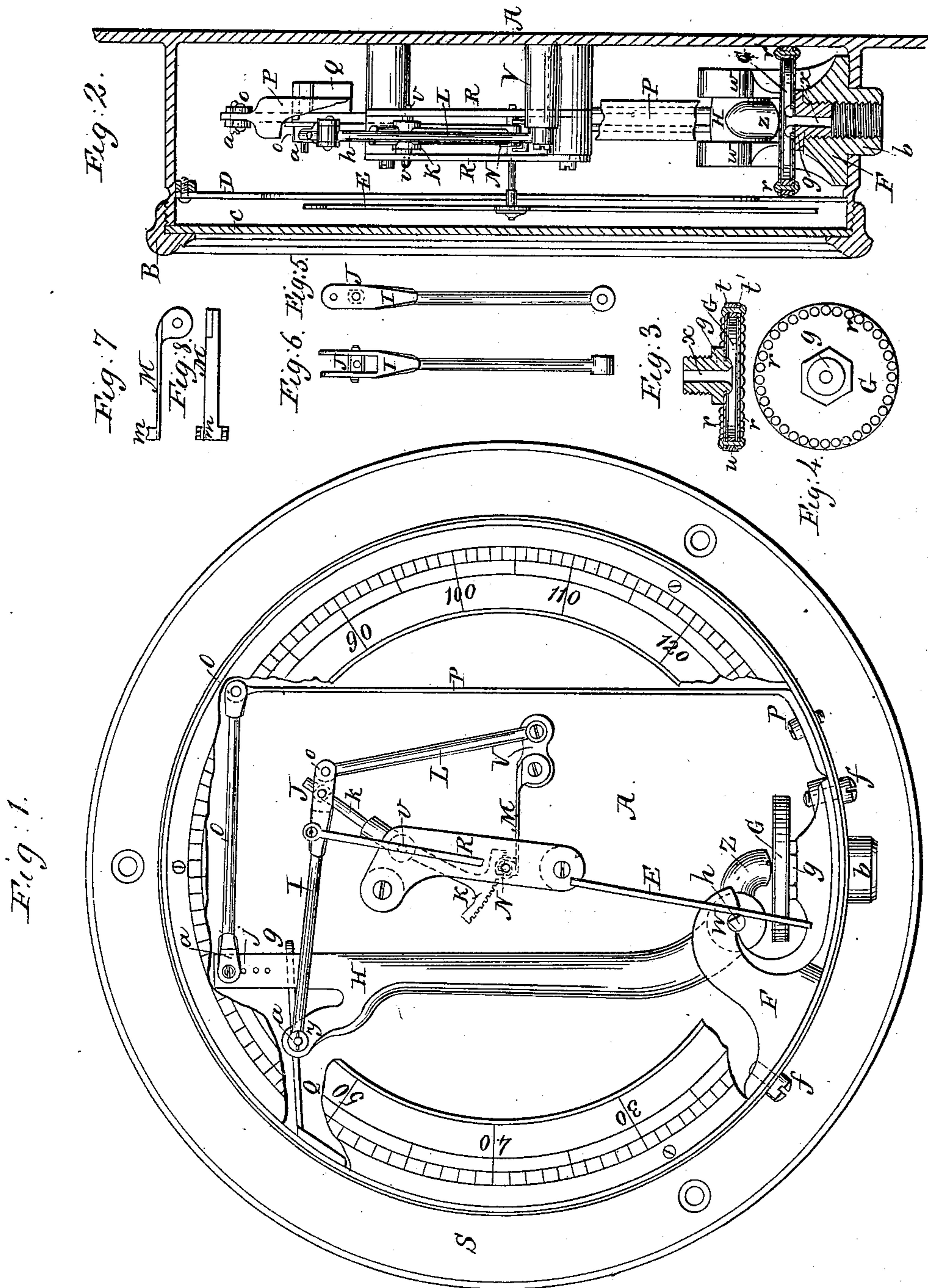


A. J. ALLEN.

Steam Gage.

No. 25,615.

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STEAM-GAGE.

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To all whom it may concern:

Be it known that I, ALBERT J. ALLEN, of the city of Buffalo and county of Erie, in the State of New York, have invented a new and useful Improvement in Steam-Gages; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a front elevation with the top ring, glass, and portions of the dial plate removed. Fig. 2 is a transverse section with part of the case removed. Figs. 3 and 4, are different views of capsule G, showing its construction. Figs. 5 and 6, are different views of connecting rod I, showing its construction, also showing swivel block J, in its place in said rod. Figs. 7 and 8 are different views of friction spring M, showing its construction.

Similar letters of reference indicate corresponding parts on the several figures.

This invention consists in a certain arrangement of parts, and machinery by, which the pressure in any steam boiler, may be accurately determined, if the steam from such boiler, be properly applied to the said improvement.

A, represents a steam gage case of the ordinary construction, being of metal of a cylindrical shape, with one end closed, and the other end open. It also has a flange S, on the outside at its closed end. The cylinder is about two inches deep, and has a screw cut on the outside, at the open end, on which is screwed ring B, Fig. 2, which serves the purpose of holding in place glass plate C, glass plate C, serving the purpose of protecting the dial plate D, and index pointer E, from damage and at the same time allows them to be seen through its transparency. It also serves to keep out dust from the working parts.

F, is a fulcrum block, having its lower side of circular shape to fit the case A, to which it is secured by screws *f*, and *f'*. It also has a projecting pipe *b*, on its circular side, that passes through the side of case A, making a connection with the outside. The pipe *b*, has a screw cut in its inside, into which the capsule G, is securely screwed steam tight, at the same time leaving suffi-

cient space in the out end of pipe *b*, to make a connection with a steam boiler by means of suitable pipe and couplings. A part of fulcrum block F, turns upward and hooks over part of capsule G. This horn has a slot in its center dividing it into two parts, between which parts lever H, is embraced. This horn also has a small hollow on its underside near its point marked *w*, in which fulcrum pin *h*, bears.

G, is a capsule of metal, permanently elastic and of such kind as will not oxidize injuriously when in contact with steam or water. I use the metal that melodeon reeds are made of, preferring that for its easy elasticity, steel being unfit, as it soon corrodes away and is too rigid. The construction of this capsule is best seen in Figs. 3 and 4. After having prepared the plates *t*, and *t'*, of the proper thickness, I secure the pipe *g*, having a hole *x*, through its center longitudinally and a screw cut on one of its ends, to plate *t*, placing it in its center and at right angles to its face, then putting ring *u*, between *t* and *t'*, rivet the whole together with rivets *r*, *r*, *r*, &c., making it entirely steam tight except the hole *x*, through pipe *g*, through which the steam or water is to enter, to operate the gage.

H is a crooked lever, of cast or other iron, having a fulcrum pin *h*, near its lower end, which bears upward, against the divided horn on fulcrum block F, which embraces the lever H, the fulcrum pin bearing in hollows *w*, on both sides of the lever to keep it firmly in place. Lever H, has a crooked point *z*, which rests on capsule G. It also has a prong *y*, near its upper end carrying pin *a*, in which rod I, is secured, but allowed to work freely. The upper end has a number of holes *j*, by which the rod O, is attached and the tension of spring P, is graduated.

P, is a thin, flat, straight spring of suitable stiffness and temper having an eye at its upper end, and the lower end bent to fit case A, to which it is secured by screw *p*.

O, is a rod of metal having jaws on each of its ends and is secured to spring P, by pin *o*, and to lever H by screw pin *a*, which secures the lever and spring together and causes them to act in concert.

Q, is a thin strip of metal secured to side of case A, and extending behind lever H,

and having a hook *q*, on its end to stop lever H, and resist a small amount of tension from spring P, and keep the whole in place when at rest.

5 R is a frame work carrying segment K, and pinion N.

K, is a toothed segment working on its small pivots *v*, *v*, and having a round tail piece *k*, on which swivel block J, slides.

10 I is a metal rod having an eye at one end, which fits on pin *a*, in lever H, and at the other end a fork in which swivel block J, is secured but allowed to turn freely. It also embraces in its open end radius bar L. Its construction is fully seen in Figs. 5 and 6.

15 J is a swivel block made of steel having small trunnions on its ends, and a hole through its center, at right angles to its trunnions, fitting accurately the tail *k*, of segment K, on which it slides.

20 L, is a radius bar of metal having an eye at each of its ends, one end being secured to post *v*, by screw *l*, on which it turns but fits accurately. The other end fits into the fork in the end of I, and is secured by rivet *o*, on which it turns freely but fits accurately. The object of this rod is to diminish the length of lever on tail piece *k*, of segment K, through the agency of rod I, and swivel block J, to equalize the tension of spring P, and cause a greater movement of the index pointer E, over the dial plate D, making the divisions greater in the higher grades where most used, thus enabling the engineer and

35 fireman to more readily detect the changes that are taking place when the steam is rapidly generated as in the locomotive engine, and the more readily maintainng an even pressure and saving fuel thereby.

40 M is a friction spring and is best shown in Figs. 7 and 8. It is made of elastic metal of the proper thickness having a palm at one end by which it is secured to post *v*, by screw *n*. At the other end are two projections wide enough apart to embrace pinion N, without touching the pinion. The projections, have little hollows *m*, in their ends, that fit against the shaft of pinion N, as shown by dotted lines in Fig. 1. The use of this spring is to

50 prevent the vibrating motion of index pointer E, in places where the gage is liable to jar, and shaking as on locomotive engines, and prevent the wearing of the segment and pinion, as all the gages now in use are unreliable in such places, and rapidly wear so as to render them useless for any purpose of accuracy or safety. This device obviates that difficulty.

60 Having described all the parts of my gage I will now describe its operation. The first operation will be to secure the gage by its flange S, in some convenient place near or attached to the steam boiler, and there connect it to such boiler by means of a suitable pipe leading from the boiler and united with the

gage at pipe *b*, of fulcrum block F. Having thus connected the gage with the boiler as the steam is generated it flows through the pipe and enters the capsule G, which being very thin readily expands or bulges out at the sides, and being confined by block F, can only expand upward pressing against the end *z*, of lever H, pressing against fulcrum pin *h*, and curving the upper or long end of the lever H backward a distance proportional to its length as compared with the end *z*, and carrying with it rod I, attached to prong *y*, and with the rod I, is carried swivel block J, and the end of radius bar L, and the tail piece *k*, of segment K, being attached to swivel blocks J, is carried back with it and the toothed segment being carried in the opposite direction causes pinion N to turn around carrying with it index pointer E, over dial plate D, and thus pointing out the pressure in the boiler in pounds per square inch. The radius bar L at the same time in its movement back with rod I pulls the end carrying swivel block J, in toward the center of segment K and causing an accelerated movement of pinion N, and consequently causing the index pointer to mark a wider space on the dial plate for the same movement of lever H as shown on dial plate between thirty and ninety this can be varied by position and length of radius bar L, so as to always have the widest divisions, at the part of the gage dial, when most used. The spring P, serves to counteract the excess of pressure in the capsule G, and to bring all back to the proper position when the steam is withdrawn.

The friction spring M pressing its forked end against the shaft of pinion N, above and below the pinion effectually prevents all vibration of the pointer E and prevents all wear of pinion and segment, and thus corrects a serious difficulty that exists with all gages now in use when applied to locomotive engines or in other places where a shaking motion is produced.

I do not claim broadly, or separately, using a metallic capsule, or lever, or spring, or segment and pinion as all these have been used in some form before; but

I claim—

1. Capsule G, of peculiar construction having the steam admitted at one side and through the center of that side, and using the flexibility of both sides, (such capsule being made of a permanently elastic metal and not injuriously oxidized by steam or water, preferring for that purpose the metal used in making melodeon reeds) in combination with fulcrum block F, lever H, spring P, rod O, rod I swivel block J, radius bar L, and segment K, having tail piece *k*, pinion N, index pointer E, dial plate D, and friction pressure spring M, substantially as shown and described.

2. I claim radius bar L, in combination with rod I, swivel block J, segment K, having tail pin *k*, pinion N, index pointer E, and dial plate D, having increasing divisions on its face substantially as shown and described.

5 3. I claim swivel block J, in combination

with rod I, radius bar L, and segment K, having tail piece *k*, substantially as shown and described.

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Witnesses:

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