# E. H. Ashcroft.

## Pressure Gauge.

No. 18,129. Patented Sept. 8, 1857.

Fig. 2.

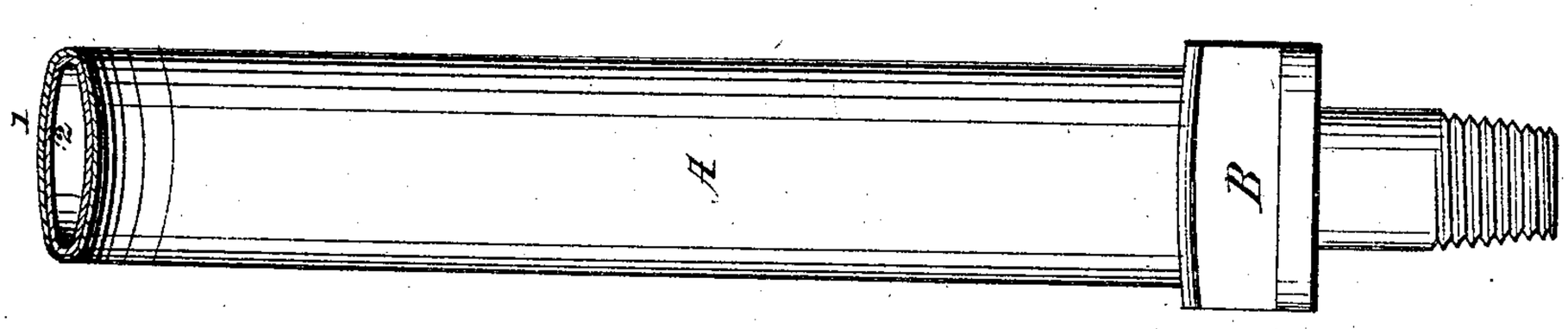
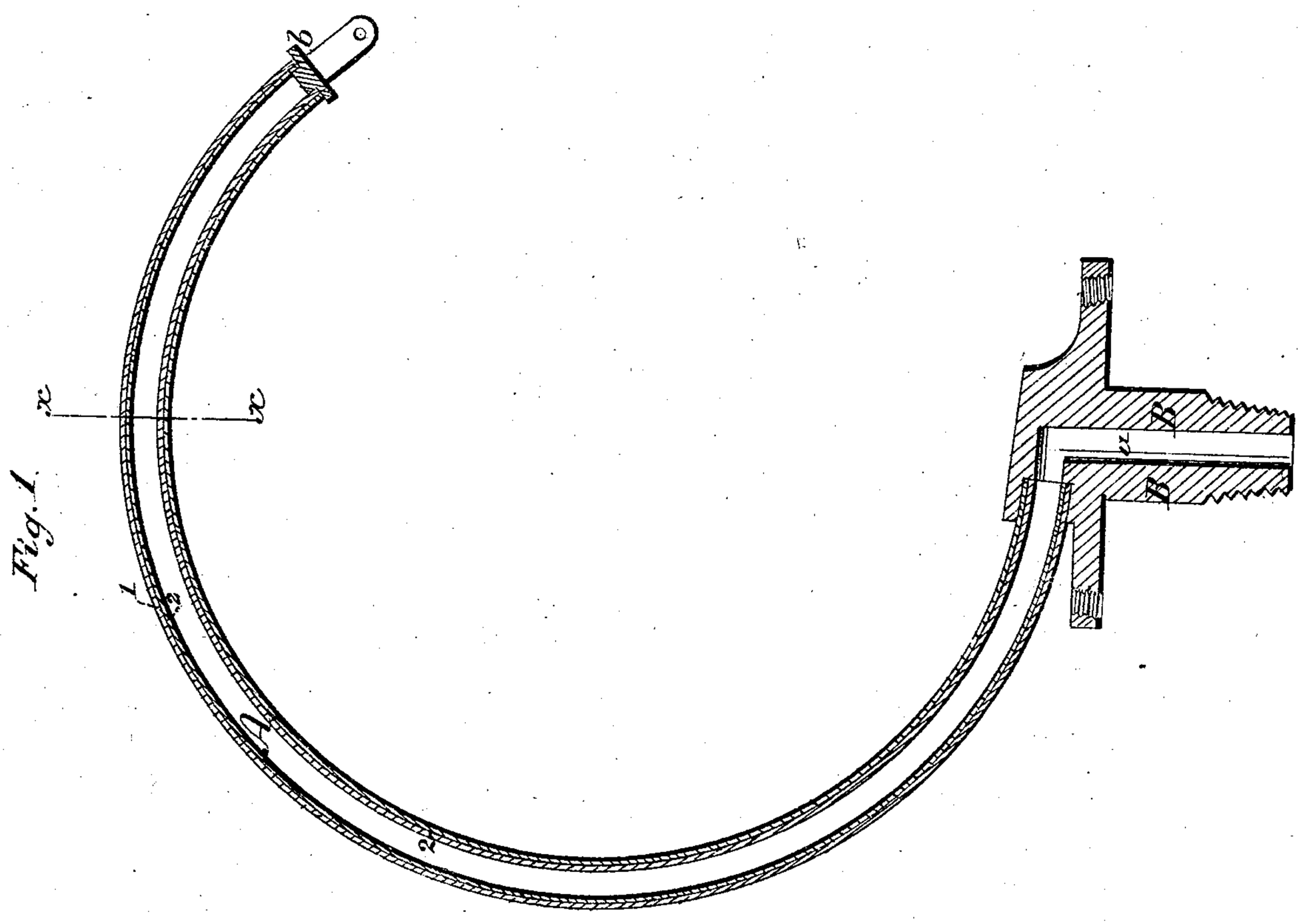



Fig. 1.



# UNITED STATES PATENT OFFICE.

E. H. ASHCROFT, OF BOSTON, MASSACHUSETTS.

## TUBE FOR STEAM-PRESSURE GAGES.

Specification of Letters Patent No. 18,129, dated September 8, 1857.

*To all whom it may concern:*

Be it known that I, E. H. ASHCROFT, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Indicating-Tubes for Steam-Pressure and Vacuum Gages, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a longitudinal section through a tube, Fig. 2, a view of the flat side of the tube, cut off at the line *x*, *x*, of Fig. 1.

In steam or hydraulic pressure gages where a flattened, bent tube is used to indicate the amount of pressure within the tube, by the tendency which such a tube has to straighten out when pressure is thus applied; a difficulty is found to exist from the fact that when the tube is made of metal of a sufficient thickness to resist a high pressure, it is liable to set or lose its elasticity if sufficient motion is given to the free or unconfined end, to give to the indicating apparatus an adequate range without complicated gearing. This I have obviated by using a compound tube made of two or more thin flattened tubes one within the other, which act in a manner similar to the leaves of a spring. As like the spring a greater range of motion without deterioration can be given where the metal is divided into leaves or layers than when the same strength of metal is used in a single piece.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried out the same.

Referring to the drawings Fig. 1 is a longitudinal section through a tube A to be used for a steam pressure gage (similar to that known as the Bourdon gage.) This tube is flattened as shown in Fig. 2, and is bent round as in Fig. 1, forming part of a circle. It is secured firmly at one end to a block B, through a passage *a*, in which the steam is admitted to the interior of the tube. The other end of the tube is closed steam tight by a plug *b*, to which is attached the indicating apparatus; so that as the pressure on the inside of the tube increases the tendency of the tube to straighten out when pressure is so applied will move the outer or free end at *b*, and indicate on a suitable dial the amount of pressure.

To obtain the required strength without a sacrifice of the proper elasticity I have constructed this tube of two thin tubes 1 and 2, of elastic metal one within the other as shown in the drawings, the steam being admitted to the interior of the inside one. Although I have spoken of but two tubes placed one within the other, it is evident that a greater number may be used. In fact I would prefer several tubes of very thin metal, thus placed together to obtain the requisite strength.

It is well known to mechanics that each piece of elastic metal has a limit to which it may be vibrated without deteriorating in an appreciable degree its elasticity; this in a measure is dependent on the length and thickness of the metal; and as in the uses for which the above mentioned tube is intended we are limited in space as regards the length of tube, and yet a sufficient strength is required to resist the internal pressure, we are consequently restricted in the amount of vibration; now as for indicating purposes it is desirable to have as great an amount of motion at the free or vibrating end of the tube as possible, consistent with the integrity of the tube. I consider that by the use of the above described compound tube I obtain a more reliable indicating apparatus than could be constructed with a tube of a single thickness of metal.

What I claim as my invention and desire to secure by Letters Patent, as an improvement in pressure and vacuum gages, is:—

The within described tube formed by incasing one tube within another as set forth for the purpose specified.

E. H. ASHCROFT.

Witnesses:

THOS. R. ROACH,

P. E. TESCHEMACHER.