G. DAVEY.

SUPPORT FOR PYROMETERS.

APPLICATION FILED AUG. 11, 1915.

Patented Mar. 12, 1918.

3 SHEETS—SHEET 1.

1,259,372.

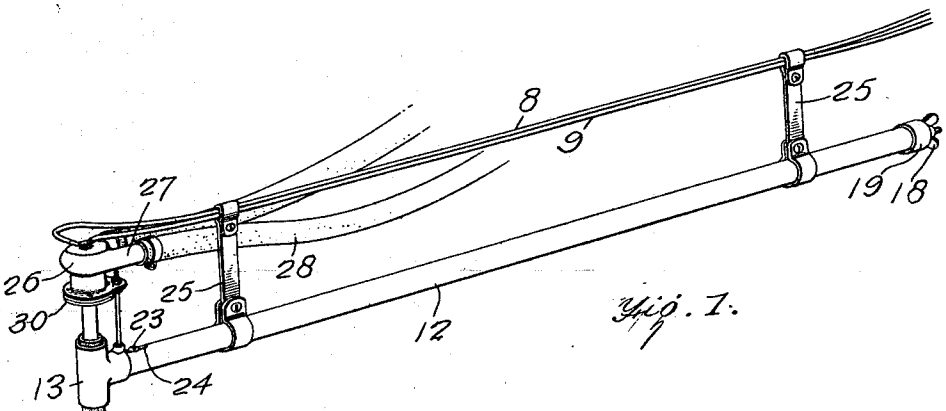


Fig. 7.

Fig. 5.

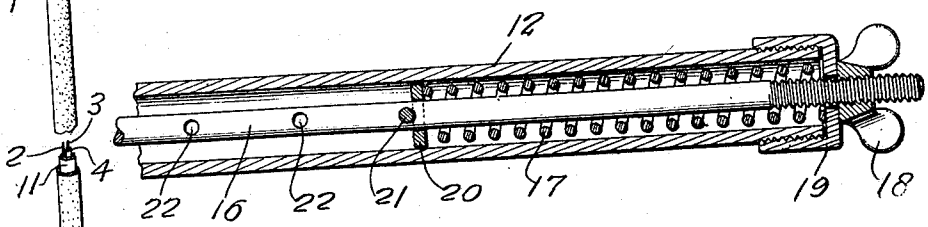
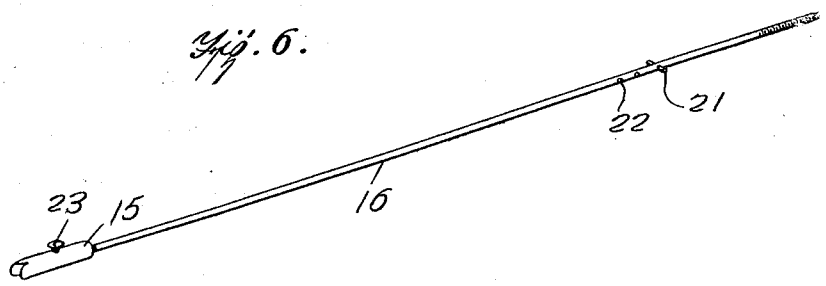


Fig. 6.



Witnesses

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3 SHEETS—SHEET 2.

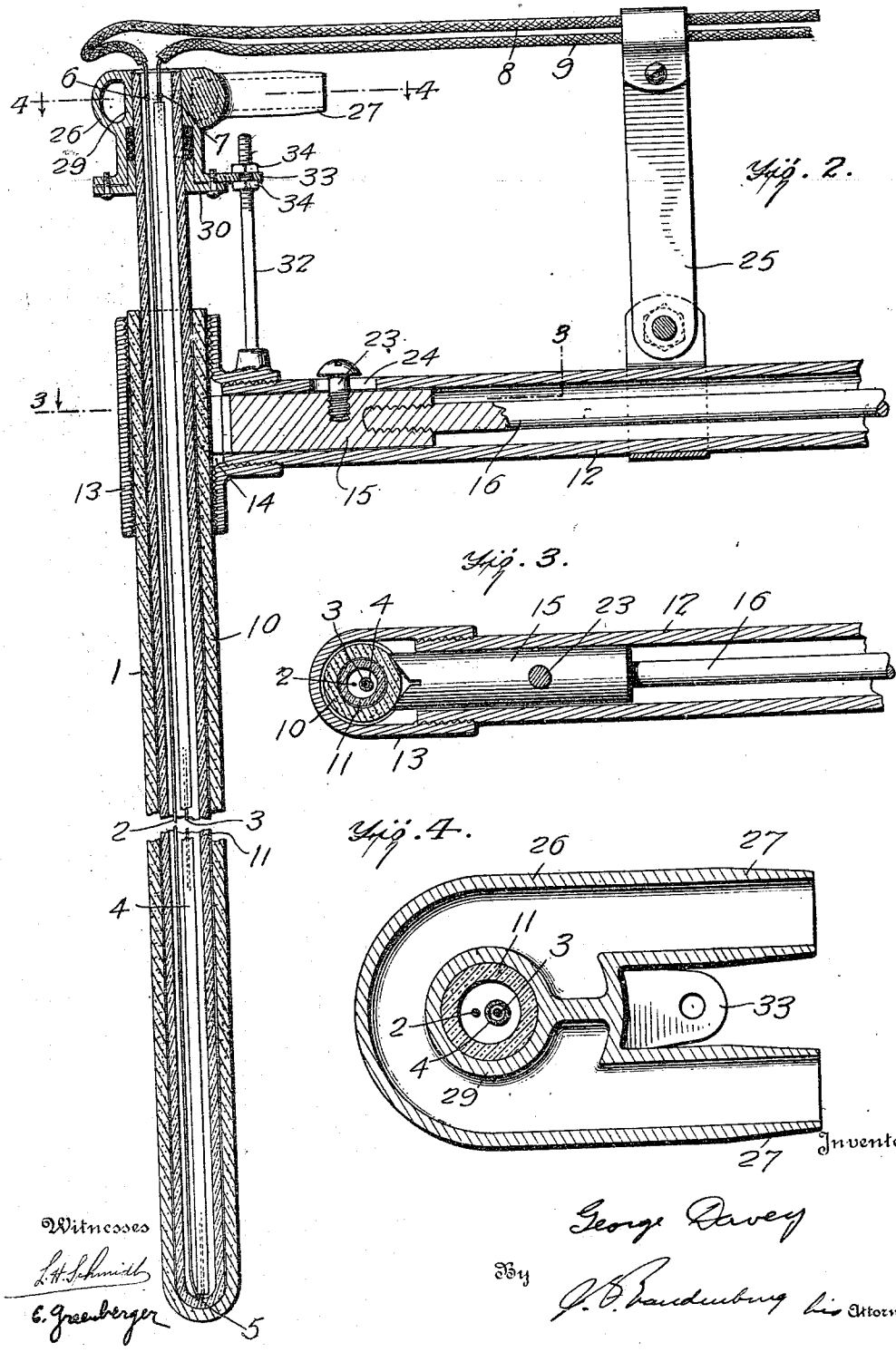


Fig. 2.

Fig. 3.

Fig. 4.

Witnesses

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3 SHEETS—SHEET 3.

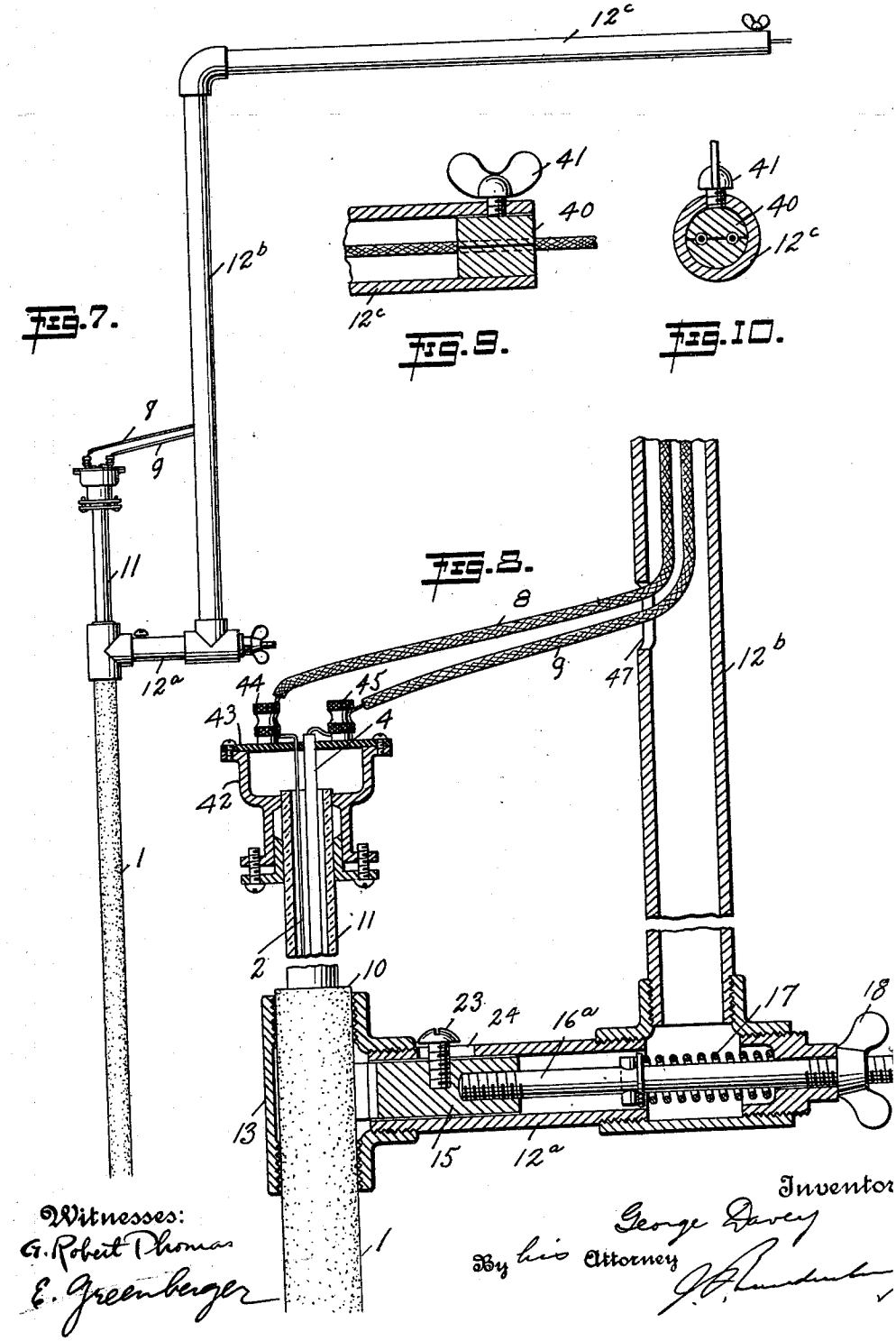


Fig. 7.

Fig. 9.

Fig. 10.

Fig. 8.

Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE DAVEY, OF BROOKLYN, NEW YORK.

SUPPORT FOR PYROMETERS.

1,259,372. Specification of Letters Patent. Patented Mar. 12, 1918.

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To all whom it may concern:

Be it known that I, GEORGE DAVEY, a subject of the King of Great Britain, and a resident of the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements Relating to Supports for Pyrometers, of which the following is a specification.

My invention comprises certain improvements relating to pyrometers, one of the objects of which is to enable the sensitive end of the pyrometer, comprising the thermo-couple, to be conveniently supported by an attendant or observer standing at a distance from a crucible of molten metal or the like, in which said sensitive end may be immersed, the sensitive end being held in such manner as to guard against breakage of the protective tube of comparatively fragile refractory material by which the couple is surrounded. Another object is to guard against error in the reading by the provision of simple and effective means for cooling the "cold" junctions of the thermo-couple.

In the accompanying drawings illustrating the invention in its preferred embodiment:

Figure 1 is a perspective view of the apparatus, the intermediate portion of the sensitive end of the pyrometer being broken away for economy of space;

Fig. 2 is a vertical section taken in the plane of the handle, the latter being broken away;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 2;

Fig. 5 is a longitudinal section through the rear part of the handle;

Fig. 6 is a perspective view of the longitudinal spring-pressed clamping member;

Fig. 7 is a side elevation of a modified form of holder with a pyrometer therein;

Fig. 8 is a fragmentary vertical section on an enlarged scale; and

Figs. 9 and 10 are detail longitudinal and cross sections, taken at the rear end of the handle.

The sensitive end of the pyrometer, designated as a whole by the reference numeral 1, is of known character, consisting of a thermo-couple incased in suitable tubing enabling it to be introduced into regions or molten bodies of great heat to measure the temperature thereof. The thermo-couple is illustrated as of the rare metal type, but the invention is also applicable to base metal couples. The members of the thermo-couple are designated 2 and 3, and are insulated from each other in a suitable manner, as by a small tube 4 of insulating material surrounding one of them. The "hot" junction 5 is at the bottom, as usual, and the cold junctions 6 and 7 at the top, the latter constituting the connections between the thermo-couple elements and the leads 8, 9, extending to the usual indicator (not shown). As will be understood by those skilled in the art, the members of the thermo-couple being of diverse metals, heating of the hot junction while the remote junctions remain cool causes a current of electricity to flow, the strength of which is proportional to the temperature and causes the indicator (not shown) to register the proper reading. In the particular type of pyrometer selected for illustration, the protective tubing comprises an outer tube 10 of graphite and an inner tube 11 of quartz, extending above the graphite tube, both tubes being closed at the bottom.

The present invention is concerned more particularly, though not necessarily exclusively, with the use of such pyrometers for measuring the temperatures of molten bodies of metal in crucibles or the like, and the purpose is to provide the sensitive end with a simple and reliable holder which enables the attendant to immerse and withdraw the thermo-couple with its protective tubing without himself being exposed to the great heat in the immediate vicinity of the receptacle and without danger of injuring the comparatively fragile graphite or refractory tube 10. The invention also aims to guard the cold junctions of the thermo-couple from the heat rising from the receptacle.

The holder of Fig. 1 comprises a horizontally elongated hollow handle 12, preferably of metal tubing, and a tubular socket 13 set at an angle on the forward end of the handle and provided with an opening 14 in its side communicating with the interior of the handle. A slidable clamping piece 15 operates in this opening and in the forward part of the bore of the handle, which it occupies with a sliding fit, and is secured to the forward end of a rod 16 which extends lengthwise within the handle. The clamp-

ing piece is formed with a V-shaped extremity, to engage the side of the outer tube 10 of the pyrometer and hold the same against the forward side of the socket 13. The socket, being preferably an ordinary T-connection, is provided with internal screw-threads, which coöperate advantageously with the forked clamping piece to hold the graphite tube securely, yet without danger of breaking. To the same end means, in the nature of a spring 17, is provided for projecting the clamping piece into the socket and against the said tube, while a wing nut 18, threaded on the rearwardly-projecting extremity of the rod and bearing against a cap 19 on the rear end of the handle serves to ease off the rod under the action of the spring or to withdraw the same against such action. The spring is housed within the rearward portion of the haindle, in order to escape the effects of the heat, and bears at one end against the cap 19 and at the other end against a washer 20 retained by a pin 21, which may be passed through one or another of a series of holes 22 in the rod provided for purposes of adjustment. A screw 23 threaded into the clamping piece 15 and operating in a slot 24 in the handle serves to keep the clamping piece from turning. It will thus be seen that I provide a non-rigid clamp for gripping the breakable tube of the thermo-couple, which holds the tube with certainty yet without danger of crushing.

Means are also provided on the handle for supporting the leads 8, 9 out of the way, the said means preferably comprising clips 25 projecting upward from the handle and having eyes through which the wires are passed.

The cooling means comprises a member 26 affording a water passage around the upper part of the thermo-couple, and consisting preferably of a hollow piece in the nature of a return bend, having nipples 27 for the attachment of suitable flexible supply and return connection 28, leading one from a suitable source of water supply and the other to a point of discharge or back to the source. A hollow core or tubular wall 29 formed within the jacket member accommodates the upper part of the thermo-couple and the inclosing tube 11, to which latter the water-jacket is preferably secured frictionally by means of a stuffing-box 30 formed with or attached to the lower part of the water-jacket member. The water-jacket member is preferably supported, however, by the handle, for which purpose a stud bolt 32 is tapped into a boss in the forward part of the holder and passes loosely through a hole in a lug 33 on the water-jacket member, nuts 34 being provided at opposite sides of this lug in order to fix the water-jacket member to the bolt. In this way an adjustable mounting is provided for the water-jacket member, which, in conjunction with the adjustability of the said member on the tube 11, enables the water-jacket to be set at the proper height with reference to the cold junctions and at the same time obviates upward displacement of the thermo-couple and tube 11 with reference to the outer tube 10. Water enters through one of the connections 28, circulates around the upper part of the thermo-couple and passes away by the other connection, thus enabling the cold junctions to be maintained at a uniform relatively low temperature, so as to secure accuracy in the readings.

In order to remove the sensitive end of the pyrometer from the holder, the nut 18 is turned in one direction, so as to draw the clamping device rearward, and the upper nut 34 holding the water-jacket is also removed. The sensitive end may now be lifted out as a whole. When it is re-inserted the turning of the nut 18 in the reverse direction merely eases off the spring 17, so that the clamping device is forced against the tube 10 only by the expansive pressure of the spring, and consequently danger of breakage is avoided.

In order to replace the graphite tube 10, when broken, the nut 18 only is released, and the tube 10 is taken out, the water-jacket member remaining supported by the holder, and in turn, through the stuffing-box, supporting the inner tube 11 and the thermo-couple.

Figs. 7 to 10 illustrate an alternative form of handle, which is designed more particularly for use where the sensitive end of the pyrometer is to be inserted into pit furnaces. In this construction the main parts of the handle are as before and are designated by similar reference characters. The portion 12^a of the handle, containing the clamping elements 15 and 16^a, is comparatively short and is united with the vertical handle member 12^b, which in turn is connected with a horizontal handle member 12^c. The sensitive end of the pyrometer is shown as provided at the top with a connection head 42, mounted on the inner tube 11 after the manner of the water-jacket, previously described, and bearing binding posts 44, 45 on an insulating cover 43. The mains of the thermo-couple and the leads 8 and 9 are connected with these binding posts, and the latter are led through the handle members 12^b and 12^c emerging from an opening 47 in the former. At the rear end of the member 12^c the wires may be held in a split block 40, the members of which are pressed together by a set screw 41.

What I claim as new is:

1. A holder for the sensitive end of a pyrometer, comprising an elongated hollow handle terminating in a tubular socket set at

an angle thereto, an element disposed longitudinally within said handle and terminating in a clamp portion adapted to project into said socket, a spring for urging said element toward the socket, and means at the rear end of said element for permitting the same to be projected by the action of the spring and for withdrawing the element against the spring action.

2. A holder for the sensitive end of a pyrometer, comprising a hollow handle member, a tubular socket on the forward end of the handle member having an opening in its side communicating with the interior of the handle member, a rod extending longitudinally within the handle member, a clamping piece on the forward end of said rod operative through said opening and having a V-shaped extremity, a spring inside the handle member arranged to urge said rod forward, and an operating nut threaded on the projecting rear end of said rod and bearing against the handle.

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

GEORGE DAVEY.

Witnesses:
CHAS. H. WILSEY,
S. SPENCER BROWN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."