E. G. ALLEN.

Pressure Gage.

No. 16,428. Patented Jan. 20, 1857.

Fig: 4.

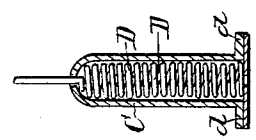


Fig: 2.

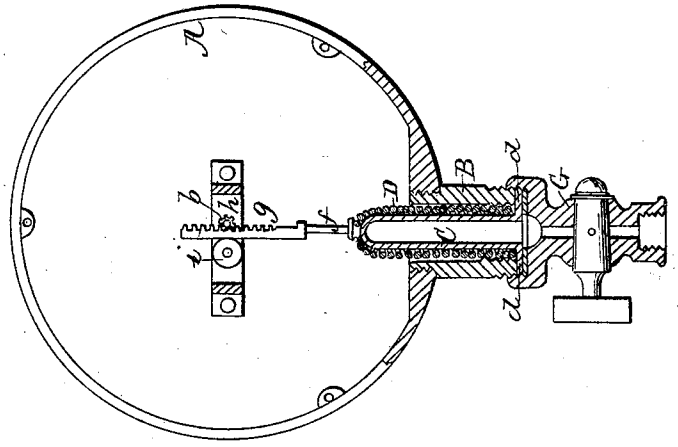


Fig: 3.

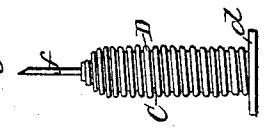
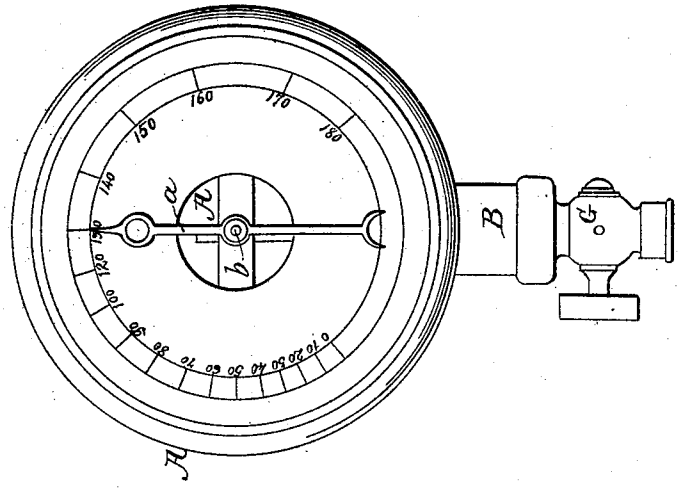


Fig: 1



N. PETERS. Photo-Lithographer. Washington. D. C.

UNITED STATES PATENT OFFICE.

E. G. ALLEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HENRY O. ALLEN.

STEAM-PRESSURE GAGE.

Specification of Letters Patent No. 16,428, dated January 20, 1857.

To all whom it may concern:

Be it known that I, E. G. ALLEN, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and Improved Gage for Indicating the Pressure of Steam or other Fluids at a Higher or Lower Pressure than that of the Atmosphere; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification.

This invention consists in a helical spring, made wholly or in part of the form of a dome or cup, combined with a capsule of india rubber or any other elastic substance of suitable character, of similar form, lining the interior or covering the exterior thereof, in such a manner that the said spring is acted upon to cause its extension or contraction by the differential pressure between the fluid to be gaged and the atmosphere, the said capsule serving as an impervious medium through which the said differential pressure acts upon the spring to produce a movement of an index and the spring serving to support and sustain the capsule and prevent its bursting or collapse.

Figure 1, in the accompanying drawing is a front view of the gage as adapted for steam boilers to indicate the pressure. Fig. 2, is a section of the same parallel with Fig. 1, showing the spring and capsule.

A, is a circular box of metal on other material whose front constitutes a graduated dial in front of which works an index *a*, which is secured to an arbor *b*, that is fitted to suitable bearings within the box A. The box is constructed with a cylinder B, at the bottom, said cylinder standing perpendicular to the arbor *b*, and being open at the top to communicate with the interior of the box. This cylinder is for the purpose of containing the spring D, and capsule C, which are shown in section, Fig. 2, where it will be seen that the capsule is inside of and forms a lining to the spring. An outside view of the spring and capsule as detached from the cylinder is given in Fig. 3. The form of the spring and capsule is that of a cylinder terminating at the top in a hemispherical dome. The capsule is made of vulcanized india rubber with a flanch *d*, around its open bottom to enable it to be secured to the bottom of the cylinder B, by means of the socket of a cock G, which screws on to a screw thread cut on the lower part of the exterior of the cylinder. Other suitable means of securing the flanches of the capsule may be adopted as will be obvious to any person of ordinary mechanical skill. The lower part of the interior of the cylinder has a screw thread cut in it to enable two or three turns of the lower portion of the spring to screw thereinto for the purpose of confining the said spring to its place when acted upon by the pressure of the steam in the boiler. The spring is made of wire of suitable strength. The upper extremity of the wire rises from the dome, as shown at *f*, Figs. 2 and 3, and has attached to it a toothed rack *g*, which gears with a pinion *h*, on the arbor *b*, of the index, said rack being held in gear by a roller *i*, placed at the back of it in suitable bearings in the box A.

The steam is admitted to the interior of the capsule to act upon the spring by means of a pipe which is to be screwed into the bottom of the socket of the cock G, and entering the capsule, exerts its pressure on all parts thereof, but, as the capsule is confined laterally by the spring it can only be extended lengthwise or in an upward direction, in which direction the spring yields and is elongated more or less according as the pressure of the steam exceeds that of the atmosphere in a greater or less degree. The spring acting through the rack and pinion on the index makes the latter stand in such position over the face of the dial that it will, if the dial be properly graduated, indicate the pressure of the steam in the boiler.

The gage is constructed in the same manner as above described for gaging the pressure of any other fluid whose pressure may be greater than that of the atmosphere, but, for what is known as a vacuum gage, the capsule will be applied to the exterior of the spring as is shown in Fig. 4, which exhibits a longitudinal section of the capsule with the spring inside it. It is obvious that the capsule must be either inside or outside the spring according as the inside or outside is to be subjected to the greater pressure, otherwise the capsule could not serve as the medium through which the spring is acted upon by the differential pressure, neither could the collapse or bursting of the capsule be guarded against. The vacuum gage, in all respects save the change in the rela-

tive positions of the spring and capsule is constructed like the steam gage.

It may be well to remark that the action of the gage with the spring and capsule arranged as shown in Figs. 2 and 3 may be reversed to make it serve as a vacuum gage, by making the box A, airtight and connecting it by a suitable pipe with the vessel in which the vacuum is to be gaged and opening the cock G, to the atmosphere. In like manner a gage with the spring and capsule arranged as shown in Fig. 4, may be employed as a steam gage, by making the box A, steam tight and admitting the steam to its interior by a suitable pipe coming from the boiler and opening the cock G, to the atmosphere.

The spring and capsule are susceptible of considerable change of form; for instance, they may be of conical, conoidal, hemispherical, semispheroidal or of any form approximating to a dome or cup.

I am aware that the use of elastic bags or capsules, in steam gages, is old. It is seen in the rejected applications for patents of J. Lowe, Oct. 17, 1851 and R. Lapham, Aug. 2, 1855. I therefore distinctly disclaim the use of an impervious bag or capsule, composed of rubber or other pliable material. But the employment of a metallic, helical spring dome D, in connection with a capsule, in steam gages forms an important and highly valuable improvement, and, therefore, disclaiming the use of springs in steam gages, unless constituting a dome D, and disclaiming every part of my device herein described which is seen in any other steam gage, or analogous instrument,

What I claim as new, and desire to secure by Letters Patent is,

The helical dome D, constructed, arranged and operating in the manner and for the purposes substantially as herein described.

E. G. ALLEN.

Witnesses:
HENRY W. HAYNES,
W. G. RUSSELL.