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1,462,680

J. BLISS

BURNER FOR FLUID FUEL

Filed Sept. 1, 1922

Fig. 1.

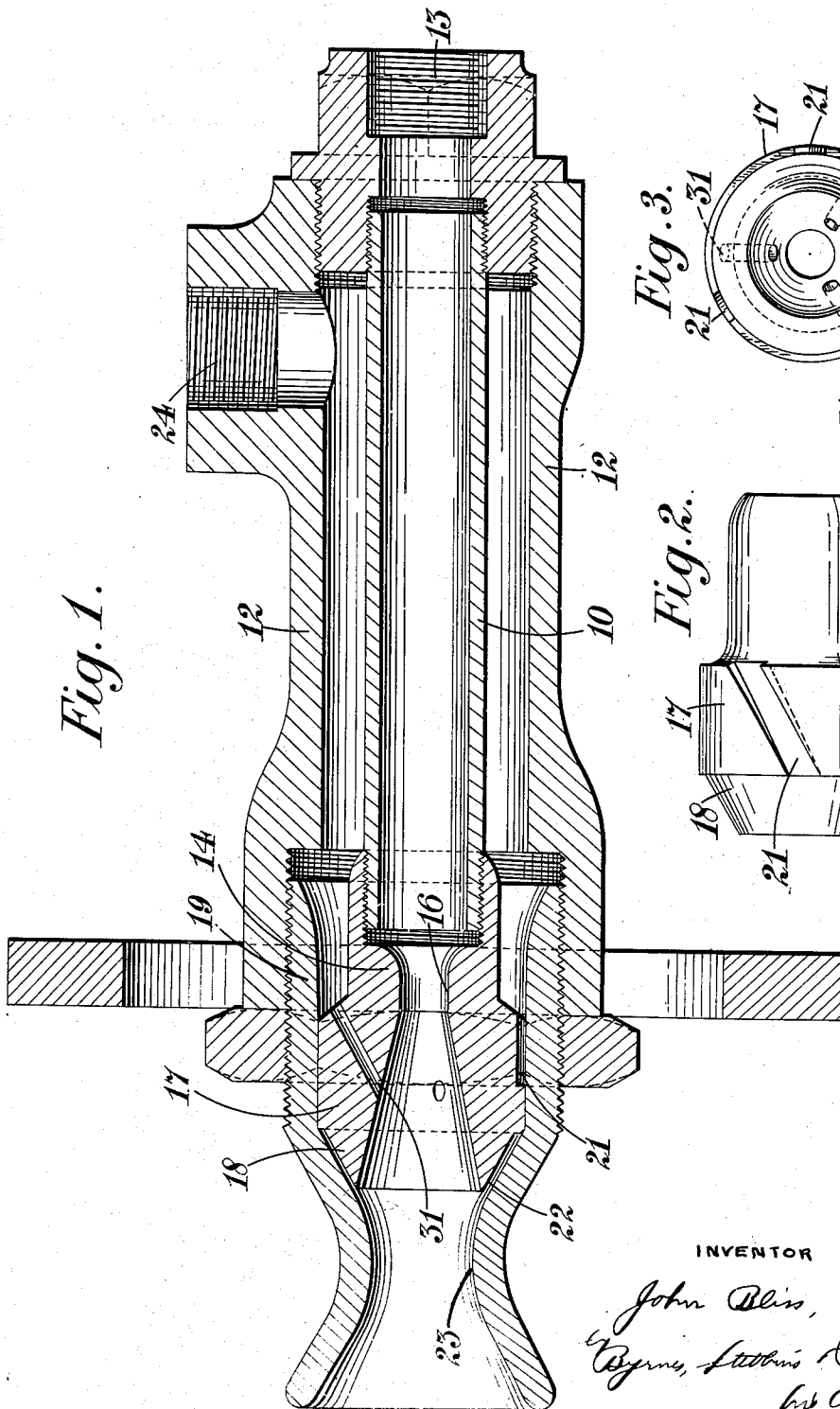


Fig. 3.

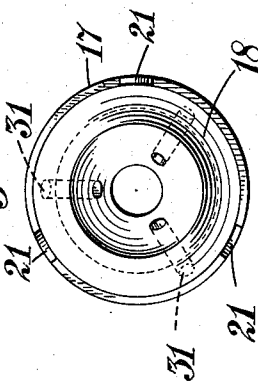
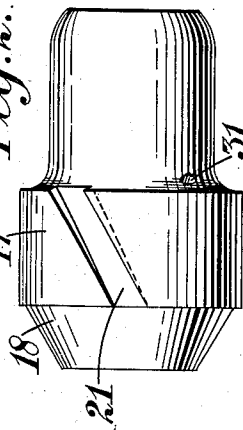


Fig. 2.



INVENTOR

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UNITED STATES PATENT OFFICE.

JOHN BLISS, OF LONDON, ENGLAND.

BURNER FOR FLUID FUEL.

Application filed September 1, 1922. Serial No. 535,654.

To all whom it may concern:

Be it known that I, JOHN BLISS, subject of the King of England, residing in London, England, have invented certain new and useful Improvements in Burners for Fluid Fuel, of which the following is a specification.

This invention consists in improvements in or relating to burners for fluid-fuel and has for its object to provide an improved burner for heavy hydrocarbons wherein an atomizing or spraying of the hydrocarbons shall be more thoroughly effected than heretofore.

According to the present invention a burner or sprayer comprises in combination a fuel-tube through which the fuel is to be passed in an axial direction, a jacket surrounding said fuel-tube with means to lead steam or other fluid into the jacket-space between it and the fuel-tube, forwardly-directed conduits communicating between the jacket-space and the interior of the fuel-tube near its outlet end to lead fluid from the jacket-space into the fuel-tube to mix with the fuel before it leaves the said tube, a nozzle enclosing the outlet end of the fuel-tube and forwardly-directed conduits exterior to the bore of the fuel-tube and so disposed as to lead streams of steam or other fluid to commingle with the fuel-mixture as it issues from the fuel-tube outlet into the nozzle.

Conveniently both sets of forwardly-directed conduits aforesaid also converge towards the axis of the fuel-tube; and it is preferred that the conduits exterior to the fuel-tube are inclined across the axis of the latter.

One preferred form of the invention will now be described by way of example only, with the aid of the accompanying drawings, in which—

Figure 1 is a central section through the burner in a plane containing the axis thereof;

Figure 2 is an exterior view of the fuel-tube nozzle; and

Figure 3 is an end view of the nozzle viewed from the left of Figure 2.

Like reference numerals indicate like parts throughout the drawings.

A fuel-tube 10 is secured at one end in a plug 11 which serves to close the corresponding end of a jacket 12 wherein the fuel-tube is axially disposed. The plug 11

itself is axially bored to communicate with the interior of the fuel-tube 10 and is formed at 13 to constitute a union for connection with a pipe leading from the fuel-supply.

At its opposite end the fuel-tube has secured to it a nozzle 14 the bore of which is flared outwardly as shown, but, at 16, immediately in advance of the end of the fuel-tube, it is restricted in comparison with the diameter of the fuel-tube. At its outer end the nozzle is enlarged and is formed with a cylindrical exterior middle portion 17 with a tapered extremity 18.

The cylindrical portion 17 of the fuel-tube nozzle fits closely within the burner or sprayer nozzle 19 which itself is screw-threaded into the corresponding end of the jacket 12.

The cylindrical portion of the fuel-tube nozzle is formed with ducts 21 which are inclined across the axis of the fuel-tube and with ducts 31 formed in the material of the nozzle and opening, at one end, as shown, in the flared mouth thereof.

The outer nozzle 19 is tapered to fit over the tapering end 18 of the fuel-tube nozzle, the latter being of such dimensions that a tapered annular space 22 is afforded (communicating with the ducts 21) between its outer surface and the inner surface of the end of the burner-nozzle 19. The tapering of the burner-nozzle is continued beyond the outer end of the fuel-tube nozzle to a restriction at 23 slightly in front of the latter and from this point the outer nozzle itself flares outwardly. The space 22 constitutes a continuation of the ducts 21 and serves, with the aid of the tapering inner surface of the nozzle 19, as a forwardly-directed conduit inclined towards the axis of the fuel-tube, the direction of the material flowing therethrough being, moreover, inclined across the axis of the fuel-tube owing to the inclination of the ducts 21.

In the jacket 12 immediately in advance of the closure-plug 11 at the fuel-inlet end is an inlet 24 for steam or other fluid.

In operation it is preferred to admit steam to the outer jacket 12 so as to heat the fuel as it passes through the fuel-tube 10. The fuel passes from the tube 10 into the nozzle 14 and is met by steam from the jacket-space surrounding the fuel-tube entering the nozzle through the conduits 31. These conduits are directed towards the

axis of the fuel-tube and thus effect an intimate contact and commingling of the steam with the warmed or heated fuel which serves partially to break up or
 5 atomize the latter as it leaves the nozzle 14 and enters the sprayer-nozzle 19. When the fuel-mixture thus produced issues from the end of the nozzle 14, it is met by further streams of steam issuing from the con-
 10 duits 21 and 22. Owing to the inclination of the conduits 21 the steam leaves the conduit 22 in a swirling manner and thus effects a swirling of the fuel-mixture with further atomization thereof so that the fuel-
 15 mixture issues from the flared end of the burner-nozzle 19 in the form of a finely-divided fuel-spray intimately admixed with steam.

Obviously, instead of supplying steam to
 20 the interior of the jacket 12, hot air or other preferred fluid or gas may be introduced into the jacket for the heating of and/or admixture with the fuel.

In an alternative construction the exterior conduits 21 and 22 could have been
 25 formed as ducts cut out of the material of the inner wall of the nozzle 19; or they could be formed partly in the material of the fuel-tube nozzle 14 and partly in the
 30 interior wall of the burner-nozzle 19.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A burner of the kind described comprising the combination of a fuel-tube
 35 through which the fuel is to be passed in an axial direction, a jacket surrounding said fuel-tube with means to lead steam or other fluid into the jacket-space between it and the fuel-tube, forwardly-directed conduits
 40 communicating between the jacket-space and the interior of the fuel-tube near its outlet end to lead fluid from the jacket-space into the fuel-tube to mix with the fuel before it leaves said tube, a nozzle enclosing the outlet end of the fuel-tube, and
 45 forwardly-directed conduits which are exterior to the bore of the fuel-tube, which are inclined across the axis of the latter and are so disposed as to lead streams of steam
 50 or other fluid into said enclosing nozzle whereby it is free to commingle with the fuel-mixture as it issues from the fuel-tube outlet into the said nozzle, said enclosing nozzle directing all of the commingled
 55 fluids.

2. A burner of the kind described comprising the combination of a fuel-tube through which fuel is to be passed in an
 60 axial direction, a jacket surrounding said fuel-tube with means to lead steam or other fluid into the jacket-space between it and the fuel-tube, forwardly-directed conduits which converge towards the axis of the fuel-tube and communicate between the
 65 jacket space and the interior of the fuel-

tube near its outlet end to lead fluid from the jacket-space into the fuel-tube to mix with the fuel before it leaves said tube, a nozzle enclosing the outlet end of the fuel-tube, and forwardly-directed conduits
 70 which are exterior to the bore of the fuel-tube, which are inclined across the axis of the latter and which are so disposed as to lead streams of steam or other fluid into said enclosing nozzle which causes the
 75 fluid discharged by said conduits to converge towards the axis of the fuel-tube whereby it is free to commingle with the fuel mixture as it issues from the fuel-tube outlet into the said enclosing nozzle.

3. A burner of the kind described comprising the combination of, a fuel-tube the outlet end of which is outwardly flared, a jacket surrounding said fuel-tube and hav-
 85 ing a burner-nozzle which closely surrounds the outlet of said fuel-tube, means to lead steam or other fluid into the jacket-space between the jacket and the fuel-tube, forwardly-directed conduits which extend
 90 through the material of the flared end of the fuel-tube, and communicate between the jacket-space and the interior of the fuel-tube near its outlet end to lead fluid from the jacket-space into the fuel-tube to mix
 95 with the fuel before it leaves said tube, and other forwardly-directed conduits which are formed in the material of the outer surface of the flared end of the fuel-tube and are so disposed as to lead streams
 100 of steam or other fluid into said burner nozzle whereby it is free to commingle with the fuel-mixture as it issues from the fuel-tube outlet through the said burner-nozzle.

4. A burner of the kind described comprising the combination of a fuel-tube the
 105 outlet end of which is outwardly flared, a jacket surrounding said fuel-tube and having a burner-nozzle which closely surrounds the outlet of said fuel-tube, means to lead steam or other fluid into the jacket-space
 110 between the jacket and the fuel-tube, forwardly-directed conduits which extend through the material of the flared end of the fuel-tube, which converge towards the axis of the fuel-tube and communicate between
 115 the jacket-space and the interior of the fuel-tube near its outlet end to lead fluid from the jacket-space into the fuel-tube to mix with the fuel before it leaves said tube, and other forwardly-directed
 120 conduits which are formed in the material of the outer surface of the flared end of the fuel-tube, which are so disposed as to lead streams of steam or other fluid into the burner nozzle which causes the fluid to
 125 converge towards the axis of the fuel-tube whereby it is free to commingle with the fuel mixture as it issues from the fuel-tube outlet.

5. A burner of the kind described, com- 130

prising the combination of a fuel-tube the outlet end of which is outwardly flared, a jacket surrounding said fuel-tube and having a burner-nozzle which closely surrounds the outlet of said fuel-tube, means to lead steam or other fluid into the jacket-space between the jacket and the fuel-tube, forwardly-directed conduits which extend through the material of the flared end of the fuel-tube towards the axis of the fuel-tube and communicate between the jacket-space and the interior of the fuel-tube near its outlet end to lead fluid from the jacket-space into the fuel-tube to mix with the fuel before it leaves said tube, and other forwardly-directed conduits which are formed in the material of the outer surface of the flared end of the fuel-tube, which are inclined to cross the axis of the latter and are so disposed as to lead streams of steam or other fluid into the burner nozzle which causes the fluid discharged thereby to converge towards the axis of the fuel-tube whereby it is free to commingle with the fuel mixture as it issues from the fuel-tube outlet.

6. A burner of the kind described, comprising the combination of a fuel-tube, a flared nozzle secured to the outlet end thereof, a jacket surrounding said fuel-tube, a burner-nozzle secured to the jacket and closely surrounding the outlet nozzle of said fuel-tube and formed with a constricted portion beyond the end of said outlet nozzle, means to lead steam or other fluid into the jacket-space between the jacket and the fuel-tube, forwardly-directed conduits which extend through the material of the said fuel-tube nozzle, which converge towards the axis of the fuel-tube and communicate between the jacket-space and the interior of the fuel-tube nozzle near its outlet end to lead fluid from the jacket-space to mix with the fuel before it leaves said nozzle, and other forwardly-directed conduits which are formed in the material of the outer surface of the fuel-tube nozzle, which are inclined to cross the axis of the latter and are so disposed as to lead streams of steam or other fluid into the burner-nozzle which causes the fluid discharged thereby to converge towards the axis of the fuel-tube whereby it is free to commingle with the fuel mixture as it issues from the fuel-tube nozzle.

7. A burner of the kind described, comprising in combination a fuel-tube through which fuel is to be passed in an axial direction, a jacket surrounding said fuel-tube with means to lead steam or other fluid into the jacket-space between it and the fuel-tube, a nozzle for the fuel-tube, a burner-nozzle secured to the jacket and closely surrounding the fuel-tube nozzle with its outlet extended beyond the outlet of the fuel-

tube nozzle, forwardly-directed conduits communicating between the jacket-space and the interior of the fuel-tube nozzle near its outlet, and other forwardly-directed conduits formed by open channels in the material of at least one nozzle and opening in that surface of it which is opposed by the adjacent surface of the other nozzle, said conduits serving to lead fluid from the jacket-space into the burner nozzle whereby it is free to commingle with the fuel-mixture as it issues from the fuel-tube nozzle.

8. A burner of the kind described, comprising in combination a fuel-tube through which fuel is to be passed in an axial direction, a jacket surrounding said fuel-tube with means to lead steam or other fluid into the jacket-space between it and the fuel-tube, a nozzle for the fuel-tube, a burner-nozzle secured to the jacket and closely surrounding the fuel-tube nozzle with its outlet extended beyond the outlet of the fuel-tube nozzle, forwardly-directed conduits communicating between the jacket-space and the interior of the fuel-tube nozzle near its outlet, and other forwardly-directed conduits formed by open channels in the material of at least one nozzle and opening in that surface of it which is opposed by the adjacent surface of the other nozzle, said conduits serving to lead fluid from the jacket-space into the burner nozzle whereby it is free to commingle with the fuel-mixture as it issues from the fuel-tube nozzle and said conduits being inclined across the axis of the latter.

9. A burner of the kind described, comprising in combination a fuel-tube through which fuel is to be passed in an axial direction, a jacket surrounding said fuel-tube with means to lead steam or other fluid into the jacket-space between it and the fuel-tube, a nozzle for the fuel-tube, a burner-nozzle secured to the jacket and closely surrounding the fuel-tube nozzle with its outlet extended beyond the outlet of the fuel-tube nozzle, forwardly-directed conduits communicating between the jacket-space and the interior of the fuel-tube nozzle near its outlet, and other forwardly-directed conduits formed by open channels in the material of at least one nozzle and opening in that surface of it which is opposed by the adjacent surface of the other nozzle, said conduits serving to lead fluid from the jacket-space into the burner nozzle whereby it is free to commingle with the fuel-mixture as it issues from the fuel-tube nozzle and said conduits being inclined across the axis of the latter and communicating with means converging towards that axis.

In testimony whereof I affix my signature.

JOHN BLISS.