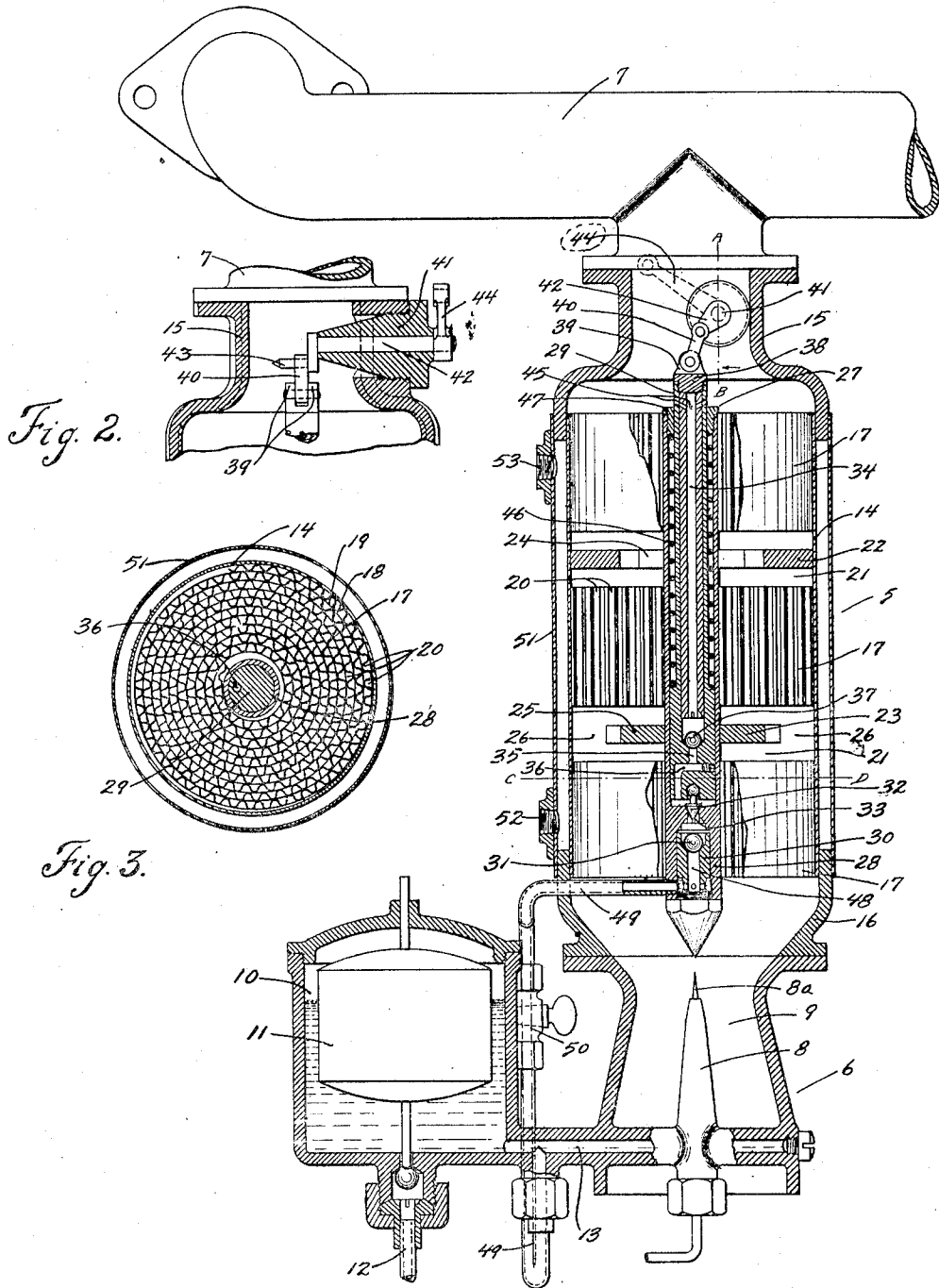


F. G. CRONE.  
 COMBINED VAPORIZER AND PRIMING PUMP.  
 APPLICATION FILED MAR. 24, 1911.

1,038,300.

Patented Sept. 10, 1912.



WITNESSES:  
*Halter H. Kelly*  
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Fig. 1.

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# UNITED STATES PATENT OFFICE.

FRANCIS G. CRONE, OF BUFFALO, NEW YORK.

COMBINED VAPORIZER AND PRIMING-PUMP.

1,038,300.

Specification of Letters Patent.

Patented Sept. 10, 1912.

Application filed March 24, 1911. Serial No. 618,612.

To all whom it may concern:

Be it known that I, FRANCIS G. CRONE, a citizen of the United States of America, residing in the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Combined Vaporizers and Priming-Pumps, of which the following is a full, clear, and exact description.

One of the objects of my invention has been to provide a vaporizer which would thoroughly vaporize the spray of volatile fluids as it passes therethrough from the carbureter, also one which may be readily inserted between the carbureter and the manifold of any internal combustion engine.

It is well known that when starting from rest any internal combustion engine, which is supplied with a volatile fluid for fuel, much cranking is usually necessary before the cylinders of the engine are supplied with a combustible mixture. Even when an extra supply of fuel is sprayed into the intake manifold of the engine much trouble is also experienced in quickly getting a proper mixture. In providing my invention I have sought to produce a combined vaporizer and priming pump which would give a combustible mixture almost immediately upon turning the crank over. To this end I have so disposed the priming pump in relation to the vaporizer that the fluid, as it is sprayed from the priming pump, before the engine is cranked, is caused to be well distributed over the vaporizer, so that when the air is drawn therethrough the said fluid is thoroughly vaporized and there is drawn into the engine cylinder, a properly proportioned combustible mixture. It is also well known that it is more difficult to start an internal combustion engine in cold weather than in warm weather. To overcome this difficulty I have provided means whereby the temperature of the vaporizer may be kept practically the same in cold as well as warm weather. These and many other advantages of my invention will be apparent to those skilled in the art from the accompanying drawings and following description.

In the drawings, forming part of this specification, like characters of reference refer to like parts throughout the several views of which:

Figure 1 is a longitudinal vertical sec-

tional view of my invention. Fig. 2 is a fragmental sectional view taken on line A-B of Fig. 1. Fig. 3 is a transverse sectional view of my vaporizer, taken on line C-D of Fig. 1.

In the drawings the numeral 5 represents the combined vaporizer and priming pump; 6 is a carbureter and 7 the intake manifold of any internal combustion engine.

8 is the fuel nozzle of the carbureter with its needle valve 8<sup>a</sup> and 9 is the choke tube.

10 is the float chamber and 11 the float disposed therein.

The volatile fluid is supplied to the carbureter at 12 and a portway 13 conducts the fluid from the float chamber 10 to the fuel nozzle 8.

14 is the casing of the vaporizer which is provided at its upper end with a head 15 and at its lower end with a similar head 16 which are secured respectively to the intake manifold 7 and the carbureter 6. Disposed within the vaporizer body 14 are atomizing sections 17 preferably formed of a corrugated sheet of copper 18 and a flat sheet of copper 19, said corrugated sheet and said flat sheet being rolled together in the form of a spiral (see Fig. 3), thus providing a plurality of longitudinal passageways 20. A space 21 is left between each section 17 and disposed in the center of said spaces or baffle plates 22 and 23. The baffle plate 22 is of solid material at its outer periphery but is provided with an open central portion 24 formed in any suitable way. The baffle plate 23 is provided with a closed central portion 25 but a space 26 is left between its outer periphery and the casing 14 of the vaporizer. Thus the vapors are caused to be thrown outwardly by the baffle plate 23 and inwardly by the baffle plate 22.

Disposed preferably in the center of the vaporizer 5 and extending up through the baffle plates 22 and 23 and the atomizing sections 17 is the priming pump 27.

28 is the cylinder of the priming pump which is preferably held in place by the said baffle plates and the atomizing sections 17, and 29 the piston of the same. At the lower end of the cylinder is fitted a plug 30 which is provided with a ball check valve 31 arranged to close the portway 48 in said plug. In the lower end of the piston 29 is, preferably loosely mounted, a needle valve 32 which is engageable with a seat

provided in the cylinder 28 and thus closes the aperture 33 which leads from the ball check valve 31 to the interior of the cylinder. Provided in the center of the piston 29 is a portway 34. This portway is connected at its lower end with the interior of the cylinder by the portways 35 and 36 and extending into the vaporizer from the said portway 34 near the upper end thereof is a plurality of apertures 45 through which the volatile fluid is sprayed. Between the portway 34 and the portway 35 is disposed a ball check valve 37. The upper end of the piston is provided with a plug which closes the upper end of the portway 34. This plug is provided with lugs 39 to which is pivotally secured a link 40.

In the head 15 is removably secured an operating crank bearing 41 which rotatably carries the operating crank 42. This crank is provided with a crank pin 43 which is engageable with the upper end of the link 40 when the bearing 41 is put into place. A lever 44 is secured to the outer end of the crank 42 and provides means whereby the piston 29 may be moved upwardly. The upper end of the piston 29 is provided for a portion of its length with a reduced peripheral diameter and this portion has disposed thereon a spiral spring 46. One end of the said spring bears against the shoulder formed by the reduced diameter of the piston and the other end bears against a bearing nut 47 which is preferably screw-threaded into the upper end of the cylinder 28 and which also forms an upper bearing for the piston 29.

Leading from some convenient point in the float chamber 10 or the portway 13 of the carbureter 6 is a pipe 49 which conducts the volatile fluid to the cylinder 28 of the priming pump. A stop-cock 50 is inserted at some convenient place in the pipe 49 whereby the supply of volatile fluid to the priming pump may be shut off if desired. Obviously, it is not necessary to have the pipe 49 running outside of the carbureter but it may, if desired, be extended up through the choke tube 9 or any other suitable means may be employed for conducting the volatile fluid to the priming pump.

51 is a jacket which is secured to the heads 15 and 16 and is provided with an inlet and outlet 52 and 53. Either hot water or hot air may be passed through this jacket, thereby making it possible to keep the vaporizer at a proper working temperature.

When it is desired to start an internal combustion engine, which is fitted with my vaporizer, the lever 44 on the operating crank 42 of the priming pump is operated by any suitable and conveniently arranged means, which raises the piston 29 and the needle valve 32 secured to its lower end.

A supply of the volatile fluid is thereby drawn through the pipe 49 or its equivalent, portway 48, past the ball check valve 31, through the portway 33 and into the cylinder 28. When the said piston is lowered by the spring 46 the ball check valve 31 will be forced closed and the ball check valve 37 will be forced open by the pressure of the fluid as it is being forced up through the portways 35 and 36 and into the portway 34. As the said piston is being lowered the fluid contained in the cylinder of the priming pump will be forced out through the apertures 45 in the upper end of the piston 29 and sprayed onto the upper atomizing section 17. Now as the engine is cranked the cylinders of the same will cause air to be drawn up through the choke tube of the carbureter and the atomizing sections 17 of the vaporizer. As this air is drawn through the upper atomizing section 17 it picks up and mixes with the molecules of fluid which have been previously scattered over this section and a combustible mixture is thereby formed which is immediately drawn into the cylinder of the engine and ignited, thus making the starting of the engine very easy. When the engine has been started the volatile fluid is then supplied by the carbureter in the usual manner but the spray of fluid, as it leaves the needle valve of the carbureter, is made to pass through the atomizing sections 17 of the vaporizer 5 and in so doing it is thoroughly broken up and mixed with the air, thus making a better and more thoroughly vaporized combustible mixture than is ordinarily supplied to internal combustion engines. The baffle plates 22 and 23 prevent the mixture from passing straight through the vaporizer and these add greatly to the vaporizing process. When the priming pump piston 29 is in its lower position it will be seen that the needle valve 32 will be seated, thus stopping the flow of volatile fluid through the pipe 49 at all times but when the said piston is operated.

Instead of inserting the vaporizer and priming pump between the carbureter and the intake manifold, obviously, the intake manifold may be provided with an extra outlet to which the vaporizer and priming pump may be separately attached and thus used solely for priming purposes. When thus arranged the carbureter will be connected to the manifold in the usual manner.

Obviously, the atomizing sections may be heated by means of a plurality of radiating pipes passing through the said sections and carrying, in circulation, heated water or any other suitable liquid.

Obviously, if desired, the carbureter 6 may be made an integral part of the head 16 of my vaporizer and many other detailed modifications may be made from the

device herein shown and described without departing from the spirit of my invention and I do not wish to be limited to the exact embodiment herein shown and described.

5 Having thus described my invention what I claim is:

1. The combination with the carbureter and intake manifold of an internal combustion engine; of a vaporizer disposed between said carbureter and said intake manifold, means connecting said vaporizer to said carbureter, means connecting said vaporizer to said manifold and an atomizing section disposed within said vaporizer, said atomizing section comprising a corrugated sheet of material and a flat sheet of material, said sheets of material being rolled together in the form of a spiral, whereby a plurality of longitudinal passage-ways are formed.
2. The combination with the carbureter and intake manifold of an internal combustion engine; of a vaporizer disposed between said carbureter and said intake manifold, means connecting said vaporizer to said carbureter, means connecting said vaporizer to said manifold and a plurality of atomizing sections disposed within said vaporizer, each of said sections comprising a corrugated sheet of material and a flat sheet of material, said sheets of material being rolled together in the form of a spiral, whereby a plurality of longitudinal passage-ways are formed.
3. The combination with the carbureter and intake manifold of an internal combustion engine; of a vaporizer disposed between said carbureter and said intake manifold comprising a casing, heads secured to said casing, means connecting one of said heads to said carbureter, means connecting the other of said heads to said manifold, a plurality of atomizing sections disposed within said casing, each of said sections comprising a corrugated sheet of material and a flat sheet of material, said sheets of material being rolled together in the form of a spiral, whereby a plurality of longitudinal passage-ways are formed, and a plurality of baffle plates disposed within said casing and between said atomizing sections.
4. The combination with the carbureter and intake manifold of an internal combustion engine; of a vaporizer disposed between said carbureter and said intake manifold comprising a casing, heads secured to said casing, means connecting one of said heads to said carbureter, means connecting the other of said heads to said manifold, a plurality of atomizing sections disposed within said casing, each of said sections comprising a corrugated sheet of material and a flat sheet of material, said sheets of material being rolled together in the form of a spiral, whereby a plurality of lon-

gitudinal passage-ways are formed, a plurality of baffle plates disposed within said casing and between said atomizing sections, and a heating jacket surrounding said casing.

5. The combination with the carbureter and the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump disposed between said carbureter and said intake manifold comprising a casing, means connecting said casing at one end with the said carbureter, means connecting said casing at the other end with the said intake pipe, atomizing means disposed within said casing, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a piston slidably disposed in said cylinder, and means for operating said piston.
6. The combination with the carbureter and the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump disposed between said carbureter and said intake manifold comprising a casing, means connecting said casing at one end with the said carbureter, means connecting said casing at the other end with the said intake pipe, atomizing means disposed within said casing, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a plug disposed in the bottom of said cylinder and provided with a central aperture, a check valve disposed in said aperture, means for carrying volatile fluid to said plug from said carbureter, a piston slidably disposed in said cylinder, means for operating said piston and means provided in said piston whereby a quantity of the volatile fluid may be sprayed upon said atomizing sections of said vaporizer.
7. The combination with the carbureter and the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump disposed between said carbureter and said intake manifold comprising a casing, means connecting said casing at one end with the said carbureter, means connecting said casing at the other end with the said intake pipe, atomizing means disposed within said casing, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a plug disposed in the bottom of said cylinder and provided with a central aperture, a check valve disposed in said aperture, means for carrying volatile fluid to said plug from said carbureter, a piston slidably disposed in said cylinder and provided with a central aperture and a plurality of small apertures extending outwardly through the wall of said piston substantially at its upper end, a check valve near the lower end of said piston, a needle valve disposed in the lower end of said piston and having its seat in said

cylinder, and means for operating said piston.

8. The combination with the carbureter and the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump disposed between said carbureter and said intake manifold comprising a casing, means connecting said casing at one end with the said carbureter, means connecting said casing at the other end with the said intake pipe, atomizing means disposed within said casing, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a plug disposed in the bottom of said cylinder and provided with a central aperture, a check valve disposed in said aperture, means for carrying volatile fluid to said plug from said carbureter, a piston slidably disposed in said cylinder and provided with a central aperture and a plurality of small apertures extending outwardly through the wall of said piston substantially at its upper end, a check valve near the lower end of said piston, a needle valve disposed in the lower end of said piston and having its seat in said cylinder, means disposed within said cylinder for keeping the said piston normally in its lowermost position, and means for operating said piston.

9. The combination with the carbureter and the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump disposed between said carbureter and said intake manifold comprising a casing, means connecting said casing at one end with the said carbureter, means connecting said casing at the other end with the said intake pipe, atomizing sections disposed within said casing, each of said sections comprising a corrugated sheet of material and a flat sheet of material, said sheets being rolled together in the form of a spiral, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a plug disposed in the bottom of said cylinder and provided with a central aperture, a check valve disposed in said aperture, means for carrying volatile fluid to said plug from said carbureter, a piston slidably disposed in said cylinder, means for operating said piston and means provided in said piston whereby a quantity of volatile fluid may be sprayed upon said atomizing sections of said vaporizer.

10. The combination with the carbureter and the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump disposed between said carbureter and said intake manifold comprising a casing, means connecting said casing at one end with the said carbureter, means connecting said casing at the other end with the said intake pipe, atomizing sections disposed within said casing, each of said sec-

tions comprising a corrugated sheet of material and a flat sheet of material, said sheets being rolled together in the form of a spiral, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a plug disposed in the bottom of said cylinder and provided with a central aperture, a check valve disposed in said aperture, means for carrying volatile fluid to said plug from said carbureter, a piston slidably disposed in said cylinder and provided with a central aperture and a plurality of small apertures extending outwardly through the wall of said piston substantially at its upper end, a check valve near the lower end of said piston and having its seat in said cylinder, and means for operating said piston.

11. The combination with the carbureter and the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump disposed between said carbureter and said intake manifold comprising a casing, means connecting said casing at one end with the said carbureter, means connecting said casing at the other end with the said intake pipe, atomizing sections disposed within said casing, each of said sections comprising a corrugated sheet of material and a flat sheet of material, said sheets being rolled together in the form of a spiral, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a plug disposed in the bottom of said cylinder and provided with a central aperture, a check valve disposed in said aperture, means for carrying volatile fluid to said plug from said carbureter, a piston slidably disposed in said cylinder and provided with a central aperture and a plurality of small apertures extending outwardly through the wall of said piston substantially at its upper end, a check valve near the lower end of said piston, a needle valve disposed in the lower end of said piston and having its seat in said cylinder, means disposed within said cylinder for keeping the said piston normally in its lowermost position, and means for operating said piston.

12. The combination with the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump, comprising a casing, means connecting said casing to said manifold, atomizing means disposed within said casing, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a piston slidably disposed in said cylinder, means connecting said cylinder with a source of supply of volatile fluid and means for operating said piston.

13. The combination with the intake manifold of an internal combustion engine; of a combined vaporizer and priming pump,

comprising a casing, means connecting said casing to said manifold, atomizing sections disposed within said casing, a pump cylinder disposed centrally in said casing, means for holding said cylinder in its place, a piston slidably disposed in said cylinder, means connecting said cylinder with a source of supply of volatile fluid, check valve means carried by said cylinder and said piston,

and means for operating said piston where- 10  
by a quantity of volatile fluid may be sprayed over said atomizing sections.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRANCIS G. CRONE.

Witnesses:

WALTER H. KELLEY,  
J. WM. ELLIS.