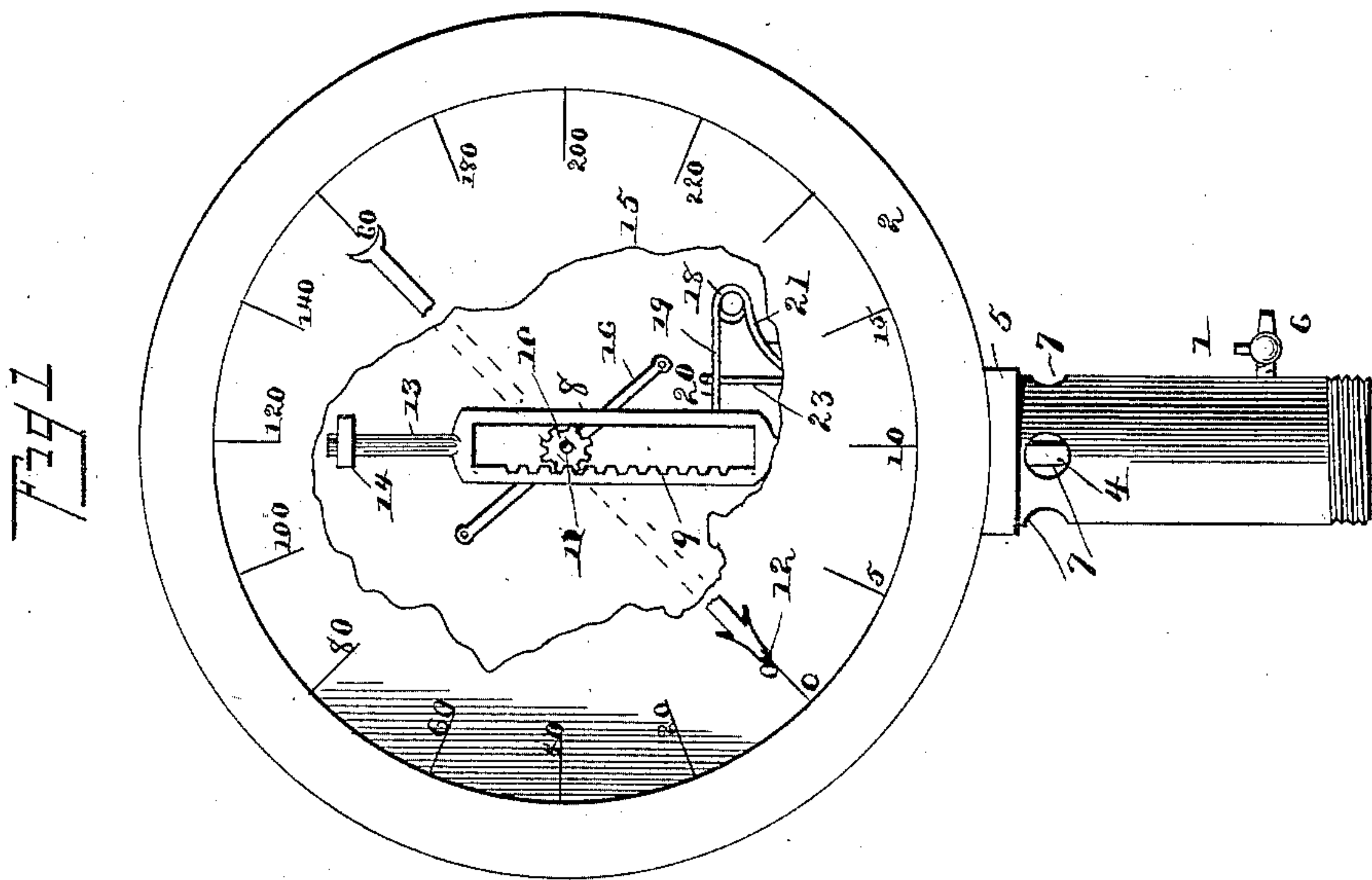
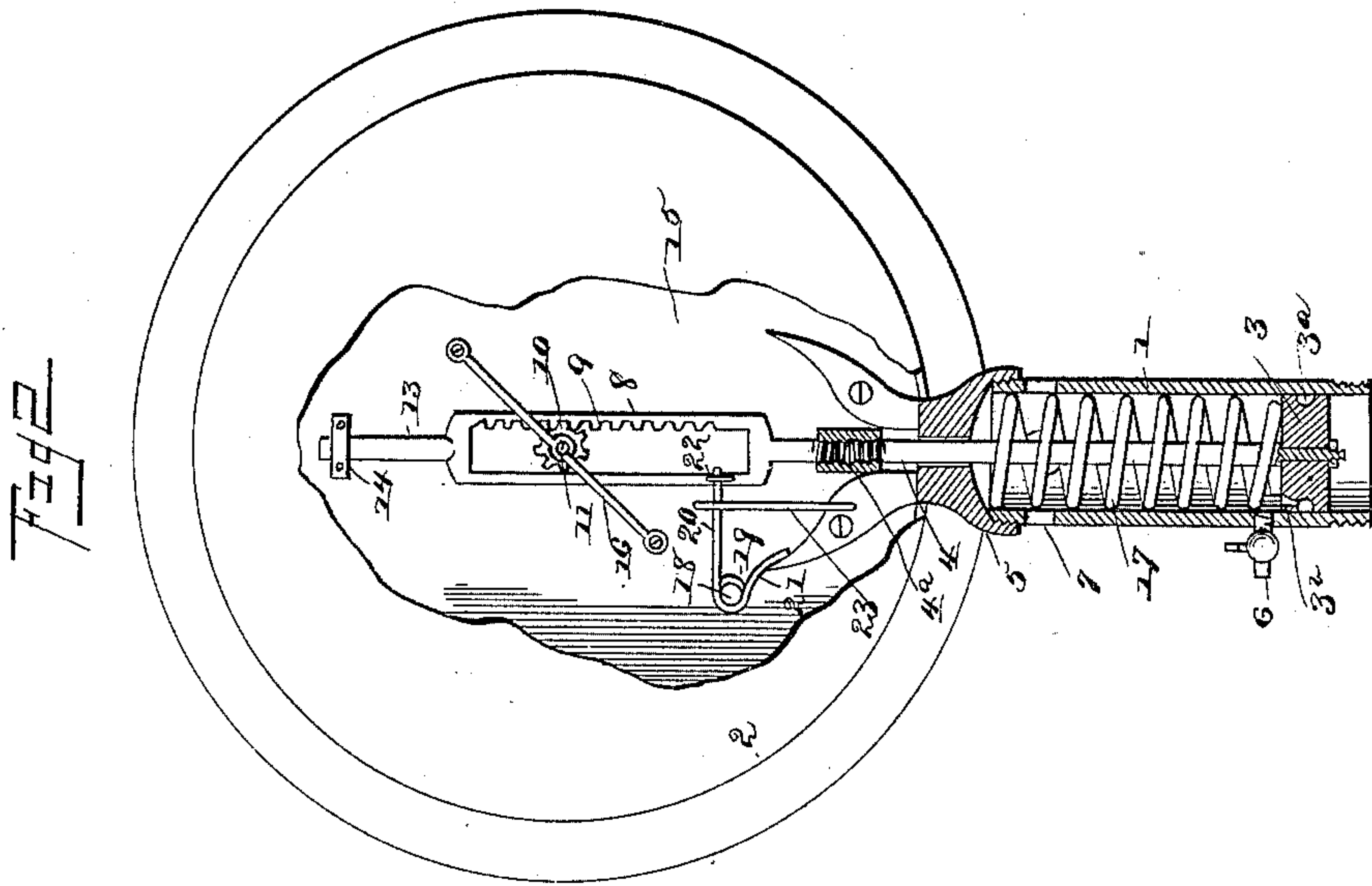


(No Model.)

C. H. RILEY.  
STEAM GAGE.

No. 411,510.

Patented Sept. 24, 1889.



Witnesses

John Amirie  
Wm. Bagger.

By his Attorneys.

Inventor

Charles H. Riley

C. H. Snow & Co.



# UNITED STATES PATENT OFFICE.

CHARLES HENRY RILEY, OF SOUTHPORT, CONNECTICUT.

## STEAM-GAGE.

SPECIFICATION forming part of Letters Patent No. 411,510, dated September 24, 1889.

Application filed June 14, 1889. Serial No. 314,204. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES HENRY RILEY, a citizen of the United States, residing at Southport, in the county of Fairfield and State of Connecticut, have invented a new and useful Steam-Gage, of which the following is a specification.

This invention relates to steam and vacuum gages; and it has for its object to provide a combined steam and vacuum gage which shall indicate in actual pounds the exact pressure to the square inch existing in the boiler to which the gage is attached, and which without change of any kind shall likewise indicate the vacuum-pressure when the device shall be attached to a condenser.

The invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a front view of my improved steam-gage, the parts of the same having been broken away for the purpose of showing the construction more clearly. Fig. 2 is a rear view, parts of the casing having been removed.

Like numerals indicate like parts in the several figures.

1 designates a pipe or cylinder, which is screwed into or otherwise attached to the boiler shell or casing, and which carries at its upper end the casing 2 of my improved gage. The inside of the pipe or cylinder 1 has a true cylindrical bore, and in it is fitted a piston 3 of an area which I prefer should be exactly one square inch. Said piston is annularly grooved, as shown at 3<sup>a</sup>, partly for the purpose of reducing the friction and partly to form a receptacle for lubricating material, which may enter said groove through a perforation 3<sup>b</sup> in the upper side of the piston. The piston stem or rod extends upwardly through a cap or guide 5, which is attached to the upper end of the cylinder 1, and which in turn serves to support the casing 2, into which latter the upper end of the piston-rod is extended, as will be seen by reference to the drawings. The cylinder 1 is provided near its lower end with a laterally-extending cock or faucet 6, which is normally closed.

The upper end of the cylinder has openings or perforations 7, through which lubricating material may be supplied.

Attached to the upper end of the piston-rod 4 by means of a right and left hand threaded nut or coupling-sleeve 4<sup>a</sup> is a rectangular frame 8, one side of which constitutes a rack-bar 9, which engages a pinion 10, mounted upon a spindle or shaft 11, journaled centrally in the casing 2, and carrying at its front end the hand or pointer 12. The upper end of the frame 8 has an upper extension 13, which is guided in a keeper 14, which is suitably attached to the rear side of the dial 15, which is mounted in the casing 2. All of the operating parts—viz., the upper end of the piston-rod 4, the frame 8, and the pinion 10—are located in rear of the said dial, and the hand or pointer 12 is located in front of the latter, the shaft or spindle 11, carrying the said hand, being journaled directly in the said dial and in a keeper 16, secured to the rear side thereof.

17 designates a coiled spring which is carefully tested and which is located in the cylinder 1 between the piston 3 and the cap 5. It will be seen that when the piston is moved in an upward direction it compresses the spring 17, while at the same time the rack 9 of frame 3 engages the pinion 10, causing the shaft 11 to rotate and the hand or pointer 12 to indicate upon the face of the dial, which has been properly graduated and numbered, the exact pressure exerted upon the under side of the piston. The only pressure against the upper side of the piston besides that of the spring is that of the atmosphere, which is admitted through the openings or perforations 7. The condensed water of such steam as may leak past the piston may be drawn off at any time through the cock 6.

18 designates a stud or lug extending rearwardly from the dial 15, and 19 is a spring coiled upon the said lug and having arms 20 and 21, the former of which bears against the under side of a pin 22 upon the rear side of the frame 8, while the arm 21 bears against the upper side of the cap 5 or against any suitable fixed point.

When the device is to be used as a vacuum-gage, and for this purpose is attached to a condenser, the pressure of the atmosphere will



force the piston 3 in an inward direction against the tension of the spring 19, which having been tested as to its tensile strength, and the face of the dial having been graduated accordingly, the hand or pointer 12 will, by its reversed movement in the direction indicated by the arrow, indicate the vacuum-pressure. A keeper 23 is suitably attached to the dial to limit the upward movement of the arm 20 of spring 19, and the springs 17 and 19 should obviously be so arranged and balanced with relation to each other and to the graduated scale upon the face of the dial as to be at rest when the hand 12 points to zero.

The operation and advantages of my invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed, by those skilled in the art to which it appertains.

The construction of the device is exceedingly simple and inexpensive, and is of such a nature as not to be liable to get out of order for any reason. Each of the working parts of the mechanism may, if injured or worn out, be replaced with little trouble and at a trifling expense. By means of the nut or coupling-sleeve 4<sup>a</sup> the frame 8 may be readily adjusted with relation to the piston-rod, so as to adjust the hand or pointer accurately with relation to the springs in case the latter by long use shall become inaccurate.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a combined steam and vacuum gage, the combination of a pipe or cylinder, the casing at the upper end of the same having a graduated dial, the vertically-movable piston having the upwardly-extending piston-rod provided with a frame having a rack-bar on one side, the shaft journaled in the dial and having a hand or pointer at its front end and at its rear end a pinion engaging the said rack-bar, a coiled spring arranged in the cylinder and bearing against the upper side of the piston, and a spring connected to the rear side of the dial and arranged to bear in an upward direction against the frame attached to the piston-rod, substantially as and for the purpose set forth.

2. In a combined steam and vacuum gage,

the combination of a pipe or cylinder having a laterally-extending cock near its lower end and perforations at its upper end, the casing at the upper end of said cylinder containing a graduated dial, a shaft journaled centrally in said dial and in a keeper upon the rear side of the latter and having a hand or pointer at its front end and a pinion at its rear end, a piston arranged in the cylinder and having an upwardly-extending stem or rod, a frame connected adjustably to said stem or rod and having a rack-bar meshing with the pinion and an upward extension confined in a suitable guide or keeper, a coiled spring arranged in the cylinder and adapted to bear downwardly against the piston, a spring mounted upon a stud extending rearwardly from the dial and having laterally-extending arms bearing, respectively, against a fixed point and against the under side of a pin extending rearwardly from the frame attached to the piston-rod, and a keeper to limit the upward movement of the said spring-arm, all combined and operating substantially as and for the purpose set forth.

3. The combination of a pipe or cylinder, the piston having the upwardly-extending stem, the springs, the vertically-movable frame having a rack-bar, a shaft carrying the hand or pointer and a pinion meshing with said rack-bar, and a right and left hand threaded nut or coupling-sleeve connecting the vertically-movable frame with the piston-rod, substantially as and for the purpose set forth.

4. The combination of the cylinder, the vertically-movable piston having annular oil-groove and a perforation in its upper side communicating with said groove, the spring, the upwardly-extending piston-rod, the rack-bar connected with the latter, and the transverse shaft carrying the pointer and a pinion engaging the rack-bar, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

CHARLES HENRY RILEY.

Witnesses:

J. S. HOLTEMEIR,  
ALBERT S. PIKE.