

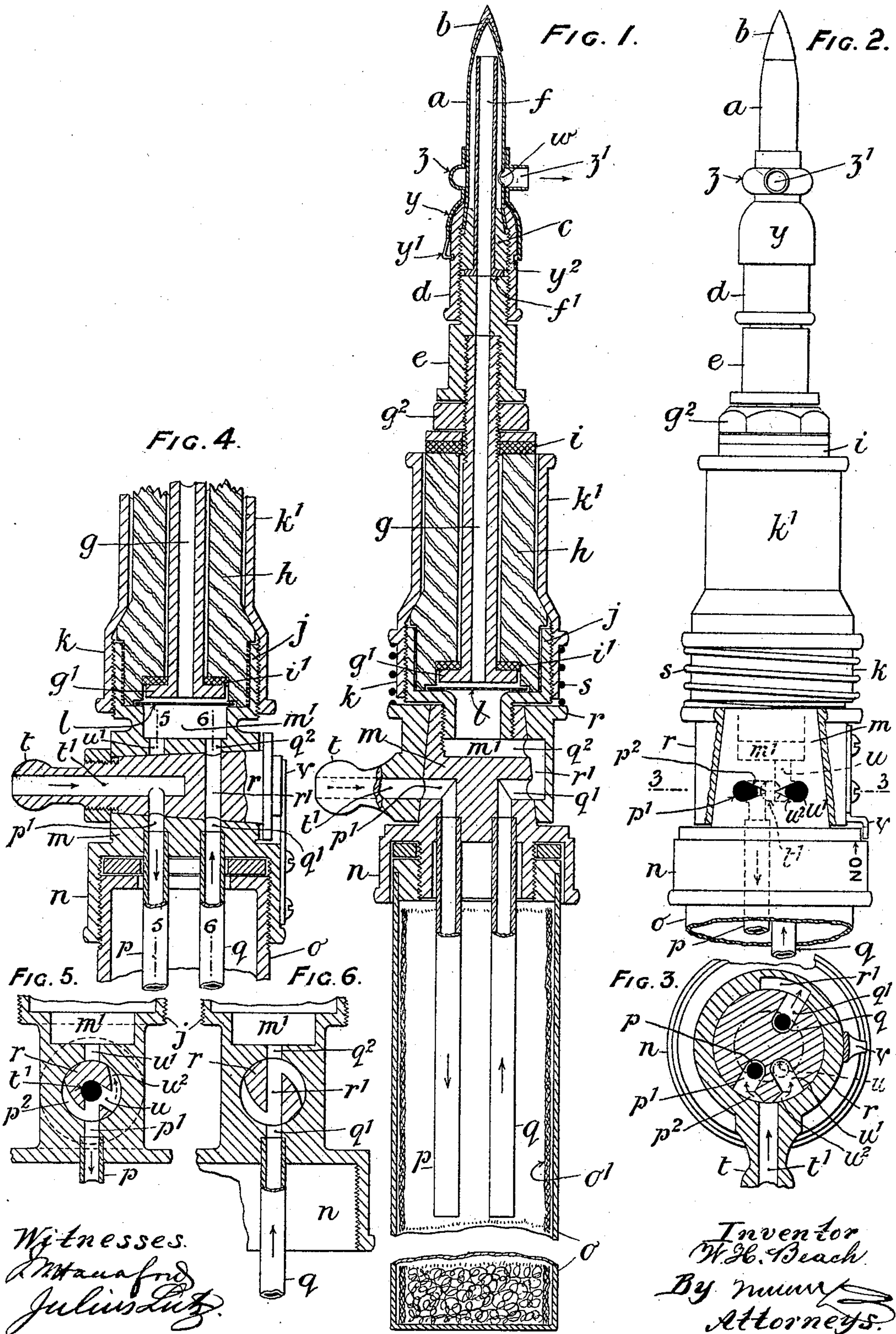
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Patented Dec. 13, 1898.

W. H. BEACH.
THERMOCAUTER LANCET.

(Application filed Dec. 30, 1897.)

(No Model.)



UNITED STATES PATENT OFFICE.

WILLIAM HENRY BEACH, OF BRIDGENORTH, ENGLAND.

THERMOCAUTER-LANCET.

SPECIFICATION forming part of Letters Patent No. 615,784, dated December 13, 1898.

Application filed December 30, 1897. Serial No. 664,565. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY BEACH, veterinary surgeon, of 25 East Castle street, Bridgenorth, in the county of Salop, England, have invented new and useful Improvements in Thermocauters and Thermocauter Lancets or Knives for Surgical and other Purposes, of which the following is a full, clear, and exact description.

My invention relates to thermocauters and to instruments intended to be used for pyrographic etching on glass. The combustion-chamber or working point of such an instrument is usually made of platinum; but for pyrographic etching on glass platinum is not suited, owing to its softness and liability to adhere to the fused particles of glass, whereas iridium is free from this objection and is admirably adapted for the purpose.

The improvements have, further, for object to more effectually prevent the transmission of heat from the incandescent working point to the hydrocarbon-vaporizing chamber which forms the handle of the instrument; and the improvement consists in the mode of connecting an insulating-block to the metallic parts between which it is interposed, so as to prevent the transmission of heat to the vaporizing-chamber and the charring of the block.

The improvements relate, further, to means of dosing the proportion of air in the mixture of combustible vapor and air, and consists in the provision of a rotary collar or plug valve between the hydrocarbon-vaporizing chamber and the combustion-chamber and in the direct connection of the air-supply tube thereto, so that a portion of the air may be blown directly into the passage leading to the combustion-chamber without first passing through the vaporizing-chamber, so as to enable the proportion of air in the mixture of air and hydrocarbon-vapor to be varied, so as to enable the maximum heating effect to be at all times obtained. The necessity for properly dosing the proportions arises from the fact that at starting, when the benzolin-receiver is fully charged, the proportion of benzolin-vapor taken up by the air passing through it will be in excess, and the incandescence of the working point cannot be maintained unless the proportion of air be in-

creased by the direct injection of air, as above described.

The improvements consist, lastly, in the provision, at the exhaust-orifice by which the products of combustion are emitted from the combustion-chamber, of an adjustable jet-nozzle by which the blast products of combustion may be so directed with regard to the work or point of application of the instrument that the fumes arising from the charring of the substance operated on may be carried away by the induced current and prevented from incommoding the visual or respiratory organs of the operator.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is an enlarged vertical section of the instrument, part of the reservoir-handle being broken out. Fig. 2 is an elevation omitting the handle, the valve being turned to another position. Fig. 3 is a corresponding cross-section on line 3 3, Fig. 2. Fig. 4 is a longitudinal section showing another form of valve. Figs. 5 and 6 are sections of the valve on lines 5 5 and 6 6, Fig. 4, respectively.

a is the combustion-chamber, made of platinum. The working point of the chamber is tipped or cased with a conical tip *b*, of iridium, so as to embrace the said point of the chamber *a*, to which it is united by welding in the usual way of working such metals.

The combustion-chamber *a* is secured in its holder in such a way as to prevent it from working loose by reason of the differences of expansion of different metals with heat. For this purpose a slightly-conical bushing *c*, of nickel, is driven into the slightly-flared end of the chamber *a*, which is received in a correspondingly-coned seat formed at the contracted end of a ferrule *d*, of nickel, screw-threaded to receive the threaded male end of a union-piece *e*, of nickel, by which the bushed end of the combustion-chamber is forced tightly into its seat in the ferrule *d*, or the parallel part of the bush *c* may itself be threaded and screw into the ferrule *d*, as shown in Fig. 1, and so act as the plug to tighten the combustion-chamber in its seat. The bush *c* is tubular to give passage to the tube *f*, by which the combustible mixture is supplied to

the combustion-chamber *a*, this tube, which is made of platinum, projecting centrally through the combustion-chamber, its open end terminating therein nearly at the point in the usual way, the said tube being fixed in position by a flange *f'* at its outer end being tightly clamped between the screw-plug of *e* and the bushing *c*. The union-piece *e* has a central bore to coincide with the tube *f* and a screw-socket at its base to receive the projecting end of a screw-threaded tube *g*, which passes centrally through an insulating-block *h*, of ebony or other poor conductor of heat, and is fixed therein by end pressure in such a way as to prevent contact of the tube with the block and the consequent charring of the latter by heat. The bore of the block is so much larger than the external diameter of the tube *g* as to give clearance all around, and the tube is secured centrally therein by a flanged head *g'* at its rear end and a nut *g²*, screwing on its front end, washers *i i'*, of mica, being interposed between the ends of the block *h* and the head and nut, so that when the latter is tightened up the tube *g* will be secured by end pressure against the block without any direct metallic contact between it and the tube. The block *h* has an enlarged conical or shouldered base, and it is fixed tightly in a metal cup *j* by being screwed therein, as in Fig. 4, or by an external ferrule *k*, of corresponding form, screwing onto the cup, as in Fig. 1, and which is prolonged toward the point of the instrument, so as to form a sheath *k'*, inclosing the block *g*, with clearance for an intervening air-space, the only contact with the block being at the base. Between the base of the block *g* and the cup *j* a disk *l*, of wire-gauze, is interposed to prevent the mixture firing back. The tubular neck of the cup *j* screws into a chamber *m'*, formed in a body portion *m*, provided with passages for air and for the combustible mixture, controlled by a valve, as hereinafter described, the body portion being carried by a cap *n*, screwing onto the tubular vaporizing-chamber *o*, which forms the handle of the instrument and is lined with cotton wick *o'* and partly filled with cotton or other absorbent for the benzolin. Into this chamber project the tubes *p* and *q*, the former for the admission of air and the latter for conveying the combustible mixture to the tube *g*.

In Figs. 1, 2, and 3 the body portion *m* is in the form of a cone and forms the seat for a rotary collar-valve *r*, which is pressed thereon by a spring *s*, confined between the collar *r* and the flange of the ferrule *k*. The collar-valve *r* is provided with a nipple *t* to connect with the rubber tube from the pneumatic bulb, the bore of the nipple when the valve is fully open for the admission of air to the vaporizing-chamber coinciding with a passage *p'*, opening through the side of the plug and in connection with the air-inlet tube *p*. The outlet-tube *q* is in connection with a similar passage *q'*, opening through

the side of the plug, a second passage *q²* leading inward through the plug to the chamber *m'*, the two thoroughfares *q' q²* being put into connection through a cavity *r'*, formed in the collar-valve when the valve is turned to the open position. When the valve is turned to the closed position, the connections of the bore of the nipple *t* with the air-inlet passage *p'* and of the cavity *r'* with the thoroughfare *q'* are entirely cut off and the vaporizing-chamber is completely closed, so that loss of fuel by evaporation is prevented. In addition to the air-inlet *p'* there is a second inlet-passage *u*, leading through the body portion *m* direct to the chamber *m'*, the orifice *u'* of this passage being adjacent to that of the passage *p'*, so that by turning the valve *r* slightly the bore *t'* of the nipple *t* may connect with both orifices at once, the two orifices *p'* and *u'* being laterally extended by beveling off toward each other, as shown at *p² u²*, so as to admit of the connection of the bore *t'* with the one being cut off gradually, while that with the other is gradually opened in order that the relative proportions of the air admitted to the vaporizing-chamber *o* and that admitted direct to the chamber *m'* may be under complete control. The cavity *r'* in the valve is of sufficient breadth in the circular direction to maintain the connection between *g' q²* so long as the bore *t'* remains open to the inlet-passage *p'*. An index *v* on the valve and a corresponding scale on the cap *n* serve to denote the position of the valve.

In Figs. 4, 5, and 6 the relative forms and positions of the valve *r* and its seat are reversed, the valve being a conical plug seated in a corresponding seat in the body portion *m*, into which it is pressed by a spring *v*, forming the index. The bore *t'* of the nipple connects with the radial passages *p'* and *u*, the plug being circularly grooved or chamfered, as at *p² u²*, to allow of simultaneous passage of air to the inlet-tube *p* and through an orifice *u'* in the valve-seat to the chamber *m'* or permit of the passage being wholly or partially shut off in one or the other direction, according as the valve is turned in its seat. The thoroughfare *r'* through the valve-plug also terminates in circumferential chamfers or grooves, as shown in Fig. 6, so as to maintain its connection with the orifices *q' q²* of the seat, so long as the bore *t'* of the nipple is in connection with the inlet-orifice *p'*.

w is the usual outlet for the products of combustion formed in the side of the chamber *a* near the base, and *y* is a sheath of platinum fitting about the combustion-chamber *a* and its ferrule *d*, being retained in position thereon by an inwardly-projecting spring-tongue *y'*, formed in one with it, engaging in a circumferential groove *y²*, turned in the ferrule, so as to permit of the sheath being revolved freely. The sheath is formed with a circumferential channel *z*, covering the outlet *w*, and provided with a radial outlet-nozzle *z'*, so as to direct the fumes away from the

operator, the rotation of the sheath enabling the outlet z' to be adjusted in any radial direction desired. Where the sheath y is not used, the outlet w may be formed by a notch cut at an acute angle to the axis of the combustion-chamber, the direction of the exhaust on leaving the outlet being determined by the outward bend given to the lip w' of the notch.

I claim—

1. In an instrument of the kind specified, the combination with the divergently-coned base of the combustion-chamber, of an internal conical bush of nickel fitting therein, a conically-contracted ferrule of nickel adapted to retain the divergent base of the combustion-chamber, and a union-piece of nickel screwing into the ferrule and adapted to force the bush and ferrule in opposite directions, so as to grip the combustion-chamber between their conical surfaces, as specified.

2. In an instrument of the kind specified, the combination, with the combustion-chamber having its divergently-coned base gripped between an internal conical bush and an internally-coned ferrule, of a tube for the supply of the combustible mixture to the combustion-chamber, said tube projecting through the bore of the bush into the combustion-chamber and having a flanged outer end interposed between the bush or the union-piece by which the cones are tightened up and the male end of the union-piece so that the combustion-chamber and its supply-tube are secured by one and the same means, as specified.

3. In an instrument of the kind described, the combination with the central supply-tube leading to the combustion-chamber, having a head on one end and a nut screwing on the other, of a block of insulating material having a bore giving passage with clearance, to the said tube, and of washers of mica interposed between the ends of the block and nut

and head on the tube, between which the block is secured by endwise pressure only, substantially as specified.

4. In an instrument of the kind described, the combination, with the insulating-block secured to the central supply-tube as specified, of the inclosing sheath adapted to embrace the shouldered base of the block and secure it to the body of the instrument between which and the central tube the insulating-block is interposed, the sheath being prolonged, so as also to shield the block as described.

5. In an instrument of the kind described, the combination with the tubular vaporizing-chamber forming the handle of the instrument, and having inlet and exit tubes projecting longitudinally therein of a rotary valve interposed between the vaporizing and combustion chambers and in direct connection by a lateral nozzle with the air-supply tube, the valve controlling the inlet and exit thoroughfares to and from the vaporizing-chamber and likewise a by-pass thoroughfare giving direct admission for air without passing through the vaporizing-chamber, so as to enable the proportion of air to be dosed and the supply of mixture or air to the combustion-chamber to be efficiently controlled, as specified.

6. In an instrument of the kind described, the combination, with the combustion-chamber having a lateral orifice for the escape of the products of combustion, of an inclosing sheath connected rotatably with the combustion-chamber and its ferrule, and having a circumferential channel into which the discharge-orifice opens, and a radial discharge-nozzle for directing the gaseous products away from the operator, as described.

WILLIAM HENRY BEACH.

In presence of—

T. W. KENNARD,
C. C. M. GIBSON.