No. 869,140. PATENTED OCT. 22, 1907.

W. MITCHELL.

SELF HEATED SOLDERING IRON.

APPLICATION FILED DEC. 9, 1905.

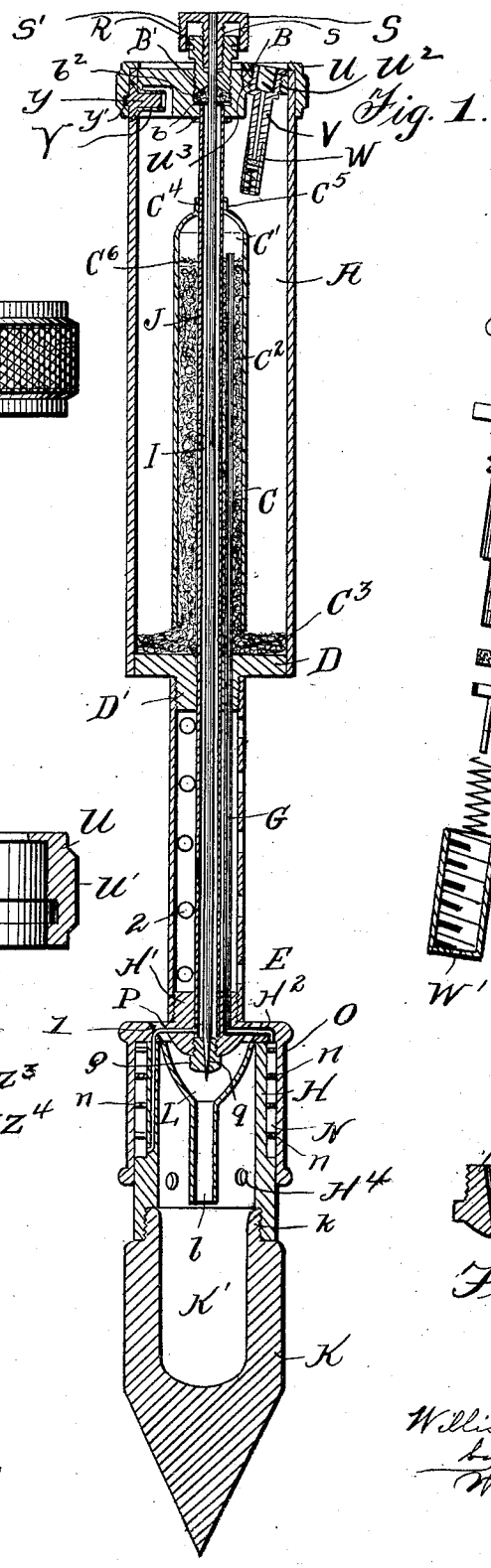


Fig. 1.

Fig. 2.

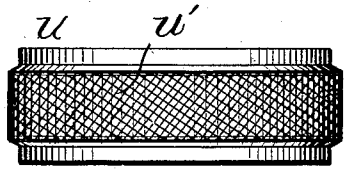
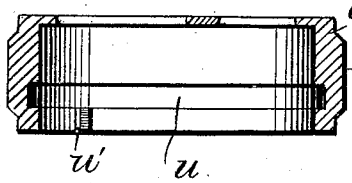


Fig. 3



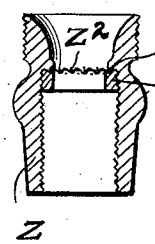
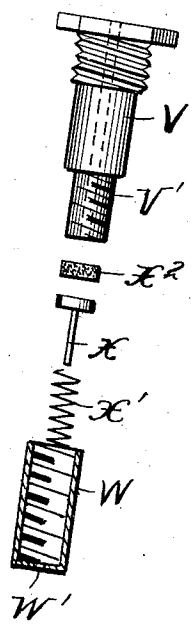


Fig. 5.

Fig. 4.



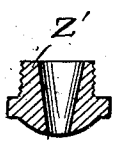


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SELF-HEATED SOLDERING-IRON.

No. 869,140. Specification of Letters Patent. Patented Oct. 22, 1907.

Application filed December 9, 1905. Serial No. 291,147.

To all whom it may concern:

Be it known that WILLIS MITCHELL, a citizen of the United States, residing at Malden, in the county of Middlesex and State of Massachusetts, has invented certain new and useful Improvements in Self-Heated Soldering-Irons; and he does 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 appertains to make and use the same.

This invention relates to vapor-heated and gas-heated implements and especially to soldering irons, though equally applicable to torches and in part available for other articles. It has more particular relation to those implements which make use of the handle as a reservoir for volatile liquid fuel, having a supplemental reservoir within it and which employ near the tool point or head and the jet block or nozzle of the burner a generator consisting of annular retorts connected by short passages, the said generator being supplied by said inner reservoir through a pipe in a relatively slender intermediate tubular shank and supplying the generated vapor or gas to the said jet block which discharges into the mixing tube or mixing chamber surrounded by the said generator, said mixing chamber completing the burner and directing the ignited gas or vapor into and upon the tool point. An instance of such construction is afforded by my Letters Patent granted July 4th, 1905, No. 793,894.

The chief objects of my present invention are to provide for operating the needle valve from the nearer end of the handle, incidentally removing the packing of said valve beyond all action of the heat; to utilize the needle-valve as a means for supporting the inner reservoir; to improve the construction of the latter, dispensing with the enlarged perforated part of it shown in said patent and permitting the forward protrusion of the contained absorbent material and its lateral expansion against the wall of the outer reservoir; to improve the air-inlet devices and other parts at the nearer or grasping end of the handle; to improve the construction, combination and arrangement of the mixing chamber, generator and proximate parts; and generally to simplify and improve the implement.

To these ends the said invention consists in the construction and combination of parts hereinafter more particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a central longitudinal section through a soldering iron embodying my invention; Fig. 2 represents a detail side elevation of the cap hereinafter described; Fig. 3 represents a cross section of the same; Fig. 4 represents a detail view of the plug V, cup W and contained parts as hereinafter described, slightly separated; Fig. 5 represents a detail cross section of casting Z hereinafter described; and Fig. 6 represents a similar view of nozzle Z′.

As in the aforesaid patent, A designates the elongated cylindrical handle which also forms the main gasolene reservoir; E, the hollow shank of the tool; H, the generator body, having formed in it the annular retorts N connected by short passages *n*; O the shell of the generator covering and completing said retorts and passages; K, the point or head having recess K′ and screw-threaded rear extension *k* engaged by internal threads of the forward end of the generator; and Q, the jet block or jet-nozzle screwed into the rear end of the generator body H and having a central jet-hole *q*, supplied by the outlet passage P of the generator. The body of the latter has a rearward screw-threaded extension H′ for the attachment of the internally screw-threaded forward end of the shank E, the rear end of the latter similarly screwing on a forward screw-threaded extension D′ of the plug D, which closes the forward end of the handle and outer reservoir A.

The aforesaid parts are substantially identical with those of the said patent except certain features of the plug D made unnecessary by changes in the arrangement and construction of the needle valve hereinafter set forth; consequently no further description of them is required.

The mixing chamber or mixing tube L, provided with chimney *l*, is arranged before and surrounding block Q as in said patent; but its main rear part is strictly conoidal from said chimney to its base where it is attached to the inner or forward face of the base of the generator body. This construction permits the burning gases to flow back between the said chamber and the generator body, as far as the rearmost retort, heating the latter more effectually than is possible by the construction shown in said patent, the latter being practically a cylinder filling the rear end of said body almost as far as the forward limit of the second retort and thereafter tapering in a cone to the said chimney.

It is necessary to have the base of the mixing chamber equal to the interior diameter of the generator body, that it may be securely held and braced thereby, without need for additional clamping devices. By my construction above described, I get the benefit of this while permitting the eddying and backward flow of the heated gases quite to the base of the generator, with nearly as perfect freedom as if the mixing chamber were of less diameter at all points than the interior of the generator. The latter receives its supply of gasolene or other volatile liquid fuel through an inlet passage H^2 in the base of its body H′ and the liquid in said passage will also be heated by the proximity of the backward

flowing and eddying gases. The liquid gasolene reaches this passage H^2 by means of a gasolene pipe G which extends rearward therefrom longitudinally through the tubular shank E and through the plug D into the inner or supplemental reservoir C as far as the space C′ in the rear end of said reservoir, beyond its filling of capillary material C^2. This inner reservoir corresponds in position and function to the part similarly designated in said patent, but differs therefrom in several respects. It dispenses with the enlarged forward perforated part shown in said patent, being strictly cylindrical and therefore easier to manufacture. Its forward end is open and at an interval from the plug D, permitting the protrusion of the filling C^2, which is made to reach not only the said plug but also the wall of the handle at all radial points, as shown at C^3, in order that it may answer both the purposes of the said perforated extension formerly employed—namely the bracing of the forward end of the inner reservoir and the admission of the liquid in the outer reservoir to the capillary material C^2. This liquid will indeed have freer and fuller access to said filling C^2 than when it must enter through holes in the shell, since a wide area of fibers is exposed without covering.

The rear end of inner reservoir C is closed except for a central passage C^4 surrounded by a rearward extension rim or hub C^5 which is fixed on the casing J of the needle valve I said casing extending from the part H′ of the generator body H back centrally through the entire implement to the plug B of handle A. A screen C^6, fixed within the said inner reservoir, cuts off the rear space C′ from the filling C^2, preventing shreds of the latter from reaching and clogging the receiving end of tube G, although not impeding the flow of liquid from said filling into said space. The inner reservoir C has its own shell, wall or casing, distinct from that of the main reservoir and arranged concentrically within the rear part of the latter is supported solely by the long slender casing J of the said needle valve I. This dispenses with all special attachments of the outer reservoir A the plugs B or D or the gasolene tube G, for suspending the said inner reservoir, which nevertheless, by reason of the protrusion of said material C^3, is always in position to draw from the lowest part of the outer reservoir, excepting only when the tool is held upward, a position seldom retained for more than a very brief period, during which the supply already absorbed by the filling C^2 may be relied on. Practically the entire contents of the main reservoir will be exhausted before there is any interruption or irregularity of flame and heat. This protruding material C^3 and the filling C^2 within the inner reservoir keep the latter concentric with regard to the said inner reservoir. The rear part of the said gasolene tube G is held by said filling and said screen, in combination with the supporting action of the plug D and its extension or hub D′, through which the said tube passes, parallel with the valve casing J and in proximity thereto; so that the said valve-casing by supporting said inner reservoir, screen and filling, is also one of the chief supports for said gasolene tube. The plug B is centrally bored to permit the passage of the rear end of said casing J into a deep packing-box B′ formed in the outer face of said plug. It is also provided with an internal annular shoulder *b* which forms the inner end of packing box B′. Within box B′ the packing b^2 surrounds the inner end of casing J and the proximate part of the valve rod, being pressed thereon by a gland R which screws into internal screw-threads of the mouth of said packing box. This gland is centrally bored to allow the passage of said valve rod, and also screw-tapped to form a recess extending from the rear inwardly to receive the screw-threaded stem *s* of the circular valve-head S. The latter is circumferentially milled for convenience of grasping and provided with annular wall S′ extending forward over the enlarged circular head of said gland, to be guided and braced thereby. By means of this milled head, the valve I, which extends all the way through the implement as far as the jet-hole *q* where its needle point operates, may be very delicately and easily adjusted to open or close the said jet hole in any required degree, thereby regulating the flame at will or cutting it off altogether. Such operation from the grasping end of the handle is often quicker and more convenient than to turn a screw at some forward point, and requires less disturbance of the position and operation of the tool.

The casing J allows the valve to play with perfect freedom, keeps it always in proper position and alinement and protects it against obstruction, strain and interference of every kind; beside the reservoir-supporting and tube-supporting functions before stated and the strength which said casing adds to the tool as a whole. The removal of the valve-packing to the extreme rear end of the implement, made practicable as above described by the construction of valve and casing now adopted, effectually guards the packing against the drying and hardening effects of the heat in and about the generator and burner.

The plug B and surrounding end of handle A are covered by a metallic cap U, having a broad milled circumferential part U′.

The rear face of plug B is exposed except near the periphery and said plug is obliquely screw-tapped at U^2 for receiving the rear externally screw-threaded part of a long removable centrally bored air-inlet plug V, to which may be attached a hose coupling or other means of providing for the supply of compressed air to the interior of the main reservoir A. The head of said air-inlet plug is arranged at such an angle to the axis of the said plug and to the correspondingly inclined bore into which the latter is screwed that when the said air-inlet plug is turned home the said head fits squarely against the end of the plug B and the outer face of said head is practically flush with that of the rear part of cap U, as shown in Fig. 1. A reduced inner part V′ of said plug is also provided with screw-threads for the attachment of an elongated cup W, the inner end of which has a central perforation W′, to permit and guide the play of the stem of an upwardly acting air-inlet check valve X held by its spring X′ against the lower end of the central bore of said long plug V. A small disk of cork X^2 may be interposed between the said valve and the end of said stem, fitting in said cup.

Y designates the liquid inlet, extending inward through the side wall of the handle near plug B and fitted with a stopper *y*. This stopper is normally covered by the side wall of the cap U, which has in its inner face a circular groove *u*, that receives a central outward boss or stud *y′* of said liquid inlet plug and is thereby held against dislodgment. To permit the in-

tentional removal of the cap, a short groove or passage u' leads from said circular groove forward to the edge of the side wall of said cap. After the latter is turned to bring the stud y' into alinement the cap may be easily slipped off and the said liquid inlet stopper may then be removed also. Before such turning can take place, the air-inlet plug V must be removed, so the parts are securely guarded against accidental dislodgment. The milled side of the cap facilitates its turning.

The general operation of the implement is substantially the same as in the patent aforesaid. Liquid fuel is supplied through the liquid inlet; compressed air is supplied through the air-inlet to start the flow; the vapor or liquid first issuing through the jet block is ignited; the flame therefrom heats the generator retorts in the order of their proximity to the end of the mixing chamber chimney, the heat acting first and most intensely on the retort last supplied with gasolene and thence eddying backward toward the inlet end of the generator but with greater effect on those first heated for reasons hereinbefore stated; the intensely heated gasolene issues in part through the jet hole as a fixed gas and in part forces its way back through the current of liquid in the gasolene pipe and applies its pressure in the reservoir, keeping up the feed of liquid gasolene through said gasolene pipe to the generator.

If a torch for burning off paint or a brazing iron be needed, instead of a soldering iron, the point K may be unscrewed and the open-end casting Z screwed on in its place. The nozzle Z' is then screwed into this, reducing the diameter of the discharge.

The operation is as before stated, except that the flame issues through one end instead of impinging on the point and eddying back around the mixing chamber to finally escape through the holes H^4 in the forward part of the body of the generator. The casting Z is provided with the usual strainer Z^2 held against its internal shoulder Z^3 by a screw-threaded clamping ring Z^4. When a broad blaze is needed, the casting Z is used as the only nozzle. The said mixing chamber is, as usual in this type of soldering irons, supplied with air through holes 1 in the base of the generator. The usual holes 2 are provided in the tubular shank for permitting the passage of air to cool the same. Of course it will also cool the valve casing.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a vapor-heated and gas-heated implement, the combination of a generator, consisting of a series of connected contiguous annular retorts forming the continuous inner wall of the generator, with a mixing chamber surrounded thereby, but adapted to leave a closed space between it and the said generator for the passage of heated gases as far back as the rearmost of the retorts, means for supplying the said generator with vaporizable liquid fuel and a jet block or nozzle discharging into said mixing chamber and supplied with gas or vapor by the said generator substantially as set forth.

2. In a vapor-heated and gas-heated implement, the combination of a generator, consisting of a series of connected annular retorts, with a mixing chamber surrounded thereby and of equal diameter at its base with the interior of said generator but having its body of pyramidal form in order that heated gases may flow back between them to act directly on the parts of the generator which first receive the fuel, a jet block or nozzle supplied by said generator and discharging gas or vapor into said mixing chamber and means for supplying easily vaporizable liquid fuel to the said generator substantially as set forth.

3. In vapor heated and gas heated implements, the combination of a hollow generator consisting of a series of retorts and presenting a closed continuous wall with a tubular mixing chamber supplied by said generator and discharging into the forward end of the implement, the rear end of said mixing chamber being flared nearly to the internal diameter of the generator but permitting the flame and products of combustion to eddy back between them and be successively applied to all the retorts substantially as set forth.

4. In a vapor-heated and gas-heated implement, the combination of a handle serving also as a main reservoir with a supplemental reservoir which is open at its forward end and provided with a filling of capillary absorbent material, a supporting device for said inner reservoir, extending longitudinally through the same, a tube for liquid fuel extending through the open end of the said supplemental reservoir nearly to the rear end thereof and supported thereby, a generator supplied with liquid fuel by said tube and a burner supplied with gas or vapor by said generator and arranged to discharge the same, ignited, in proximity to said generator for the purpose set forth.

5. In a vapor-heated and gas-heated implement, a handle serving also as a main reservoir, a tubular shank attached to said handle and a generator and burner attached to said shank, in combination with a rigid device extending longitudinally through said handle and shank and fastened to said generator and the rear end of said handle, a supplemental reservoir having an independent wall or shell and arranged concentrically within the rear part of the said main reservoir fastened on said device within said main reservoir and supported thereby and supplied with liquid fuel by said reservoir and a tube entering said inner reservoir supplied thereby and supplying said generator substantially as and for the purpose set forth.

6. In a vapor-heated and gas-heated implement, a handle serving also as a main reservoir, a tubular shank attached to said handle and a generator and burner attached to said shank, in combination with a rigid device extending longitudinally through said handle and shank, a supplemental reservoir wholly contained in said main reservoir and terminating at an interval from the forward end thereof, but supported within said main reservoir by such device which extends longitudinally through it and to which its rear end is fastened, a tube conveying liquid fuel from said supplemental reservoir to said generator, and means for holding in unchanging relative position the forward end of said supplemental reservoir through which the liquid fuel is received by it from the main reservoir substantially as set forth.

7. In a vapor-heated and gas-heated implement, a handle serving also as a main reservoir, a tubular shank attached to the said handle and a generator and burner attached to the shank, in combination with a rigid device attached at its ends to parts of said implement and extending longitudinally through said handle and shank, a supplemental reservoir, wholly contained in the said main reservoir having an open forward end, a closed rear end fastened on said device, which extends longitudinally through it, and provided with a filling of capillary material, which protrudes at the said forward end, extending laterally into contact with the wall of the main reservoir and a tube conducting liquid fuel from the supplemental reservoir to the generator substantially as and for the purpose set forth.

8. In a vapor-heated and gas-heated implement, a handle serving also as a main reservoir, a tubular shank attached to the handle and a generator attached to the shank, in combination with a tubular valve casing attached at its ends to parts of the implement and extending longitudinally through the said reservoir and shank, a jet-block or nozzle provided with a jet-hole supplied by said generator and discharging in proximity thereto, a needle valve extending longitudinally through the said casing governing the said jet hole and operated from the rear end of the handle, an inner reservoir supplied by said main reservoir, and wholly contained within the same and attached at its rear end to said valve casing, which extends longitudinally through it and a tube conveying liquid fuel from said inner reservoir to said generator, the greater

part of the space within said inner reservoir being filled with capillary material which protrudes through the open forward end of said inner reservoir and is in contact with the wall of said main reservoir substantially as and for the purpose set forth.

9. A soldering iron provided with two concentric reservoirs having distinct walls or shells, the inner reservoir being wholly combined within said main reservoir and supplied with absorbent material which extends out of one of its ends and spreads peripherally into contact with the wall of the outer reservoir.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIS MITCHELL.

Witnesses:
CHAS. W. HOWARD,
MADALINE B. CRAWFORD.