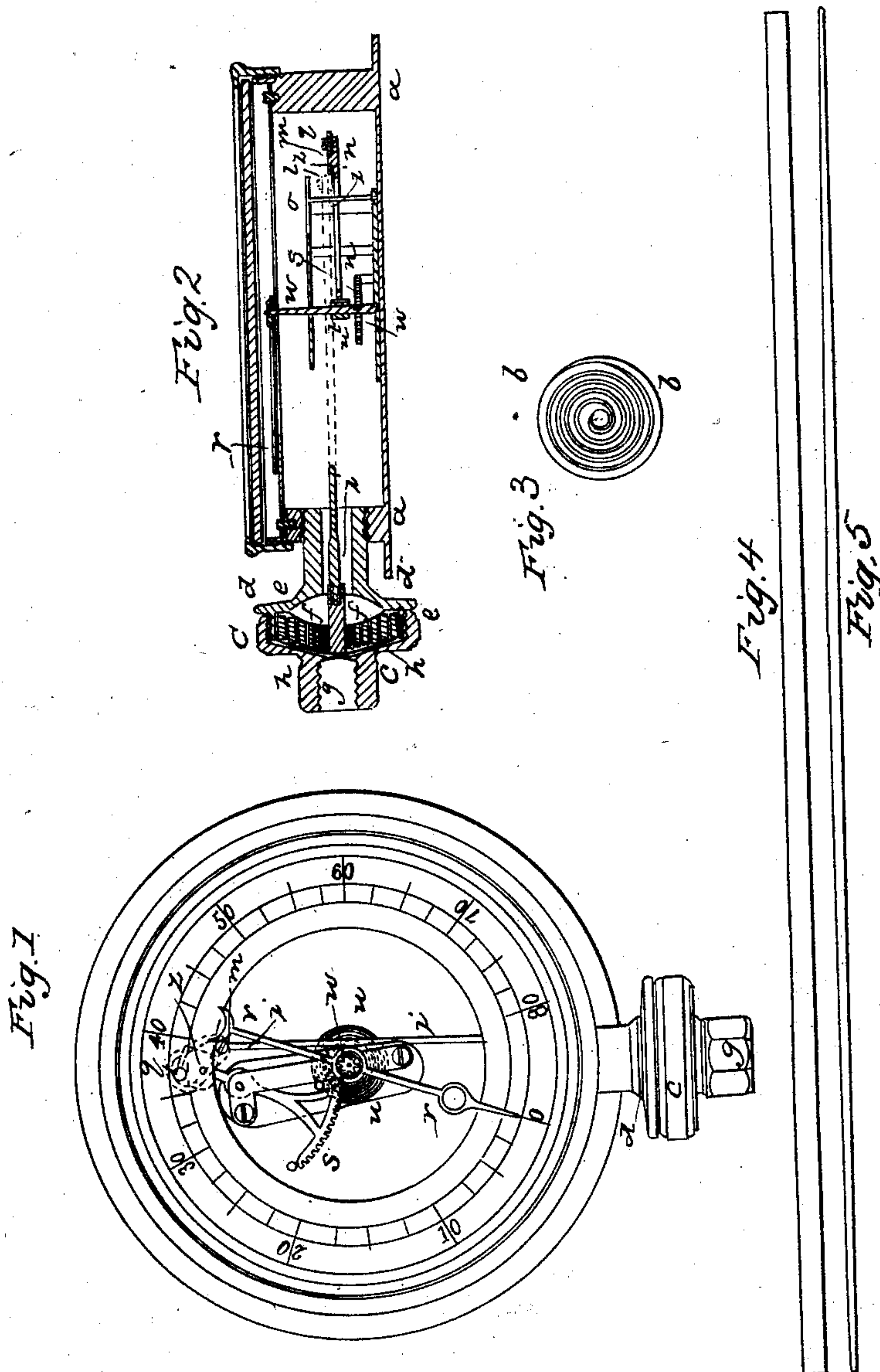


E. G. ALLEN.  
Steam Pressure Gage.

No. 28,045.

Patented May 1, 1860.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

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## STEAM-GAGE.

Specification of Letters Patent No. 28,045, dated May 1, 1860.

*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 certain new and useful Improvements in Steam-Gages; and I do hereby declare that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The figures of the accompanying plate of drawings represent my improvements.

Figure 1 is a plan or top view of my improved steam-gage. Fig. 2 is a longitudinal central vertical section of the same. Fig. 3 is a plan or top view of my improved spring. Figs. 4 and 5 are views in detail.

I have heretofore made certain improvements in steam-gages for which Letters Patent of the United States were granted to me bearing date the 17th day of January, 1860, in which a volute spring, tapering in width only was the medium used for transmitting the pressure of the steam to the index-hand. While this form of spring has been found to operate successfully and with accuracy for ordinary pressures its form will not allow sufficiently thick steel to be used for very heavy pressures—say from 500 pounds to the square inch upward—and consequently when subjected to very great strains these kinds of springs do not possess the requisite strength to prevent their being warped or otherwise injured. In cases where perfect accuracy is not of so much consequence as strength, as in machines or the various apparatus used in mechanics which are to be tested with regard to their strength so as to guard against the danger of explosion or collapsing, for instance, and subjected to an enormous pressure or a much greater one than they are to receive while actually in use, the importance of having a spring that while having sufficiently accurate powers of indicating for the purpose, shall also be of such a form as to possess great strength and retain its powers without injury during repeated tests, will be evident.

To so construct a volute spring in a steam gage as to possess these requisites of great

strength and with sufficiently accurate indicating functions for purposes where only great pressures are to be applied is one of the essential features of the present invention, the desired results being attained by the use of a volute spring of uniform width and tapering only in thickness. This form of spring allows thicker and heavier steel to be used than would otherwise be possible and consequently can be made so as to possess great strength and also has proved to be sufficiently accurate for the purposes for which its use is intended. I have also made an improvement which consists in inserting between the rubber which I have heretofore employed in combination with the volute spring, a thin flexible plate of metal which obviates a difficulty that has been experienced from the cutting and wearing out of the rubber diaphragm by coming in contact with the edges of the coils of the spring.

My last improvement relates to the mechanism that constitutes the medium for communicating the movements of the spring, produced by the pressure thereon, to the index-hand, whereby the gage can be readily connected in case of error, adapted to heavy and light pressures, &c., and consists in rendering the length of the indicating arm so as to vary at pleasure the leverage and consequently the length of movement communicated from the spring to the index-hand.

*a a* in the drawings represents the box in which the devices whereby the movement of the spring is transmitted to the indicator are placed.

*b b* is a volute spring, Figs. 2 and 3, placed in two box couplings *c* and *d*. These couplings are firmly screwed together, a shoulder *e* of the coupling *d* being thus brought to bear upon the outer coil of the spring and holding it rigidly so as to prevent any play or friction between the spring and the box-couplings, while at the same time the remaining portion of the spring is left perfectly free to act. The volute spring *b b* is of peculiar shape, as shown in the drawings, being formed of a bar of steel of uniform width throughout and tapering in thickness only, as shown in Figs. 4 and 5. It will be seen by inspection of Fig. 5 that the end of the bar of steel of which the spring is composed that is to bear upon the shoulder *e* of the coupling *d* commences with an increasing taper for a short distance and then diminishes to the requisite thickness at the end



which is to form the smallest coil, the part with an increasing taper at the larger end being only for the purpose of a true bearing surface upon and to be held by the box-couplings *c* and *d* which hold the spring in its place, this portion of the coil not acting as a spring. The outer coil of the spring being held by the shoulder *e* of the coupling *d*, the inner or smallest coil is fastened to a short shaft or piston *f*. Steam is admitted to the spring *b b* through the short tube *g*, forming a part of the box coupling *c* and in order that the pressure of the steam may be exerted equally upon all portions of the spring *b b*, a disk or diaphragm of rubber *h*, or other suitable elastic material Fig. 2 is inserted between and held by the two box-couplings *c* and *d* in such a manner as to entirely cover the outer surface of the spring, a thin plate of metal, represented by a blue line in Fig. 2, being inserted between the rubber diaphragm and the spring, to prevent the wearing and cutting away of the rubber disk as invariably happens when the rubber is in direct contact with the coils of the spring.

I will next proceed to describe the devices which form the medium for communicating the movement of the spring produced by the pressure of the steam to the indicator. To the short shaft or piston *f* which is fastened to the inner and smallest coil of the spring *b b* is attached a connecting rod *i i*. The rod *i, i* is attached by a pivot joint *l*, to a short arm *m* attached to the sector shaped arm *n*, turning upon a bearing at *o*. The short arm *m* turns upon a center at *z* and can be set at any desired angle with regard

to the sector shaped arm *n* by means of a slot *p* and set-screw *q*, as shown by red lines in Fig. 1, thereby diminishing or increasing the lever power brought to bear upon the indicator *r*, at pleasure. Thus the connecting rod *i* and arm *m* form the long arm of a lever of which the sector shaped arm *n* is the short arm and *o* the fulcrum. The end of the sector-shaped arm *n* terminates in a geared arc *s* that engages with a pinion *t* retracted by a coil spring *u*. The pinion *t* is attached to the spindle *w*, upon which is fastened the indicator *r*. It will be seen from this description that the movement of the volute spring *b b*, is imparted to the indicator *r*, through the levers *i i* and *n* thereby indicating the exact pressure of the steam upon the spring *b b*.

Having thus described my improvements I shall state my claim as follows:

What I claim as my invention and desire to have secured to me by Letters Patent is—

1. The use in gages for indicating the pressure of steam or other fluids of a volute spring, the coils of which are of uniform width throughout and which taper in thickness only, in combination with the rubber and metallic disks or diaphragms as set forth.

2. The thin flexible metallic disk interposed between the rubber diaphragm and the outer surface of the coils of the volute spring, for the purpose specified.

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Witnesses:

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