

E. G. ALLEN.

Steam Gage.

No. 26,871.

Patented Jan'y 17, 1860.

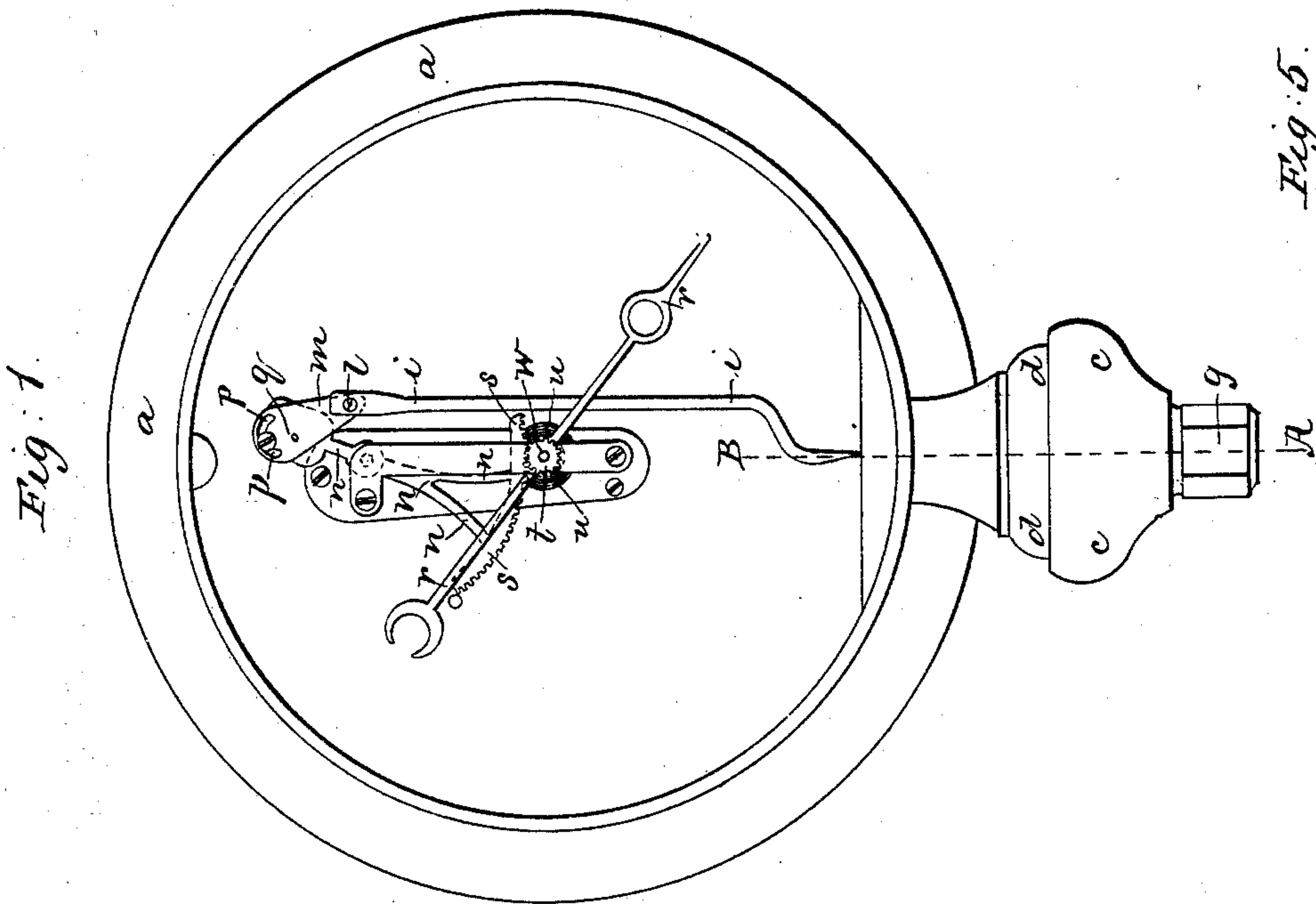
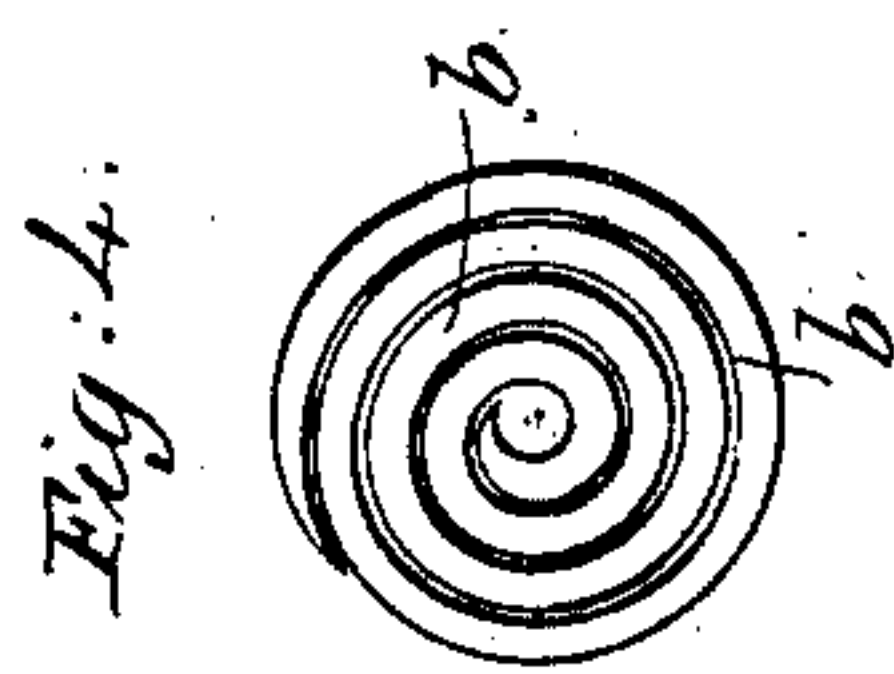
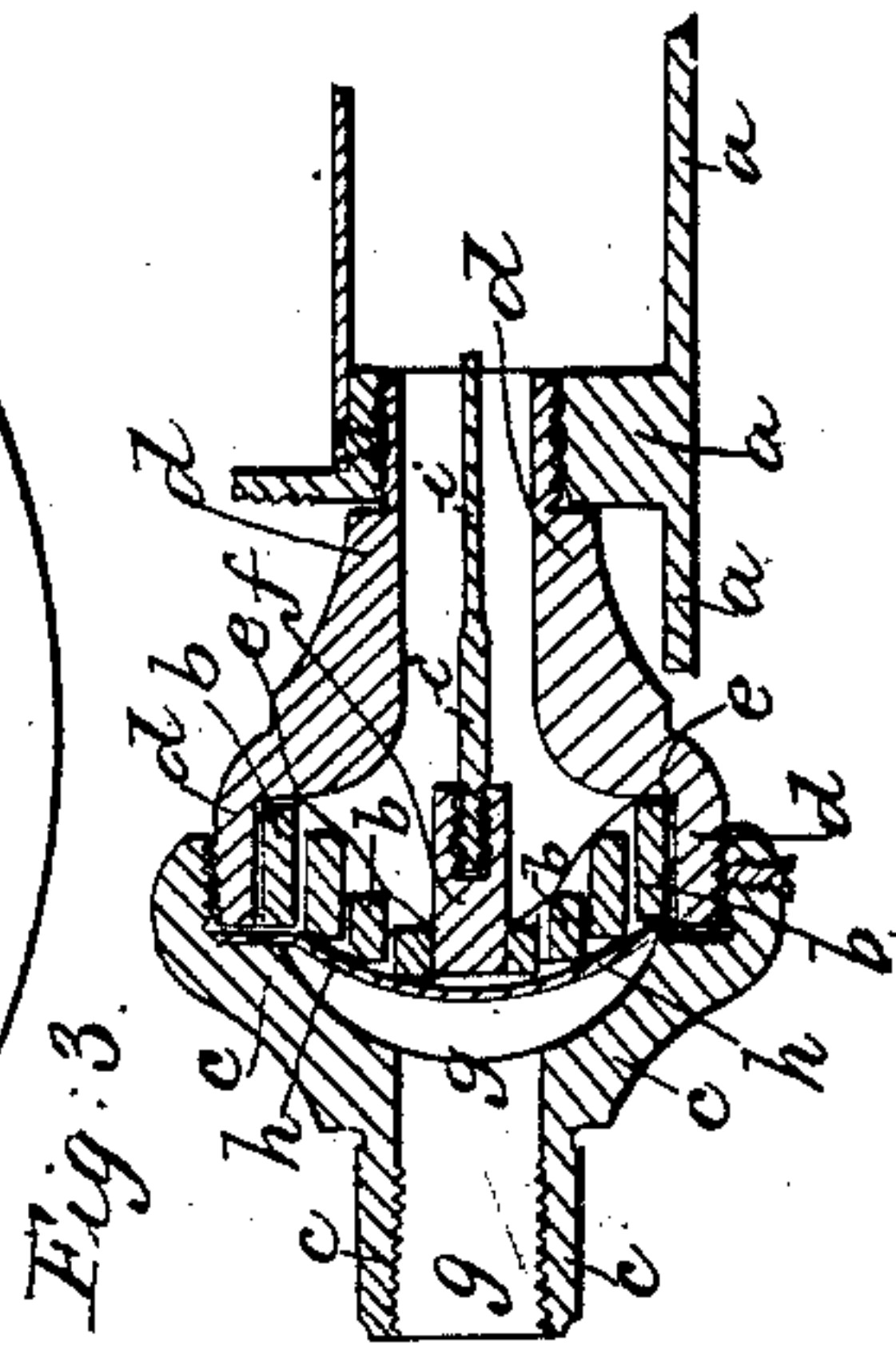
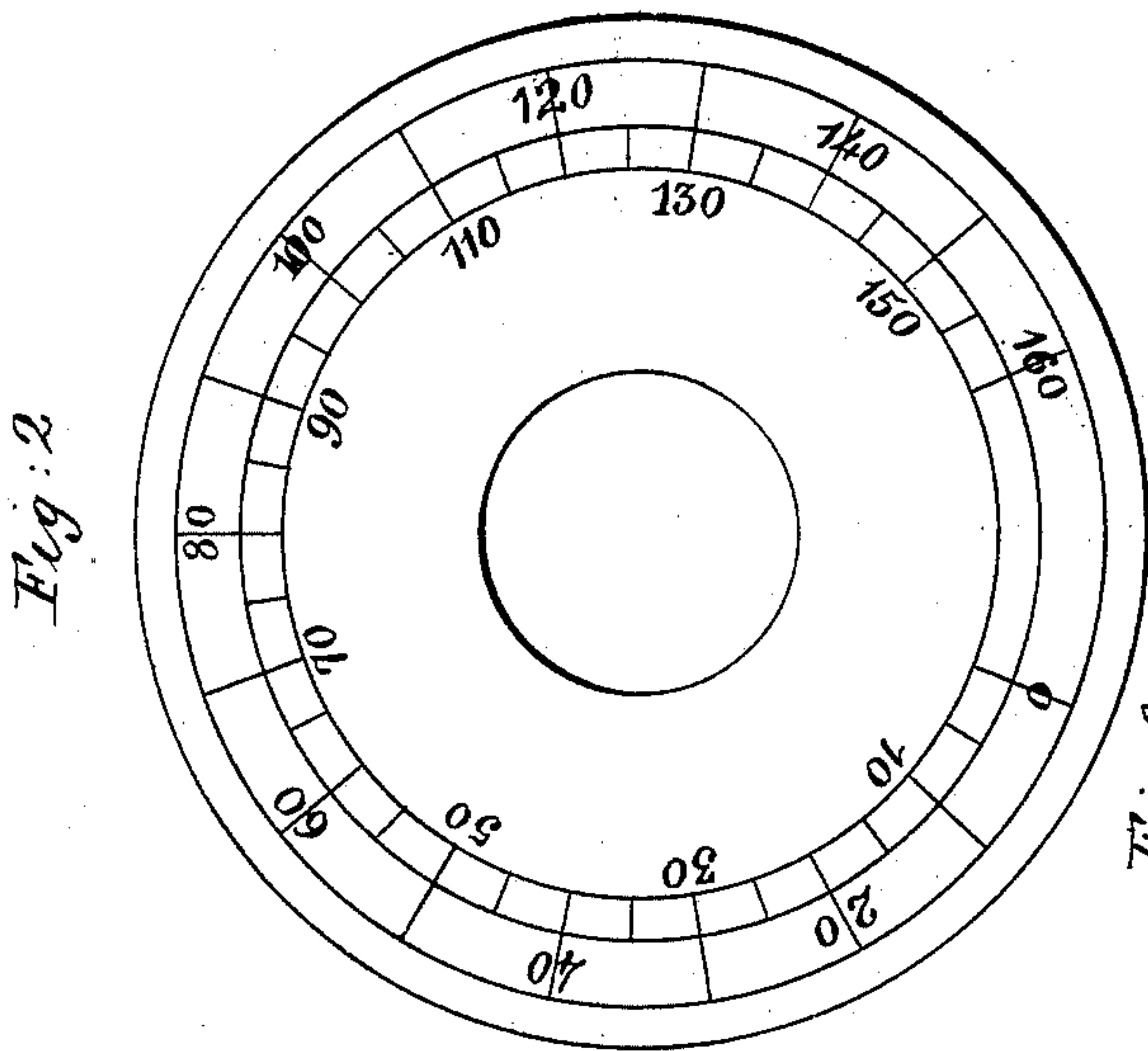


Fig. 5

Fig. 6

Witnesses.

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STEAM-GAGE.

Specification of Letters Patent No. 26,871, dated January 17, 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 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 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 secure 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 gage with the dial plate removed. Fig. 2 is a view of the dial plate. Fig. 3 is a section in detail, taken in the plane of the line A B Fig. 1. Fig. 4 is a side view of a volute spring. Figs. 5 and 6 are views showing the shape of the bar of steel of which the spring is made.

In the construction of steam gages, the spacing or graduating of the dial plate constitutes a very expensive part of the manufacture, as each dial has to be marked differently from the others. This difficulty arises from the fact, that it has been found impossible to manufacture any number of the springs which communicate the pressure of the steam to the index hand exactly alike, and so that they shall all possess the same amount of tensile power. The nearest approach to accuracy has heretofore been attained by the use of a volute spring tapering both in width and thickness as described in the schedule of Letters Patent of the United States, granted to me bearing date the 27th day of October, in the year 1859. But I have found in practice, that it is impossible to so make these springs that they shall be all exactly alike, owing partly to their form, they being too thin to permit their being planed down, from the bar of steel of which they are made, to the required shape or so as to taper two ways and consequently are constructed entirely by forging, which is not only an expensive operation but one which precludes the possibility of obtaining perfect accuracy in the spring, as the steel so forged cannot be uniform

throughout, being thicker or thinner, or harder or softer in some parts than in others.

The present invention consists in constructing the volute spring of a bar of steel of uniform thickness throughout and tapering in width on one side only, which form of spring I have found by repeated tests to produce the most accurate results, as the bar of steel, which when coiled, constitutes the spring, can as it is of uniform thickness, be reduced to the required shape by planing, thereby avoiding the imperfections and great expense of forging. Moreover this form of spring enables me, without difficulty or great cost, to manufacture all the springs so exactly alike that instead of being obliged to mark each dial plate by accurate and actual experiments, so as to correspond with its spring, as has heretofore been necessary, I am enabled to prepare the dial plate by electrotyping, as any spring will answer for any dial and vice-versa, a result which in the manufacture of steam gages has never before been attained and one which produces a very great saving in the cost of construction.

I will now proceed to describe in detail the construction of my improved steam-gage.

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, the dial plate being removed.

b b is a volute spring Figs. 3 and 4, 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 being formed of a bar of steel of uniform thickness throughout and tapering in width, on one side only, as shown in Figs. 5 and 6.

It will be seen by inspection of Fig. 5 that one end of the bar of steel of which the spring is composed, maintains a uniform width for a short distance and then commences gradually to taper, on one side only, as above stated, to the requisite or desired

width at the other end, the part of the bar of uniform width being so constructed for the purpose of obtaining a true bearing surface upon and to be held by the box couplings *c* and *d*, which hold the spring in its place, the tapering part only acting as a spring. By giving the spring this peculiar shape, it will receive at all times the same degree of play or movement from a stated number of pounds pressure, at whatever degree of compression of the spring, the addition of the said number of pressure be applied. 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 parts or portions of the spring *b b* a disk or diaphragm of rubber *h* or other suitable elastic material, Fig. 3 is inserted between and held by the two box couplings *c* and *d*, in such a manner as to entirely cover the rear surface 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*. 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 short arm *m* can be set at any desired angle with the sector shaped arm *n* by means of a slot *p* and set screw *q*, lengthening or short-

ening the connecting rod *i i* and thereby increasing or diminishing the lever power brought to bear upon the indicator *r*. 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*.

It will be observed by the foregoing description that from the fact of being enabled to make the spring of one uniform thickness throughout, fewer coils will be necessary to constitute the spring and that these coils will be nearer together than would be possible if the spring varied in thickness as well as in width, and thus a greater bearing surface is afforded to the rubber diaphragm, which is a very important advantage, as the rubber diaphragm can not be forced between the coils as would otherwise happen.

Having thus described my improvements, I shall state my claims as follows.

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

The use, in gages for indicating the pressure of steam or other fluid, of a volute spring, the coils of which are of uniform thickness throughout, and which taper in width on one side only in combination with the rubber disk or diaphragm, as set forth.

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Witnesses:

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