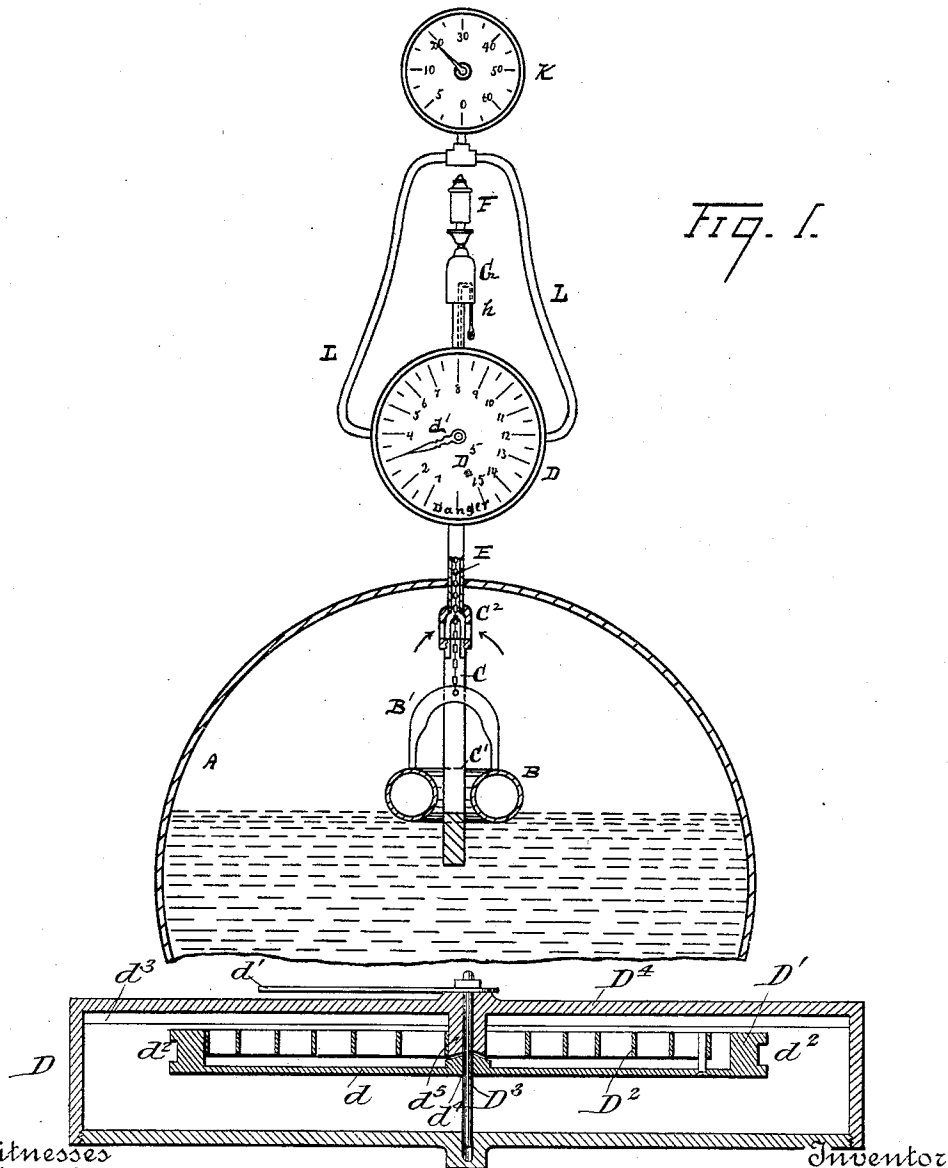


2 Sheets—Sheet 1.

No. 480,309.

Patented Aug. 9, 1892.



Witnesses  
John Schuman.  
John F. Miller.

*Fig. 3.*

Isaac Willan  
By his Attorney  
Newell S. Wright.

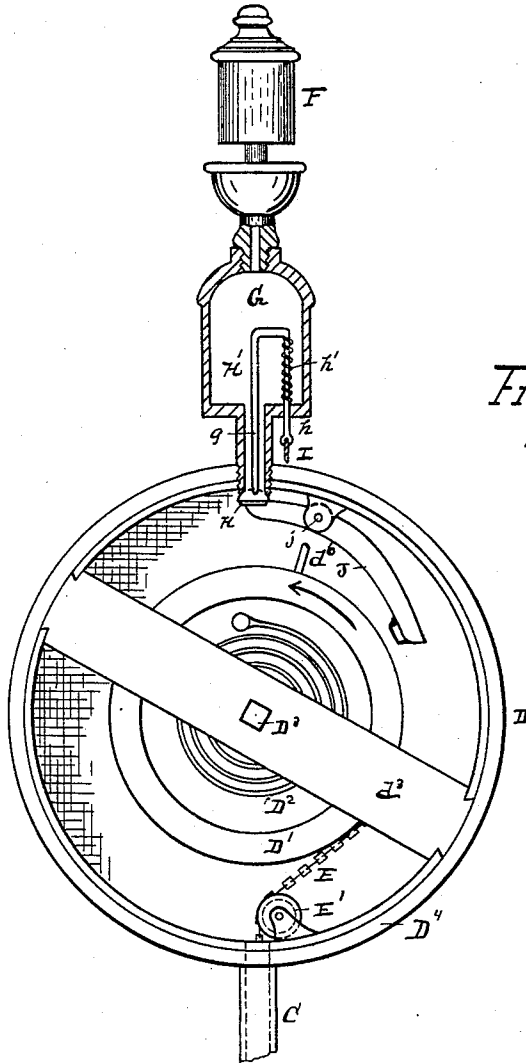
(No Model.)

2 Sheets—Sheet 2.

I. WILLAN.  
COMBINED WATER AND STEAM GAGE.

No. 480,309.

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Witnesses  
John Schuman.  
John F. Miller

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# UNITED STATES PATENT OFFICE.

ISAAC WILLAN, OF DETROIT, MICHIGAN.

## COMBINED WATER AND STEAM GAGE.

SPECIFICATION forming part of Letters Patent No. 480,309, dated August 9, 1892.

Application filed February 12, 1892. Serial No. 421,346. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC WILLAN, a subject of the Queen of Great Britain, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in a Combined Low-Water Alarm and Water and Steam Gage; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates particularly to certain new and useful improvements in a combined low-water alarm and water and steam gage, and has for its object to provide a simple, economical, and efficient device whereby the state of the water in a boiler will be accurately and closely indicated, and whereby also, if desired, an alarm will be sounded when the water is low. I do not, however, limit my invention to use in boilers alone, as it may be used as a water fluid-gage with water-tanks and for similar uses.

My invention consists of the devices and appliances, their construction, combination, and arrangement, as hereinafter explained and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view, partly in vertical section and partly in front elevation. Fig. 2 is a detail view of the gage with the cover removed, showing the interior construction and adjacent features in section. Fig. 3 is a cross-section through the gage.

I carry out my invention as follows: A represents a boiler.

B is a float located within the boiler to rise and fall with the changes of water-level therein.

C is an arm extending through the boiler, preferably tubular at its upper end, and supporting thereupon a water-gage D. Within the gage I locate a spring-case D', provided with a coiled spring D<sup>2</sup> and preferably with a cover-plate *d* to close the spring-chamber within the case to protect the spring and exclude steam and moisture from the chamber in order to prevent the corrosion of the spring. The case D<sup>4</sup> of the gage D is provided with a rigid hub *d*<sup>5</sup>, extending into the case D', the

said case D' being rotatable thereon, one end of the spring being engaged therewith. The opposite end of the spring is engaged with the case D'. D<sup>3</sup> is a shaft rigidly engaged with the case D', as at *d*<sup>4</sup>, said shaft rotatable through said hub, and bearing thereupon an index-finger *d*'. The front of the case is formed with a dial D<sup>5</sup>, as shown in Fig. 1, around which the index-finger travels. The spring-case is firmly engaged to the shaft D<sup>3</sup> to rotate therewith. The outer circumference of the spring-case is preferably grooved, as shown at *d*<sup>2</sup>, to carry a chain E, engaged and wound thereupon. A retaining cross-bar *d*<sup>3</sup> may be engaged over the case D to the case D<sup>4</sup>. The chain E extends from the spring-case down through the arm C and is connected with the float. To this end the float is provided with a yoke B', to which the chain is attached. The float, with its yoke B', has a movable relation to the arm C, said arm having a stationary engagement in the shell of the boiler. For this purpose the lower end of the arm C is constructed with an elongated guide-slot C', through which the yoke passes, so as to move up and down freely in said slot as the float rises and falls. Above the upper end of said slot, preferably, the arm is provided with an open chamber C<sup>2</sup> to allow the passage of steam into and through the tubular arm, as indicated at the arrows in Fig. 1. It is designed to give to the spring in the spring-case simply sufficient tension to rotate the spring-case to take up the slack of the chain engaged therewith and connected with the float.

The features now explained constitute an efficient water-gage.

My invention also contemplates, however, the provision of a low-water alarm also, which I accomplish by suitably attaching a whistle F to the water-gage. As shown, the whistle is supported upon the water-gage by an intervening valve-case G, with which the whistle mechanism communicates, the valve-case also having communication, as shown at *g*, with the interior of the water-gage, said communication controlled by a valve H, which may be arranged to close said communication. As illustrated herewith, the valve is connected upon the end of a weighted lever-arm J, fulcrumed, as at *j*, to the case of the gage, the lever-arm when in normal position closing the

valve. The spring-case is provided with a pin or stop  $d^6$ , which upon sufficient rotation of the spring-case will strike against the lower end of the lever-arm J, and thereby throw  
 5 down its upper end thus unseating the valve. This will take place when the water is too low. The opening of the valve H will admit steam to the whistle and so sound an alarm at low water.

10 In order to test the working of the device I prefer to so construct the valve as to provide an outside connection therewith. This may be done by providing the valve with a valve-stem H', extending upward into the  
 15 valve-case G, and forming the stem with a downwardly-projecting arm  $h$ , extending through the valve-case to the exterior. A spring  $h'$  surrounds the arm  $h$  to aid in holding the valve in closed position. With the  
 20 outer end of said stem I connect a cord or cable I, whereby the valve may be opened at will to sound the whistle. To the water-gage I also contemplate attaching a steam-gage K. The steam-gage may be of any desired construction and is supported upon the case of  
 25 the water-gage D by one or more intervening pipes L, communicating with the water-gage and steam-gage, whereby steam may pass to the steam-gage. The dial of the water-gage  
 30 may be provided with a "danger-point" marked thereon, as shown in Fig. 1. When the dial-finger reaches that point the attendant can see the fact as well as hear the alarm.

E' denotes a pulley over which the chain is  
 35 passed.

The operation of the device is as follows: With the lowering of the water in the boiler the float descends, thereby pulling down the chain connected therewith and rotating the spring-  
 40 case, upon which the chain is wound. This moves the dial-finger about the dial-plate and indicates very minutely the degree to which the water has lowered in the boiler. As the water rises in the boiler the operation is reversed.  
 45 Should the water descend so low as to reach the danger-point the pin  $d^4$  on the spring-case strikes the lever-arm connected with the valve and opens the valve, permitting the steam to pass to the whistle. The operation of the

steam-gage will be understood, since, except 50 the method of its combination with other parts of the device, it is of any ordinary construction.

It will be seen that the device is very sensitive and accurate in its operation and is not 55 liable to get out of order. Any other flexible connection can be used in place of the chain, if preferred.

What I claim as my invention is—

1. The combination of the arm C, provided 60 with the slot C', the float provided with the yoke B', passed through said slot, a water-gage provided with a rotatable spring-case carrying an index-finger, and a flexible connection connecting said case and yoke, sub- 65 stantially as described.

2. The combination of the float, the water-gage, a steam-gage communicating with the water-gage, the arm C, communicating with the interior of the water-gage, whereby steam 70 may pass to said gage, a rotatable spring-case located in the water-gage case, carrying an index-finger, and a flexible connection connected with the spring-case and float, substantially as described.

3. The combination of the float, the arm C, made tubular at its upper end, the water-gage provided with a rotatable spring-case, connected with the float, alarm mechanism communicating with the interior of said gage, and 80 a controlling-valve operated by the movement of the spring-case, substantially as described.

4. The combination of the float, the arm C, made tubular at its upper end, the water-gage provided with a rotatable spring-case, con- 85 nected with the float, alarm mechanism communicating with the interior of said gage, and a self-closing controlling-valve arranged to be opened by the movement of said case, said valve provided with a valve-stem projecting 90 to the exterior, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

ISAAC WILLAN.

Witnesses:

N. S. WRIGHT,  
 JOHN F. MILLER.