T. J. CUNERTY.

ATOMIZING OIL BURNER.

APPLICATION FILED NOV. 20, 1920.

1,399,006. Patented Dec. 6, 1921.

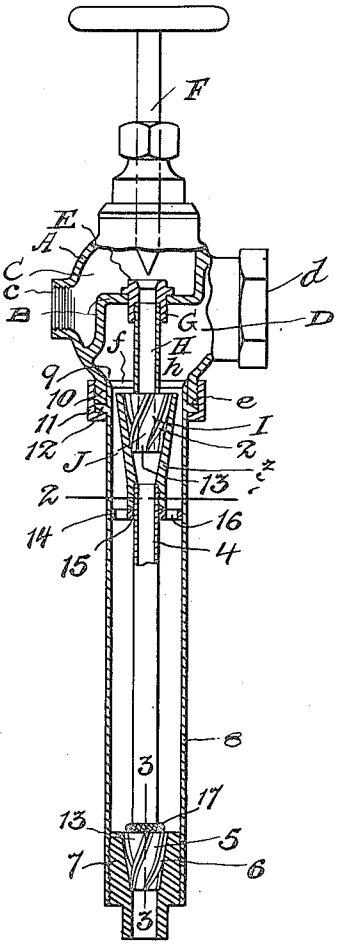

Fig. 1.

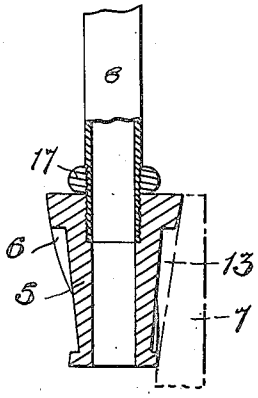

Fig. 3.

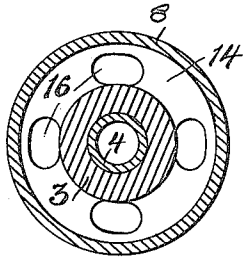

Fig. 2.

T. J. Cunerty INVENTOR.

BY

Egerton R. Case ATTORNEY.

UNITED STATES PATENT OFFICE.

TERENCE JOSEPH CUNERTY, OF TORONTO, ONTARIO, CANADA.

ATOMIZING OIL-BURNER.

1,399,006. Specification of Letters Patent. Patented Dec. 6, 1921.

Application filed November 20, 1920. Serial No. 425,477.

To all whom it may concern:

Be it known that I, TERENCE JOSEPH CUNERTY, a subject of the King of Great Britain, residing in the city of Toronto, county of York, Province of Ontario, Canada, have invented certain new and useful Improvements in Atomizing Oil-Burners, of which the following is a specification.

My invention relates to improvements in atomizing oil-burners, particularly of that type known as "inside mixers," and one object of my invention is to provide a burner of the type set forth which can be used with steam at high or low pressure, to provide a thorough breaking up of the oil so that when the same issues from the burner-tip it will be thoroughly atomized and mixed with the proper proportion of steam with the result that the burner can be used a relatively indefinite period without cleaning.

Another object of the invention is to simplify the construction of this type of burner and so reduce cost of manufacture, and the provision of a burner that can be readily taken apart to facilitate repairs.

In putting my invention into practice I provide a second admixture of a rapidly rotating stream of steam, with a stream of previously admixed steam and oil immediately the same issues from the oil-line thereby "boosting," so to speak, the speed of rotation of the mixture as it passes from the oil-line with the result that there are no waste products of combustion.

The preferred construction is that illustrated whereby I embody the principle of my invention, but it will of course be understood that I do not confine myself thereto in all particulars. The device broadly comprises an oil-line surrounded practically for its whole length by a steam line. At one point in the oil-line I provide a mixer-head, of a well-known type, preferably conical in general form, and at this point I introduce a stream of steam which, before it comes into contact with the oil, is given a rapid rotary movement by said mixer-head so that the rapid swirling movement given the oil in the balance of the oil-line will very largely break the oil up into small particles and insure the mixing together of the same and the steam. At or near the outlet end of the burner I provide a second mixer-head communicating with a steam line so as to give the stream of steam passing there-around a rotary motion so that as this stream of steam strikes the stream of admixed oil and steam as it passes from the oil-line, it "boosts" the same, so to speak, and restores the speed of rotation of the mixture from the oil-line substantially to its initial velocity resulting in the advantage before set forth. In the preferred construction of burner, a head is provided separated into oil and steam compartments, the oil-line communicating with the oil compartment and the steam line communicating with the steam compartment. Means is of course provided whereby the supply of oil is readily controlled.

Figure 1 is a vertical central longitudinal section through my preferred form of burner. Fig. 2 is a horizontal cross section on the line 2—2 Fig. 1 on an enlarged scale, and Fig. 3 is a longitudinal central section on the line 3—3 Fig. 1, through the outer end of the oil-line, also on an enlarged scale.

In the drawings like characters of reference refer to the same parts.

At the outset it must be understood that I omit the use of all small apertures or openings in the oil-line as these restricted passage-ways invariably eventually cause a stoppage in the flow of oil, and the consequent fouling of the device.

A is the head of the device in the form of a valve casing which is provided with a dividing wall B to divide the same into oil and steam compartments C and D, which are provided respectively with inlets *c* and *d*. Forming part of the oil-line is a valve seat mounted in the dividing wall B, and co-acting with said valve seat is any suitable type of valve, for instance the needle valve F, which controls the flow of oil from the compartment C into the oil-line. Screwed into the flange G of the valve seat E is a pipe or conduit H which is in communication with the passageway formed through the valve seat E. Suitably associated with the other end of the pipe or conduit H is a mixer-head I having a passageway J there-through which communicates with said pipe or conduit H. The mixer-head I is shaped in general form like the frustum of a cone, and is externally provided with a plurality of spiral ribs 2. 3 is a bore-provided casing shaped to receive the mixer-head I, and this casing is preferably detachably coupled to a pipe or conduit 4 which is in communication with the bore of said casing. Preferably detachably coupled to the outer end of the

pipe or conduit 4 is a bore provided mixer-head 5 through which passes a stream of admixed oil and steam. This mixer-head 5 is also exteriorly provided with spiral ribs 6, and is incased by the bore-provided casing 7 internally shaped to conform to the general shape of said mixer-head. The casing 7 is the tip of the burner, and the same is preferably removably mounted within the tubular casing 8 which is adapted for removable connection with the outlet 9 of the steam compartment D. The said outlet 9 is provided with an exteriorly threaded flange 10 with which has threaded engagement a union 11 which clamps the tubular casing 8 in place through the medium of the flange 12 of said casing between which, and the flange 10, is placed any suitable gasket *e*. The inner end *h* of the tubular casing 8 extends within the flange 10 so as to facilitate the placing of this tubular casing and also to relieve the union 11 and flange 12 of unnecessary strain in case of the application of force laterally to the casing 8.

As will be understood by one skilled in the art, the outer faces of the spiral ribs 2 and 6 rest in contact with the wall of the bore in each of the casings 3 and 7, and the consequence is that spiral passageways 13 are formed between said mixer-heads and their respective casings.

These passageways in respect of the mixer-head I open into the steam compartment D, and therefore steam will pass into the oil-line around the mixer-head I and will commingle with the oil passing from the pipe H into the casing 3 and will continue so to do until the mixture escapes through the casing 7. By reason of the construction of the mixer-head I, the stream of steam is given a rotary motion and consequently the vaporized oil this stream of steam intermingles with will also be given a rotary motion. By the time the stream of commingled oil and steam passes from the mixer-head 5, the velocity of the rotary movement will have appreciably slackened, and in order to restore this velocity to its initial value I pass into the tubular casing 8 a stream of steam which surrounds the oil-line, and as this steam passes through the spiral passageways 13 formed between the mixer-head 5 and the casing 7 it will be given a rapid rotary movement and will eventually surround the stream of commingled steam and oil passing from the mixer-head 5 and "boost," so to speak, the rotary motion thereof. The advantages of the operations set forth have already been clearly stated.

The external diameter of the mouth of the casing 3 is less than the internal diameter of the casing 8 thus forming an annular passageway *f* through which steam passes into said casing 8 from the steam compartment D.

If desired, I may support the tubular casing 8 at some point between its ends so as to prevent that portion of the oil-line from warping, in case it should have a tendency to warp. A suitable means for this purpose comprises a flange 14 centrally apertured and adapted for threaded connection with the inner end of the pipe or conduit 4 as shown at 15. The flange 14 is circular in form and contacts with the bore of the tubular casing 8. 16 are a plurality of passageways through the flange 14 to permit steam to flow through the casing 8. It must be clearly understood that I do not confine myself to using flange 14.

The mixer-heads may be coupled to their associated pipes or conduits after any suitable manner, but preferably after the construction shown in Fig. 3, wherein it is shown that the pipe or conduit associated with each mixer-head is preferably tapped there-into.

If desired, a nut lock 17 may be employed, though this is not of any moment.

What I claim as my invention is:

1. An oil-burner comprising an oil-line, a steam line encasing said oil-line; an incased mixer-head in said oil-line through which the oil passes, provided exteriorly with a plurality of spiral ribs which form like passage ways with said casing and which passage ways communicate with said steam line and whereby steam passing from said steam line into said oil-line is given a rotary motion; another incased mixer-head in said oil-line forming the discharge end thereof, also provided exteriorly with a plurality of spiral ribs which form passage ways with second-mentioned casing and which passage ways communicate with said steam line and whereby a stream of steam is given a rotary motion prior to its mixing with the admixed oil and steam issuing from said oil-line, and a head provided with oil and steam compartments with which said oil and steam lines are adapted to be respectively coupled.

2. An oil-burner comprising a head having a dividing wall separating the same into oil and steam compartments, each having an inlet, and the steam compartment being further provided with an outlet; a conduit mounted in said dividing wall and communicating with said oil compartment; a tubular member having a flared inner end, through which oil and steam passes; a tubular casing adapted to be coupled to the outlet of said steam compartment and to incase said tubular member, the external diameter of said flared end being less than the internal diameter of the bore of said tubular casing to provide a passage way for steam between these parts; a mixer-head

associated with the outer end of said conduit and adapted to set within said flared inner end of said tubular member and exteriorly provided with a plurality of spiral ribs which provide spiral passage ways between said mixer-head and said flared inner end, which passage ways communicate with said steam compartment; a tip associated with the outer end of said tubular member and adapted to communicate with the oil-line; a mixer-head associated with the outer end of said tubular member and to be located within said tip, and a plurality of exterior spiral ribs carried by said second-mentioned mixer-head which form spiral passage ways between said second-mentioned mixer-head and said tip, which passage ways communicate with said tubular casing.

3. An oil-burner comprising a head having a dividing wall separating the same into oil and steam compartments, each having an inlet, and the steam compartment being further provided with an outlet; a conduit mounted in said dividing wall and communicating with said oil compartment; a tubular member having a flared inner end, through which oil and steam passes; a tubular casing adapted to be coupled to the outlet of said steam compartment and to incase said tubular member, the external diameter of said flared end being less than the internal diameter of the bore of said tubular casing to provide a passage way for steam between these parts; a mixer-head associated with the outer end of said conduit and adapted to set within said flared inner end of said tubular member and exteriorly provided with a plurality of spiral ribs which provide spiral passage-ways between said mixer-head and said flared inner end, which passage ways communicate with said steam compartment; a tip associated with the outer end of said tubular member and adapted to communicate with the oil-line; a mixer-head associated with the outer end of said tubular member and adapted to set within said tip and exteriorly provided with a plurality of spiral ribs which provide spiral passage ways between said second-mentioned mixer-head and said tip, which passage ways communicate with said tubular casing, and an apertured supporting flange carried by said tubular member and adapted to contact with the internal wall of said tubular casing.

4. An oil-burner comprising an oil-line; a steam line incasing said oil-line; incased means through which the oil passes, located in said oil-line and exteriorly adapted to communicate with said steam line and whereby steam passing from said steam line into said oil-line is given a rotary motion; incased means through which the oil passes located in said steam line and exteriorly adapted to communicate with said oil-line and whereby steam passing from said steam line into said oil-line is given a rotary motion, and a head provided with oil and steam compartments with which said oil and steam lines are adapted to be respectively coupled.

TERENCE JOSEPH CUNERTY.