No. 727,414. PATENTED MAY 5, 1903.

J. McDERMOTT.

OIL BURNING APPARATUS.

APPLICATION FILED APR. 3, 1901.

NO MODEL.

Fig. 1.

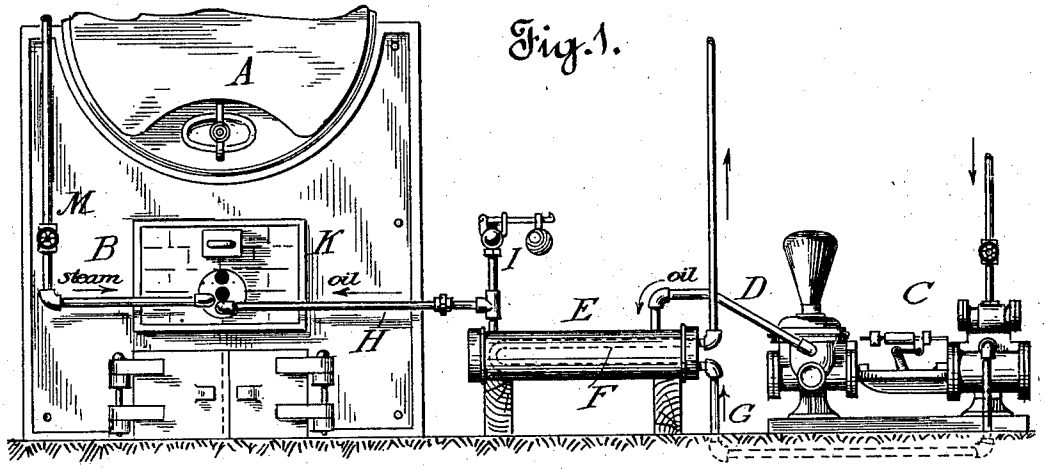


Fig. 2.

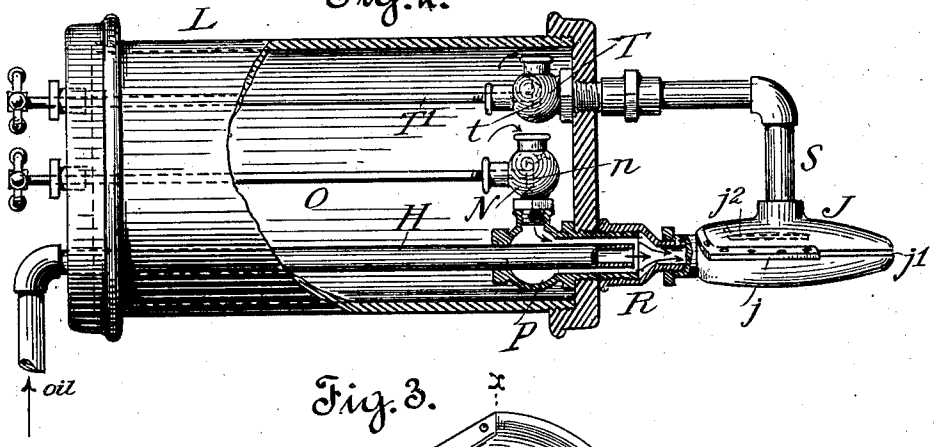


Fig. 3.

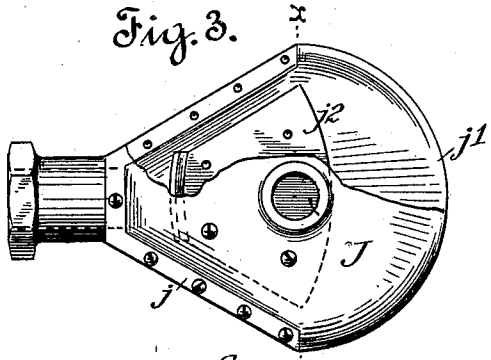
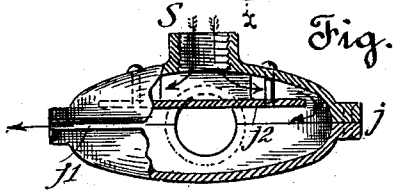


Fig. 4.



Witnesses.

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No. 727,414. Patented May 5, 1903.

UNITED STATES PATENT OFFICE.

JOHN McDERMOTT, OF WEST BERKELEY, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN CRUDE OIL BURNER COMPANY, A CORPORATION OF CALIFORNIA.

OIL-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 727,414, dated May 5, 1903.

Application filed April 3, 1901. Serial No. 54,145. (No model.)

To all whom it may concern:

Be it known that I, JOHN McDERMOTT, a citizen of the United States, residing at West Berkeley, in the county of Alameda and State of California, have invented certain new and useful Improvements in Oil-Burning Apparatus, of which the following is a specification.

My invention relates to apparatus for burning oil as fuel in boiler-furnaces and other situations wherein oil, if properly consumed, has economical advantages over other fuels.

My main object is to provide an apparatus for burning crude petroleum without leaving a residuum and practically without smoke. I have accomplished this successfully, using heavy California oils, whose base is asphaltic, with very marked commercial economy as compared with former results in the same boiler when using coal.

In the accompanying drawings I have shown my device as applied to an ordinary boiler-furnace, which might be a stationary, marine, or locomotive boiler, and is intended to be illustrative of many different kinds of situations and localities in which oil fuel can be used with my apparatus.

Figure 1 is an elevation of boiler, furnace, oil-pump, and connections, with my burner in operative relation as in actual use. Fig. 2 is a section of steam drum or casing with my burner attached and showing oil and steam connections. Fig. 3 is a top plan of my burner broken away to show the interior. Fig. 4 is a cross-section of the same on line $x\,x$, Fig. 3.

A represents a boiler, and B its furnace.

C represents a pump for supplying the oil from any tank or reservoir containing it. When using some light oils, the oil-outlet pipe D from the pump can lead directly to the furnace and burner; but when using heavy crude oils, which flow slowly and with difficulty, I prefer to lead the pipe D into a chamber E and to furnish said chamber with a coil F for warming and softening the oil. The coil F may receive steam from the main boiler; but I prefer to connect the exhaust-pipe G of the pump to said coil and have shown such connection in the drawings. From the chamber E an oil-pipe H leads to the burner, and a safety-valve I is preferably provided, as shown, to relieve any excess of pressure by oil-vapors which might be to some extent generated in the chamber E. The oil is forced into the furnace through a burner J, located at any convenient point relatively to the furnace. In the drawings it projects into the furnace through the front plate K. Before leaving the burner, however, the oil receives a double treatment with steam, the combined effect of which is to render it capable of complete combustion. The apparatus preferred for this purpose is illustrated in Fig. 2. L is a drum made steam-tight and which is supported in the furnace-wall or in the front plate K, as shown, and to this drum steam under pressure is admitted through a pipe M. The oil-pipe H enters this drum and passes completely through it. Near the discharge end of the oil-pipe, but within the steam-drum, is an open valve-chamber N, having a valve n with an externally-operable valve-stem O, and this valve-chamber communicates with a hollow sleeve P, tapped through the head of the drum and surrounding the oil-pipe. Secured upon the end of sleeve P is a contracted pipe R, which forms a hollow coupling between the sleeve and the burner J, the latter being threaded upon the end of the coupling. Since the drum contains steam under pressure, the valve n can be opened to admit a regulated quantity of steam to the sleeve P, which rushes into the contracted space adjacent to the mouth of the oil-pipe and there mingles with the oil, saturating it, agitating it, and to some extent separating it, so that a saturated mixture of oil and steam is formed at this point and carried into the burner. In this condition attempts have previously been made to burn the mixture of oil and steam issuing from an open jet or nozzle, such as the pipe R, and while combustion can take place it is marked by dense black smoke formed from carbonaceous particles and watery vapor, showing that such combustion is only partial and that valuable fuel is being wasted. My object at this point is simply to obtain a saturation of the oil with steam and an intimate mixture and agitation of the two preliminary to further treatment which will fit them for complete combustion. The mixed oil and steam

enter the burner J, which is preferably a chamber fan-shaped in plan view, Fig. 3, and of a substantially elliptical cross-section, Fig. 4. I have shown it as composed of two concavo-convex plates secured together at meeting flanges j and formed with a wide curved nozzle j', which throws a fan-shaped sheet. Within the burner is preferably placed a horizontal diaphragm or deflector j^2, made fan-shaped, as shown, Fig. 3. Entering the top of the burner is a steam-pipe S, which communicates with the steam-drum and with an open valve-chamber T within it. A valve t within this chamber is operable externally by the stem T'. By means of this valve a separate volume of steam in regulated quantity is admitted to the burner.

In operation the mingled oil, oil-vapor, and steam rush into the burner in a state of agitation and are at once exposed to the action of the second volume of steam. This volume, spread by the deflector and descending on three sides of it, mingles with the saturated mixture and reduces it by agitation throughout the burner, breaking up the globules of watery vapor and producing a highly-combustible mixture, which escaping under pressure from the burner burns with an intense heat. By means of the controlling-valves in the steam-drum the burner-flame can be regulated, so that it can burn from a bright clear candle-flame at very low pressure up to a fierce jet several feet long at greater pressure and of such intense heat that fire-brick, for instance, cannot withstand it, as demonstrated by me in actual practice. There is practically no smoke at any pressure, showing complete combustion, and it is the change in the characteristics and qualities of the mixture produced by the second treatment with steam that leads to this result. The force of the jet escaping from the burner can be completely controlled by the valve t. If it is necessary to use a certain pressure through the valve n to obtain the preliminary mixture and the supply of such mixture to the burner and the resulting jet at the nozzle would be too strong for some particular use, an increase of steam-pressure in pipe S acts to retard or check the force of the jet before it issues from the burner. By proper relative adjustments of the valves n and t the combustible jet may be regulated as to pressure to the nicest degree, according to the quality and force of jet and degree of heat desired.

It will be noted that by the manner of applying steam described and shown there is no blowpipe action, as is the case where a jet of steam is introduced behind the current of oil in order to force said oil through the passage.

I do not wish to limit myself to the precise construction described and shown in the drawings, as I desire to avail myself of such modifications and equivalents as fall properly within the spirit of my invention.

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

1. In an oil-burning apparatus, the combination with the steam-drum, and with the oil-pipe passing through it, of the open valve-chambers within the drum, having valves, a steam-pipe leading from each valve-chamber, and a burner with which the oil-pipe and one steam-pipe communicate jointly to supply oil mingled with steam to said burner, and with which the other steam-pipe communicates at another point to supply steam to the mixture of oil and steam.

2. In an oil-burning apparatus, the combination with a steam-chamber, of an oil-pipe entering and passing through and beyond the same, a steam-pipe surrounding said oil-pipe and projecting from the said chamber, and having a valved communication with the interior of the chamber, a pipe secured to said steam-pipe outside of the chamber and contracted relatively to said steam-pipe, and a burner secured to said contracted pipe, the said contracted pipe being adapted to receive oil and steam from the oil and steam pipes.

3. In an oil-burning apparatus, an oil-pipe, a member spaced from said oil-pipe to form a steam-space surrounding the same, and contracted adjacent to and beyond the open discharge end of the oil-pipe, a burner secured to said contracted portion, and a steam-pipe entering said burner independently of the oil-pipe and steam-space.

4. An oil-burner comprising, in combination two concavo-convex plates secured together to form a chamber of substantially fan shape in plan view and having a narrow discharge slit or orifice, a pipe for mixed oil and steam at the rear of the chamber and in line with said discharge-slit, a steam-pipe entering said chamber at an angle to said oil and steam pipe to supply steam to mix with said mixed oil and steam, and a deflecting-plate situated opposite the inlet from said steam-pipe and arranged longitudinally of said chamber.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 26th day of March, 1901.

JOHN McDERMOTT.

Witnesses:
ZENAS U. DODGE,
L. W. SEELY.