(No Model.)

Z. DAVIS.

APPARATUS FOR VAPORIZING AND FEEDING HYDROCARBON.

No. 456,510. Patented July 21, 1891.

Fig. 2.

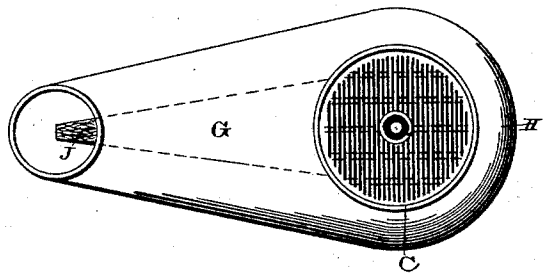

Fig. 3.

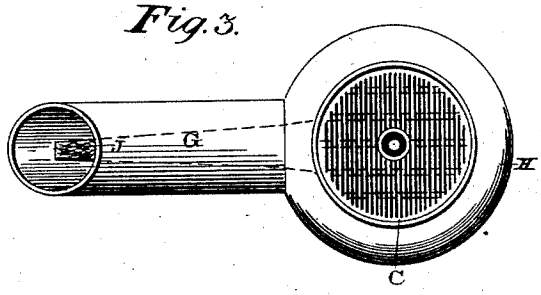

Fig. 1.

Fig. 4.

Witnesses:
E. P. Ellis,
J. M. Nesbit

Inventor
Z. Davis
per
Lehmann & Pattison,
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ZEBULON DAVIS, OF CLEVELAND, OHIO.

APPARATUS FOR VAPORIZING AND FEEDING HYDROCARBON.

SPECIFICATION forming part of Letters Patent No. 456,510, dated July 21, 1891.

Application filed December 6, 1890. Serial No. 373,781. (No model.)

To all whom it may concern:

Be it known that I, ZEBULON DAVIS, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Apparatus for Vaporizing Hydrocarbon and Feeding it to a Burner; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in apparatus for vaporizing hydrocarbon and feeding it to burners; and it consists in an attachment of any suitable construction to the main pipe through which the vaporized hydrocarbon is conducted to the burner, whereby the excess of hydrocarbon which gathers on the inner sides of the pipe is caught and conveyed into the warm-air pipe to be volatilized instead of being allowed to flow down the pipe to the bottom of the burner, where it requires either a sub-fire to volatilize it or causes a smoky flame to be produced, as will be more fully described hereinafter.

The great trouble with the class of stoves here shown is that in cold weather, if the hydro-carbon is not nicely regulated in its flow upon the evaporator at the time of starting the stove, a portion of the fluid escapes from the evaporator and gathers in liquid form upon the inner side of the pipe and flows down into the bottom of the burner, where special means—such as a sub-fire—must be provided to dispose of it, and the lighting of this sub-fire is a constant source of annoyance in frequently extinguishing the flames of the main burner.

The object of my invention is to catch the unvaporized fluid and convey it to a point where it is gradually vaporized without the slightest trouble in the operation of the stove, and thus entirely dispense with the sub-fire, which has heretofore been absolutely necessary in operating the stove.

Figure 1 is a vertical section of an apparatus which embodies my invention. Fig. 2 is a plan view of the burner and the heat-collector surrounding it. Fig. 3 is a similar view showing a modified form of construction. Fig. 4 is a vertical section of the devices shown in Fig. 3.

A represents the main supply-pipe, in the upper end of which is placed the evaporator B, and to the lower end of which is secured the burner C in any desired manner. The hydrocarbon drops in regulated quantities from the pipe D upon the top of the evaporator B, where it becomes vaporized, and the cold vapor being heavier than the air it descends through the pipe A to the burner. During very warm weather, unless the hydrocarbon is fed in excess, practically all of the fluid becomes vaporized; but in cool weather, unless great care is exercised in regulating the amount of fluid fed to the evaporator, a portion of the fluid escapes from the evaporator and descends and gathers inside of the pipe A and flows down it to the burner. In order to dispose of this surplus quantity a sub-fire must be used or a smoky flame is produced as soon as the heat of the burner begins to vaporize the fluid in its lower end. As soon as this vaporization begins to take place a yellow smoky flame is produced. When a sub-fire is used, the explosive ignition of this sub-fire often causes the flames of the main burner to be extinguished, especially in starting the stove when all of the parts are cold.

In order to prevent the accumulation of the fluid in the burner, as above described, and to get rid of the annoyances attending it, I form upon the pipe A an annular chamber E of any shape, form, or size that may be preferred, and into which the fluid which escapes from the evaporator will gather as it flows down upon the inner side of the pipe, and from this chamber E the liquid flows through the pipe F into the warm-air pipe G, which extends from around the burner to the top of the pipe A. This warm-air pipe may be of any desired shape or size, and will preferably have an annular chamber H secured to its lower end and extending around the burner C for the purpose of quickly heating the air which is conducted through the pipe into the top of the pipe A to vaporize the hydrocarbon, so that less of it will escape from the evaporator. It is immaterial what form the annular chamber connected to the lower end of the warm-air pipe is given, for this may be varied at will with-

out departing from the spirit of my invention.

Through the outer side of the chamber is formed an opening I, through which the air flows, and this air in coming in contact with the heated sides of the burner becomes warmed or heated to such an extent that it assists in the rapid vaporization of the fluid upon the evaporator.

In Figs. 2, 3, and 4 different forms of chambers are shown, but the difference consists in the mere matter of form alone and not in principle.

Placed inside of the lower portion of the warm-air pipe or conduit at any suitable point is a quantity of asbestus J or other suitable absorbent material, upon which the surplus fluid is discharged through the small conducting-pipe from the annular chamber. This absorbent material is secured to and in contact with the top of the conduit in any suitable manner, so as to receive heat directly from the burner and also from the heated air which is passing through the conduit. As the fluid drops upon the absorbent material at the opposite end from the burner it is absorbed and flows slowly toward the burner, where it becomes vaporized, and this vapor is carried up by the warm current into the top of the pipe A. By thus catching all fluid which escapes from the evaporator all care and trouble in starting the stove is entirely done away with, the sub-fire is dispensed with, and the operator has only to turn on the hydrocarbon to wait about a half-minute, and then apply the light to the burner, which lights like gas.

The reason the fluid that drops upon the evaporator is not all vaporized is that that which escapes to the inner sides of the pipe does so in a carbureted atmosphere, due to the lighter fluid having been vaporized first, and the heavier portion of the fluid being more difficult to vaporize and coming only in contact with the air already carbureted or saturated with vapor it escapes from the lower edge of the evaporator and flows down inside of the pipe. This fluid coming only in contact with carbureted air does not become vaporized, and hence keeps its liquid form until it reaches the burner. Where this surplus heavier fluid is caught and conveyed into the warm-air pipe it is removed from the carbureted air and subjected to warm fresh air and the heat from the burner and is all vaporized very rapidly as it collects.

While an absorbent material is here shown and preferred, any other means desired may be used for preventing the too rapid flow of the fluid toward the side of the burner, the object being to retain the fluid sufficiently long to cause it to become thoroughly vaporized by the heat from the burner.

Instead of a short conducting-pipe from the annular chamber terminating at the outer end of the absorbent material, as here shown, the pipe may be continued so as to extend around the upper end of the burner to become quickly and thoroughly heated before allowing the fluid to escape from it upon the absorbent material or other device prepared to receive it. Also, instead of the small conducting-pipe here shown, the absorbent may be extended into the main conducting-pipe and receive the surplus fluid and convey it into the warm-air pipe or conduit.

No claim is here made to the warm-air pipe, which connects with the upper end of the pipe A, for this is not my invention, and no claim is made to it *per se*.

If the annular chamber and a receiver connected to the chamber is used it will catch all of the surplus fluid; but when the fluid is drawn off from the receiver it will only be of that heavy grade which is not adapted for mixing with other fluid, because the heavy grade is constantly accumulating. If it is merely desired to prevent this heavy grade from flowing down to the burner, a receiver may be connected to the annular chamber and the receiver emptied from time to time. If, however, the surplus material is to be utilized at the time and without any waste whatever, it must be conducted outside of the main pipe and vaporized, as above described, so as to be utilized while the stove is in operation.

Having thus described my invention, I claim—

1. The combination of an evaporator, means for supplying fluid thereto, a burner, a vapor-pipe leading from the evaporator to the burner, a pipe having an open end near the burner and leading to the evaporator, whereby air heated by the burner is delivered to the evaporator to be vaporized, a device below the evaporator for collecting unevaporated fluid, and a communication between this device and the hot-air pipe, as set forth.

2. The combination of an evaporator, means for supplying fluid thereto, a burner, a vapor-pipe leading from the evaporator to the burner, a pipe having an open end located near the burner and leading to the evaporator, an annular chamber in the vapor-pipe below the evaporator, and a communication between the chamber and the hot-air pipe, substantially as described.

3. The combination of an evaporator, means for supplying fluid thereto, a burner, a vapor-pipe leading from the evaporator to the burner, a pipe having an open end located near the burner and leading to the evaporator, whereby air heated by the burner is delivered to the evaporator to be vaporized, a chamber in the vapor-pipe below the evaporator for collecting the unevaporated fluid, a communication between the chamber and the hot-air pipe, and an absorbent in the hot-air pipe to which the communication leads, as specified.

4. The method herein described of wholly evaporating fluids for burning purposes, con-

sisting in feeding the fluid to an evaporating apparatus and subjecting it to the atmosphere for evaporating the lighter particles thereof, then catching the unevaporated heavier particles and conducting them to a separate chamber, subjecting them alone in the said chamber to fresh air for evaporating them, and then feeding the air carbureted by these two operations to a burner, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ZEBULON DAVIS.

Witnesses:

F. A. LEHMANN,

PHILIP MAURO.