E. ODAM.

BLOWPIPE.

APPLICATION FILED OCT. 8, 1907.

943,043. Patented Dec. 14, 1909.

2 SHEETS—SHEET 1.

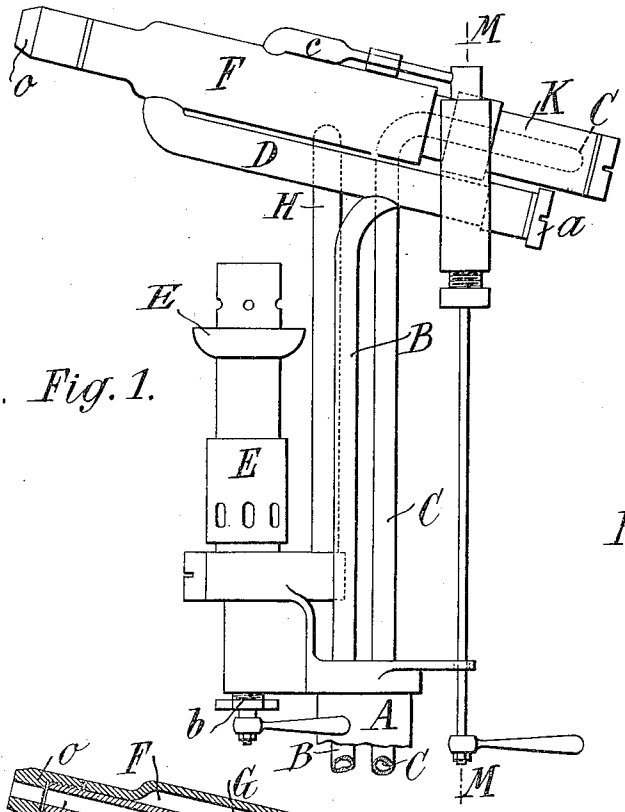


Fig. 1.

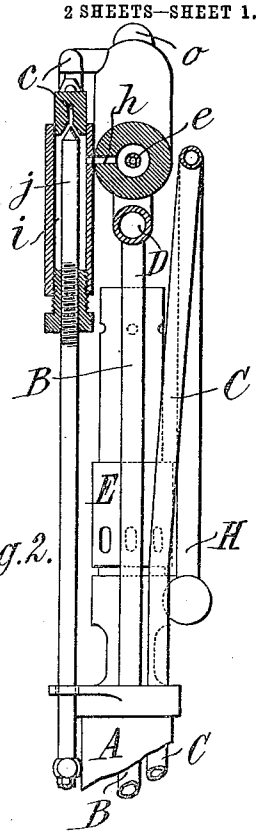


Fig. 2.

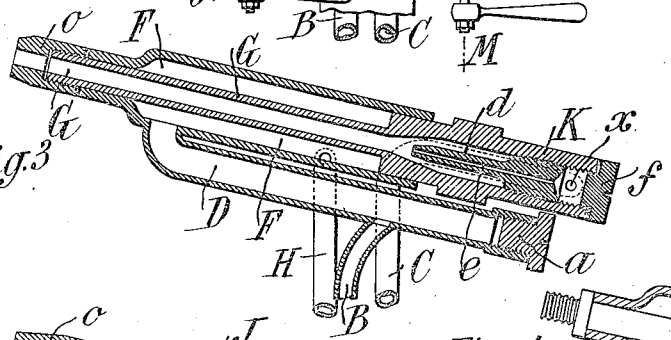


Fig. 3

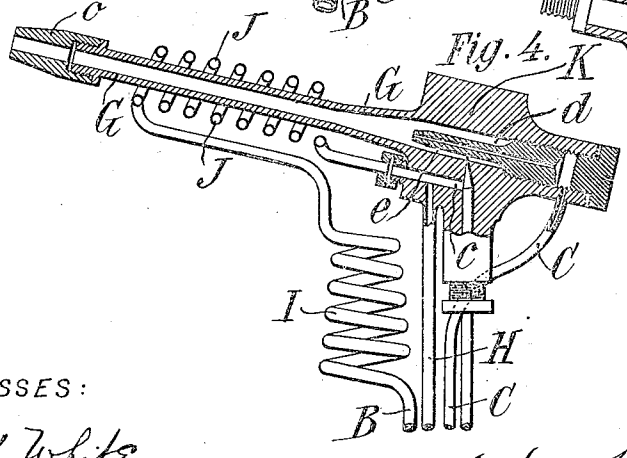


Fig. 4.

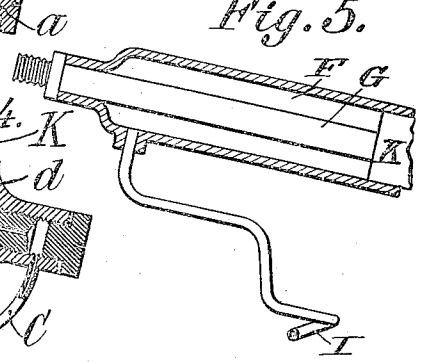


Fig. 5.

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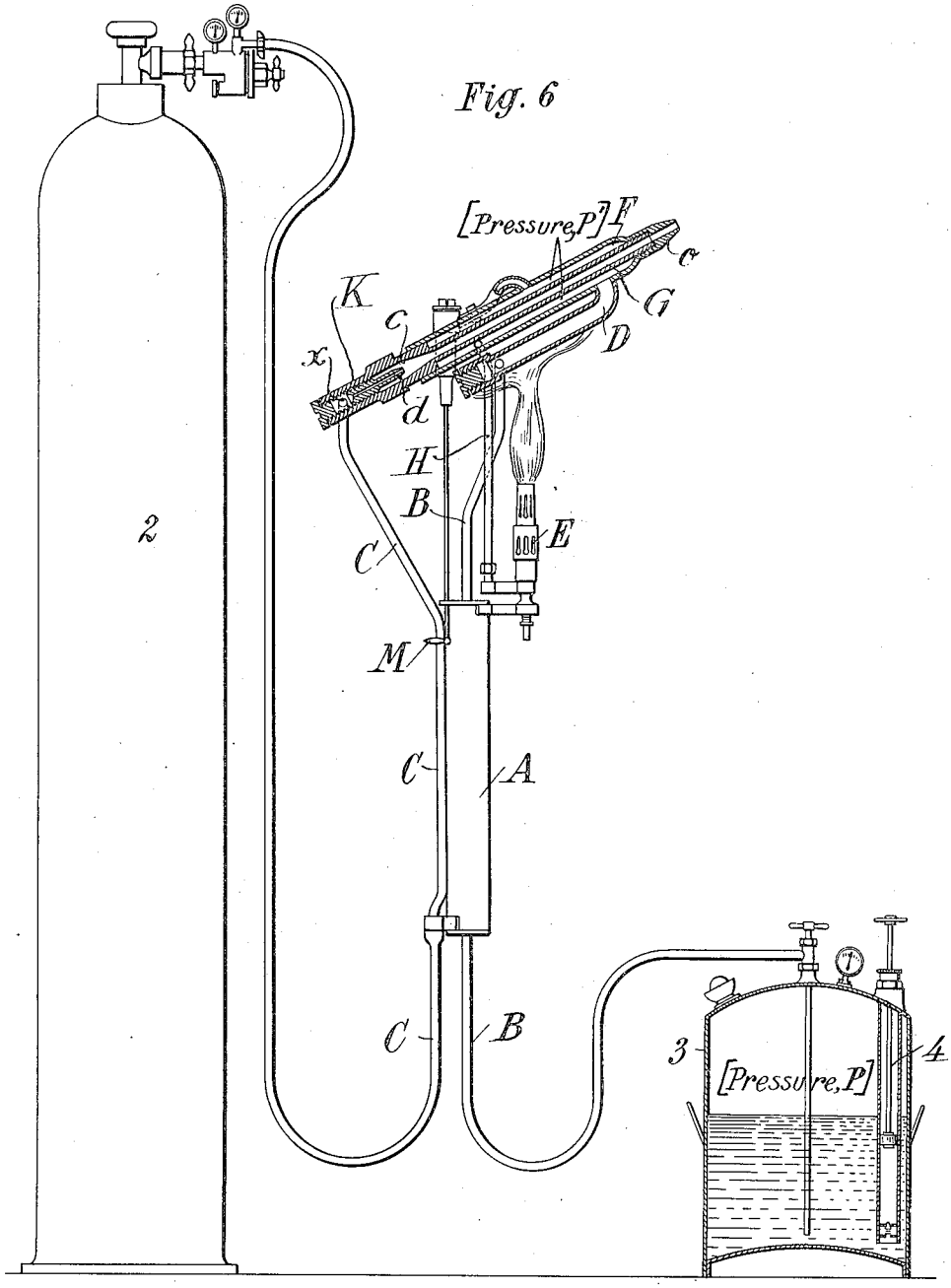
2 SHEETS—SHEET 2.

*Fig. 6*

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# UNITED STATES PATENT OFFICE.

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## BLOWPIPE.

943,043. Specification of Letters Patent. Patented Dec. 14, 1909.

Application filed October 8, 1907. Serial No. 396,432.

*To all whom it may concern:*

Be it known that I, EUGENE ODAM, a citizen of the Republic of France, residing in Paris, France, have invented certain new and useful Improvements in Blowpipes, of which the following is a specification.

This blowpipe uses the vapor of mineral essences or other liquid fuel and oxygen or air as comburant, the combustible vapor and the comburant gas mixing inside the blowpipe so as to form a combustible gaseous mixture which on leaving the nozzle burns in the form of an intense and exceedingly hot flame capable of fusing and welding metals. This blowpipe may utilize the vapors of all liquid fuels such as ethers, alcohols, petrol, benzin and the like.

The liquid which is to be converted into combustible vapor is supplied directly to the blowpipe and it is in the appliance itself that this liquid is converted into vapor, which vapor is utilized not only for furnishing the jet of gas which is to combine with the oxygen and form the combustible gaseous mixture but also for supplying a burner the heat of which vaporizes the liquid fuel. Accordingly, this blowpipe is differentiated from those heretofore known in that only one combustible fluid is supplied to the apparatus and this fluid itself forms the vapor which is to serve for the vaporization of the said fluid at the same time that this fluid is burning in the blowpipe.

Several different arrangements of the blowpipe in accordance with this invention are illustrated by way of example in the accompanying drawing, in which:—

Figure 1 is an external elevation of the blowpipe. Fig. 2 is a cross section on the line M M of Fig. 1. Fig. 3 is a vertical longitudinal section on the axis of the body of the blowpipe. Fig. 4 is an external elevation partly in section of a modified form of the blowpipe. Fig. 5 is a sectional elevation of another form. Fig. 6 is an elevation, partly in section, of the blow-pipe with the subsidiary apparatus for supplying oxygen and a combustible liquid.

The different parts of which the blowpipe is composed are mounted on a fitting with a handle which is shown at A Fig. 6; the spirit supply pipe B and the oxygen supply pipe C pass through this handle. The spirit supply pipe B opens into a heating chamber D arranged below the blowpipe proper and extending parallel with this blowpipe body throughout almost its entire length; it is in this chamber D that the vaporization of the mineral essence takes place under the influence of the heat liberated by the Bunsen burner E.

The chamber D, which is closed at one extremity by a screw plug *a* by means of which it is possible when desired to clean the said chamber, terminates in an annular reserve chamber F which surrounds the central tube or nozzle G of the blowpipe. The vapor of the mineral essence generated in the chamber D, the vaporization being completed if necessary in the chamber F, finds two discharge orifices in this latter chamber: one opens on the passage H descending as far as the Bunsen burner E and which furnishes the essence vapor required for the operation of this burner; the supply of essence to the Bunsen burner is also regulated by means of a pin cock *b*. The other discharge orifice for the vapor from the chamber F is the conduit *c* which opens into the annular space *d* surrounding the oxygen supply nozzle *e*, as hereinafter explained.

As stated, the oxygen enters through the pipe C which bends and opens at *x* at the rear extremity of the blowpipe; the screw plug *f* enables the blowpipe to be cleaned if necessary; the nozzle *e* through which the oxygen issues is itself screwed into the rear fitting K of the blowpipe and this nozzle may be unscrewed for inspecting the interior of the blowpipe and cleaning it if necessary.

The annular space *d* receiving the essence vapor with which the blowpipe is to be supplied, communicates through the conduit *h* with the casing *i* of a pin cock *j;* this pin *j* closes more or less the orifice through which the conduit *h* opens into the casing *i*. Accordingly, as already explained, it is possible to regulate the admission of the essence vapor to the Bunsen burner and to the blowpipe at will and according to requirements.

The extreme nose *o* of the blowpipe is screwed on to the head of the blowpipe and it may be exchanged according to requirements and the work to be executed.

It will be understood that the oxygen, which leaves the nozzle *e* at a certain pressure, carries along the vapor which is contained in the annular space *d;* the oxygen and the essence vapor mingle intimately and

travel together along the passage G, and finally a homogeneous combustible gaseous mixture leaves the extremity *o* of the blow-pipe in the form of an intense flame.

In order to start the blowpipe, it is only necessary to connect the essence supply pipe B with the reservoir under pressure which contains this liquid and the oxygen conduit C with the cylinder containing this gas. The blowpipe is then heated at some convenient flame, its chamber D in particular being heated so as to form a little hydrocarbon vapor which is first of all directed toward the Bunsen burner E by opening its pin cock, whereupon this burner is kindled so that the heat liberated by it produces the vaporization of the said liquid; at the end of a short time the apparatus will operate regularly. Its action may also be started by providing around the Bunsen burner a cup E′ for the reception of a small quantity of alcohol or other readily inflammable product which is kindled in order to heat the Bunsen burner and give rise to a speedy liberation of vapor enabling the Bunsen burner to begin to act.

In the modification represented in Figs. 4 and 5, the vaporization of the mineral essence or other liquid which is supplied through the pipe B is effected in a heating chamber in the form of a coil I arranged above the Bunsen burner. The upper extremity of this coil is able to communicate directly with the annular space surrounding the oxygen discharge nozzle or with a chamber surrounding the blowpipe tube or nozzle, such as the chamber F of Fig. 5, or again it may end in a tube J, Fig. 4, coiled helically around the blowpipe tube G. The vaporization of the liquid is completed in this helical tube J acting also as a reserve chamber and the vapor which has traversed its convolutions becomes distributed at its other extremity, on the one hand in the conduit H which ends at the Bunsen burner and on the other hand in the conduit *c*, which ends at the casing of the pin cock *i*, which is itself connected, as already explained, with the annular space *d* which surrounds the nozzle *e* for the admission of the oxygen.

The arrangement of the apparatus as a whole is shown in Fig. 6. The oxygen supply-pipe C passes to a tank 2 containing a supply of oxygen, and the liquid supply-pipe B passes to a vessel 3 in which air pressure is maintained by any suitable means such as the pump 4. In the air space above the liquid in the tank 3 the pressure P is approximately the same as the pressure P′ in the mixing chamber F in the head of the burner. This equilibrium of pressures is an important feature of the invention, producing an automatic regulation of the feed of the liquid. It is understood that in the beginning the air in the receptacle 3 carrying the liquid exerts a certain pressure upon the liquid and causes the latter to ascend through the tube B to the vaporizing chamber D and annular chamber F in the head of the blow-pipe. The liquid remains throughout its passage up to the chamber D at the temperature of the surrounding atmosphere substantially. When it enters the vaporizing chamber the vapor is formed and a reserve accumulates which produces a counter-pressure against the air pressure P in the receptacle 3. The tension of the combustible vapor increases with the temperature of the head of the blow-pipe until equilibrium of pressures is established. From this point the pressure remains stationary whatever may be the temperature and the nature of the combustible liquid. The pressure in the vapor cannot increase above that in the receptacle. This effect insures the regular operation of the blow-pipe with combustible liquids having very different vaporizing points (such, for example, as ordinary ether vaporizing at 35 degrees C. and refined petroleum at 280 degrees C.).

What I claim and desire to secure by Letters Patent of the United States is:—

1. A blow-pipe for fusing and welding metals, utilizing the vapor of a combustible liquid and oxygen or air as a comburant, including in combination a supply pipe B for the liquid, an annular reserve chamber adapted to carry a certain reserve of vapor of a combustible liquid so as to maintain an approximately constant pressure, and thus to insure a regular flow, an auxiliary heating chamber communicating with said annular chamber, and a Bunsen burner acting directly upon said heating chamber to heat the same, the said tube, annular reserve chamber and heating chamber constituting together a single compact device with the parts firmly connected to each other.

2. A blow-pipe for fusing and welding metals, utilizing the vapor of a combustible liquid and oxygen or air as a comburant, including in combination a supply pipe B for the liquid, an annular reserve chamber adapted to carry a certain reserve of vapor of a combustible liquid so as to maintain an approximately constant pressure, and thus to insure a regular flow, an auxiliary heating chamber consisting of a coil I, and a Bunsen burner acting directly upon said heating chamber to heat the same, the said tube, annular reserve chamber and heating chamber constituting together a single compact device with the parts firmly connected to each other.

3. A blow-pipe for fusing and welding metals, utilizing a vapor of a combustible liquid with oxygen or air as a comburant, including in combination in a single body, a central tube or blow-pipe proper, an annular

reserve chamber for the vapor, and an auxiliary heating chamber, a Bunsen burner arranged to heat said heating chamber directly, a tube *c* through which the annular reserve chamber communicates with the central tube, a small reservoir *i* between said tubular member *c* and said central tube, and a needle valve *j* controlling the passage of gas from said tubular member *c* to said small reservoir *i*, said reservoir being directly in communication with said central tube through an opening *h*.

4. A blow-pipe for fusing and welding metals, utilizing a vapor of a combustible liquid with oxygen or air as a comburant, including in combination in a single body a central tube or blow-pipe proper, an annular reserve chamber for the vapor, and an auxiliary heating chamber, consisting of a coiled pipe, a Bunsen burner arranged to heat said heating chamber directly, a tube *c* through which the annular reserve chamber communicates with the central tube, a small reservoir *i* between said tubular member *c* and said central tube, and a needle valve *j* controlling the passage of gas from said tubular member *c* to said small reservoir *i*, said reservoir being directly in communication with said central tube through an opening *h*.

5. A blow-pipe for fusing and welding metals, utilizing a vapor of a combustible liquid with oxygen or air as a comburant, including in combination in a single body a central tube or blow-pipe proper, an annular reserve chamber for the vapor, an auxiliary heating chamber, and a reservoir containing the combustible liquid under pressure of compressed air, in communication with said heating and annular reserve chambers, whereby the operation is continuous under the balanced pressures of the annular reserve chamber and the reservoir containing the combustible liquid.

6. A blow-pipe for fusing and welding metals, utilizing a vapor of a combustible liquid with oxygen or air as a comburant, including in combination in a single body a central tube or blow-pipe proper, an annular reserve chamber for the vapor, an auxiliary heating chamber in the form of a coiled pipe, and a reservoir containing the combustible liquid under pressure of compressed air in communication with said heating and annular reserve chambers, whereby the operation is continuous under the balanced pressures of the annular reserve chamber and the reservoir containing the combustible liquid.

In witness whereof I have hereunto signed my name this 25th day of September 1907, in the presence of two subscribing witnesses.

EUGENE ODAM.

Witnesses:
DEAN B. MASON,
GABRIEL BELLIARE.