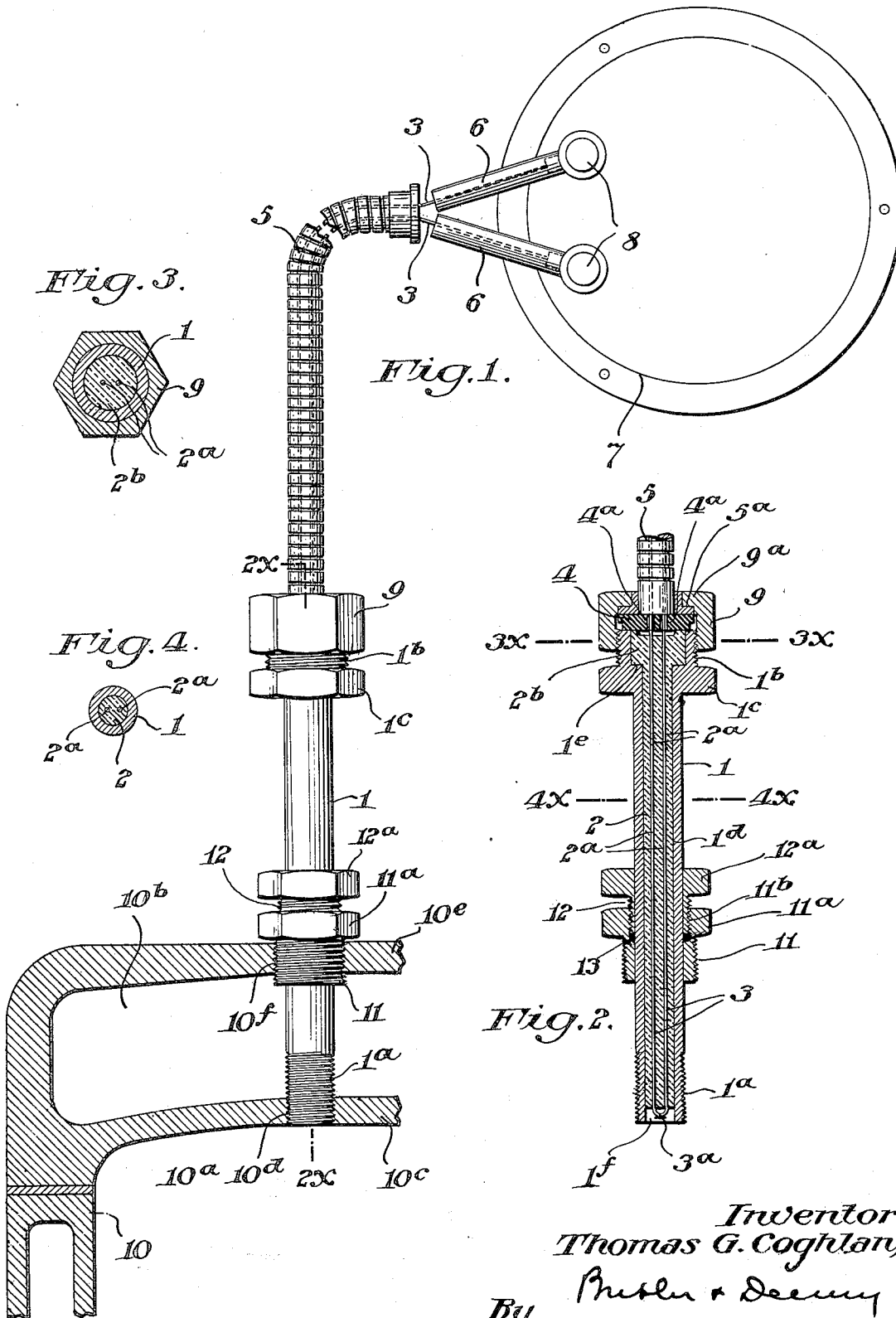


1,422,672.

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UNITED STATES PATENT OFFICE.

THOMAS G. COGHLAN, OF WELLSBURG, WEST VIRGINIA.

THERMOCOUPLE.

1,422,672.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THOMAS G. COGHLAN, a citizen of the United States, residing at Wellsburg, in the county of Brooke and State of West Virginia, have invented certain Improvements in Thermocouples, of which the following is a specification.

This invention is an improved thermocouple designed for combination with an internal combustion engine and mechanism adapted to indicate the temperature of combustion and to provide the necessary information for regulating the constituents of the explosive mixture.

The present invention is an improvement of the apparatus shown in the U. S. patent to Hopkins, No. 903090, and its characteristic features of improvement comprise means for preventing the couple from igniting the explosive charge in the combustion chamber of the engine.

The invention is characterized, in its preferred form, by a metal housing or tube adapted to be set in the wall of an explosion chamber, insulating means housed by the metal tube, conductors of different metals passing through the insulation to a union or junction in a chamber within the housing, and a meter in circuit with the conductors for indicating or interpolating the temperature within the explosion chamber.

My improved device possesses the desiderata that it can be mechanically secured advantageously in gas tight and insulated relation to the combustion chamber of an engine with the union of the conductors housed therein so as to prevent the ignition of the charge thereby as also the deposit of carbon thereon by the burning gases, and that will cause an instant indication of the slightest temperature changes in the combustion chamber so that the operator may be advised of the character of the mixture and of changes desirable therein.

In analogous means heretofore proposed for indicating the temperature of combustion in explosion chambers, the union or junction between the metallically different conductors entering into the couple and acting electrically upon a meter to indicate temperature changes, has become heated by the character of its exposure to the burning gases so as to prematurely ignite succeeding charges of combustible gas and has been subject to deposits of carbon interfering with its desired operation, which objection-

able conditions are avoided by my improvements.

In the accompanying drawings, Fig. 1 is a broken view of a form of my improved device applied to the combustion chamber of a gas engine shown in fragmentary section; Fig. 2 is a longitudinal sectional view of the features embodying my improvements taken on the line 2^x-2^x of Fig. 1; Fig. 3 is a sectional view taken on the line 3^x-3^x of Fig. 2, and Fig. 4 is a sectional view taken on the line 4^x-4^x of Fig. 2.

My improved mechanism, in the form thereof illustrated in the drawings, comprises the metal housing 1, which is suitably a steel tube having a threaded end 1^a, an enlarged threaded end 1^b and polygonal flange 1^c adjacent to the latter end, the tube containing the cylindrical bore 1^d having the enlarged section 1^e within the end 1^b.

An insulating core 2, containing the longitudinal passages 2^a, fits within the housing, the core having the enlarged end section or head 2^b which fits within the housing section 1^e, and the opposite end of the core terminating short of the corresponding end of the housing to provide therein a recess or chamber 1^f, say $\frac{1}{4}$ inch in diameter.

Conductors 3, respectively of different metals such as chromal (nickel plus 5% chromium) and alupal, (nickel plus 10% aluminum), extend through the passages 2^a and have a union or junction 3^a within the chamber 1^f. The conductors 3, at the end of the core 2 opposite the chamber 1^f, extend through passages 4^a in an insulating washer 4 and through the flexible armor 5 fixed to the housing 1 and the armor 6, fixed to the milli-volt meter 7, to the binding posts 8 in the back of the meter, the latter being adapted for fastening to a convenient support as the dash board of an automobile.

The armor 5 is provided with an end flange 5^a which engages the washer 4 and is engaged by the flange 9^a of a gland nut 9 screwed on the housing section 1^b, whereby the parts 1, 2, 4 and 5 are clamped together.

The housing 1 is adapted to be connected with a gas engine 10 having the combustion chamber 10^a and the water cooling chamber 10^b by tapping the wall 10^c of the cooling chamber with the threaded aperture 10^d, adapted for engaging the threaded end 1^a of the housing, and the wall 10^e with the larger threaded aperture 10^f in line with the aper-

ture 10^d. An externally threaded bushing 11, having the polygonal section 11^a together with the internally threaded stuffing chamber 11^b, and the externally threaded gland 5 or follower 12 having the polygonal section 12^a, are sleeved on the housing 1. The housing 1 is passed through the aperture 10^c and its end 1^a screwed into the aperture 10^d, the bushing 11 is screwed into the aperture 10^c, and the follower 12 is screwed into the bushing against the packing 13 therein to provide a gas tight joint with the housing. The washer 4, which is pressed against the ends of the parts 1^b and 2^b, prevents the 15 escape of gas from the cylinder 10 between these parts. The device is thus adapted to be connected with the cylinder in gas tight relation.

It will be understood that temperature 20 changes in the combustion chamber will be indicated by the milli-volt meter due to variations in the electrical action induced by heating the union of the conductors to different temperatures.

25 As the union 3^a of the couple is housed in the chamber 1^f and as this chamber is filled with inert or dead gas resulting from the explosions of the live gases, such live gases are not in direct or such contact with the 30 union as to be ignited thereby.

There is thus provided, by the metal tube and porcelain or insulating core, housing means for the conductors and a cell for the union within the housing means, of such 35 character as to permit such union to be directly heated by the exploded charge and to prevent the ignition by such heated union of a succeeding charge of explosive fluid.

Having thus described my invention, I 40 claim:—

1. A thermo-couple comprising different metals forming a union and means comprising an open chamber for housing said union so as to permit its exposure to heat 45 transfer from gaseous products of combustion and prevent its ignition of an unexploded fluid adapted for providing such gaseous products.

2. A thermo-couple comprising conductors 50 of different kinds forming a union and housing means for said conductors, said housing means comprising a metal tube having therein an open chamber containing said union and adapted for preventing the

explosion by heat transfer therefrom of an 55 explosive fluid with which said chamber communicates.

3. In a thermo-couple, the combination with an insulator and a housing therefor, said housing having an open chamber, of 60 conductors extending through said insulator and having a union within said chamber.

4. In a thermo-couple, the combination with a metal tube and an insulating core housed therein, said tube and core forming 65 an open chamber, of conductors extending through said core to a union of dissimilar metals within said chamber.

5. A thermo-couple comprising a pair of conductors of dissimilar metals having a 70 union and a housing for said conductors, said housing having a restricted open chamber in an end thereof with said union therein adjacent to the opening thereof.

6. In a thermo-couple, the combination 75 with an engine having an explosion chamber, of a housing set in a wall of said chamber, an insulator within said housing, and conductors extending through said insulator to a union in communication with said 80 chamber, said housing and insulator providing a cell for said union and adapted for preventing the explosion of gas in said chamber thereby.

7. A thermo-couple comprising a metal 85 tube having an enlarged end, an insulating core disposed in said tube, said core having an enlarged end in the enlarged end of said tube, means comprising a coupling member whereby said tube and core are held in 90 fixed relation, and conductors extending through said core to a union in a cell at the end of said core, opposite said head.

8. A thermo-couple comprising a metal 95 tube provided with means adapted for connecting it with a gas chamber and packing means movable on said tube for preventing the escape of fluid around the same, in combination with an insulating core in said tube and forming therewith a cell com- 100 municating with said chamber, means for closing the joint between said tube and core to prevent the escape of gas therebetween, and conductors extending through said core to a union in said chamber. 105

In testimony whereof I have hereunto set my name this seventh day of March, 1921.

THOS G. COGHLAN.