

C. B. THWING.
 COMPENSATING DEVICE FOR THERMO COUPLES.
 APPLICATION FILED NOV. 30, 1918.

1,344,462.

Patented June 22, 1920.

Fig. 1.

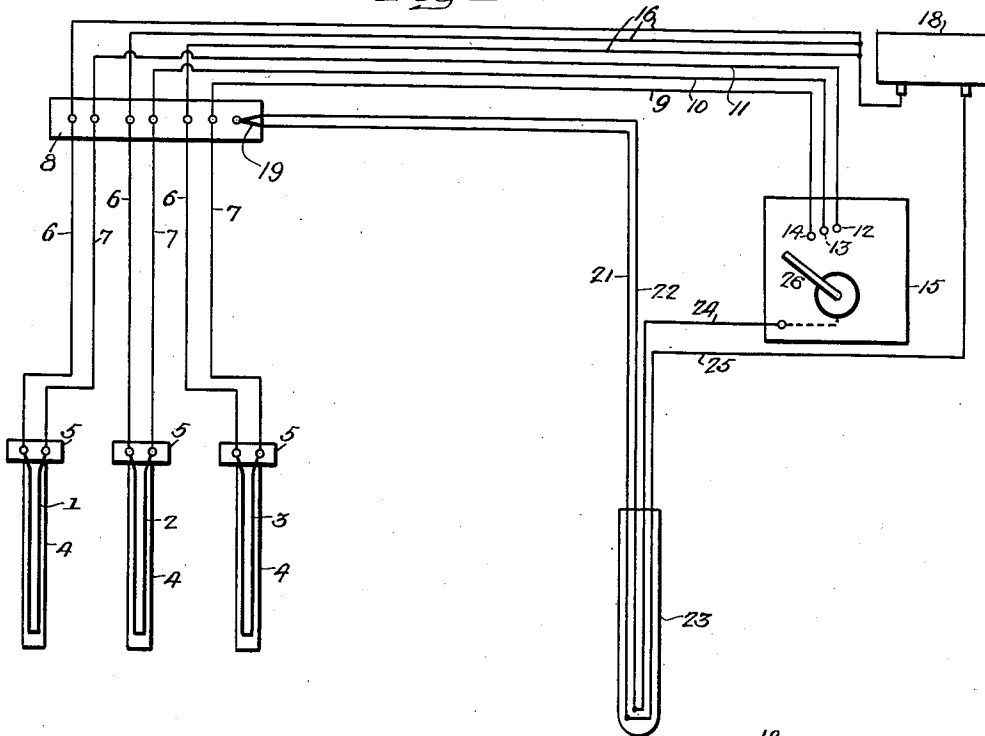
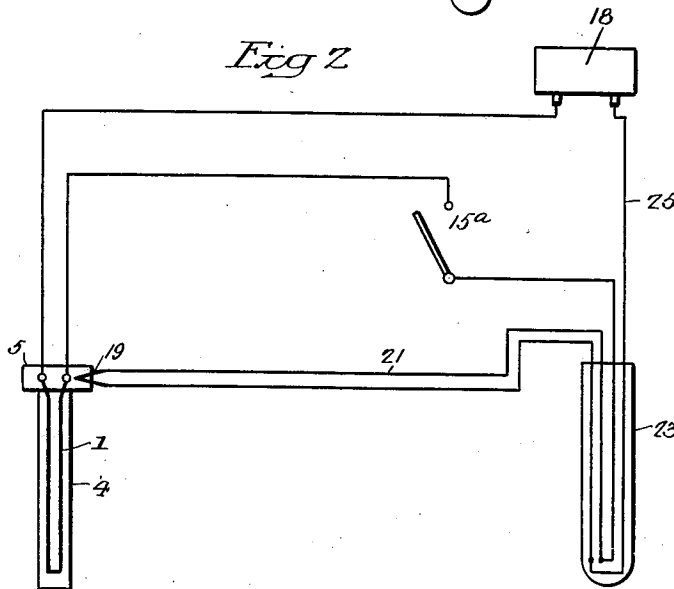


Fig. 2



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COMPENSATING DEVICE FOR THERMO-COUPLES.

1,344,462.

Specification of Letters Patent. Patented June 22, 1920.

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To all whom it may concern:

Be it known that I, CHARLES B. THWING, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented
5 Compensating Devices for Thermo-Couples, of which the following is a specification.

As is understood by those skilled in the thermo-electric art, there is an error in the indications of a galvanometer connected to
10 a thermo-couple, by reason of the variations of temperature occurring at the cold end of the latter, so that it is necessary, in order that the readings of the galvanometer shall be due solely to variations of temperature of
15 the hot end of the thermo-couple, to provide some device whereby the temperature variations of the cold end shall be compensated for or corrected.

One object of my invention therefore, is
20 to provide a compensating device for instruments of the class above indicated which in addition to satisfactorily performing its required functions, shall be inexpensive and of such a nature as will permit of its being installed at a distance from the thermo-couple
25 or couples with which it is designed to operate;—usually at a point adjacent the indicating galvanometer.

These objects and other advantageous ends
30 I attain as hereinafter set forth, reference being had to the accompanying drawings, in which:

Figure 1 is a diagrammatic view illustrating one form of my invention; and

35 Fig. 2 is a view similar to Fig. 1, showing a modification of the invention.

In Fig. 1 of the above drawings 1, 2 and 3 represent thermo-couples having their hot ends within tubes 4 which may be mounted
40 within a stack, kiln, furnace or other structure or apparatus whose temperature it is desired to record or indicate. In the present instance, the three thermo-couples are designed for use in three different parts of a furnace and each of the containing tubes 4
45 has connected to or associated with it a junction box 5 into which the cold ends of said thermo-couples project. In addition, each thermo-couple has connected to its terminals
50 a pair of conductors 6 and 7 constituting extensions, and as they are made of the same metals as the elements of their respective thermo-couples, they are usually of reduced cross section. All of these extensions project

into and terminate within a common junction box 8 from which copper or other relatively inexpensive conductors 9, 10 and 11 extend from the extensions 7 to three contacts 14, 13 and 12 respectively of a multi-point switch 15. The extensions 7 are like-
60 wise connected by three copper conductors or, if desired, by a single copper conductor 16, to one terminal of an indicator 18.

According to my invention I provide an auxiliary thermo-couple 19 having its hot
65 end within the common junction box 8, and including conductors 22 and 21 of the same materials as those of said thermo-couples 1, 2 and 3 constituting thermo-couple extensions, which are run into and terminate
70 in a cavity in the ground indicated at 23, constituting a cold end well. From said cold end terminals two copper or relatively inexpensive metal conductors 24 and 25 lead
75 to the adjustable blade 26 of the switch 15 and to the second terminal of the indicating instrument 18 respectively.

The cold end of the auxiliary thermo-couple is thus maintained at a substantially
80 constant temperature by being placed in the cold end well 23, and the latter may be situated at any convenient point, preferably near the indicator 18. The electromotive force of this thermo-couple is thus dependent solely on the variations of temperature
85 occurring in the common junction box 8 which likewise affect the cold ends of the thermo-couples 1, 2 and 3 and as a result the auxiliary thermo-couple exactly counteracts or compensates for the variations
90 in the electromotive force of the thermo-couples 1, 2 and 3, being connected in series with the indicator 18 and with any one of said thermo-couples according to the position of the switch blade 26 relatively to the
95 contacts 12, 13 or 14.

In some cases it may be advantageous to provide the auxiliary thermo-couple and its cold end well arranged as above described when but a single main thermo-couple is
100 employed. The hot end of the auxiliary thermo-couple 19 in this case is placed in the junction box 5 and as before it has extensions 21 and 22 which terminate in the cold end well 23. A switch 15^a is connected be-
105 tween one of the cold end terminals and one terminal of the main thermo-couple so as to allow of the current being cut off from

the apparatus when the apparatus is not required to be in service.

I claim:

1. The combination of a plurality of thermo-couples; a common junction box for said thermo-couples; pairs of thermo-couple extensions connected respectively to the thermo-couple terminals in the common junction box; an indicating instrument having one of its terminals connected to one thermo-couple extension of each pair; a multiple switch having certain of its contacts connected respectively to the second thermo-couple extension of each pair; a cold well; an auxiliary thermo-couple having its hot end in the common junction box and its cold end in the cold well; with conductors respectively connecting the cold end terminals of the auxiliary thermo-couple with another contact of the switch and with the second terminal of the indicator.

2. The combination of a series of thermo-couples each having extensions; a common junction box receiving said extensions; an indicator; conductors connecting certain of the thermo-couple extensions with one terminal of the indicator; a cold well; an auxiliary thermo-couple having its hot end in the common junction box and its cold end in the cold well; with means for connecting at will said auxiliary thermo-couple in series between the second terminal of the indicator and any of the remaining thermo-couple extensions.

3. The combination of a series of thermo-couples, each having extensions; a common junction box entered by said extensions; an indicator; a multiple switch; conductors connecting certain of the thermo-couple ex-

tensions with one terminal of the indicator; other conductors connecting the remaining thermo-couple extensions to the switch; a cold well; an auxiliary thermo-couple having its hot end in the common junction box and its cold end in the cold well; with conductors connecting said auxiliary thermo-couple with the switch and with the second terminal of the indicator.

4. The combination of a plurality of thermo-couples; extensions for each of said thermo-couples; a junction box entered by said extensions; an indicating instrument connected to certain of said extensions; a cold well relatively distant from the thermo-couples; an auxiliary thermo-couple having its hot end in the common junction box and its cold end in the cold well; and means including a switch for connecting the auxiliary thermo-couple in series with the indicator and any of the other thermo-couples at will.

5. The combination of a main thermo-couple; extensions for said thermo-couple; a junction box for said extensions; an indicating instrument; a base metal conductor connecting one of the indicator terminals to one of the thermo-couple extensions in said junction box; a cold well relatively distant from the thermo-couple; an auxiliary thermo-couple having its hot end in the junction box and its cold end in the cold well; with means for connecting said auxiliary thermo-couple between the second extension of the main thermo-couple and the second terminal of the indicator.

In witness whereof I affix my signature.

CHARLES B. THWING.