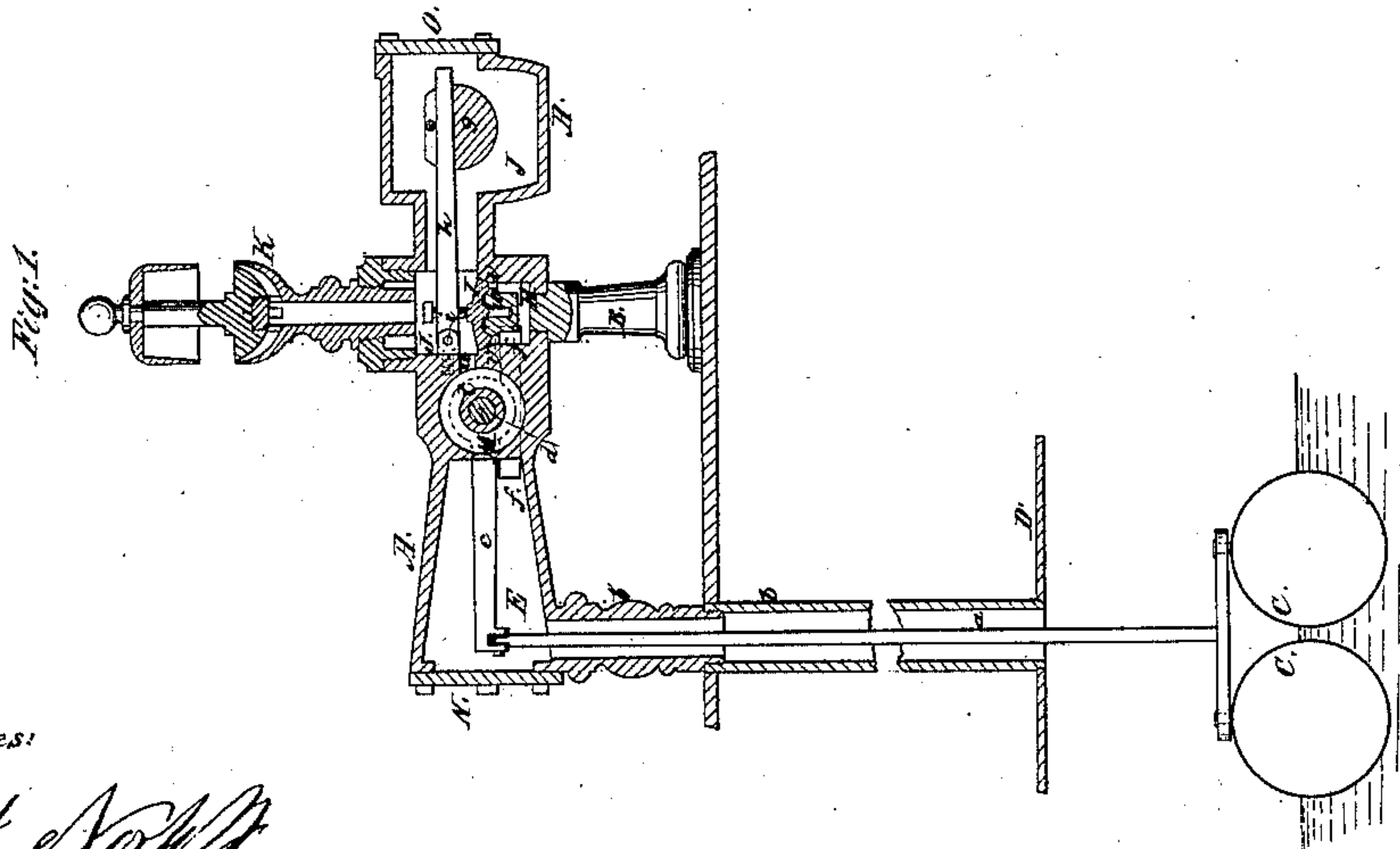
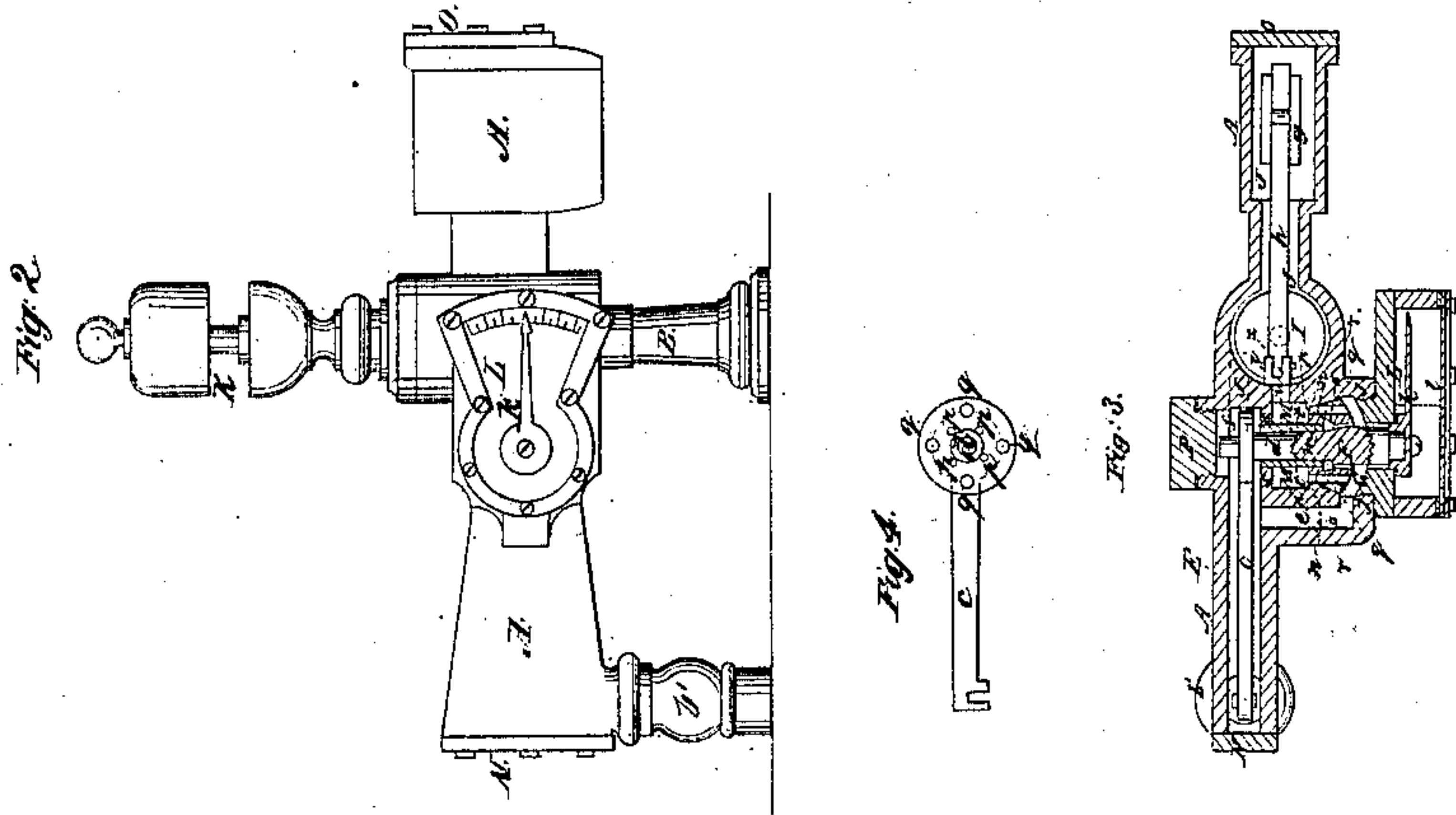


*Grader & Corran,  
Steam-Boiler Indicator.*

*N<sup>o</sup> 22,287.*

*Patented Dec. 14, 1858.*



*Witnesses:*

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# UNITED STATES PATENT OFFICE.

GEO. W. GRADER AND BENJN. F. COWAN, OF MEMPHIS, TENNESSEE.

## STEAM AND WATER ALARM GAGE FOR STEAM-BOILERS.

Specification of Letters Patent No. 22,287, dated December 14, 1858.

*To all whom it may concern:*

Be it known that we, GEORGE W. GRADER and BENJAMIN F. COWAN, of Memphis, in the county of Shelby and State of Tennessee, have invented a new and Improved Combined Steam and Water Alarm Gage, for Steam-Boilers; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1, is a vertical section of the gage. Fig. 2, is a front view of the same. Fig. 3, is a horizontal section of the same. Fig. 4, is a front view of the water alarm valve.

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

This invention consists in a novel and very simple and effective arrangement of the parts of an alarm gage for steam and water, whereby the whole, with the exception of a float that is arranged within the boiler, and a whistle, are brought into a very compact form within a closed case of neat appearance and limited size, without the use of stuffing boxes or packing of any kind, making an instrument which can be placed in the cabin of a steam vessel, and which is beyond the control of the engineer, or any other person on board the vessel, but serves to announce to the captain or other officer and passengers whenever there is any likelihood of danger of explosion of the boiler in consequence of excessive pressure of steam or deficiency of water.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

A, is the case, mounted upon a pedestal B, which is placed upon a shelf, stand, or other support.

C, is a float resting on the surface of the water in the boiler and having attached to it a rod *a*, which passes upward through a tube *b*, the lower end of which is secured to the top of the boiler, D, and the upper end to a socket *b'*, at the bottom of the case A, near one end thereof, the said tube forming at all times a means of free communication between the boiler and the inlet chamber E, of the case. The rod *a*, is attached to a lever *e*, which is fast upon the horizontal spindle *d*, of a circularly-moving water-alarm valve F, which lever works within the inlet

chamber E, which is made only just large enough in every direction for the said lever to work freely within it. From the inlet chamber E, of the case, there is a passage *e*, see Fig. 3, which leads to the valve box G, which contains the valve F, and another passage *f*, which leads into a small chamber H, below a puppet valve I, which is loaded like an ordinary safety valve, with a weight *g*, applied to a lever *h*, which works on a fulcrum pin *i*, within a closed chamber J, which extends to the opposite end of the case A, to where the tube *b*, connects.

K, is the alarm whistle placed on the top of the case A, above the valve I.

L, is a small box screwing at *j*, into the front of the valve box G, and containing an index *k*, which is fast on the valve-spindle *d*, and which serves to indicate upon a graduated scale, engraved on the back of the box, the level of the water in the boiler; the position of the said index being governed by the height of the water in the boiler, and being visible through a glass *l*, which constitutes the front of the box L. The float C, as it rises and falls, with the level of the water, turns the valve spindle *d*, and thus moves the index.

The circularly-moving water-alarm valve F, which admits steam to the chamber J, to sound the whistle when the water in the boiler gets below a certain level, has an annular face, the transverse section of which is of a convex form resembling the letter U, as shown at *n, n*, in Fig. 3), fitting to a seat of corresponding form, and between the valve and the partition *m*, of the case, which forms the seat, there is provided a cavity *o*, to which steam enters by means of openings *p, p*, in the valve for the purpose of balancing the valve, which, having steam admitted to act on the back end of its spindle which projects into the inlet chamber E, is partly balanced, having only a pressure opposite its U-formed face and seat. The said valve has a series of small passages *q, q*, through it, whose inner orifices terminate in the U-formed annular face, and corresponding with a series of passages *r, r*, of similar size, leading from its annular seat through the partition *m*, into an annular chamber M, which is formed between the said partition *m*, and a partition *s*, in front of the chamber E, and which is shut off from the valve spindle by a bushing *t*, surrounding the valve



spindle, from which annular chamber a passage *u*, see Figs. 1 and 3, leads to the chamber J, to admit steam to sound the whistle.

The valve F, is kept in its seat by the pressure of steam in front of it, and the U-formed face constitutes the only necessary guide. The spindle *d*, requires no stuffing box or packing, but fits easily into the bushing *t*, which is merely to prevent leakage from the chamber M, around the spindle, leakage to or from the cavity *o*, and inlet chamber E, around the spindle, being of no consequence. The puppet valve I, has a face and seat of a similar U-form, to the valve F, and the only communication between the chambers H and J, is by means of a series of small passages *v*, *v*, see Fig. 1, in the partition *w*, in which the said seat is formed, so that the area of the valve, exposed to steam, is small, which obviates the necessity of a heavy weight *g*, and long lever *h*, thereby keeping the chamber J, of small size. The stem of the said valve I, does not enter the lower chamber H, but works in a guide in the partition *w*.

The case A, is furnished at the end of the inlet chamber E, with a movable bonnet N, which permits the insertion of the lever *c*, and at the end of the chamber J, the said chamber is furnished with another movable bonnet O, which permits adjustment of the weight *g*, and the insertion of the lever *h*, and the stock *x*, which holds its fulcrum *i*, the latter screwing into its place, as shown in Fig. 1. The spindle *d*, is inserted before the box L, is screwed in; and a screw cap P, is provided at the back of the said spindle to admit of the latter being driven out. With the exception of the bonnets N, and O, the cap P, and bushing *t*, the case is a single casting.

The operation of the apparatus is as follows: The pipe *b*, chamber E, passages *e* and *f*, and chambers G, and H, are always filled with steam from the boiler. While the water remains at a proper level the float

keeps the valve F, in such a position that its passages *q*, *q*, do not communicate with *r*, *r*, but as soon as the water gets below such level the descent of the float causes the lever *c*, to move the said valve to such a position as to permit the escape of steam through the passages *q*, *r*, chamber M, and passage *u*, to the chamber J, from whence it issues upon the whistle, and gives the alarm, which continues till the water rises high enough for the rise of the float to close the passages *q*, *r*. While the steam is below the pressure to which the valve I, is loaded, the said valve remains closed, but as soon as it gets above that pressure it lifts the said valve and allows the escape of steam to the whistle which continues to be sounded till the pressure is reduced below that to which the said valve I, is loaded.

We will remark that a brass steam-tight partition may be provided in the box L, in front of the spindle *d*, and a magnet be attached to the said spindle to move an index in front of the said partition, which will prevent the glass *l*, being dimmed by the steam.

We do not claim broadly the invention of a combined steam and water alarm gage, nor do we claim broadly the dispensing of a stuffing box or packing in a water gage, but,

What we claim as our invention and desire to secure by Letters Patent, is—

The combined arrangement of the two valves F, I, and their seats, the several chambers and passages, the valve levers and their connections within the case A, substantially as described, whereby the construction of the instrument is rendered simple, its form compact and its size limited, without the use of stuffing boxes or any packing.

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Witnesses:

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