

June 6, 1933.

H. W. IBBOTT

1,913,239

BOURDON TUBE FOR PRESSURE GAUGES, LIQUID EXPANSION
THERMOMETERS, AND OTHER INSTRUMENTS
Filed May 25, 1931

Fig. 1.

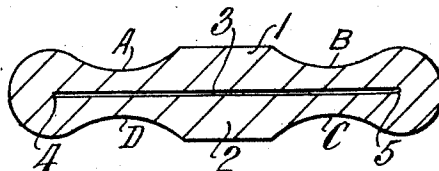
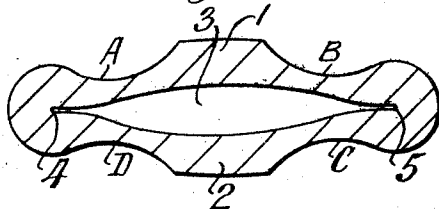


Fig. 2.



Inventor:
Harold William Ibbott,
By His Attorneys,

Baldwin & Wright

UNITED STATES PATENT OFFICE

HAROLD WILLIAM IBBOTT, OF LONDON, ENGLAND, ASSIGNOR TO NEGRETLI & ZAMBRA,
OF LONDON, ENGLAND

BOURDON TUBE FOR PRESSURE GAUGES, LIQUID EXPANSION THERMOMETERS, AND
OTHER INSTRUMENTS

Application filed May 25, 1931, Serial No. 539,957, and in Great Britain March 13, 1931.

This invention relates to improvements in Bourdon tubes for pressure gauges, liquid expansion thermometers and other instruments.

A Bourdon tube consists of a flattened tube of metal bent into an arc of a circle or other curve. When pressure is applied to the interior of the tube, the flattened walls of the tube deflect, causing the Bourdon tube to assume a greater radius of curvature. The Bourdon tube may be in the form of an arc or may consist of many convolutions forming a helix of one or more turns. If one end of the Bourdon tube be fixed, the free end will deflect when pressure is applied to the inside of the tube, and this deflection is a direct indication of the pressure or of the increase in volume of the space enclosed by the walls of the tube. When a Bourdon tube is employed to indicate pressure or expansion, its deflection may be magnified by linkage and gearing, or an index may be directly affixed to the free end of the tube, or any other suitable means may be employed to translate the deflection to an indicating or recording device.

For certain purposes and particularly when the Bourdon tube is applied to distance reading thermometers, it is necessary to reduce the internal volume of the Bourdon tube to a minimum, and in this case the walls of the tube are flattened on themselves so as to leave only a shallow intervening gap.

A Bourdon tube formed in this way is liable to fail by fracture at its edge after a number of dilations, owing to the material fatiguing, the strain being concentrated in the vicinity of the edges of the shallow internal gap.

The purpose of this invention is to increase the life of the Bourdon tube, particularly when it is necessary to form the tube so that it has little internal volume.

According to the present invention, the construction of the tube is modified by reducing the thickness of the walls of the tube about those parts of the shallow internal gap approaching towards but before reaching the edges of the gap, so that upon dilation little if any separation of the walls occurs at the edges of the gap, that is to say divergence of

the walls starts some distance away from these edges. In this way splitting strain is removed from the material where the internal gap terminates.

This may be readily carried into effect by reducing the thickness of the walls of the tube about those parts of the internal gap approaching towards but before reaching the edges of the gap. This localized reduction of the thickness of the walls is suitably effected by recessing (in a gentle curve) the external surface of the tube.

The invention will now be further described with reference to the accompanying drawing, the views in which are enlarged transverse sections of a Bourdon tube. Figure 1 shows a Bourdon tube constructed according to the invention, and Figure 2 is an exaggerated view of this tube dilated.

In the usual form of Bourdon tube, the walls are flattened on one another so as to leave little intervening space 3 between them. When internal pressure has dilated such a tube several times it is found that the tube will fail by fracture at the edges 4 and 5 of the internal gap, owing to the material fatiguing under the splitting strain.

Figures 1 and 2 illustrate how this can be prevented according to the present invention. Referring to these figures, it will be seen that the walls of the tube are reduced in thickness by recessing the outer surface as at A, B, C and D, thereby increasing the transverse flexibility at these points, so that when pressure is set up internally the dilation will commence at A, B, C, D, that is at some distance from the edges 4 and 5, substantially no divergence taking place at the edges as shown in Figure 2.

What I claim is:—

A Bourdon tube having opposed relatively flat walls providing a shallow internal gap between them, the said walls having parallel longitudinal grooves adjacent the transverse edges of the tube whereby the walls are provided with zones of reduced thickness.

In testimony that I claim the foregoing as my invention I have signed my name this 7th day of May, 1931.

HAROLD WILLIAM IBBOTT.

CERTIFICATE OF CORRECTION.

Patent No. 1,913,239.

June 6, 1933.

HAROLD WILLIAM IBBOTT.

It is hereby certified that the name of the first mentioned assignee in the above numbered patent was erroneously written and printed as "Negretli" whereas said name should have been written and printed as "Negretti", as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of August, A. D. 1933.

M. J. Moore.

(Seal)

Acting Commissioner of Patents.