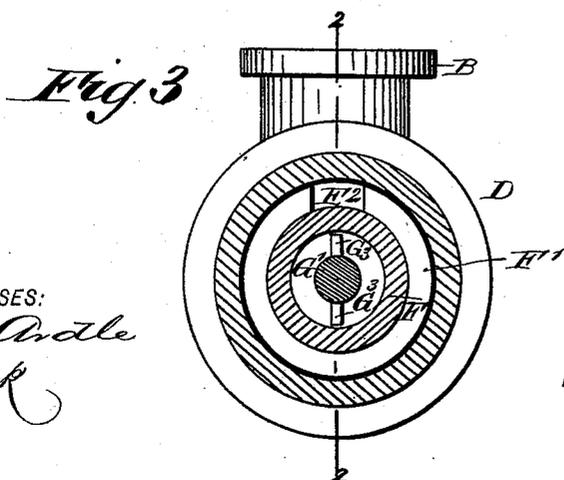
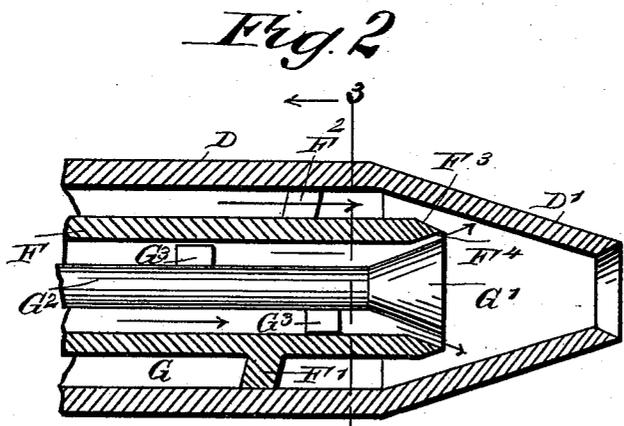
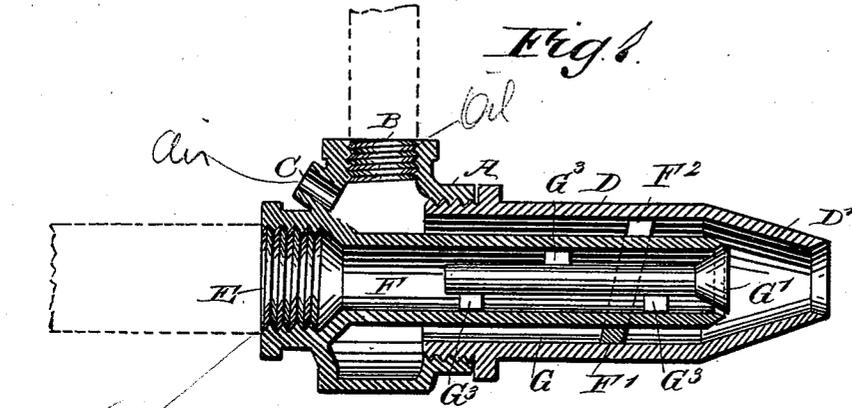


(No Model.)

B. KAMPS.  
HYDROCARBON BURNER.

No. 527,695.

Patented Oct. 16, 1894.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

BEREND KAMPS, OF ZEELAND, MICHIGAN.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 527,695, dated October 16, 1894.

Application filed January 9, 1894. Serial No. 496,273. (No model.)

### *To all whom it may concern:*

Be it known that I, BEREND KAMPS, of Zeeland, in the county of Ottawa and State of Michigan, have invented a new and Improved Hydrocarbon-Burner, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved hydrocarbon-burner, which is simple and durable in construction, very effective and reliable in operation, and more especially designed for burning crude petroleum in connection with steam and air.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is an enlarged sectional elevation of part of the improvement on the line 2-2 of Fig. 3; and Fig. 3 is a transverse section of the same on the line 3-3 of Fig. 2.

The improved hydrocarbon burner is provided with a casing A, made circular and provided at its top with an oil inlet B, connected by a pipe with a suitable oil supply. On the casing A is also arranged an air inlet C, slightly inclined, as is plainly shown in Fig. 1, so as to supply a current of air, to cause the oil to flow forward in the manner hereinafter more fully described.

Into the front end of the casing A screws a nozzle D, having a contracted end D', as is plainly shown in the drawings, this end extending into the furnace or other place on which the hydrocarbon burner is used, so as to direct the flame to the desired spot.

The rear end of the casing A is formed with a steam inlet E, connected by a pipe with a suitable steam supply, the inner end of the said steam inlet E terminating in a steam pipe F, extending through the casing A and into the nozzle D, the front end of the said steam pipe F terminating within the contracted end D' of the said nozzle. Near the front end of the pipe F is arranged a collar F', extending to the inner surface of the nozzle D so as to form a stop for the oil contained in the space G, formed between the pipe F and the

inner end of the nozzle D. The collar F' is provided on the top of the pipe F with a longitudinally extending slot or recess F<sup>2</sup> so that the oil in the space G can pass through the slot upon the front end of the steam pipe F, as the oil rises within the casing A to a level above the bottom of the slot F<sup>2</sup>. The recess F<sup>2</sup> is of sufficient area to permit all sediment and heavy substances in the oil to pass without choking. The forward movement or flow of the oil is caused by the current of air passing through the air inlet C into the casing A and nozzle D, the current being produced by the steam jet flowing through the contracted end D', as hereinafter more fully described.

The extreme front end of the steam pipe F has a bevel F<sup>3</sup>, from which extends an inner bevel F<sup>4</sup>, so that the two bevels form a blunt edge at the extreme end of the steam pipe. In this forward end of the pipe F is arranged a cone-shaped plug G', which forms, with the inner bevel F<sup>4</sup>, an annular space through which steam can pass into the contracted end D', the said space being very minute, say about a one-hundredth of an inch in width, so that the steam passes in a very fine jet and with a high velocity from the pipe F into the contracted end D'. The plug G' is provided with a rearwardly-extending stem G<sup>2</sup> having lugs G<sup>3</sup> fitted in the steam pipe F, so as to hold the plug G' in the proper position.

The operation is as follows: Steam is admitted to the pipe F through the steam supply pipe, the steam passing through the annular opening between the plug G' and the bevel F<sup>4</sup> into the contracted end D' of the nozzle D to mix with the oil passing from the oil space G through the recess F<sup>2</sup> upon the forward outer bevel F<sup>3</sup> of the pipe F, the mixture of oil and steam finally passing through the forward end of the nozzle D into the furnace or other place in which the flame is to be used, it being understood that the mixture is ignited as it leaves the contracted end D'. The plug G' allows for the small amount of steam to leave the forward end of the steam pipe F, so that the steam escapes at a very high velocity through the circular opening, which is of very small area, thus giving a large acting surface to the steam jet, and the said plug guides the steam so as to strike the

inner surface of the contracted end D' a short distance beyond the junction of the contracted end with the body of the nozzle D. As the steam is retarded in the pipe F by the plug G' it has sufficient space and time to expand and to pass out of the burner at a low pressure. Thus the arrangement gives a steam jet small in volume, acting with high velocity in the most effective manner, at the same time being greatly reduced in pressure before being discharged.

The oil in the casing A and the oil space G is maintained on a level with the upper side of the steam pipe F, so that the oil is heated by the heat radiating from the steam heated pipe F. The hottest oil thus rises to the top and is forced forward along the upper surface of the steam pipe F, to pass through the slot or recess F<sup>2</sup> upon the forward part of the said steam pipe F, in a very thin stream, the forward flow of the oil being caused by the current of air through the air inlet C. This air inlet has about double the area of the recess F<sup>2</sup>, so that a weak current of the oil in the casing A and oil space G is produced, which current is greatly increased as the oil passes the recess F<sup>2</sup> and enters on the forward end of the steam pipe F. The oil is thus spread out, and is drawn over the beveled end F<sup>3</sup> to meet the steam issuing over the plug G' and under the bevel F<sup>4</sup>.

It will be seen that the oil is spread in a very thin stream over the entire bevel F<sup>3</sup>, and as it is thoroughly heated it readily passes or is drawn into the steam jet at nearly right angles and with considerable force, caused by the air current induced by the vacuum created within the nozzle D by the steam jet. The oil is thus vaporized and readily combines with the steam, so that a mixture is produced which will burn with a white heat at the front end of the nozzle D.

It will be seen that the different courses pursued by the steam and the oil at the point where they come in contact; that is, nearly at right angles, gives the high pressure steam jet a grinding and separating action, thereby dashing every particle against the inner surface of the contracted end D' with considerable force, so that the oil vapors and steam are thoroughly mixed. The mixed gases striking the inner surface of the nozzle D' are deflected inward by the bevel of the contracted end D', so that the heavier gases go to the inside, while the lighter and more expansive gases form the outside of the stream which now passes through the opening in the contracted end D' to the outside to be burned in the furnace. The low pressure at the discharge end of the opening causes the gases

to be fed to the furnace at a moderate velocity, the gases igniting close to the burner, and burning in a strong white flame with perfect regularity and evenness.

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

1. A hydro-carbon burner, comprising a pipe adapted to discharge steam under pressure, a casing surrounding the said chamber and adapted for connection with an oil supply, a nozzle secured to the casing and projecting in advance of the steam pipe, and a collar fitted between the said nozzle and steam pipe to retain the oil within the casing and nozzle, said collar being provided in its upper part, with a recess for the passage of the oil to the forward end of the steam pipe, substantially as described.

2. A hydrocarbon burner comprising a casing connected with an oil supply, a nozzle extending from the said casing and having a contracted end, a steam pipe connected with the steam supply and extending through the said casing and nozzle into the contracted end thereof, the forward end of the said steam pipe having an exterior and an interior bevel forming a blunt edge at the extreme end of the pipe, a plug fitted in the said extreme end of the steam pipe to form, with the inner bevel, a circular steam outlet, and a collar fitted between the said steam pipe and nozzle to retain the oil within the casing and nozzle, the said collar being provided on its top with a recess for the passage of the oil to the forward end of the steam pipe, substantially as shown and described.

3. A hydrocarbon burner comprising a casing connected with an oil supply, a nozzle extending from the said casing and having a contracted end, a steam pipe connected with the steam supply and extending through the said casing and nozzle into the contracted end thereof, the forward end of the said steam pipe having an exterior and an interior bevel forming a blunt edge at the extreme end of the pipe, a plug fitted in the said extreme end of the steam pipe to form, with the inner bevel, a circular steam outlet, a collar fitted between the said steam pipe and nozzle to retain the oil within the casing and nozzle, the said collar being provided on its top with a recess for the passage of the oil to the forward end of the steam pipe, and an air inlet in the said casing, substantially as shown and described.

BEREND KAMPS.

Witnesses:

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