HEAT FROM USED OIL

Lt. Col F. Evans describes a burner for disposing of waste lubricating oil. Model Engineering, 10 Nov 1955?

This burner can be used for heating of water, raising steam in small boilers, cooking, space heating and for burning the solids in sewage and evaporating the liquids.
In this burner, the principle of the venturi was use to encourage a draft for the flame into the furnace space and was designed so as to give sufficient air supply without cooling the combustion area too much, Through the addition of water, well distributed throughout the oil, in the ratio of at least 1 part water to 3 parts oil, the burning lubrication oil is atomized thoroughly and combustion made so complete that there is no smoke. This results in a flame and burned gases of such high temps that flues have to be cleaned quite free of soot before the "oil and water flash fire" is use in the installation. In any existing furnace with a large combustion space, the stacking of a honeycomb of firebricks is an advantage as it spreads the flame and slows its progress down before it roars up the flue. The method requires a burner set on the outer side of a boiler and it can be used with stoves designed for use normally with solid fuel, the burner being fitted either into the ash door at the bottom or into the furnace door. In the former case, it is well to take out the firebars and to substitute a baffle of firebricks. A firebar baffle might deteriorate rapidly in the fierce flame.

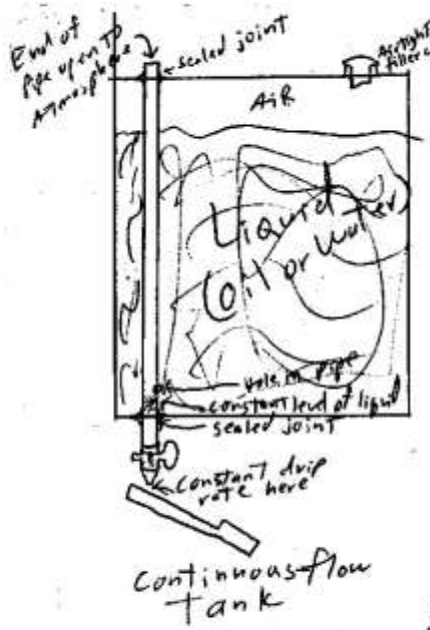
Principle of Burner

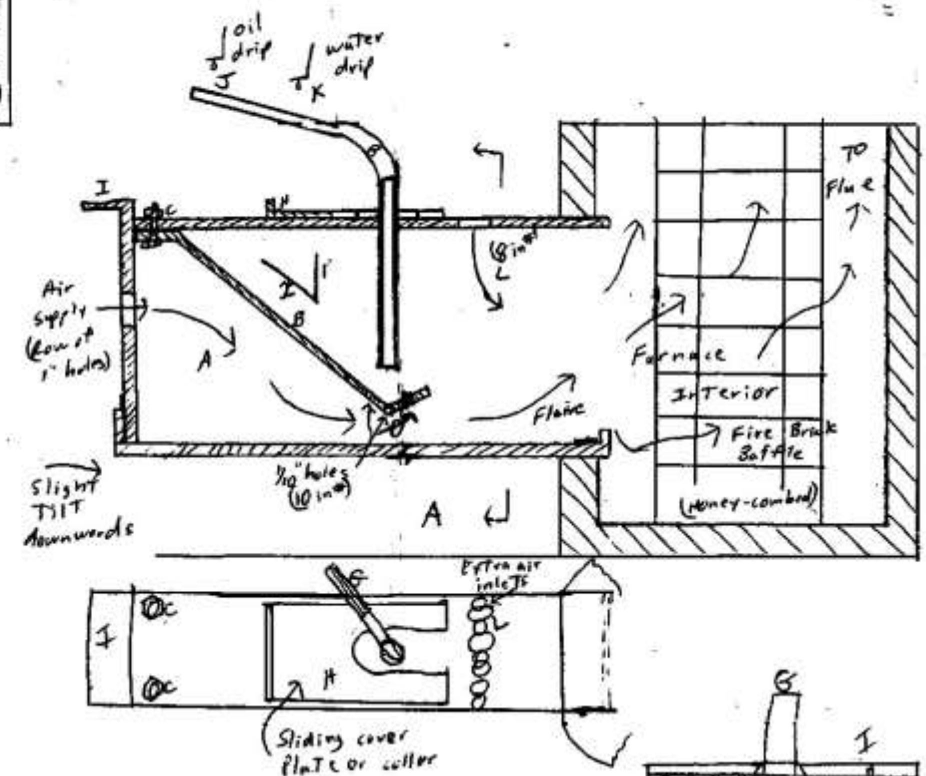
A prototype burner can be welded up from 1/8 " mild steel plate and is made so as to fit easily into the existing furnace entry and has a venture plate (B) which is bolted to the casing of the burner at (C) in such a manner as to make removal for cleaning or replacement easy. The venturi plate drops at (D) to within about ¾" of the bottom of the burner casing and here 2 struts (E & F) are left to support the plate at this height. On the reversed "V" apex of the venturi plate and about ¾" on each side of the apex, rows of 1/10" holes are drilled, to enable the oil-and-water mix to fall at the burning point (D). Between the oil and water drip pipe (G) and the furnace exterior, the burner casing has a row of 1" holes across its width. These holes capable of being covered or uncovered by tie sliding collar (R) forming an extra air supply. At the back of the burner, a removable plate (I) has a row of 1" holes at the top for normal air supply. The drip tube is 1/2" and is supported by a collar where it drops loosely into the burner and the sloping piece is half cut for most of its length. Oil running at about the thickness of a stout pin (about 3/4-1 gallon per hour) will give a good fire.

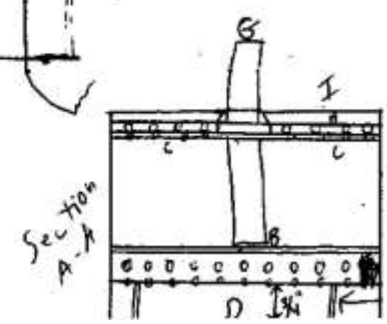
The water drip would be noncontinuous at this rate of oil supply and the water should fall in closely distributed globules, to be carried by surface tension into the burner on the oil. A good means of distributing the water over the oil is to plug a piece of stout string into the tap of the water container and lay the other end in the oil flow. The string by capillary attraction, gives an even flow of water. It is necessary that the mixed fuel should reach the burning point relatively good and un-vaporized. To light, take off plate (I) and a piece of cotton (not woolen) rag is moistened with paraffin is lit in the chamber (A).

The flame will be forced past the orifice (D) and the metal will be heated hot enough to flash the oil when a little is turned on. Use no water at first. After burning, increase the oil flow and then add the drip of water but not too much at first and no more than 1/3 of the oil. The fire is noisy owing to the numerous and continuous small explosions of the globules of water in the oil, the water being the atomizing agent. In a very hot and efficient burner, the water content can be increased almost in the ratio of 1 part water to 2 parts oil to achieve smokelessness. When the fire is burning well, the back movable plate is replaced and the extra air inlet (L) is opened. Use only lubricating oil in this burner.

You can have a shallow burning well at (D) in which when the mix is not burning the entry pipes are shut up. Or you can mix the correct proportions of oil and water in a mechanical emulsifier driven by a small electric motor. The emulsion would be unstable, unless used with soap, and have to be used as fuel as soon as it emerged from the emulsifier. Sump oil should be strained first to remove any solids.


End of pipe open to atmosphere
sealed joint
Airtight fillercap
AIR
Liquid (Oil or water)
holes in pipe
constant level of liquid
sealed joint
constant drip rate here
Continuous-flow tank


oil drip
water drip
J
K
I
Air supply (Row of 1" holes)
A
B
Flame
Furnace Interior
Fire Brick Baffle
(Honey-combed)
TO Flue
1/10" holes (10 in.)
Slight Tilt downwards
A
Extra air inlets
G
H
C
Sliding cover plate or collar


Section A-A
G
I
C
B
D