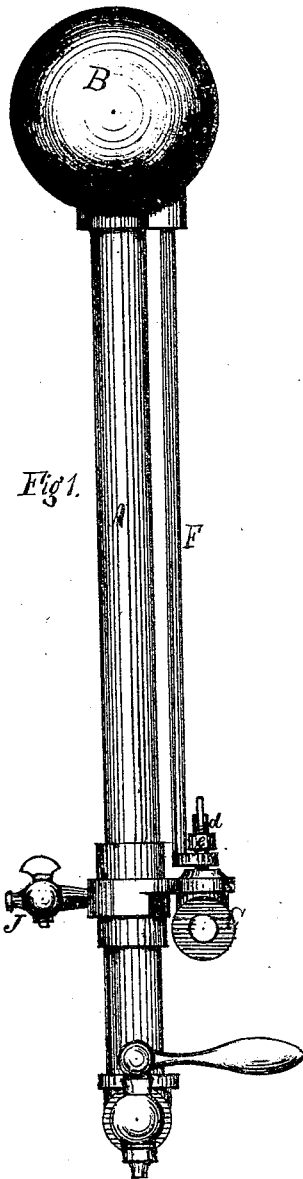


*Hopkins & Straight,*

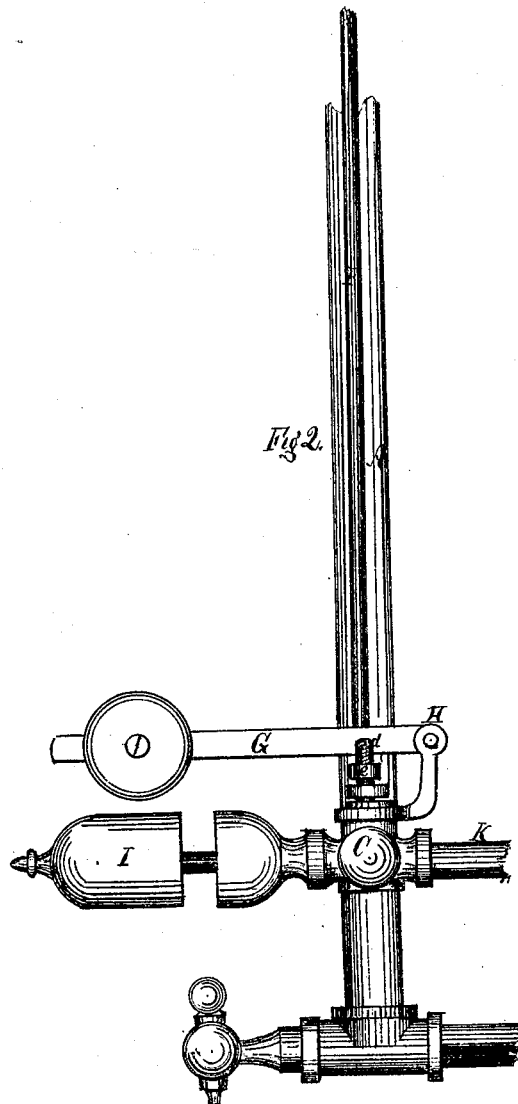
*Indicator.*

*No. 106,821.*

*Patented Aug. 30. 1870.*



*Fig 1.*



*Fig 2.*

*Witnesses:*  
*H. M. Hopkins,*  
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*Inventors:*  
*Geo. M. Hopkins,*  
*John A. Straight*

# United States Patent Office.

GEORGE M. HOPKINS AND JOHN A. STRAIGHT, OF ALBION, NEW YORK.

*Letters Patent No. 106,821, dated August 30, 1870; antedated August 13, 1870.*

## LOW-WATER AND HIGH-PRESSURE INDICATOR.

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

We, GEORGE M. HOPKINS and JOHN A. STRAIGHT, of Albion, in the county of Orleans and State of New York, have invented a certain Improvement in Low-water Indicators and Pressure-Alarms, of which the following is a specification.

### *Nature and Object of the Invention.*

Our invention relates to the combination of a safety-valve and expansion-tube, provided with an air-chamber, in such a way that, when there is a deficiency of water in the boiler, the expansion of the tube raises the valve and admits steam to the whistle, and, when there is an over pressure of steam in the boiler, the valve will rise independently of the expansion-tube.

The object of this invention is to furnish a reliable means of giving an alarm when the water becomes low in the boiler, or when the safety-valve fails to act from any cause.

### *Description of the Accompanying Drawing.*

Figure 1 is an elevation of the apparatus, with the whistle and weighted arm of the safety-valve removed.

Figure 2 is a view of the safety-valve, whistle, and connections.

### *General Description.*

A is an expansion-tube, made of any suitable material.

B is an air-chamber attached to or connected with the tube A.

C is a small safety-valve, of ordinary construction, except that the valve-stem *d* is threaded, and is provided with the nut *e*.

F is a rod attached to the upper end of the tube A, the lower end of which is bent out at a right angle, and is provided with a hole, through which the valve-stem *d* passes. The nut *e* is above the bent portion of the rod F.

By reference to fig. 2 it will be seen that the weighted lever G has its fulcrum at H, and bears upon the valve-stem *d*.

The whistle I is connected with the valve C in such a way that the steam which escapes the valve sounds the alarm through it.

J is an air-cock, which admits of letting the water down from the tube A. The lower end of the tube A is connected with the boiler at the lower try-cock, as in the drawing, or at any other suitable place.

K is a pipe which conducts steam to the valve C.

The operation is as follows:

When the water in the boiler is above the point at which the indicator is attached, the tube A is full of water, and remains cool; but when the water drops below the point at which the indicator is attached, the water in the tube A gradually runs back into the

boiler, and steam enters, heating and, consequently, expanding it, raising the valve C by means of the rod F, when steam passes through the whistle I, giving an alarm, which continues until the water is again above the point at which the indicator is attached, when the water again fills the tube A, and, cooling, allows the tube to contract, when the valve C closes and the alarm ceases.

Should the steam at any time rise above the limit at which the valve C is weighted, it will rise independently of the tube A, and the escaping steam will give the alarm through the whistle I.

As previously described, it will be seen that the stem of the double alarm-valve projects beyond the shell or casing, and is embraced by the lower end of the rod F. The nut *e* is fitted on the stem, so that the rod is retained thereon, and thereby bears against the nut when the tube expands, and thus the valve is opened.

When the tube cools and contracts, the rod is lowered, and allows the weight which rests on the stem to close the valve.

We are aware that expansible tubes, connected by non-expansible tubes or rods to the alarm-valve, have been in use, for the purpose of sounding an alarm in the event of low water in the boiler; but, as far as we are aware, such tubes, when provided with an air-chamber, in the manner hereinbefore indicated, have not been used in connection with a valve that could be raised by the steam pressure within the boiler.

We are also aware that it has been proposed to connect an expansible tube with an alarm-valve, in such a way that the valve can be raised not only by the expansion of such tube upon the admission of steam thereto when the water in the boiler has fallen to low-water mark, but also by the pressure of steam within the boiler; but, so far as we know, the expansible tube has not been connected to the valve in the manner herein shown; nor has an air-chamber, for the purpose hereinbefore specified, been used in such connection.

We disclaim the various parts of our invention separately; but

What we do claim is—

The combination, with the low-water and high-pressure alarm-valve C, of the rod F, having its lower end embracing the projecting stem *d* of the valve, with a nut, *e*, above it, in connection with the expansion-tube A and air-chamber, B, when the parts are adapted to operate together, substantially as described.

GEO. M. HOPKINS.  
JOHN A. STRAIGHT.

Witnesses:

H. M. HOPKINS,  
HORACE B. DOOLITTLE.