in vertical section through the outer wall of the outer combustion-chamber and of the outer drum. Fig. 8 is a view in vertical section through the base on the line 8 8, Fig. 2; and Fig. 9 is a view in vertical section through parts of the device, illustrating a modification in the construction of the walls of the combustion-chamber.

The object of our invention is to provide a hydrocarbon-burner of superior construction and of increased efficiency.

Our present invention is the result of a long experience in the construction of burners of this class and embodies the results of our experience and of various applications and experiments in the construction of hydrocarbon-burners, the burner in its entirety embodying various improved features over other burners of this nature.

Our invention embodies a base constructed with two concentric vaporizing-channels, with foraminous air-inlet walls located upon the interior and exterior walls of each of said channels forming combustion-chambers therebetween above said channels, an air-chamber within the inner foraminous wall, an air-chamber between the two combustion-chambers, the burner also being provided with a surrounding drum forming an air-chamber outside the exterior combustion-chamber. The air-chambers are provided with caps or coverings to deflect the air to cause the air to pass through the adjacent foraminous walls into the combustion-chamber to support combustion.

Our invention includes an improved construction of the base and an improved construction of the foraminous walls.

We carry out our invention as follows.

The two concentric vaporizing-channels of the base are indicated at *a* and *b*, the base being formed with an interior air-inlet opening *c* and with an air-inlet opening *d* between the two channels *a b*, said channels being connected, preferably, by two communicating channels or ducts, (indicated at *e* and *f*.) A feed-pipe enters the outer channel preferably at a little distance from the duct *e*. Should the base of the burner rest exactly on a level, one duct connecting the two vaporizing-channels of the base would serve all necessary purposes, as the hydrocarbon fuel, either in liquid condition, as in first starting up the burner, or in vaporized form, as when the burner is in full operation, would flow readily about the exterior channel and through the duct *e* into the interior channel and thereabout; but it has been found that when the base of the burner is not exactly on a level the free flow of the fuel around the entire outer vaporizing-channel may be impeded by the tilting of the base, in consequence of which its entrance into the interior channel would be facilitated by providing an additional duct, preferably arranged on the side of the base opposite the duct *e*, as shown at *f*. Furthermore, to more effectually cause the hydrocarbon fuel to pass through the outer channel into the interior channel we have found it of advantage to provide the outer channel with a slightly-raised rib or bead, as at *h*, on the farther side of the open-

ing of the ducts into the outer channel from the entrance of the feed-pipe, this rib or bead more effectually causing the fuel to enter into the interior channel and also to pass around the outer channel to make a complete annular flame. Another and a very important feature in our present improved construction of the base consists in constructing the inner wall of the outer channel of greater height than the outer wall of said channel and providing the said inner wall, toward its upper edge and on a plane above the upper edge of the outer wall of said channel, with a series of air-inlet openings or perforations, (indicated at *i*.) By making the inner wall of the outer channel higher than the outer wall of the said channel we are enabled to bore said perforations or air-inlet openings through the upper portions of the inner wall of said channel in a ready and convenient manner, inasmuch, as will be obvious, a boring-tool can readily be extended over the upper edge of the outer channel in boring said perforations. Moreover, by locating said perforations above the upper edge of the outer channel and toward the upper edge of the inner channel we are enabled to provide the inner wall with a series of such perforations extending annularly around the entire inner wall, the said perforations being formed through said wall above the connecting-ducts *e f*, so that the annular arrangement of said air-inlet openings is not interfered with by any obstructions or by said ducts. Moreover, by forming said inlet air openings or perforations so high up in the upper edge of the inner wall of the outer channel the free flow or spread of the fuel round about within the base of the outer channel is not interfered with or impeded by the air entering through said perforations. It is found that for the best operation of the burner said inlet air-openings in the inner wall of the outer channel should be raised to such a point as not to interfere with the free spread and flow of the fuel in the outer channel. Were said perforations located lower down, the air entering therethrough would tend to puff or blow back the fuel, especially when in the vaporized form, thereby occasioning an uneven distribution of the fuel in the outer channel, and consequently causing an uneven flame in the outer combustion-chamber. It will be obvious also that if the outer wall of the outer channel was at the same height as the inner wall it would be difficult to form said perforations on a horizontal plane in the inner wall and that the only way said perforations could practically be so formed would be to form them on an angle to a horizontal plane. If formed on an angle from outside of said wall, then the air entering through said perforations would be admitted into the chamber between the walls of the channel on an ascending angle, which would tend to prevent the best results, and that if, on the other hand, said perforations were formed at an angle from the inside of the inner wall of the outer channel then the air entering therethrough would enter on a descending angle, the air thus being thrown down toward the base of the outer channel, which would impede, as above described, the proper flow and spread of the fuel in the outer channel. It becomes important, therefore, to conduct the perforations in the inner wall of the outer channel horizontally therethrough, and this we accomplish readily by extending the inner wall to a suitable height above the upper edge of the corresponding outer wall.

The inner foraminous wall is indicated at *j*, the same resting upon the inner flange of the interior channel. The outer wall of the interior combustion-chamber is indicated at *k* and rests upon the outer flange of the interior channel. The inner wall of the outer combustion-chamber is shown at *l* and rests upon the inner flange of the outer channel. The outer wall of the combustion-chamber is indicated at *m* and is located upon the outer flange of the outer channel.

The outer drum is indicated at *n*, the same being spaced from the outer wall of the outer combustion-chamber, forming an air-chamber *p* therebetween. An air-chamber is thus formed, as at *q*, within the inner wall *j* and an additional air-chamber *r* between the wall *k* and *l*. The inner wall *j* is formed with a cap *s*, preferably perforated, as indicated at *t*, the cap *s* serving to deflect the air in the air-chamber *q* through the adjacent foraminous wall *j*. The air-chamber *r* is also provided with a cap *u*, the same serving to divert the air within said chamber and causing it to pass through the adjacent foraminous walls *k l*. In Fig. 6 the cap *u* is shown in elevated position. The air-chamber *p* is provided with a cap *v*, which may preferably be made integral with the wall *m*. It will be obvious that the foraminous walls *j k* form a combustion-chamber *w* above the interior channel *a* and that the foraminous walls *l m* form a combustion-chamber *x* above the outer channel of the base. The interior wall *j* and cap *s* are preferably formed integral, while the walls *k l* are preferably formed separate one from another, the cap *u* also being constructed of a separate piece. We prefer that the foraminous walls shall be made of cast metal and kerfed horizontally, said walls being formed with ribs (indicated at *y*) to connect the various horizontal rings or divisions formed by the horizontal kerfing of said walls, the kerfs preferably extending into said ribs. The ribs on the walls *j* are preferably formed on the interior thereof, also the ribs of the wall *l*, while the ribs of the wall *k* are preferably formed on the exterior thereof, as shown, the ribs on the outer wall *m* being also preferably formed on the exterior. We have also found it advantageous in kerfing said walls to have the

kerfs made wider toward the upper portions of the walls, so as to allow more air to enter into the combustion-chamber through the upper portions of the foraminous walls. We have also found it advantageous to so form the upper walls as to increase the width of the combustion-chamber toward the upper portion thereof to permit the vapor and intermingled air to expand in the upper portions of the combustion-chambers to secure more efficient combustion. This we may accomplish by oppositely flaring the upper ends of the walls forming each of the combustion-chambers, said walls extending vertically parallel up to a desired height from the base and merely flaring in opposite directions, the upper portions of the walls forming a combustion-chamber. As shown in a modified form in Fig. 9, the adjacent walls forming each of the combustion-chambers may be oppositely flared from the base to the walls of the top thereof. Either of these constructions makes the corresponding combustion-chamber wider at the top than at the bottom, allowing for the freer rise of the commingled air and vapor in the combustion-chamber and for expansion toward the top thereof.

One object of our invention is to so construct and arrange the parts of the burner as to have the burner operate in a superior and efficient manner even with a low fire, the fuel being distributed evenly throughout the entire circumference of the outer and inner channels. This result we accomplish as above described and especially by forming the air-inlet openings in the inner wall of the outer chamber toward the top thereof and above the upper edge of the outer channel. If said inlet air-openings were lower down, under a low fire the draft through said openings would tend to blow the vapor back and prevent its even distribution. This would obviously occur to a more detrimental degree under a low fire than under a full fire. We have found, therefore, that a burner embodying the improvements above described possesses superior advantages. It will be seen that the construction of the foraminous walls to flare in opposite directions at the top of the corresponding combustion-chamber also contracts the corresponding air-chambers toward the upper portions thereof, facilitating the passage of the air therethrough into the adjacent combustion-chambers.

What we claim as our invention is—

A hydrocarbon-burner comprising a base constructed with inner and outer vaporizing-channels, a duct connecting said channels, a feed-inlet pipe leading into the outer channel, the outer channel formed with a rib on the side of the duct opposite the entrance inlet-pipe, and foraminous walls forming a combustion-chamber above each of said channels, said channels each constructed with an inner and an outer flange, the inner flange of the outer channel rising above the upper edge of the outer flange of the outer channel and provided with a series of inlet-orifices above the horizontal plane of the upper edge of the outer flange, said orifices extending entirely around said inner flange.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

EDWIN G. MUMMERY.
WILLIAM J. BEST.

Witnesses:
N. S. WRIGHT,
M. L. SIMMONS.