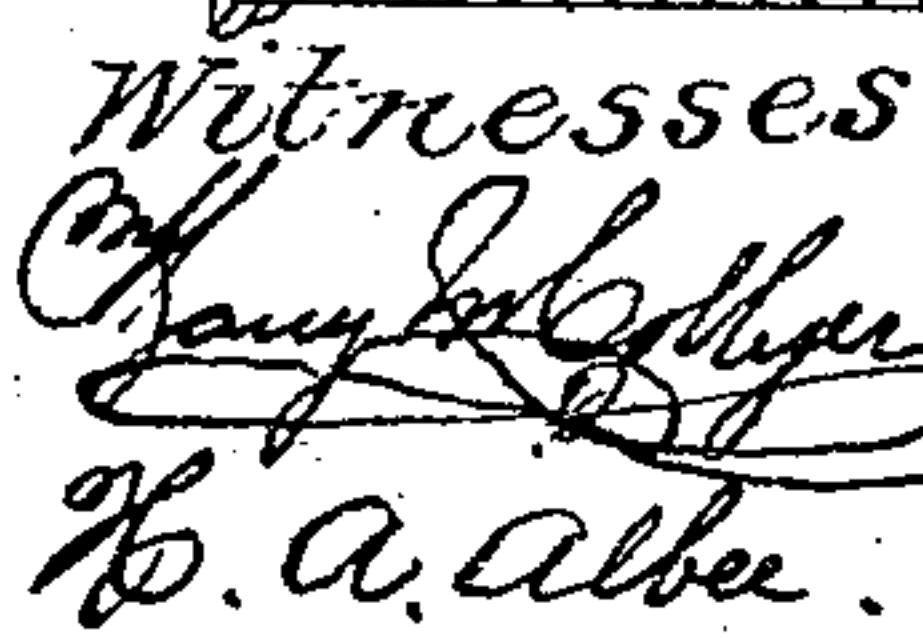


## Water Gage for Steam Boilers.

Patented May 10, 1864.



*Inventor*  
 My Theodore Scheffler  
 per E. E. Peterson, Attorney



# UNITED STATES PATENT OFFICE.

THEODORE SCHEFFLER, OF PATERSON, NEW JERSEY.

## IMPROVEMENT IN WATER-GAGES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 42,690, dated May 10, 1864.

*To all whom it may concern:*

Be it known that I, THEODORE SCHEFFLER, of Paterson, in the county of Passaic, in the State of New Jersey, have invented a certain new and useful Improvement in Water-Gages for Steam-Boilers; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, which form a part of this specification.

Figure 1 is a front view of the instrument, with its case complete. Fig. 2 is a corresponding view, with the exterior case removed to show the arrangement of the pulleys, cords, &c., within. Fig. 3 is a central vertical section on the line S S in Fig. 1. Fig. 4 is a plan view of the entire construction, with the top of the case removed to show the arrangement of the interior. Fig. 5 is a section through the stop-cock, on the line T T in Fig. 3. Fig. 6 is a cross-section of the same plug on the line U U in Fig. 3. Figs. 7, 8, and 9 indicate different positions of the passages in this latter plane, produced by turning the plug.

Similar letters of reference indicate like parts in all the figures.

The great importance of determining rightly at any moment the height of the water-surface in a steam-boiler is well known.

My invention is a compact and cheap instrument intended to be permanently attached to the end or side of the boiler and put in connection with the interior thereof, to indicate the water-level by the position of a suitable index or movable piece on the outside. The movement of the indicator or movable finger, being in the same direction and to precisely the same extent as the changes of level in the water, obviates the necessity of any considerable practice or skill, or even any high degree of intelligence, in order to operate by its aid successfully.

My instrument depends for its operation on the movement of a float or ball in the interior of an upright vessel. A stop-cock is provided, by which the communication between this vessel and the boiler may be closed, or may be so adjusted as to leave a communication between the vessel and the external air or between the boiler and the external air, as may be desired by the operator. This makes it easy to empty or clean the instru-

ment and its connections. The part connecting the float, which is necessarily subjected to the pressure of the steam with the index or finger on the exterior, is extremely slender. It is, in short, a wire of great tenuity, kept straight by tension, and as uniform in size and shape as possible. It is adapted to move with freedom through a corresponding passage or aperture; and I have ascertained by experiment that such a connection may be preserved steam-tight without inducing any appreciable friction to obstruct the motion. I so arrange the parts exterior to the upright vessel that the motion of the finger is in the right direction—that is to say, always in the same direction as the movement of the float, and yet make the whole so compact that it may be inclosed in a very small and compact casing.

To enable others skilled in the art to make and use my invention, I will proceed to describe it by the aid of the drawings and of the letters of reference marked thereon.

A is the iron of the boiler. B is the neck of the instrument connected to A by bolts, and made tight in the obvious manner. C is an upright vessel made of sufficient length to allow for all the variations in the height of the water which will ever require to be measured. The upright vessel C is cast in one piece with the neck B, and is provided with two passages communicating with the boiler. The lowermost, *b*, extends from the bottom of C directly to the interior of the boiler and the uppermost, *c*, extends from the top of C to the interior of the boiler. The inner end of *c* is continued upward within the boiler by the addition of a slender pipe, as represented, so that its open end shall be above the water-line. Both these passages are controlled by the plug of the stop-cock D. The lowermost, *b*, is provided with a branch or side aperture, *b'*, which leads out at right angles and communicates with the external atmosphere, or with a suitable spout to conduct away any water or steam which may be discharged therefrom. It will be seen that by turning the plug D in various positions the water in C may be discharged through this side opening.

Fig. 7 shows the position in which the apparatus is in condition for use. Fig. 8 indicates the position in which the water will be drained from C, and a strong current of steam



blown through C, the same coming in through the passage *c*. Fig. 9 indicates the position in which the portion of the passage *b* which intervenes between the plug D and the boiler will be cleansed, and any dirt lodging therein blown out through the side passage. In all these positions the passage *c* will be open, but by turning the plug D one-eighth round from either of these positions all the passages will be tightly closed.

E is a ball of copper or other suitable material; and *e* is a fine wire, of brass or of precious metal, connected to E and leading up through a fine aperture in the top of the vessel C. F is a light pulley mounted in bearings *f*, so as to turn with great freedom. The wire *e* runs in a groove in the periphery of the pulley F, and extends downward from thence and is tied at the point G to a silk cord which forms a continuation thereof. The silk cord *g* runs in a groove in the periphery of the pulley H, mounted in bearings *h*, and extends up from thence and runs in a similar groove in a similar pulley, I, mounted in bearings *i*. From thence it extends down and is loaded with a weight, J, which is allowed to run up and down in the space inclosed between the two partitions K' K<sup>2</sup> as the float E rises and sinks in C. A suitable finger or pointer, M, is attached to the silk cord *g* at the point represented. A cylindrical casing of brass (designated K) incloses and protects the several parts represented. The index finger extends out through a slot, *k*, in this case, so as to present it on the outside and be plainly visible to the eye. This slot is of sufficient width to allow the index to move without friction, and the exterior of the case K is graduated in inches and parts of inches to allow the position of the water-level to be more accurately noted. The weight J is less than the united weights of E and M. The passage *c* is filled with steam, and the passage *b* with water. The upright vessel C is partially filled with water and partially with steam. Each change in the height of the water in the boiler, excepting always the momentary changes or splashes due to ebullition, is accompanied by a corresponding change in the height of the water-level in C. The ball E is so nearly balanced by the weight J that it floats partially immersed in the water. With each change of level of the water it makes a corresponding movement. If the water rises an inch, the ball E rises an inch, and in doing so allows the weight J by its tension on the silk cord *g*, and through this on the connected wire *e*, to turn the several pulleys F, H, and I, and move the index M one inch upward. Any change in the opposite direction will be similarly made apparent by a movement of all the parts in the opposite direction.

I prefer to employ ordinary silver, the same as in coin, as the material for my slender wire *e*, and I provide closely-fitting tubes of the same material, and arrange them in the man-

ner indicated by P and P', in Fig. 3. I fit the lowermost, P, very tightly into the material of a brass cap, which forms the top of my chamber C, and I fit the other, P', into a cap which fits upon or, rather, into the top of the portion last described. Screw-bolts (indicated in Fig. 4) confine these parts firmly and tightly together. I make the tubes P and P' of such length and so apply them, as represented, that a small chamber, Q, remains between them. This chamber may be made to receive any sufficiently delicate packing if the space between my wire *e* and the interior of the tubes P P' shall ever be found to leak; but I have found by experiments, continued several weeks with steam of a pressure from sixty to eighty pounds, that the apparatus may be relied upon to traverse freely and to indicate the elevation of the water-level with accuracy and without leaking, so as to form any objection to its use, even without any packing in the space Q. The packing introduced in this position may be of any approved kind, but care must be taken not to adjust it so as to induce any considerable friction on the wire *e*.

I find it advisable to secure the moving parts to prevent their working during the transportation of the instrument from one place to another. I effect this by the aid of the screw W, (seen in Fig. 1,) which is tapped through the outer case, K, at the point represented, and makes a sufficient pressure against the weight J to hold it very firmly. This pressure is maintained, and all the working parts of the gage consequently remain stationary until the gage has been properly secured to the boiler, after which, by slackening the screw W, the weight J is released and all the working parts are free to operate as above described.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In water-gages for steam-boilers, the slender connection *e*, subjected to a constant tensile strain, and arranged to operate substantially in the manner herein set forth.

2. In connection with the above, the combination and arrangement of the guiding-pulleys F H, the wire or cord *e g*, the index M, and the tension-pulley and weight I J, or their equivalents, substantially as and for the purpose herein set forth.

3. In a water-gage, the passages *b b' c*, and the plug D, with its several passages, combined and arranged in the manner and so as to serve the several purposes herein set forth.

4. In water-gages, the tubes P P', and the intervening space Q, arranged relatively to each other and to the slender wire *e*, substantially in the manner and for the purpose herein set forth.

THEODORE SCHEFFLER.

Witnesses:

HENRY WORRESON,  
MORRISS SHWARZBAUM.