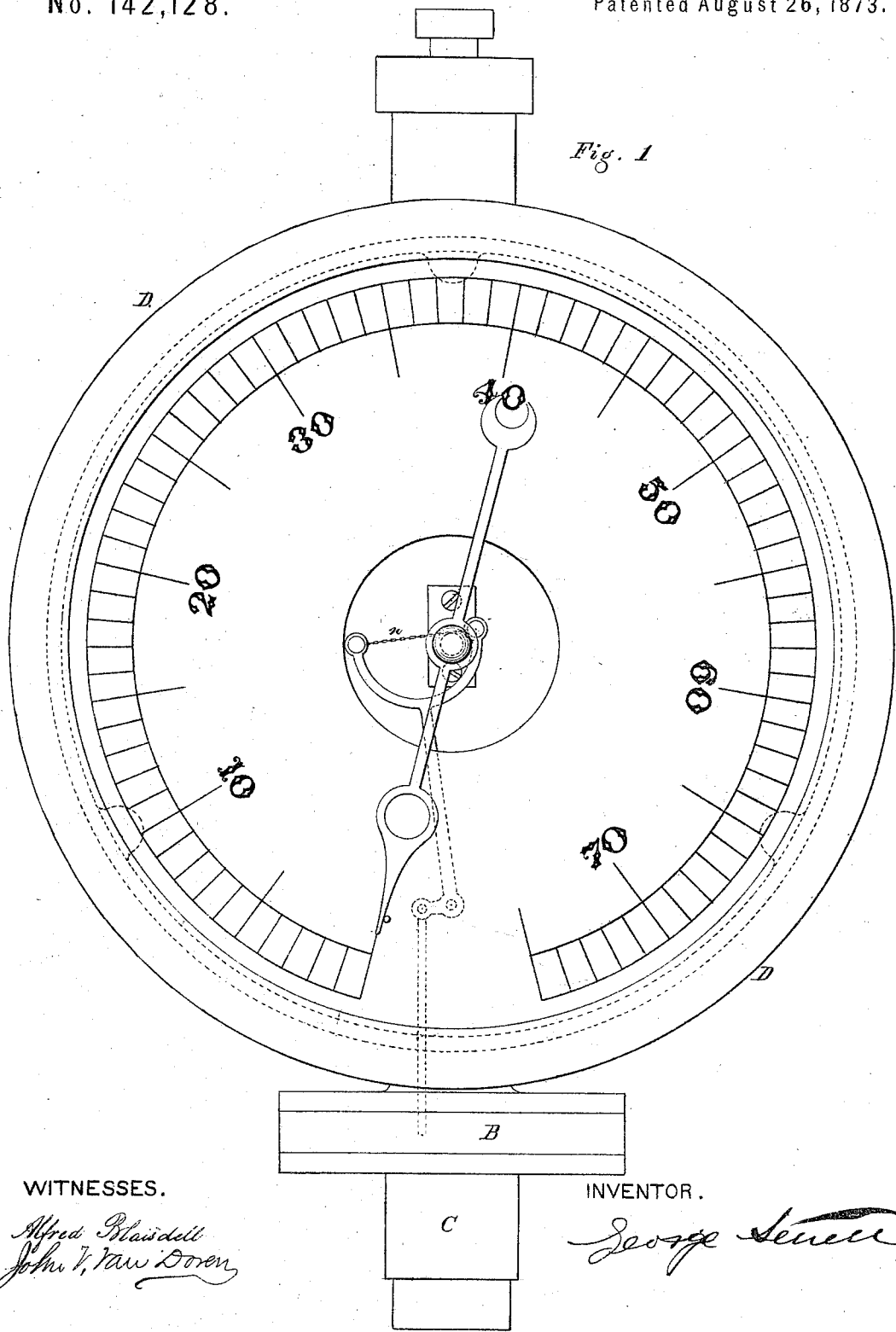


G. SEWELL.
Pressure Gages.

No. 142,128.

Patented August 26, 1873.



WITNESSES.

Alfred Blaisdell
John T. Van Doren

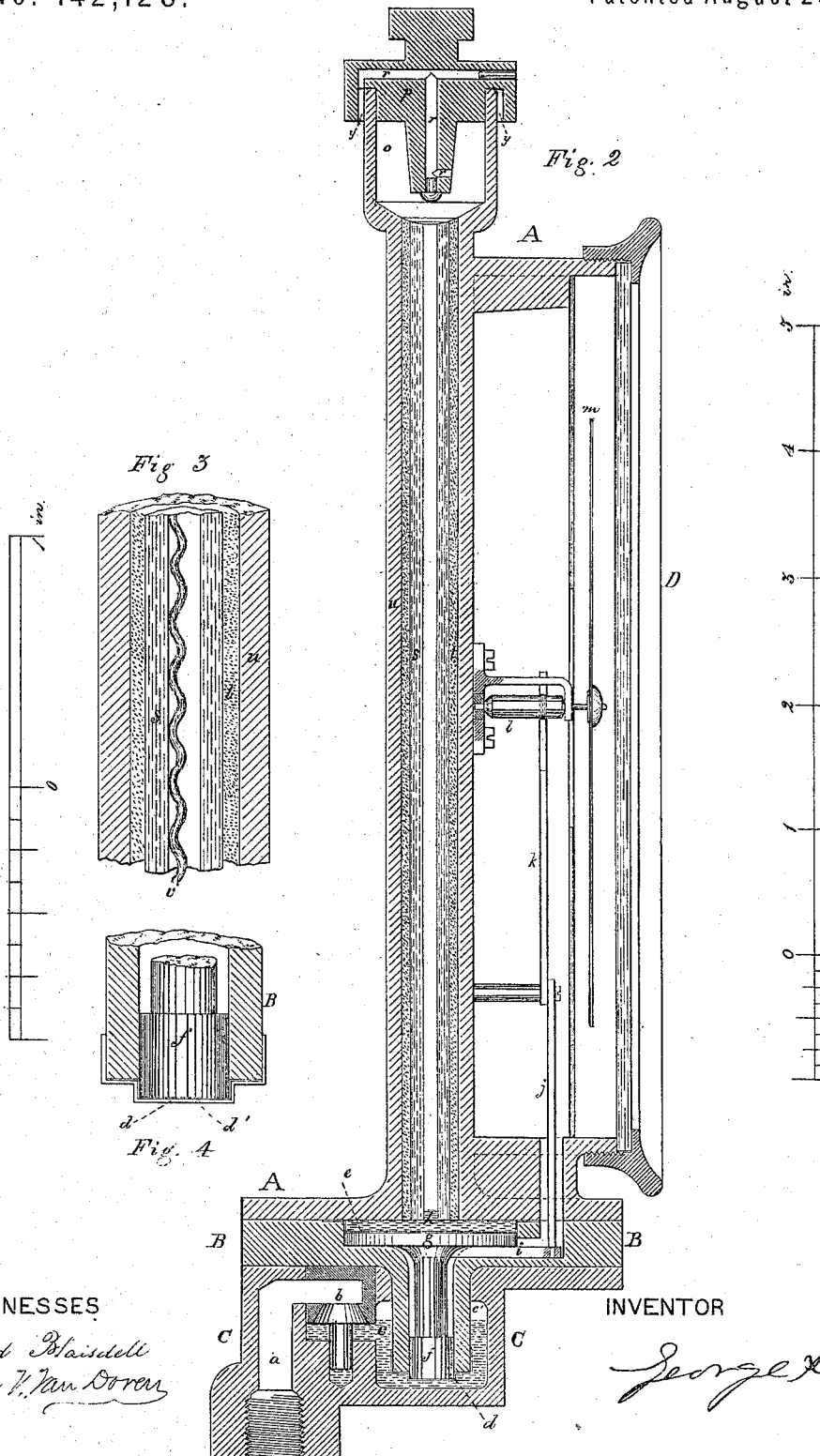
INVENTOR.

George Sewell

G. SEWELL.
Pressure Gages.

No. 142,128.

Patented August 26, 1873.



WITNESSES

Alfred Blaisdell
John W. Van Orman

INVENTOR

George Sewell

UNITED STATES PATENT OFFICE.

GEORGE SEWELL, OF BROOKLYN, ASSIGNOR TO WILLIAM KING PHILLIPS,
OF NEW YORK, N. Y.

IMPROVEMENT IN PRESSURE-GAGES.

Specification forming part of Letters Patent No. **142,128**, dated August 26, 1873; application filed
December 17, 1872.

To all whom it may concern:

Be it known that I, GEORGE SEWELL, of the city of Brooklyn, and county of Kings, in the State of New York, have invented certain new and useful Improvements in Steam-Gages; and I do hereby declare the following to be a full and exact description of the same, the construction of which is fully shown in the accompanying drawings making a part of this specification, in which—

Figure 1 is a front view. Fig. 2 is a transverse section of the same; Fig. 3, an enlarged view of the glass tube and its inclosing-case; Fig. 4, an enlarged view of small piston *f* and a portion of its cylinder and packing *d* and *d'*.

My invention is intended to afford the public a perfectly reliable steam-pressure gage for all pressures, the indications of which shall be controlled entirely by the height and weight of a column of mercury alone, the construction of which is such that it will be next to impossible for it to get out of order.

The same letters refer to like parts in all views.

A A, Fig. 2, is the body of the gage, so constructed as to serve as a case for the glass tube *s*, and also as a support for the dial *x* and its appurtenances. B B is the casting, which is accurately bored for the reception of the differential pistons *f* and *g*. *c c* is the casting, in which is located the valve *b* and its seat, and serves to contain the medium *c*, through which the steam acts on the piston *f*. The space *c'* above amalgam *c* is intended as an air-chamber, the object of which is to allow amalgam *c* to expand in obedience to change of temperature of the surrounding air without raising small piston *f*, by which the zero-point of the gage would be altered. For this material I make use of a metallic amalgam of mercury, lead, tin, or both, or any other suitable metal that mercury will take up and still maintain the requisite fluid state, the proportion being regulated by the quantity of each metal that will be taken up by the mercury, and at the same time remain sufficiently fluid for the purpose intended.

The amalgam consists of mercury and as much tobacco-wrapping foil (composed of tin and lead) as the former would take up. The object of this amalgam is to protect the pack-

ing or piston *f* from rapid deterioration by immediate contact with the steam.

Air can be employed in place of amalgam *c* for the purpose of protecting packing *d* from immediate contact with steam by intervening a body of mercury between chamber containing amalgam *c* and floating valve *b*.

I employ amalgam *c* instead of mercury for the following reasons: First, it will reduce the cost of the manufacture of the gage. Second, it will have less affinity for the sulphur in the rubber packing *d*. Third, its grade of expansion will be reduced, hence less liability to disturb from its normal position small piston *f*.

To prevent the loss of this medium in the handling of the gage, either by accident or design, I employ the valve *b*, which will always be kept closed by the pressure of the amalgam, but will open in obedience to the pressure of the steam, and allow it to act in forcing up small piston *f*, and will close when the pressure is removed, and so keep the fluid from escaping. The lower end of the small piston *f* is covered by a cup-shaped packing, *d*, and the upper piston *g* by a similar packing, *e*, made of India rubber, non-porous animal membrane, or other suitable material, which are so arranged relatively to the movements of the pistons in obedience to pressure, as shown in the accompanying drawings, that when the pistons *f* and *g* are raised by pressure under piston *f* the packing will become relaxed instead of stretching, as is the custom in some other gages, thus leaving the true indications of the gage unopposed by any extraneous opposition; hence the pressure indicated by the index *m* will exactly conform to that due to the weight of the mercury column. To any convenient part of the pistons *f* and *g*, or the connection between them, I attach arm *i* to secure rod *j*, through which medium index *m* receives its motion as the pistons rise or fall.

The chamber above the large piston *g* is filled with mercury *h*, which is forced up the glass tube *s* as the piston rises. This tube is inclosed and protected by the metallic casing of the instrument *u*, and is kept in place by plaster of Paris or other suitable cement. At the upper end of the case *u* and the tube

s a chamber, *o*, is formed for the purpose of receiving the mercury should the gage be inverted by accident or design. This chamber *o* is closed with a tight-fitting plug, *p*, having air-passages *rrr* leading into the annular space *y y* formed between the outside of chamber *o* and protecting flange of plug *p*. Thus the mercury *h* will have continued communication with the atmosphere, and should the gage be inverted the mercury *h* would not fill chamber *o* sufficiently to escape through the air-passages *rrr*. The annular space *y y* is for the purpose of concealing from view the external termination of air-passages *rrr*, and thus prevent tampering with by evil-disposed persons.

To insure the return of the mercury from chamber *o* upon the gage being righted, I place in the tube *s* a thread of woolen yarn or other similar material, as shown at *v v* in the enlarged view, Fig. 3. This allows the air to pass up through it, while the mercury passes down on the outside of the same to its proper position above piston *g*, thus preventing the breaking of the mercury column, which might occur through the opposing pressure of the confined air in chamber above piston *g*. The same result may be secured by placing a small tube (as a thermometer-tube) by the side of the tube *s*, and allowing the upper end in chamber *o* to project some distance above tube *s* for the air to ascend while the mercury passes down tube *s*.

In order to have the least possible weight to oppose the steam-pressure other than the column of mercury, also to employ a material that will not corrode, also as a means of reducing the cost of manufacture, I construct the pistons *f* and *g*, and the connection between them, out of vulcanite, or other suitable material, that is lighter than metal, by which means I am enabled to construct a differential piston steam-gage with the zero-point nearer the true 0° than I otherwise could were I to use metal for the purpose.

I construct the valve *b* and its seat of vulcanite for the reason that it is lighter than metal, and will not be liable to damage and to

leak from corrosion; also, as a means of cheapening the manufacture of the gage. Other portions of the gage could be made of vulcanite or other suitable material lighter than metal for the same reasons.

The quantity of mercury *h* is intended to consist of but a trifle more mercury than the capacity or bore of tube *s*, which enables me to construct a mercurial gage in which the 0°-point will be but little affected by changes of temperature, thus dispensing with an adjustable index or scale, as in Brown's gage, and the adjustable plug, as in A. S. Green's gage, and others, to adjust the 0°-point.

To prevent the possibility of undue friction on small piston *f* in the event of the rubber packing or cap *d* becoming soft and adhesive from any cause whatever, I place a cap, of cloth or kid or any other suitable material, between the rubber packing and small piston *f*, as shown at *d'* in enlarged view, Fig. 4.

I do not claim, broadly, a differential piston steam-gage; but

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

1. Mercury *h*, amalgam *c*, air-space *c'*, and differential pistons *f g*, in combination with the arm *i* and rod *j*, substantially as herein described, for the purpose of imparting motion to mechanism, whereby the pressure of steam may be indicated.

2. The floating valve *b*, arranged substantially as described, in combination with the chambers *c*, for the purpose set forth.

3. The chamber *o*, with its plug *p* and passages *rrr*, constructed and arranged substantially as shown and described, to retain the mercury but allow communication with the atmosphere.

4. The strand of yarn or other fibrous material through the tube *s*, substantially as and for the purpose herein described.

GEORGE SEWELL.

Witnesses:

JNO. D. PATTEN,
F. W. RITTER, Jr.