

No. 614,241.

Patented Nov. 15, 1898.

E. A. UEHLING.  
PYROMETER.

(Application filed Nov. 9, 1897.)

(No Model.)

Fig. 1,

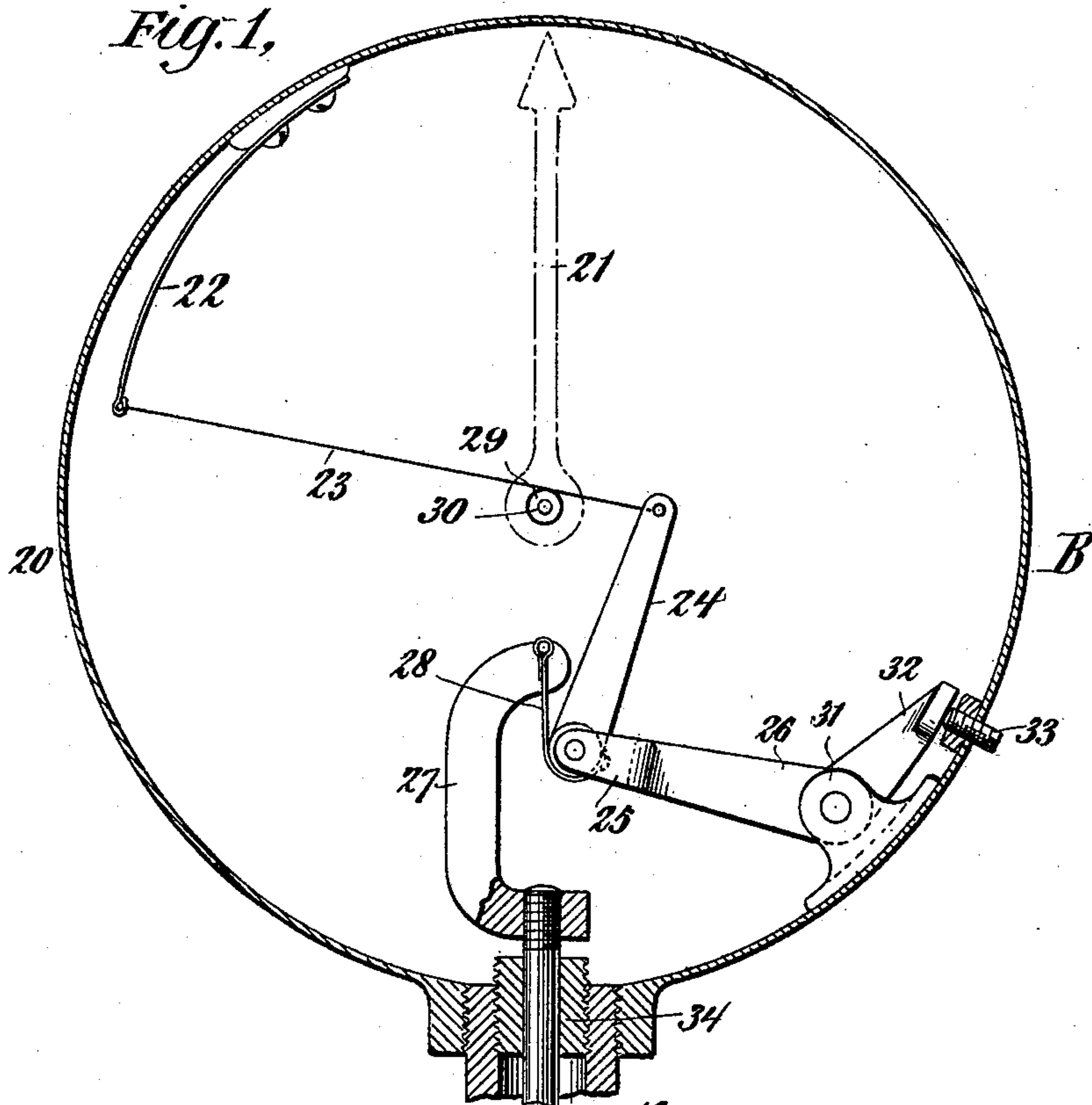
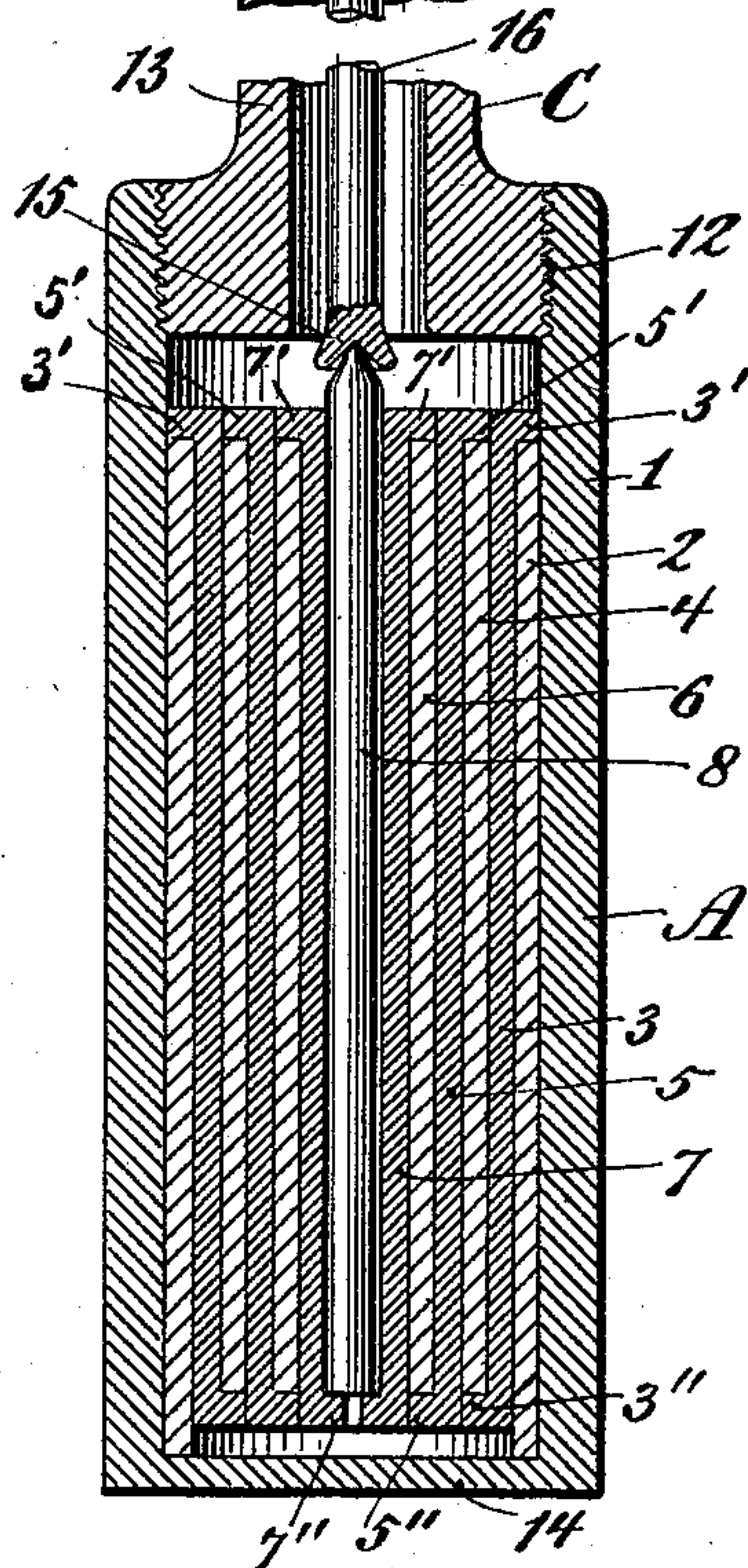
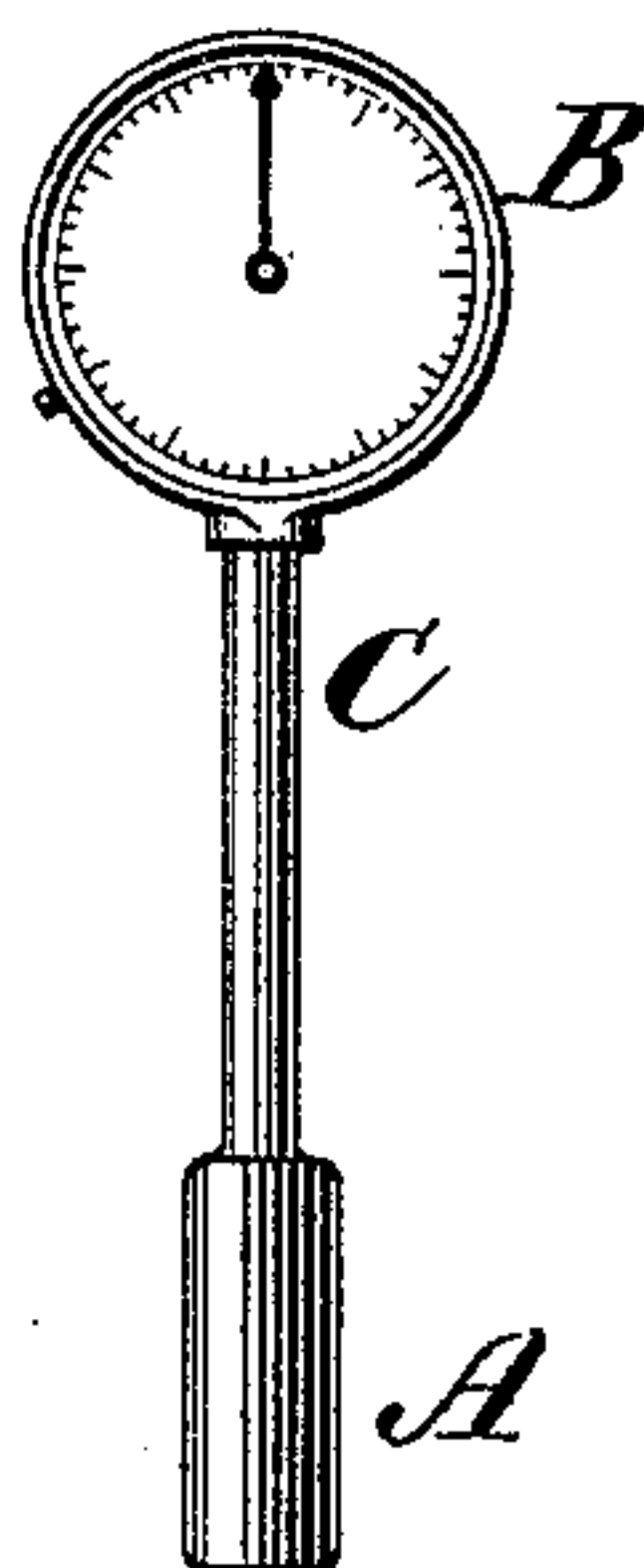


Fig. 2,



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## PYROMETER.

SPECIFICATION forming part of Letters Patent No. 614,241, dated November 15, 1898.

Application filed November 9, 1897. Serial No. 657,922. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD A. UEHLING, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Pyrometers, of which the following is a specification.

My invention relates to pyrometers of the class in which the indicating mechanism is operated by the relative expansion of solids having different coefficients of expansion, the object being to produce a pyrometer of the class described in which the part exposed to the action of the heat and controlling the indicator shall occupy a relatively small space. The object is, further, to produce a pyrometer of more simple and effective construction and one that is more easily adjusted and cheaper to manufacture than those heretofore produced.

My invention consists in providing two series of relatively short expansion members, one series having a greater coefficient of expansion than the other, arranged side by side in parallel positions and alternately joined together at their ends, so that while the length of the group taken as a whole is practically that of a single member the resultant movement available for actuating the indicator is equal to the aggregate difference between the expansion of all of the members having the smaller coefficient and those having the greater coefficient of expansion.

My invention consists, further, in a novel construction and arrangement of the indicating mechanism, whereby an exceedingly simple and effective adjustment is obtained.

My invention comprises in a general way an expansion mechanism, (designated in a general way by A,) an indicating mechanism, (designated in a general way by B,) and a connecting mechanism, (designated in a general way by C.)

In the drawings accompanying and forming a part of this specification, Figure 1 is a sectional view of a pyrometer embodying my invention, taken through the center of the expansion mechanism A and connecting mechanism C in a plane parallel to the dial of the indicating mechanism B. Fig. 2 is a front view, on a reduced scale, of the pyrometer.

Similar characters of reference designate like parts in both of the figures.

In the preferred form of my invention herein shown and described the expansion mechanism (designated generally by A) consists of the series of expansion members 2, 4, 6, and 8, having a relatively great coefficient of expansion, and another series of expansion members 1, 3, 5, and 7, having a relatively small coefficient of expansion.

The expansion member 1, forming one of the series having a small coefficient of expansion, is made in the form of an inclosing case adapted to receive within it the other expansion members of both series and is joined by the screw-threads 12 to the tube 13 of the connecting mechanism C. The expansion member 2 is made in the form of a plain cylindrical ring and rests upon the bottom 14 of the case 1 and supports at its upper end the expansion member 3 by means of its flange 3'. The expansion member 4 is supported by the flange 3'' of the expansion member 3 and supports at its upper end the expansion member 5 by means of the flange 5', and the expansion member 6 in like manner is supported by the flange 5'' on the lower end of 5 and in turn supports the expansion member 7, while the expansion member 8 is supported by the flange 7'' on the lower end of the expansion member 7.

The expansion members 2, 4, and 6 are in the form of plain cylindrical rings, while 3, 5, and 7 are in the form of plain cylindrical rings with outwardly-extending flanges at their upper ends and inwardly-extending flanges at their lower ends. The expansion member 8 is in the form of a cylindrical rod pointed at its upper end and adapted to have engagement with the recess 15 in the lower end of the rod 16, which communicates the movement from the expansion mechanism to the indicating mechanism.

The particular material used for the different expansion members will vary somewhat according to the particular kind of service required of the pyrometer, and it is not necessary that all of the expansion members of either series should be of the same material. It is, however, desirable to make the tube 13 and the rod 16 of the same material or of ma-



materials having the same coefficient of expansion, inasmuch as these connections are generally made relatively long and inasmuch as a great or small portion of their length may  
 5 be exposed to the heat. If the rod 16 and the tube 13 are made of the same material, it is obvious that the indicator will not be affected by the different extents which the tube 13 is exposed to the heat. For ordinary uses  
 10 in which the temperature does not exceed from 1000° to 1200° Fahrenheit I prefer to make the expansion members 1, 3, 5, and 7 of cast-iron and those designated by 2, 4, 6, and 8 of brass or copper.

15 The indicating mechanism B comprises the case 20, the indicator-hand or pointer 21, the spring 22, the flexible cord 23, the lever 24, mounted in the end of the arm 25 of the bell-crank 26, the arm 27, attached to the end of  
 20 the rod 16 and also attached to the flexible connection 28, connecting the arm 27 with the lever-arm 24. The cord 23 is attached to the end of the spring 22 and passes around the wheel 29 on the shaft 30 and is attached to  
 25 the end of the lever 24. Attached also to the shaft 30 is the pointer 21. The bell-crank 26, which carries the lever 24, is pivoted in the bracket 31, attached to the indicator-case 20. The screw 33 has contact with the arm 32 of  
 30 the bell-crank 26 and forms a means of adjusting the arm 25. The tension of the spring 22 always tends to press the arm 32 against the screw 33.

It is obvious that for any particular position of the arm 27 corresponding to any particular temperature by means of turning the  
 35 screw 33 in or out the pointer 21 may be brought to any position on the dial and that this forms an exceedingly simple and efficient  
 40 means of adjustment.

The rod 16 is guided at its upper end by the threaded sleeve 34.

I do not wish to limit myself to the exact form of the expansion mechanism herein  
 45 shown, as it is obvious that instead of having a series of concentric cylinders a series of bars or plates suitably connected at their ends could be used with similar effect. I prefer this form as being most convenient to manu-  
 50 facture and as affording opportunity to limit the expansion members to a very small space and at the same time making them in a form best calculated to support each other and resist buckling in case they become overheated.

55 The action of the spring 22 tends to maintain engagement between the ends of the expansion members 3, 5, and 7 and the bottom of the member 1. It is obvious that instead of having a simple bearing engagement a fixed  
 60 connection could be substituted therefor, as

by means of screw-threads, without affecting the operation of the expansion mechanism and without departing from the principle of my invention.

It is further obvious that instead of mak- 65  
 ing the series of members 1, 3, 5, and 7 of material having a smaller coefficient of expansion and the series 2, 4, 6, and 8 of a material having the greater the conditions may be reversed, the only difference in the operation 70  
 being that a rise in temperature of the expansion mechanism would then cause the rod 16 to fall relative to the indicator-case, whereas in the pyrometer described the rod 16 rises  
 with a rise in temperature. The rotation of 75  
 the pointer 21 corresponding to the rise in temperature may be made in either direction, according to the manner in which the flexible cord 23 is attached to the wheel 29.

Having thus described my invention, what 80  
 I claim is—

1. In a pyrometer, the combination of the case forming one and inclosing the remainder of two series of expansion members having different coefficients of expansion as illustrated 85  
 by 1, 3, 5, and 7, forming one series, and 2, 4, 6, and 8, forming the other series, the tube 13 connecting the case 1 with the indicator-case 20, the rod 16, the arm 27 attached thereto, the pointer 21 pivoted in the indicator-case, 90  
 the spring 22, the flexible cord 23 attached to the spring 22 passing around and attached to the wheel 29 on the pivot 30 of the pointer and attached to an arm 24, the arm 24 mounted  
 in the arm 26, the arm 26 being pivoted in the 95  
 bracket 31, and the flexible connection 28 for connecting the expansion mechanism with the indicator mechanism, all substantially as described.

2. In a pyrometer, the combination with 100  
 the expansion mechanism, of the pointer 21, the spring 22, the flexible cord 23, the lever 24, pivoted in the lever 26, the lever 26 being pivoted in the indicator-case B, means for  
 adjusting the lever 26, and connection be- 105  
 tween the lever 24 and the expansion mechanism whereby the pointer 21 is actuated in one direction by the spring 22 and in the opposite direction by the expansion mechanism,  
 and whereby the position of the pointer 21 110  
 may be adjusted independently of the lever 24 and the expansion mechanism.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 6th day of Novem- 115  
 ber, 1897.

EDWARD A. UEHLING.

Witnesses:

M. LAWSON DYER,  
 EDWIN B. HOPKINSON.