(No Model.) 2 Sheets—Sheet 1.

J. W. MORRIS.

OIL BURNING APPARATUS.

No. 523,675. Patented July 31, 1894.

Fig. 1.

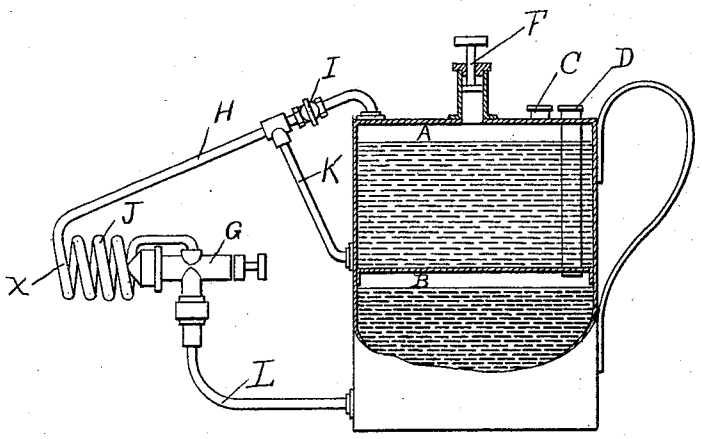
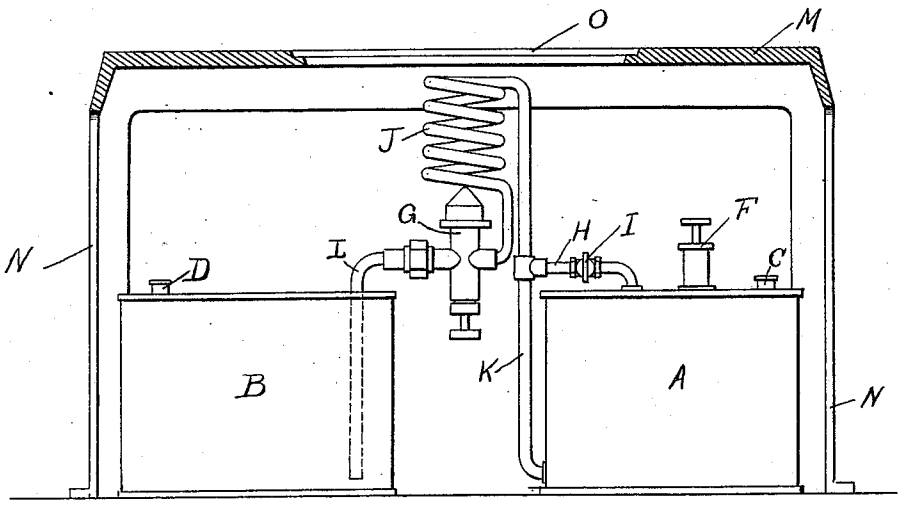


Fig. 2.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

J. W. MORRIS.

OIL BURNING APPARATUS.

No. 523,675. Patented July 31, 1894.

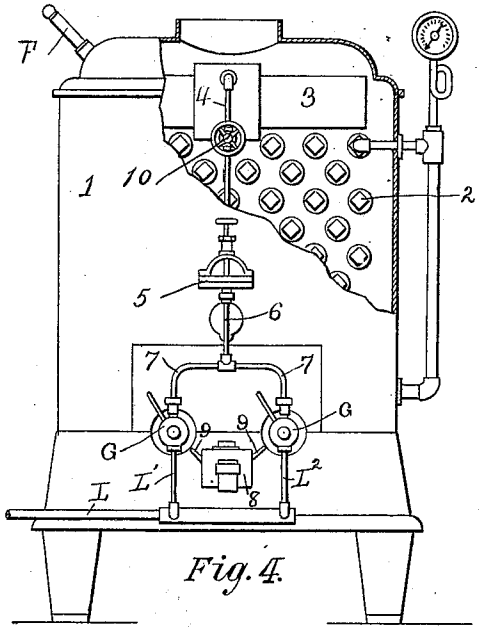

Fig. 4.

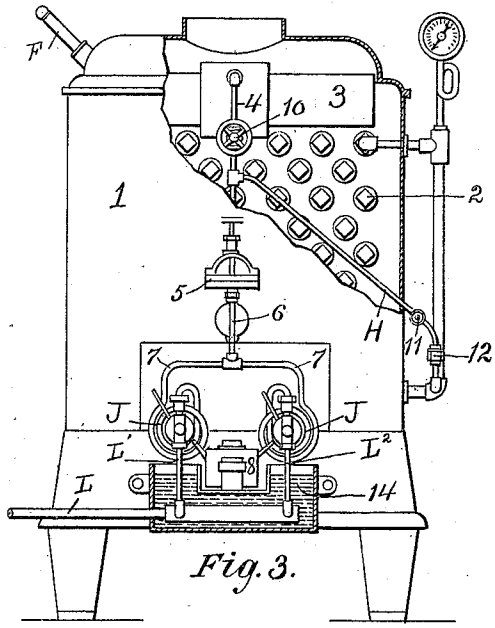

Fig. 3.

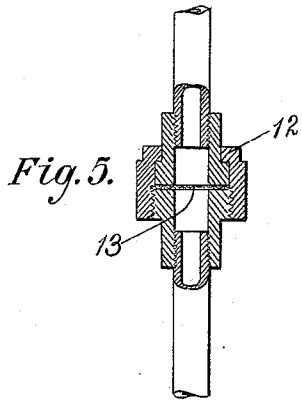

Fig. 5.

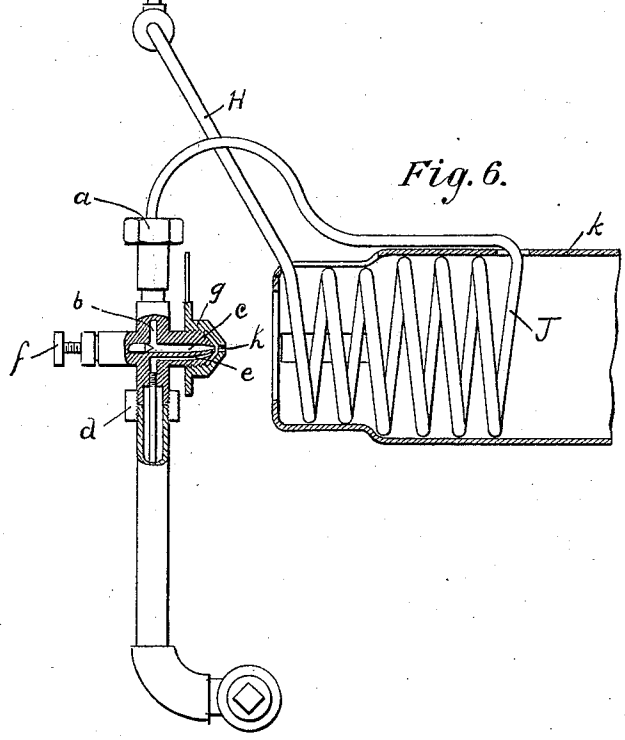

Fig. 6.

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UNITED STATES PATENT OFFICE.

JAMES WILLARD MORRIS, OF PLEASANT VALLEY, NEW JERSEY.

OIL-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 523,675, dated July 31, 1894.

Application filed April 16, 1891. Renewed November 9, 1893. Serial No. 490,484. (No model.)

To all whom it may concern:

Be it known that I, JAMES WILLARD MORRIS, of Pleasant Valley, Bergen county, and State of New Jersey, have invented a certain new and useful Improvement in Oil-Burning Apparatus, of which the following is a specification.

My invention relates to that class of oil burning apparatus wherein an atomizer is used to commingle air or steam, under pressure and oil, whereby the commingled fluids are ejected from the exit orifice of the atomizer in an atomized or gaseous condition and are thus burned.

In all oil burning apparatus of this class prior to my invention, with which I am acquainted, where steam was to be commingled with the oil in the main operation of the apparatus, it was initially necessary to compress air continuously until steam of sufficient pressure was generated to itself induct the oil through the oil orifice of the atomizer; or sometimes a separate vessel was employed for generating steam until steam was made in the main apparatus of the required pressure.

By my invention I am enabled to get up steam after but a very short time spent in compressing air, to be used in the initial operation of the apparatus, and to continuously thereafter maintain the flame without attention to the pressure of the steam in the generator when the apparatus is used as a steam generator, or where the apparatus is used for other purposes than a steam generator, such as for a torch, or as the burner of a cooking stove, without making steam except for combustion purposes.

The essential feature of my invention consists in heating a steam generator arranged in proximity to an atomizing burner by means of oil inducted to the burner by the flow of a body of compressed air to the atomizer, and then permitting water to flow through said generator, the supply of compressed air being cut off, whereby steam is formed in said generator and acts to induct oil, whereby the operation of the apparatus is continued.

It is to be understood that the supply of compressed air is to be used in inducting oil until such time only as the generator has become sufficiently heated to be in a condition to generate steam in conjunction with the flame from the burner.

The generator referred to is preferably an iron pipe leading from the water vessel of the apparatus, to and in front of the atomizer where it is preferably thrown into a coil and thence proceeds to the steam entrance of the atomizer, the oil connection of the atomizer remaining as in the well known forms of atomizers. It has been found that with this arrangement, the generator will be in condition to commence generation of steam in about a minute after the flow of compressed air therethrough has begun.

The compressed air referred to is to be contained above the water in the water vessel so that after the flow thereof through the generator ceases, the remainder of the compressed air in the water vessel will exert pressure on the water to force it through the generator. It is usual to join the connections from the air space and water space of the water vessel at a point above the highest level of the water; in this case, a cock or any suitable controlling device being placed in the air connection so that when the generator is sufficiently heated, the flow of air will cease and the flow of water begin. But it is obvious that when the said two connections are joined at a point below the water level it will be only necessary to change the cock from the air connection to the water connection so that in starting the apparatus, water being turned off, air will flow, but when the water is turned on, it will rise in the water connection to a point above the junction of the water and air connection, and thus cut off the flow of air while permitting the flow of water.

The methods of connecting the air and water connections to the generator may be various. It is immaterial to the operation of the apparatus whether there is a junction between said water and air connection, it only being necessary that the water connection shall permit a flow of water through the generator so that steam may be produced while the air connection may go direct to the burner to induct the oil.

It will be obvious from the foregoing statement that during the actual operation of the apparatus it is unnecessary to employ steam

generated under pressure or compressed air, although either steam or compressed air or both may be employed without departing from my invention, the effect then being a super-heating of the steam or high heating of the compressed air resulting in increased efficiency of the apparatus. The coil of pipe before referred to arranged in front of the atomizer, when steam is admitted to it, maintaining the flow of oil, as before stated, superheats the steam, and for brevity I will term the coil, or any equivalent arrangement, a super-heater, although when steam is generated from the water in the coil this term is somewhat a misnomer, a better term being generator.

My invention does not include an apparatus in which oil is forced by compressed air to a generator or vaporizing chamber near the burner and in which air under pressure may first be used to spray oil supplied to the burner through said generator, and the oil vapor thus produced subsequently used for spraying the oil so forced to the burner.

In the accompanying drawings forming part of this specification, Figure 1 shows my invention embodied in the form of a torch which may be useful for welding, heating crucibles, &c. Fig. 2 shows my invention embodied in the form of a cooking stove. Fig. 3 shows my invention embodied in a steam generator. Fig. 4 shows an apparatus in use prior to my invention for utilizing air or steam and oil commingled for the generation of the steam. Fig. 5 shows a detail of a sieve employed in connection with the form of my invention used for the generation of steam. Fig. 6 illustrates a common construction of atomizer that may usefully be employed in carrying out my invention, with the superheater arranged within a refractory fire tube, such as is employed in the form of apparatus shown in Fig. 4.

Referring to Fig. 1 it will be seen that the apparatus therein shown is composed of a main vessel divided into two compartments A and B, the compartment A containing water and being filled through the filling orifice C, and the compartment B containing oil and being filled through the orifice D.

F represents an air compressor pump.

G represents an atomizer to be described in detail in connection with Figs. 3, 4, 5 and 6.

H is a pipe connected with the water compartment A at a point normally above the water level, and provided with a cock I. This pipe H is thrown into a coil in front of the atomizer G as shown, constituting a superheater J, the direction of the coil being from outward in toward the atomizer whence it proceeds to the steam entrance thereof. The object of thus arranging the coil is so that the coil farthest from the exit of the atomizer marked *x* in the drawings which contains the coldest fluid will receive the hottest part of the flame, thus prolonging the life of the superheater. From a point normally below the water level of the water compartment A, a pipe K is led, which connects with the pipe H as shown.

L is the oil supply pipe leading from the oil compartment of the main vessel to the atomizer G.

The operation of the device above described is as follows: In starting, the air compressor F is worked for a short space of time until air is compressed at fifteen or twenty pounds in the compartment A. The cock I is then opened and the compressed air flows through the pipe H to the atomizer, thence inducting oil which is ejected with force. A match being applied, a flame is had, which immediately begins to heat up the superheater J. When this is heated, which will take not more than a minute, the cock I is turned off, and the pressure of air now being exerted on top of the body of water in the compartment A, water is forced through the pipe K, thence to the superheater J, where it is converted into steam, and thence to the atomizer, where it acts to induct the oil and thereby support the flame. This operation will continue as long as desired without further operation of the air compressor and without the generation of steam otherwise than at the superheater.

Referring to Fig. 2, my invention is shown embodied in the form of a cooking stove, the operation being the same as shown in Fig. 2 and similar parts being similarly lettered.

M is the top plate of the stove supported on suitable legs N N, and O is the stove hole.

Referring to Figs. 3, 4, 5 and 6, I will first briefly describe the apparatus shown in Fig. 4, so that the differences between that device and my own may be more apparent when the same is described in connection with Fig. 3. In these figures, parts similar to those described in Figs. 1 and 2 will be marked with similar characters.

1 is the steam generator, 2 the water tubes thereof, and 3 the steam drier.

4 is a pipe which leads steam from the steam drier to the diaphragm 5, which steam is thence led through pipe 6 to the branches 7, 7 which lead to the steam entrance to the atomizers G, of which two are shown.

L is the oil tube, of which L′, L^2 are branches leading to the oil entrance of the respective atomizers.

8 is an oil torch, provided with cotton wicks in the nozzles 9, 9, which are constantly kept ignited during operation, thus igniting the oil ejected from the atomizer.

F is a hand air compressor.

10 is a cock controlling the pipe 4.

In starting this apparatus to generate steam, the hand compressor F is operated until a pressure of between twenty and twenty-five pounds is indicated in the steam gage, the cock 10 having been closed during this time. The cock is then opened and the compressed air flowing through diaphragm 5, pipes 6 and 7 serve to induct oil from the oil reservoir

and eject it, the flame from the torch 8 igniting it as it passes in proximity to it. Of course this flame begins to heat the water in the boiler, but considerable time is required to generate steam under required pressure. During all this time, which in cold weather is sometimes as high as twenty minutes, and in warm weather sometimes as high as fifteen minutes, the operation of the hand compressing pump must be kept up otherwise the flow of oil would cease and the flame die. Obviously this operation is fatiguing.

In Fig. 3, which shows my invention applied to the same character of steam generator as that shown in Fig. 4, the simplicity of the change will be readily apparent, for instead of taking the pipe 6 through its branches 7, 7 directly to the steam entrance to the atomizer, the said pipe is converted into a superheater J, shown in Fig. 3 as a flattened spiral, for clearness of illustration, but really existing in the form shown in Fig. 6. The oil connections remain as before, but an additional connection is made through the pipe H from a point below the normal water level of the generator with the pipe 4. Preferably the pipe H is provided with a cock 11, and also, at the point 12, with a screen, shown in detail in Fig. 5. The use of the cock 11 and screen 12 will be explained hereinafter.

The operation of my improved device when employed with a steam generator is substantially similar to its operation when employed with the torch shown in Fig. 1. Instead, however, of continually employing the superheater to generate steam direct from water passing through it, the cock 10 may be turned on after steam of sufficient pressure has been generated by the steam generator, when the water will cease to rise in pipe H beyond the level in the generator, and thereafter steam may be passed through the superheater to maintain the flame. This might be considered desirable by some, while the practice of generating steam direct from water passing through the superheater would be preferred by others.

Referring to Fig. 5, a screen 13 is shown arranged in the joint connecting two sections of the pipe H. The object of this screen is to prevent rust and dirt from the generator passing through the pipe H and thence to the diaphragm or atomizers which it would tend to clog. The cock 11 is only used when it is required to shut off water and steam from the diaphragm or atomizers to clean them. At other times it is to remain on.

In cold weather it sometimes may be found desirable to employ a mechanism for heating the oil just before it reaches the atomizers. In Fig. 3 I have shown a vessel 14 supporting the torch 8, through which vessel the oil pipe L and the branches thereof pass, the vessel being supported on the base of the steam generator. Hot water placed in this vessel will somewhat heat the oil and render it more serviceable. The vessel might also be used to contain cold water for cooling the oil should this be found desirable at any time.

In Fig. 6 a common arrangement of atomizer is shown. The steam entrance to this atomizer is at the point *a*, thence through the passages *b* and *c*. The oil entrance is at a point *d* and thence through the narrow passage *e*. A plug valve *f* serves to close the passage *b*, and a cap *g* serves to regulate the amount of oil flowing through *e*. As will be obvious, steam flowing through the passages *b* and *c* will tend to suck the oil through the passage *e* and eject it through the orifice *h* of the cap; the oil being ignited at the point of ejection maintains a continuous flame while supplied in quantity under pressure with fresh oil.

In steam generators a refractory fire tube *k* is employed in the path of the flame. The superheater J may be arranged in such fire tube in any suitable manner, preferably as shown in Fig. 6.

What I claim is—

1. In an oil burning apparatus, the combination of an oil vessel and water vessel, means for providing said water vessel with compressed air, an atomizing burner, a superheater or generator in communication with said burner and a connection from the water in the water vessel to the generator through which water is forced to the generator by the expansive force of compressed air, another connection from the compressed air in the water vessel for supplying compressed air to the atomizing burner, whereby the oil is inducted to said burner, means for controlling the flow of air and water whereby air is used initially to induct oil for heating the generator and then water, converted into steam by the generator, subsequently used to induct oil to maintain combustion, substantially as set forth.

2. In an oil burning apparatus, the combination of a water vessel, means for providing said water vessel with compressed air, an atomizing burner, an oil vessel containing oil at a level below the level of the atomizing burner, a connection between said oil vessel and burner, a super-heater or generator, and a connection from the compressed air to the burner, a connection from the water vessel to said generator through which water is forced by the expansive force of the compressed air, whereby first air and then water converted into steam draws the oil to the burner, whereby when the flame is extinguished, oil will cease to flow, substantially as set forth.

3. In an oil burning apparatus, the combination with an oil vessel and a water vessel, of an air compressor in the water vessel, an atomizer, a pipe leading from above the normal water level of the water vessel, another pipe connecting therewith leading from below the normal water level, a superheater interposed therein, and an oil supply pipe leading from the oil vessel to the atomizer, substantially as set forth.

4. In an oil burning apparatus, the combination with an oil vessel and a water vessel, of an atomizer, a pipe leading from the water vessel to said atomizer, a coil formed in said pipe in front of the atomizer, another pipe connecting with said first mentioned pipe leading from a point below the normal water level, and an oil supply pipe leading from the oil vessel to the atomizer, substantially as set forth.

5. In an oil burning apparatus the combination of an oil vessel, a water vessel, an atomizing burner communicating with each, a generator connected with said burner, means for supplying compressed air to the same to induce initially a flow of oil, and means for subsequently conveying water to the generator to generate steam therein to continue the oil supply to the burner, substantially as set forth.

This specification signed and witnessed this 11th day of April, 1891.

J. WILLARD MORRIS.

Witnesses:
EUGENE CONRAN,
W. PELZER.