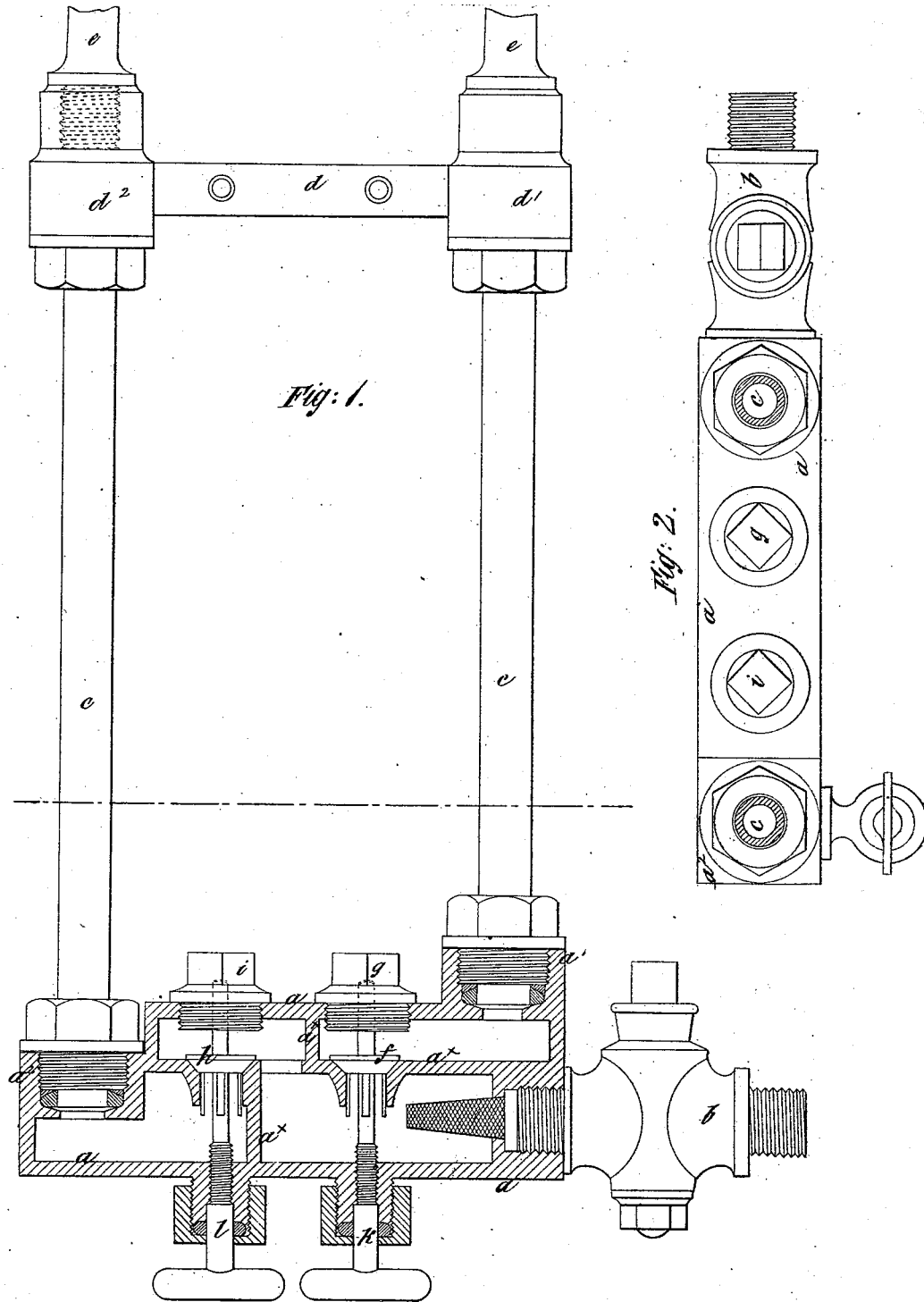


G. J. FIRMIN

Water Gage.

No. 106,801.

Patented Aug. 30, 1870.



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# United States Patent Office.

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ENGLAND.

*Letters Patent No. 106,801, dated August 30, 1870; patented in England April 25, 1870.*

## MAXIMUM AND MINIMUM WATER-GAUGE.

The Schedule referred to in these Letters Patent and making part of the same.

### *To all to whom it may concern:*

Be it known that I, GEORGE JORDAN FIRMIN, of No. 19 Lorn Road, North Brixton, in the county of Surrey, England, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Self-registering Water or Liquid Gauges; and I, the said GEORGE JORDAN FIRMIN, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say:

This invention has for its object improvements in self-registering water or liquid-gauges.

In order to indicate the lowest and the highest levels at which water has stood in a steam-boiler, or other vessel, I employ two glass tubes, each similar to an ordinary glass water-gauge, but provided at the foot with a valve; the valve of the maximum or highest-level gauge opens to allow water or liquid to enter it, but closes against its return. The valve of the minimum or lowest-level gauge opens in the contrary direction, to allow the water or liquid to pass out from it but not to enter.

I fit screws or studs beneath the valves, for the purpose of lifting the valves to set the instrument with the liquid in both tubes at the level at which it stands in the boiler or vessel at the time of setting.

The height the liquid stands in the tubes shows at any time the highest and the lowest levels to which the water or liquid has been in the boiler or vessel to which the instrument is attached since the last setting.

It is not necessary in every case that both the maximum and minimum arrangements should be used; they may be employed separately.

Taps or plugs are provided for running water or liquid through the tubes, from time to time, to cleanse them.

The setting-screws or studs of the apparatus are incased or locked, so that the instrument may not be tampered with between the time of setting.

In place of lifting the valves to set the instrument, setting-cocks may be provided, and

In order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the drawing hereunto annexed.

### *Description of the Drawing.*

Figure 1 is a side view, partly in section, of apparatus constructed according to my invention.

Figure 2 is a plan of the lower part of the same.

*a* is a metal casting fixed to the front of the boiler;

it is hollow, and the space within it communicates with the interior of the boiler by the cock *b*.

There are two sockets, *a*<sup>1</sup> and *a*<sup>2</sup>, upon the casting *a*, into which glass tubes, *c c*, are fixed, in the usual way, by means of screw-rings and packing.

*d* is another casting, also fixed to the front of the boiler; it carries two sockets, *d*<sup>1</sup> and *d*<sup>2</sup>, which receive the upper ends of the glass tubes *c c*.

The tubes are fixed by means of screw-rings similar to those at their lower ends.

*e e* are pipes passing from these sockets, and putting them in communication with the upper part of the boiler.

The pipes *e* rise sufficiently to prevent water being drawn from one tube, *c*, into the other by means of them.

*a*<sup>x</sup> *a*<sup>x</sup> are partitions dividing the cavity in the piece *a* into several parts; into one of these the cock *b* opens. Its mouth is covered with a cap of wire-gauze, to prevent the passage of grit or sediment.

*f* is a valve fitted in the partition *a*<sup>x</sup>, and which opens to let water pass up into the right-hand tube *c*, and it will rise in this tube until it attains an elevation less than that in the boiler by a certain fixed amount, (dependent on the weight of the valve *f*), which is known and allowed for. The valve *f* prevents the return of the water from this tube, so that its level will always correspond with the highest level at which the water in the boiler has stood.

The valve *f* is covered by a screw-plug, *g*, by removing which access may be had to the valve. The stem of the valve projects upward into a guiding-hole formed for it.

In the plug is another similar valve, which shuts to prevent water passing from the left-hand tube *c* to the boiler, but opens to allow water to pass in the contrary direction; hence, the level of the water in this tube will always correspond with the lowest level to which the water has fallen in the boiler, and will, by a certain fixed amount, exceed the boiler-level which it represents, in consequence of the weight of the valve *h*.

*i* is a screw-plug covering and guiding the valve *h*.

*k* and *l* are two screw-studs passing through tapped holes into the water-spaces of the piece *d*; they terminate immediately beneath the valves *f* and *h*. A suitable packing is applied around the stems of the screw-studs *k* and *l* to prevent leakage, and, by turning them, the valves may be lifted from their seats. The water, then, runs to the boiler-level in each of the tubes *c*.

The screw-plugs over the valves may be removed,

in order to admit of a clear flow of water through the apparatus to clean it.

The apparatus, when in use, is suitably cased, to prevent the workmen tampering with the setting-screws *k* and *l*.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood, that

What I claim, is—

The maximum self-registering liquid-gauge, constructed with a measuring-tube and self-acting inlet-valve, substantially as described.

Also, the minimum self-registering liquid-gauge, constructed with a measuring-tube and self-acting exit-valve, substantially as described.

Also, the combination in one instrument, of the maximum and minimum self-registering liquid-gauges, substantially as described.

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