No. 647,164. Patented Apr. 10, 1900.

W. I. STAAF.

STEAM GAGE.

(Application filed Jan. 30, 1899.)

(No Model.)

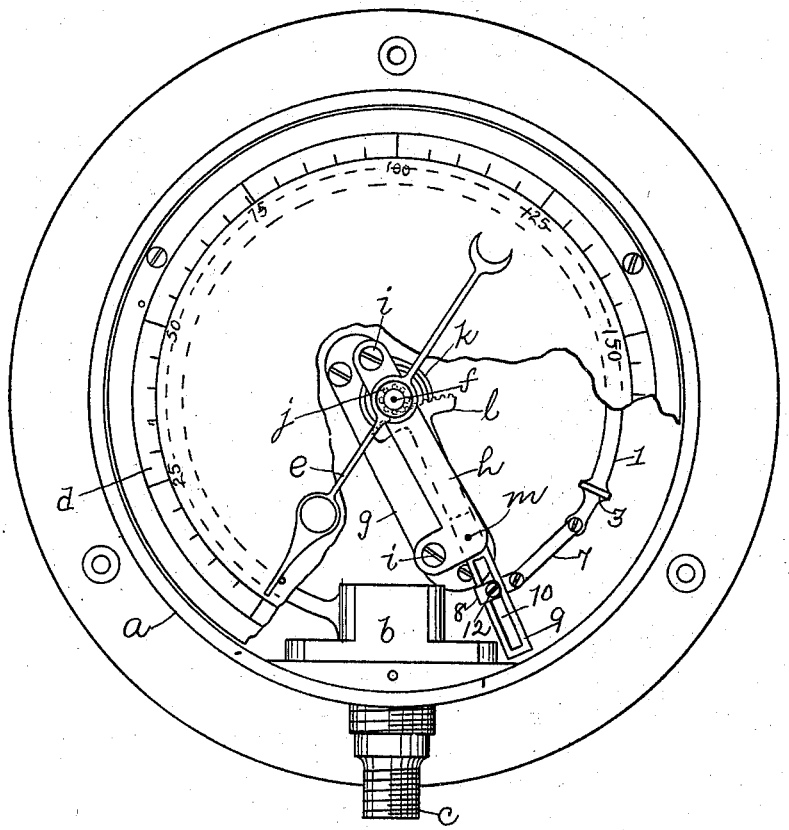

Fig. 1.

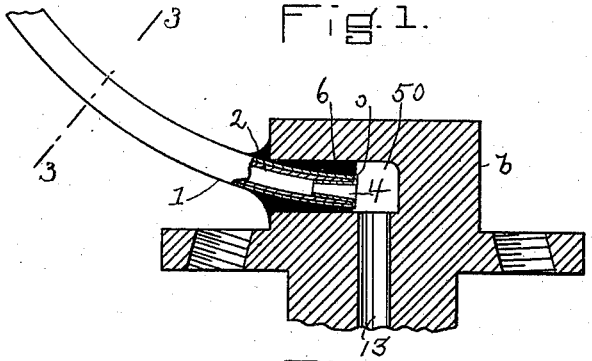

Fig. 2.

WITNESSES.

Matthew M. Blunt

J. Murphy.

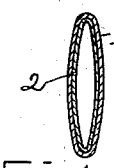

Fig. 3.

INVENTOR.

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ATT'Y.

UNITED STATES PATENT OFFICE.

WERNER I. STAAF, OF CAMBRIDGE, MASSACHUSETTS.

STEAM-GAGE.

SPECIFICATION forming part of Letters Patent No. 647,164, dated April 10, 1900.

Application filed January 30, 1899. Serial No. 703,830. (No model.)

To all whom it may concern:

Be it known that I, WERNER I. STAAF, a citizen of the United States, residing in Cambridge, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Steam-Gages, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention relates to steam-gages of that class in which an index or pointer is rotated by the movement of a spring composed of a curved tube closed at one end and operatively connected to said pointer. The curved tubes referred to are now commonly made of brass or like metals, and in practice these tubes readily respond to variations in pressure, but are faulty in that when the pressure is removed they do not return to the starting-point, but soon become set, and thereby render the gage inaccurate and wholly unreliable.

This invention has for its object to provide a steam-gage which is not open to the objections above referred to, and I accomplish my object by providing the gage with an expansion-tube composed of an outer tube of tempered steel and an inner tube of copper, brass, or like non-corrodible metal, which latter protects the tempered-steel tube from interior corrosion. The tempered-steel tube does not set and renders the steam-gage accurate and available for a substantially long time. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a front elevation, with parts broken away, of a steam-gage embodying this invention; Fig. 2, a sectional detail, on an enlarged scale, to be referred to; and Fig. 3, a cross-section of the expansion-tube.

The main parts of the steam-gage herein shown as embodying this invention may be of any suitable or usual construction and comprise the casing *a*, socket-piece *b*, having the socket 50 and the threaded nipple *c*, the dial *d*, pointer *e* on shaft *f*, having bearings in a frame within the casing *a* and composed of bars *g h*, separated by suitable posts, (not shown, but to which the bar *h* is fastened by screws *i*,) the pinion *j* on shaft *f*, spring *k*, and toothed segment *l*, engaging said pinion and fast on a shaft *m*, having bearings in the bars *g h*. The pointer or index *e* is moved over the dial *d* in accordance with this invention by means of a non-setting expansion-tube composed of an outer tube 1, of tempered steel, and an inner tube 2, of non-corrodible metal, such as brass, copper, &c. The expansion-tube has imparted to it the usual form of the springs now commonly employed, which may be effected by inserting into a cylindrical steel tube a cylindrical inner copper or brass tube, filling the latter with rosin or other suitable material, and rolling the same to substantially flatten the tubes into the form in cross-section shown in Fig. 3, which is substantially elliptical.

One end of the expansion-tube is closed, which may be effected by a suitable cap or plug 3, brazed to the steel tube 1, and the other or inlet end of said expansion-tube may and preferably will be provided with a hollow plug 4, of substantially the same shape in cross-section as the expansion-tube and which is forced into the open end of the non-corrodible tube 2, and preferably the said hollow plug is made tapering on its outer side, so as to expand the end of the tube 2 tightly against the interior of the steel tube 1, and the said hollow plug is also preferably provided with a flange 5 to enable a more efficient joint between the ends of the tubes 1 2 to be obtained by the soldering or brazing material 6 employed to secure the expansion-tube in the socket 50.

The cap or plug 3 and the hollow plug 4 effect a steam-tight joint between the tubes 1 2 at their adjacent ends to prevent entrance of steam between said tubes, which would corrode the steel tube 1 and also force the opposite sides of the thin or light copper or brass tube together, thereby rendering the gage useless.

The cap or plug 3 may and preferably will be connected to the toothed segment *l*, as herein shown—namely, by a link 7 to a block 8, adjustable in an arm 9 of the said segment, said arm having a slot 10, in which the block 8 is adapted to slide, but which may be secured in its adjusted position by set-screw 12.

By means of the adjustable block 8 the pointer may be accurately positioned on the starting-point or zero-mark.

In operation the steam passes through the passage 13 and socket 50 and enters the inner tube 2 of the expansion-tube through the hollow plug 4, and, according to the pressure of the steam, moves said expansion-tube so as to indicate on the dial the amount of the steam-pressure. By reason of the outer tube of the expansion-tube being made of tempered steel the said expansion-tube does not set, but returns to its original condition and position when the steam-pressure is removed, and by reason of the inner tube being of non-corrodible metal the injurious effects of corrosion of the outer tube are avoided and an efficient, accurate, and durable steam-gage obtained.

I prefer to use the hollow plug 4; but while this construction is advantageous good results may be obtained without the same by depending on the brazing material to effectively close the joint or space between the ends of the tubes 1 2.

I claim—

1. In a steam-gage, the combination of the following instrumentalities, viz: a pointer or index, a non-setting expansion-tube connected thereto to effect rotation of the same and composed of an outer tube of tempered steel and an inner tube of non-corrodible metal, and means to effect a steam-tight joint between said inner and outer tubes at their adjacent ends, for the purpose specified.

2. In a steam-gage, the combination of the following instrumentalities, viz: a pointer or index, a non-setting expansion-tube connected thereto to effect rotation of the same and composed of an outer tube of steel and an inner tube of non-corrodible metal, and a hollow tapering plug inserted into the inlet end of the non-corrodible tube, substantially as described.

3. In a steam-gage, a curved expansion-tube composed of a non-setting outer tempered steel tube and an inner tube of non-corrodible metal, and means to effect a steam-tight joint between said tubes at their adjacent ends, substantially as described.

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

WERNER I. STAAF.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.