W. BURNETT.

Pressure Gage.

No. 19,400. Patented Feb. 16, 1858.

Fig. 6

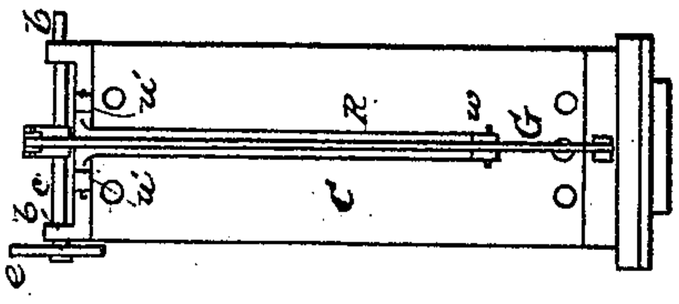


Fig. 5

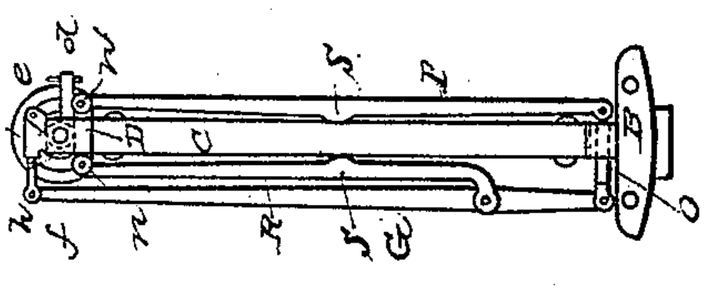


Fig. 4

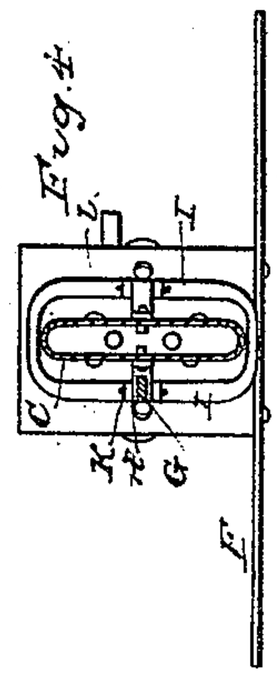


Fig. 3

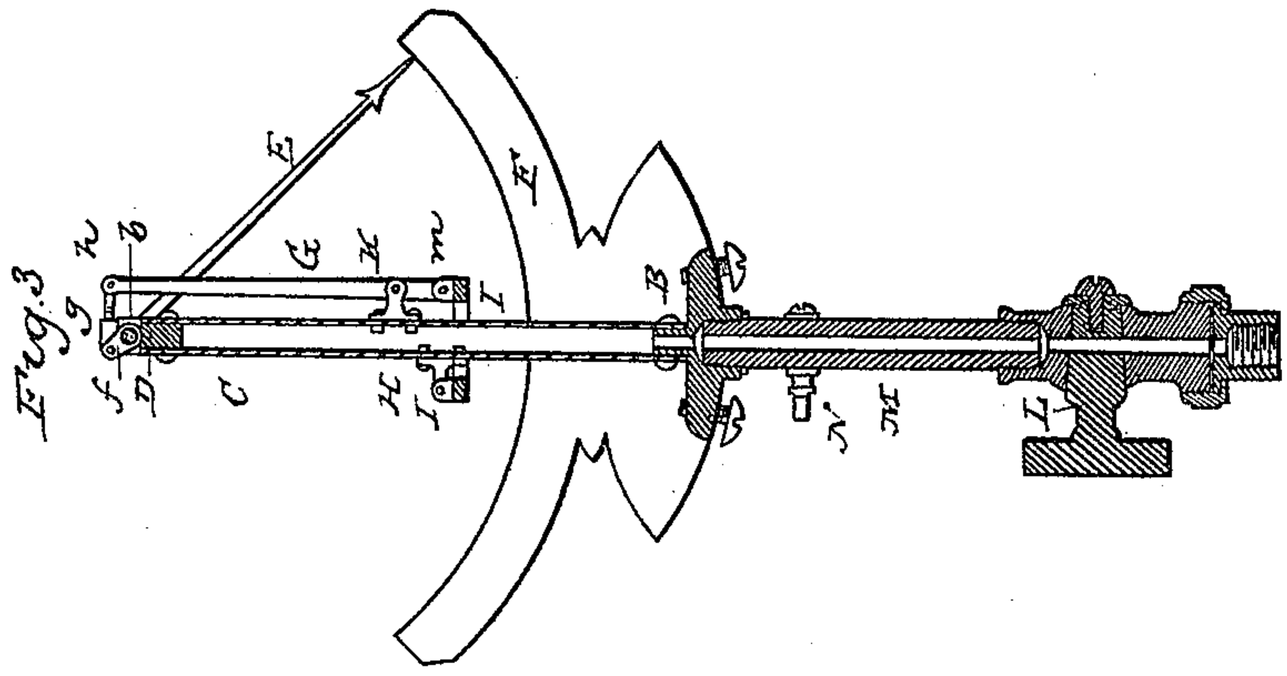


Fig. 2

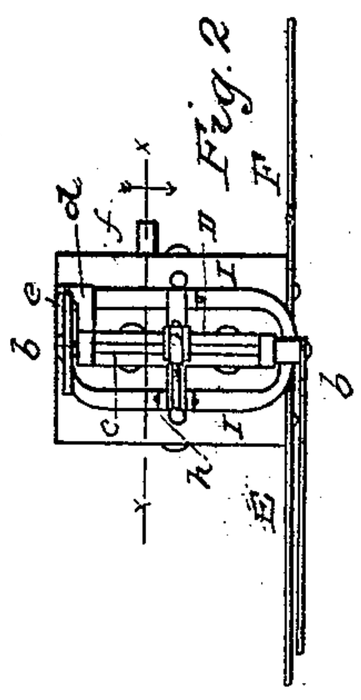
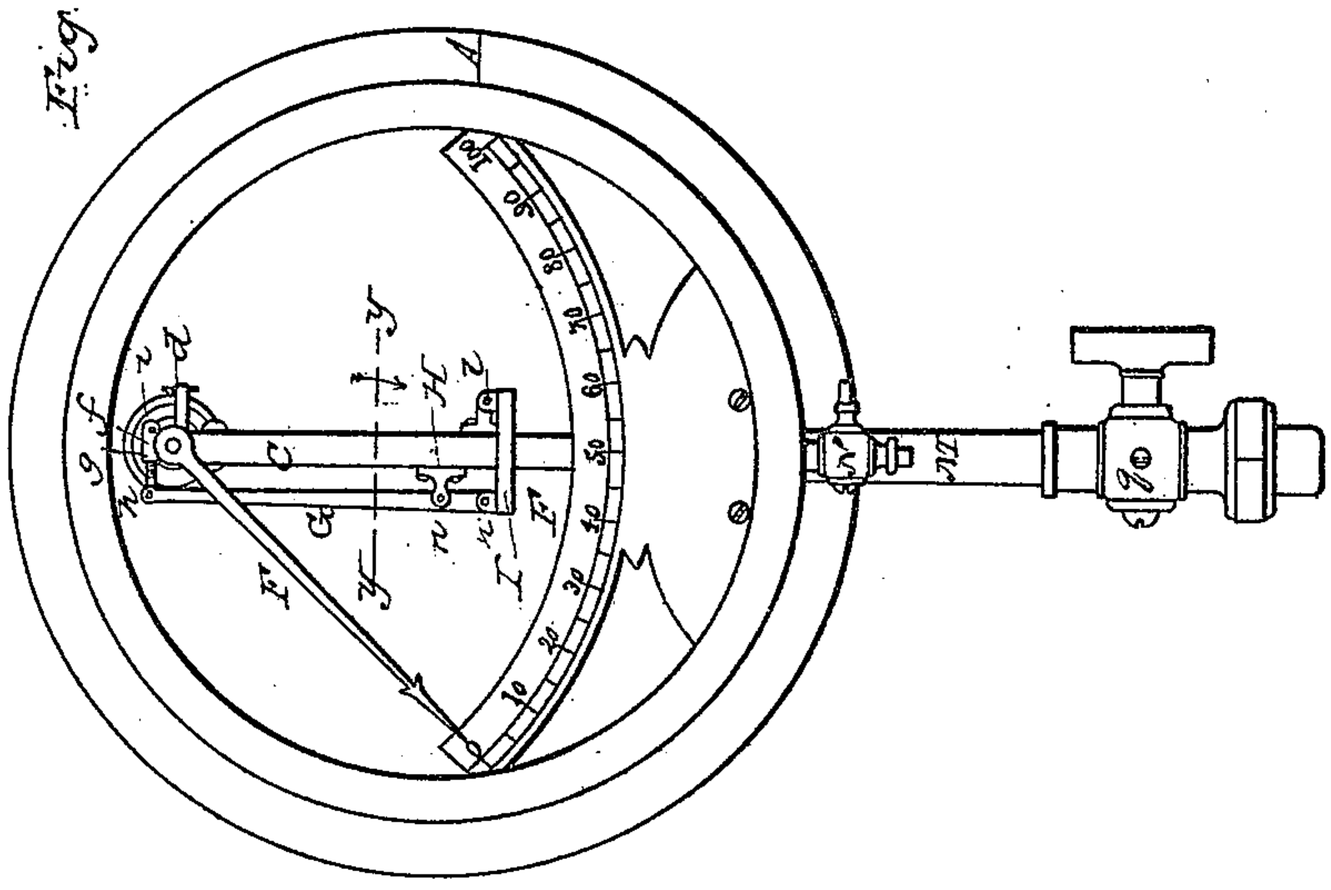


Fig. 1



UNITED STATES PATENT OFFICE.

WM. BURNETT, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO SETH ADAMS, OF SAME PLACE.

STEAM-PRESSURE GAGE.

Specification of Letters Patent No. 19,400, dated February 16, 1858.

To all whom it may concern:

Be it known that I, WILLIAM BURNETT, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Pressure-Gages, of which the following is a full and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a front elevation of the gage. Fig. 2 a plan of the same, the case removed. Fig. 3 a vertical section on the line *x*, *x* of Fig. 2. Fig. 4 a transverse section on the line *y*, *y*, of Fig. 1. Figs. 5 and 6 show a modification of my improved gage.

In the drawings, A is the case of the ordinary form with a glass plate over the dial and working parts. To the inside of the lower part of this case is secured by screws *a*, *a*, passing through the case, a block B, from which rises a hollow flattened pipe C, of the form shown in section in Fig. 4, of brass or other suitable metal properly tempered by hammering or otherwise to retain its elasticity; the top of this pipe is closed steam tight by a block D, which is brazed into it; and is further secured by riveting. Secured to or cast upon the block D, are two short standards *b*, these serve as bearings for a shaft *c*, which projects through both standards and carries on its front end the index hand E, pointing to the dial F. From the standard *b*, nearest the back of the case projects on one side a bent block or arm *d*, to which is secured a coiled spring *e*, the inner end of which is attached to the end of the shaft *c*, and serves to take up any original slack of the joints or pivots or that which may arise from wearing of the parts. Secured to the middle of the shaft *c*, between the two standards *b*, is a short arm *f*, to the outer end of which is pivoted at *i*, a link *g*, which is formed of two pieces screwed together, making its length adjustable. To the outer end of this link at *h*, is pivoted the upper end of the long lever G. To the two flat sides of the tube C, near the middle of its length are attached short standards H and K, to the former of which is hung by a pin at *l*, a rigid yoke I, which embraces the tube C, as seen in Figs. 2 and 4; to this yoke on the side opposite to where it is pivoted to the standard H, is pivoted at *m*, the lower end of the lever G, and at a short distance above this point the same lever is pivoted at *n*, to the standard K. This arrangement of parts allows the tube C, to communicate through its connections to the index hand E, the amount of motion due to the expansion of both its sides multiplied in its transmission to the required extent by means of the lever G. The screw in the link *g* allows the adjustment and correction of the hand or pointer. When this gage is used to indicate internal pressure, as on a steam boiler, the pipe M, with a suitable three way stop cock at L, is used to admit the pressure into the tube C, through an opening *p* (Fig. 4) in the bottom of the tube; and another opening *s*, communicates with the blow off and air cock N. The cock N, is for the purpose of blowing steam through the gage to clear out any sediment which may have collected, and to prevent the water from condensation of steam in the tube C, from freezing when the gage is used under circumstances liable to produce such a result, by occasionally supplying its place with steam from the boiler. The cock N, is used as an air cock when it is desired to remove any water that may be contained in the pipe C, to prevent injury from freezing when the gage is not in use, which is effected by shutting off communication with the boiler by means of the stop cock L, which will open the side way of said cock shown at *q*, Fig. 1; if the cock N, is now opened air will rush into the tube C, and the water will be discharged through the opening in the side of the lower cock, as through a siphon.

When the gage is used to indicate the quality of a vacuum, the cock N, may be dispensed with, and the three way cock used only, as when the communication with the chamber in which the vacuum is maintained is shut off by closing the cock L, the side opening of said cock will admit the air into the pipe C, and the index hand or pointer will return to zero. When the gage is used as a barometer, the pipe M, with its cock L, and the blow off cock N, will be discarded, and the tube C, after having a perfect vacuum formed within it, will be hermetically sealed and the barometrical variations will be indicated on the dial by the means already described.

Figs. 5 and 6 of the drawings show a modification of the arrangement for transferring the motion from the flat sides of the tube C, to the indicating apparatus. The long lever G is pivoted at its lower end at *r*, to a link O, which passes through a hole in the block to which the lower end of the pipe C′ is brazed and riveted. This allows the free play of the link O, longitudinally. To the other end of this link at *t*, is pivoted another long lever P, pivoted also at its other end at *u*, to ears projecting from the block D, at the upper end of the tube C. On the opposite side between the tube C, and the lever G′ is another lever R pivoted at *v*, to ears projecting from block D, and similar to those shown at *u′*, *u′*, Fig. 6—it is also pivoted at *w* to the lever G toward its lower end. Both the levers R, and P, have on their inner side next the tube C, a projection S which rests in contact with the flat surface of the tube C, near the middle of its length; thus like that previously described, this arrangement of levers communicates the motion of the flat sides of the tube C, to the indicating hand. In this modification the spring *e*, in addition to its functions already described is employed to retain in contact with the sides of the tube C, levers R and P, by means of the lever G, and to return the index hand to zero when the tube is relieved of pressure.

By the use of such a flattened or compressed elastic tube, as the above described, I obtain two flat elastic disks (the sides of the tube) which will indicate the pressure applied to their interior or exterior surfaces in a more reliable and durable manner than will similar elastic disks in any other form with which I am acquainted. Where a disk or plane of elastic metal is firmly fastened at its edges to a rigid and unyielding case, and pressure is applied on one surface, causing it to bulge out or expand on the opposite side, although the elasticity of the metal may at first return it to its normal position when the pressure is removed, yet this action has a tendency to stretch the metal, by which means only can motion be produced, which will eventually cause to some extent, a depreciation of its elasticity, whereas in the form and arrangement which I have adopted the two elastic planes of metal being formed by flattening or compressing a metallic pipe, said disks or planes are connected at their edges by a medium equally thin and elastic with the planes themselves, which allows the outer edges of the disks to retract as the middle is forced out by pressure within the tube, or collapsed by external pressure, and does not cause that stretching of the metal to which it would be liable if the edges were held rigidly; the edges of circular disks although formed and conjoined as in my gage would not admit of the retractive action consequent on the production of motion in the sides of my tube as above described, as in a circular plate the retractive force caused by the bulging of the center of the plate is resisted by a continuous arch, and if retraction takes place it must be by a condensation of the metal—in the case of my tube the beam is substituted for the arch to which motion may be imparted as to a spring.

In constructing the flattened tube C, I prefer to employ a drawn brass tube, turned down (if it is required to be very thin) before flattening as in that case a seam in the pipe is avoided which would have to be brazed, and which would otherwise render it difficult to hammer the metal to a proper temper without injury.

An important feature in my gage consists in so arranging the mechanism that together with the index or dial, it is secured to and carried wholly upon the tube itself and is entirely independent of the case in which it is contained, said case being used merely as a covering to protect the gage from dust or injury. With such an arrangement any distortion of the case in putting up and securing the gage or any unequal expansion of the tube and case, will neither derange nor affect the working parts, or the correctness of the indications. It will also be readily perceived that where in an instrument of this character, a small amount of prime movement is to be of necessity multiplied, it is of the greatest importance that the controlling pivots, as to relative position, should be beyond the possibility of change or departure from their original condition; this is effected in my gage by placing all the said pivots on the same piece of metal—viz the pipe or tube C—so that separation is impossible; under such conditions, the value of a small amount of first motion is considerably increased and may be multiplied with confidence. Another feature of improvement in this gage is the immediate production from the disks by means of the lever G, of a sufficient amount of motion in a plane parallel to that in which it is to be employed, rendering unnecessary the employment of gears and other similar contrivances which are liable to rapid wear and derangement.

A gage constructed as above described is cheap reliable and durable, and it is believed more free from objections than any gage now in use.

I am aware that a flattened elastic curved tube has been used to indicate the amount of pressure applied to its inner surface, by its tendency to straighten out when the pres-

sure is applied; I do not therefore claim such an application of a flattened tube. But

What I claim as my invention and desire to secure by Letters Patent, is—

The use in a pressure gage of a straight flattened elastic tube in combination with suitable mechanism for communicating the motion of the flattened sides of the tube, caused by pressure applied to its surfaces, to a suitable indicating apparatus.

WM. BURNETT.

Witnesses:
SAM. COOPER,
THOS. R. ROACH.