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L. K. LEAHY.

INJECTOR BURNER.

APPLICATION FILED SEPT. 8, 1903. RENEWED JUNE 13, 1905.

Fig. I

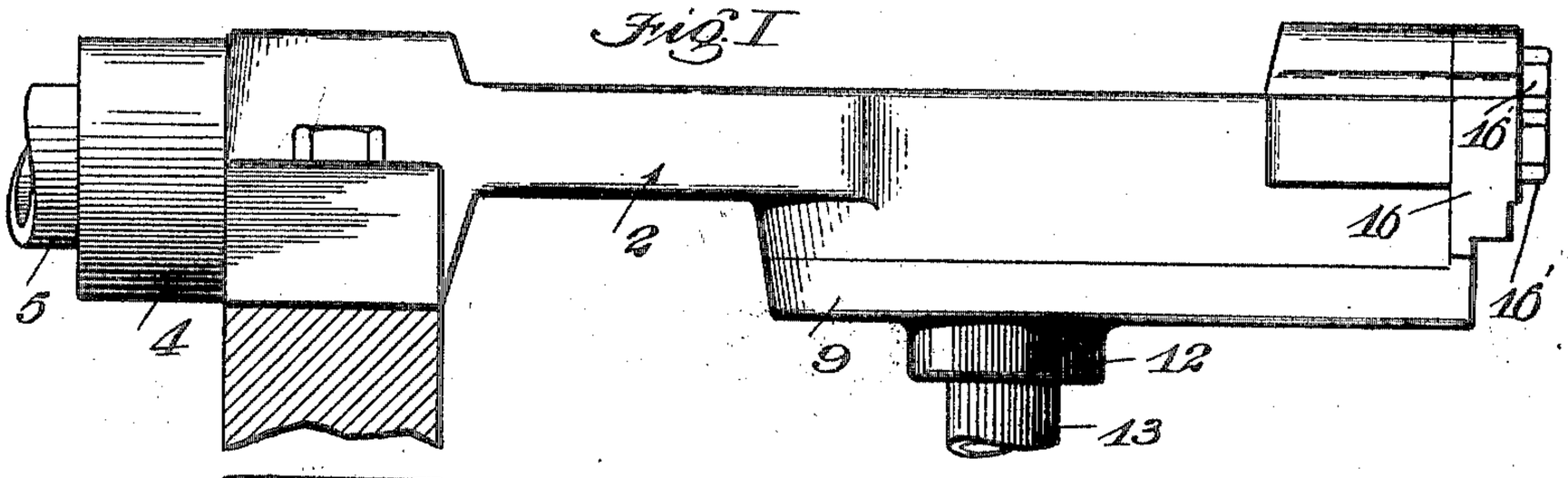


Fig. II

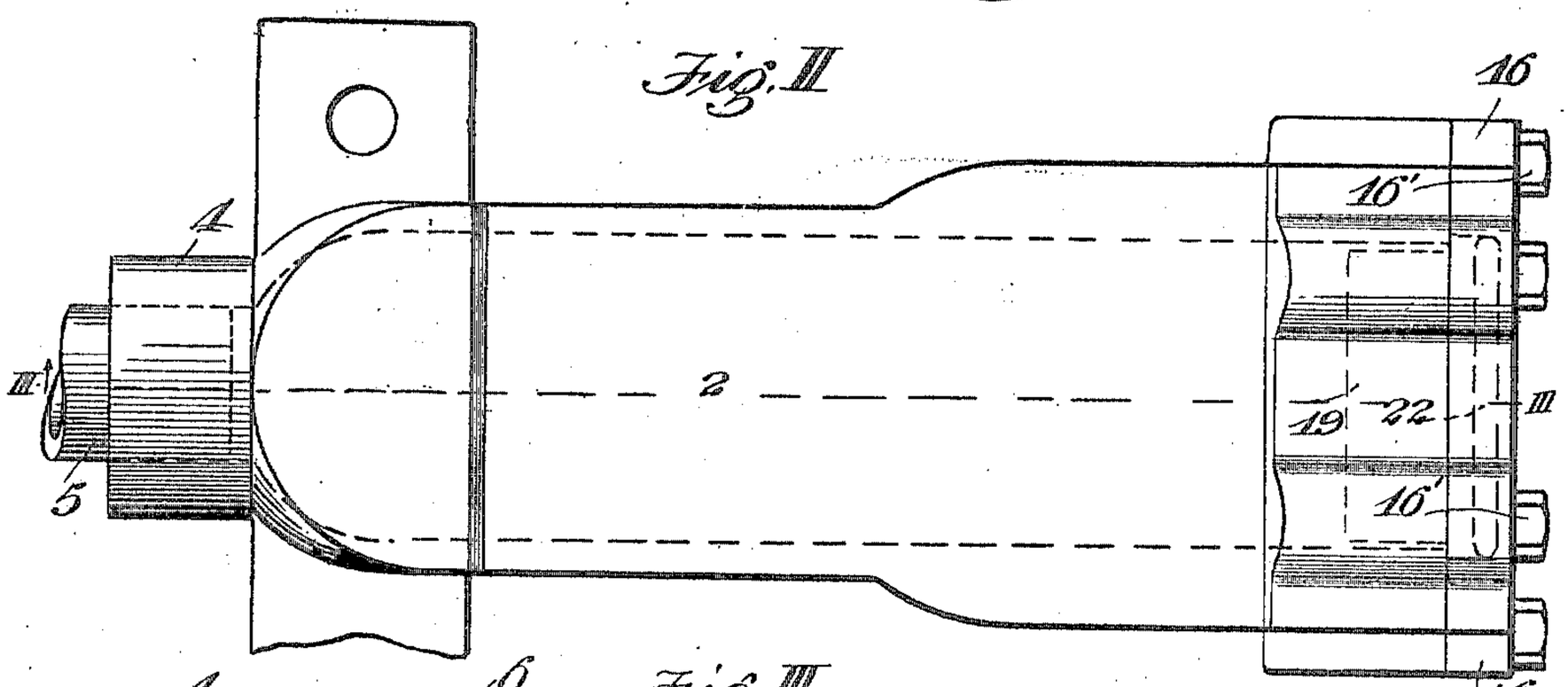


Fig. III

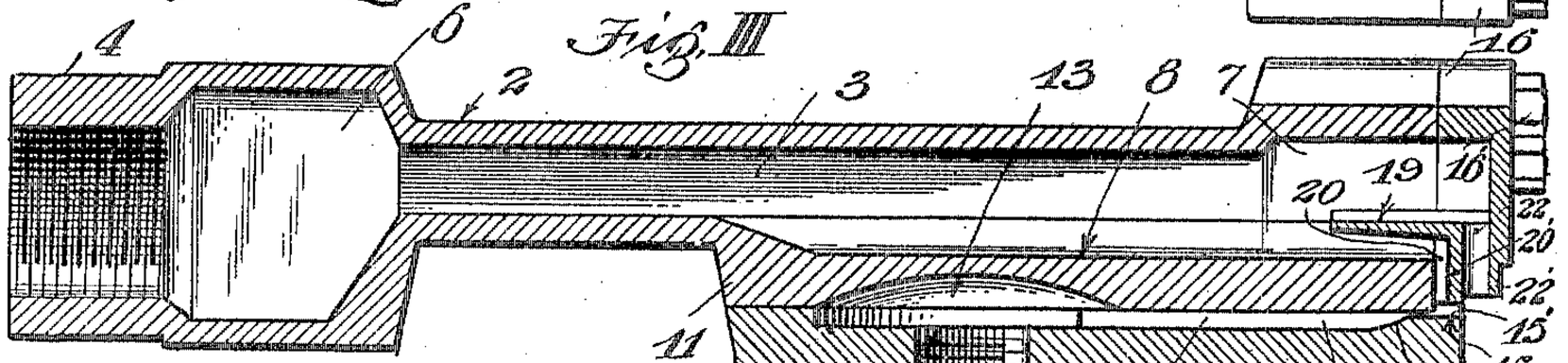


Fig. IV

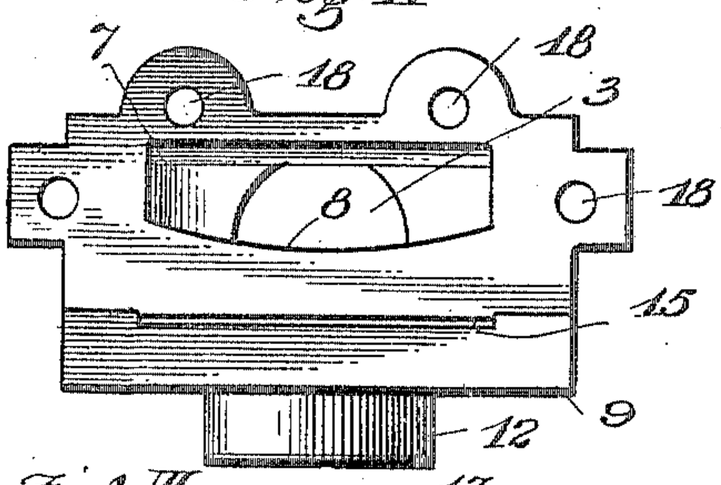


Fig. V

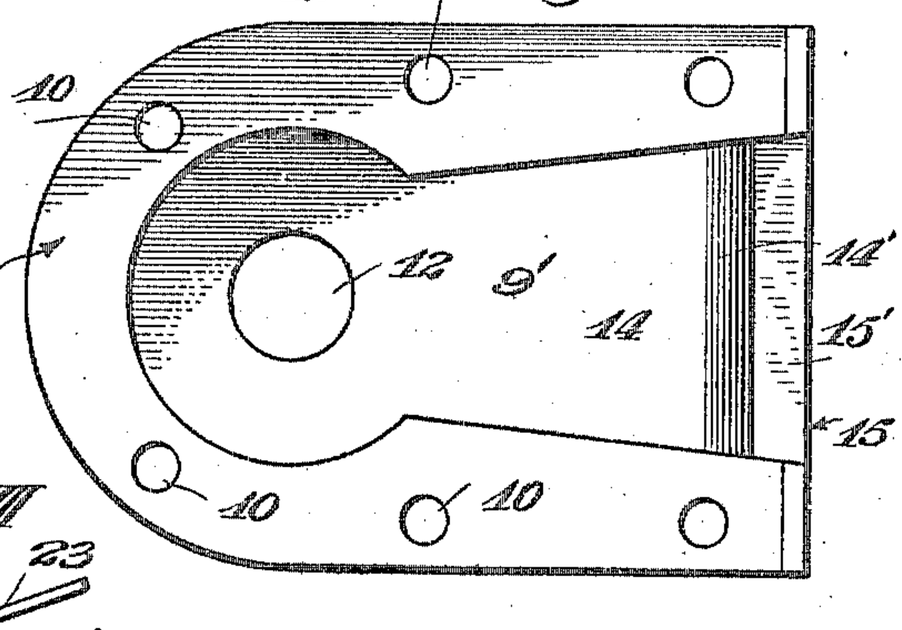


Fig. VI

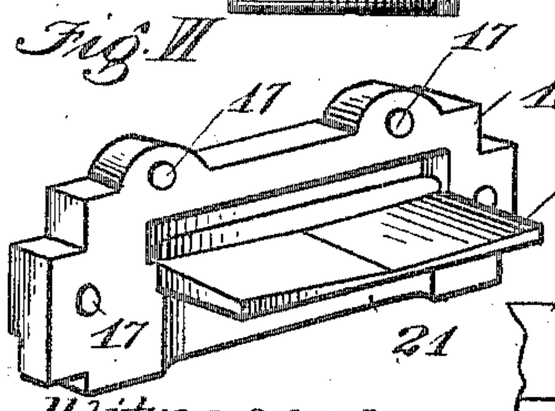
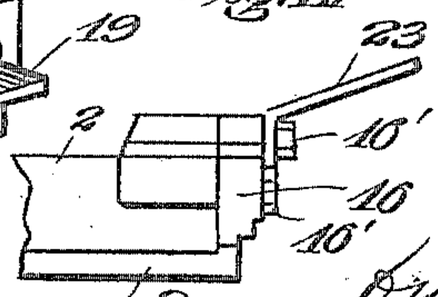


Fig. VII



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UNITED STATES PATENT OFFICE.

LOUIS K. LEAHY, OF LOS ANGELES, CALIFORNIA.

INJECTOR-BURNER.

No. 811,935. Specification of Letters Patent. Patented Feb. 6, 1906.

Application filed September 8, 1903. Renewed June 13, 1905. Serial No. 265,066.

To all whom it may concern:

Be it known that I, LOUIS K. LEAHY, a citizen of the United States of America, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain Improvements in Injector-Burners, of which the following is a specification.

This invention relates to means for burning hydrocarbon oils, and particularly to simple, cheap, positive, durable, and efficient means for burning heavy or crude hydrocarbon oil.

The general object of the invention is to provide a burner which shall be particularly adapted for use under a locomotive-boiler and with which a very small or low fire as well as a great or intense fire may be provided and perfect combustion maintained at all times with a wide flat fan-shaped flame covering the entire area of the furnace.

Another object is to thoroughly atomize the oil not only when the fire is high or intense, but also when the fire is low.

Other and further objects and ends in view will hereinafter appear from the detail description of construction and operation.

In general the invention consists in an injector-burner comprising a broad flat steam-chamber having a thin broad discharge-opening and an oilway adapted to discharge oil downward upon the steam-jet from said steam-discharge opening.

The invention consists, further, in the constructions and in general and specific combinations of parts, all hereinafter described, and particularly pointed out in the claims.

The invention will be more readily understood by reference to the accompanying drawings, in which—

Figure I is a side view of a burner embodying my invention. Fig. II is a plan view thereof. Fig. III is a longitudinal sectional view thereof. Fig. IV is an end view of the body with the end block removed. Fig. V is a plan view of the plate which forms the steam-chamber. Fig. VI is a perspective view of the end block viewed from the inner side. Fig. VII is a partial detail view of the front end of the burner, showing the drip-guard in place.

As shown in the drawings, 2 represents the main body of the burner, which is provided with a longitudinal oilway 3, in the end 4 of which an oil-supply pipe 5 is adapted to be screwed.

6 represents an oil-chamber into which the pipe 5 communicates and in turn communicating with the oilway 3. As shown, the chamber 6 is of greater diameter than the oilway 3.

The body 2 at its forward end is enlarged so that the oilway 3 is expanded at 7, as shown. The floor of the oil-discharge is concave, as shown at 8 in Fig. IV, so that when the supply of oil is turned down low the oil will run from the center.

The steam-chamber is formed by the plate 9, fastened in place at the forward end and on the under side of the body 2 by suitable screws (not shown) which pass through holes 10 in the plate and into the body. This plate is recessed or hollowed out, as shown at 9′, and is provided with a steam-inlet 12, into which the steam-pipe 13 may be screwed. Directly above the steam-inlet 12 the portion 11 of the body is concaved to form a chamber 13.

14 represents the steamway, which, as shown, is contracted to a wide and exceedingly-thin outlet 15, the forward wall of the recess of the plate 9 curving upward at 14′ at its forward end and being provided with a straight tip portion 15′, which coming in close proximity with the straight surface of the body portion 11 forms the steam-outlet 15.

16 represents a removable end block which is secured on the end of the body 2 by suitable bolts 16′, which pass through the holes 17 and 18 in the end block and body, respectively. This end block is provided with an inwardly-projecting flange or lip 19, the upper surface of which is concave. This lip forms a director adapted to deflect or guide the oil through the primary oil-discharge slot 20, formed between the end of the body portion and the recessed portion 21 of the end block. This primary oil-outlet discharges right angularly downward onto the straight lip 15′ of the plate 9 slightly forward of the chamber 9′, and the oil is precipitated directly upon the outgoing jet of steam. The end block 16 is cored out to form a second oil-discharge 22, which, as shown, is of greater width than the primary oil-discharge duct 20, and the upper concave surface of the lip 19 terminates at this duct 22. This discharge-slot 22 discharges right angularly downward across the plane of discharge of the steam from the steam-outlet 15 and at a point just beyond its emission from such outlet. When the burner is being used at its full capacity, the oil flows through both out-

lets 20 22. When a low fire is desired and the oil-supply is reduced, the oil flows under the lip 19 and through the primary outlet 20 and is precipitated onto the steam-jet, passing out in the slot 15 and its thorough atomization insured. Any overflow flows over the lip 19 down the center of the concave thereof and down the center of the slot or duct 22 onto steam-jet as the steam commences to expand.

By this construction I have found that I am able to avoid any possibility of the dripping of the oil from the burner onto the floor of the fire-box and the formation of a pool of oil thereon when the locomotive has been brought to a standstill, necessitating the lowering of the fire.

By this construction I secure all the advantages of both internal and external admixture of the expansive fluid with the oil and secure a most thorough atomization of the oil, effectuating perfect combustion.

It is obvious that either steam or compressed air may be used with my burner, and I therefore use the term "steam" in this specification and in the claims for either steam or air.

It will be noted that when the supply of oil is low for a low fire any gas or vapor rising from the oil in the oil-chamber 6 or oilway 3 will be drawn out through the duct 22 by suction caused by the passage of the steam across the mouth of the oil-duct 22.

As shown, the wall 20′ terminates somewhat above the lower face of the body portion 11, and the wall 22′ terminates somewhat above the end of the wall 20′, so that the discharge-slot 15 is increased in size and expansion of the steam provided for. The lower end or edge of the wall 20′ terminates slightly above the lower face of the body 2, and the lower end or edge of the wall 22′ terminates slightly above the lower end of the wall 20′, so as to allow the steam to expand upwardly as it passes the ducts 20 and 22, thereby avoiding any tendency of the steam to expand or "back up" into either of the oil-ducts 20 22, as might be the result were the walls 20′ 22′ not shortened, as shown.

In Fig. VII, I have shown the front end of the burner provided with a drip-guard 23, fastened on the body by the bolts 16′. This guard extends out beyond the end of the burner a suitable distance and is inclined upward, as shown, and prevents any dripping water from the stay-bolts of the boiler, due to leakage, &c., from dropping onto the atomizing oil and steam near its point of discharge. Such drip has been found to retard the atomization and to cause imperfect combustion.

It will be noted that the oil duct or passage 3, leading from the oil-chamber 6, is of less diameter than the chamber and opens from the upper portion of the chamber. Toward its outer end this duct 3 is enlarged, the enlargement being secured by lowering the surface of the bottom of the duct, a slanting wall or portion connecting the floors or bottoms of the portions of the duct, the bottom 8 of the enlarged portion of the duct being concaved or centrally depressed. It is thus seen that when the oil-pressure is low the burner will not "go out;" but the oil flowing over the slanting wall and down onto the portion 8 creates a gravity-pressure on the oil in the expanded portion of the duct and a gravity-pressure on the oil passing through the primary oil-discharge slot 20. As shown, the lip 19 is in the plane of the bottom of the primary portion of the oil-duct 3 and the slot 20 is of less capacity than the capacity of the expanded portion of the duct lying below the plane of the lip 19, thus insuring the retention of a body of oil for the duct 20, so that when the pressure of the oil is turned down low a gravity-pressure in the oil passing through the duct 20 is maintained.

What I claim is—

1. An injector-burner comprising a body provided with an oilway terminating in two parallel discharge slots or ducts, the bottom of said way being concaved at its communication into one of said slots or ducts, and a steamway, said ducts arranged beyond the discharge-opening of said steamway and discharging across the plane of discharge therefrom.

2. An injector-burner comprising a body provided with an oilway terminating in a wide concave-bottomed discharge-outlet, and a recessed plate affixed to said body and forming a steamway terminating in a thin wide discharge-slot, and means for directing the oil from said discharge-outlet right angularly across the plane of discharge from said steamway.

3. An injector-burner comprising a body provided with an oilway, a recessed plate affixed to said body and forming a steamway terminating in a thin wide discharge-slot, and an end block or end wall for said body and forming a downward extension of said oilway adapted to project the oil downwardly across the plane of the steam-discharge, the bottom of said oilway being depressed at its center, where it communicates into said downward extension.

4. An injector-burner comprising a body provided with an oilway terminating in two discharge slots or ducts, and with a steamway terminating in a thin wide discharge-outlet, one of said oil-discharge ducts communicating into the steam-discharge slot, the other duct discharging across the plane of discharge from said steam-discharge slot.

5. An injector-burner comprising a body comprising an oilway terminating in two discharge slots or ducts separated by an inwardly-projecting lip or partition extending above one of said ducts, and with a steam-

way terminating in a thin discharge-slot, one of said oil-ducts communicating into the steam-discharge slot, the other duct discharging across the plane of discharge from said steam-discharge slot.

6. An injector-burner comprising a body having an oilway terminating in two discharge slots or ducts separated by a lip or partition forming the floor of the outward duct, said lip or partition having a concave upper face, the floor of the other duct also concaved, and said body provided with a steamway terminating in a discharge-slot adapted to impinge steam against the oil from said ducts.

7. An injector-burner comprising a body having an oilway terminating in an outlet having a concave bottom, a partition or lip superposed above said bottom and having a concaved upper face, a downwardly-projecting wall forming a discharge-slot between such wall and the end of said concaved bottom, and an outer wall forming a second discharge-slot, said body provided with a steamway discharging across the plane of discharge of said oil-discharge ducts.

8. An injector-burner comprising a body having an oilway terminating in an outlet having a concave bottom, a partition or lip superposed above said bottom and having a concaved upper face, a downwardly-projecting wall forming a discharge-slot between such wall and the end of said concaved bottom, and an outer wall forming a second discharge-slot, and a recessed plate affixed to said body and forming a steamway, the front wall of the recess of said plate extended upward to form a thin wide discharge-slot discharging at an angle to the plane of discharge from said oil-ducts.

9. An injector-burner comprising a body having an oilway terminating in an outlet having a concave bottom, a partition or lip superposed above said bottom and having a concaved upper face, a downwardly-projecting wall forming a discharge-slot between such wall and the end of said concaved bottom, and an outer wall forming a second discharge-slot, and a recessed plate affixed to said body and forming a steamway, the front wall of the recess of said plate extended upward to form a thin wide discharge-slot, the first-named oil-slot discharging into said steam-slot, and the second oil-duct discharging across the plane of discharge of said steam-discharge slot.

10. An injector-burner provided with an oilway terminating in a wide thin discharge-outlet, the floor of the discharge-outlet concaved, and a steamway adapted to impinge steam against the oil from said oilway, and a drip-guard extending above said ways and adapted to prevent the precipitation of water into the atomizing-oil.

11. An injector-burner comprising a body provided with an oilway terminating in two discharge slots or ducts, and with a steamway terminating in a thin wide discharge-outlet, one of said oil-discharge ducts communicating into the steam-discharge slot, the other duct discharging across the plane of discharge from said steam-discharge slot, said body provided at its front end with an upwardly-inclined drip-guard.

12. An injector-burner comprising a body having an oilway terminating in two discharge slots or ducts separated by a lip or partition forming the floor of the outward duct, said lip or partition having a concave upper face, the floor of the other duct also concaved, and said body provided with a steamway terminating in a discharge-slot adapted to impinge steam against the oil from said ducts, said body provided with a forwardly-extending upwardly-inclined drip-guard.

13. An injector-burner comprising a body provided with an oilway terminating in a wide, thin discharge-outlet, said body provided at its under side with a recess or cavity, a detachable plate secured on said body below said recess or cavity, said plate being recessed to form a steamway, said recess or cavity in the bottom face of said body forming an expansion-chamber, an inlet into said steamway, said inlet opening thereinto at an angle to the discharge from said steamway, and means for directing the oil from said oilway across the plane of discharge from said steamway.

14. An injector-burner comprising a body provided with an oilway terminating in a wide, concave bottom discharge-outlet, the under face of said body provided with a cavity, a recessed plate affixed to said body opposite said cavity and forming a steamway terminating in a wide steam-discharge slot, the recess in the bottom face of said body forming an expansion-chamber, and said body provided with an end block or end wall forming a downward extension of said oilway adapted to project the oil downwardly across the plane of the steam-discharge.

15. An injector-burner comprising a body provided with an oilway and two discharge slots or ducts, said oilway communicating directly into the primary discharge-duct and a plate superposed above said primary duct, and over which said way communicates into the secondary duct, and a steamway discharging across the plane of discharge of said ducts.

16. An injector-burner comprising a body provided with an oilway having a downwardly-expanded outer portion and two discharge ducts or slots, said oilway communicating directly into the primary discharge-duct, a plate or floor superposed above said primary duct in substantially the plane of the floor of the unexpanded portion of the oilway

and over which said way communicates into the secondary duct, and a steamway discharging across the plane of discharge of said ducts.

17. An injector-burner comprising a body provided with an oilway and two discharge slots or ducts extending angularly with respect to said way, said oilway communicating directly into the primary duct, a partition above said primary duct over which said way communicates into the secondary duct, and a steamway discharging right angularly across the planes of said discharge-ducts, said body provided with a lip extending beyond the point of discharge from said steamway and spaced apart from the edge or end of the walls of the primary oil-discharge duct, the end of the outer wall of said duct terminating above the plane of the top wall of the steam-discharge slot and the end of the outer wall of said secondary duct terminating above the plane outer wall of said primary duct.

18. An injector-burner comprising a body provided with an oilway, two oil-discharge slots or ducts and a steamway, said ducts discharging right angularly across the plane of discharge from said steamway, the end of the outer wall of the inner duct terminating above the plane of the upper edge of the steamway and the outer wall of the outer duct terminating above the plane of the edge of said outer wall of said inner duct to provide for the upward expansion of the steam from the steamway.

19. An injector-burner comprising a body provided with oil and steam ways, two oil-discharge ducts and a steam-discharge slot, the lower wall of the steam-discharge slot extended outwardly across the plane of the inner duct, the outer wall of the inner duct terminated above the plane of the upper edge of the discharge-slot.

20. An injector-burner comprising a body provided with oil and steam ways, two oil-discharge ducts, and a steam-discharge slot, the lower wall of the steam-discharge slot extended outwardly across the plane of the inner duct, the outer wall of the inner duct terminated above the plane of the discharge-slot, and the outer wall of the outer duct terminated above the plane of the end of said outer wall of said inner duct.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 1st day of September, 1903.

LOUIS K. LEAHY.

Witnesses:
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JULIA TOWNSEND.