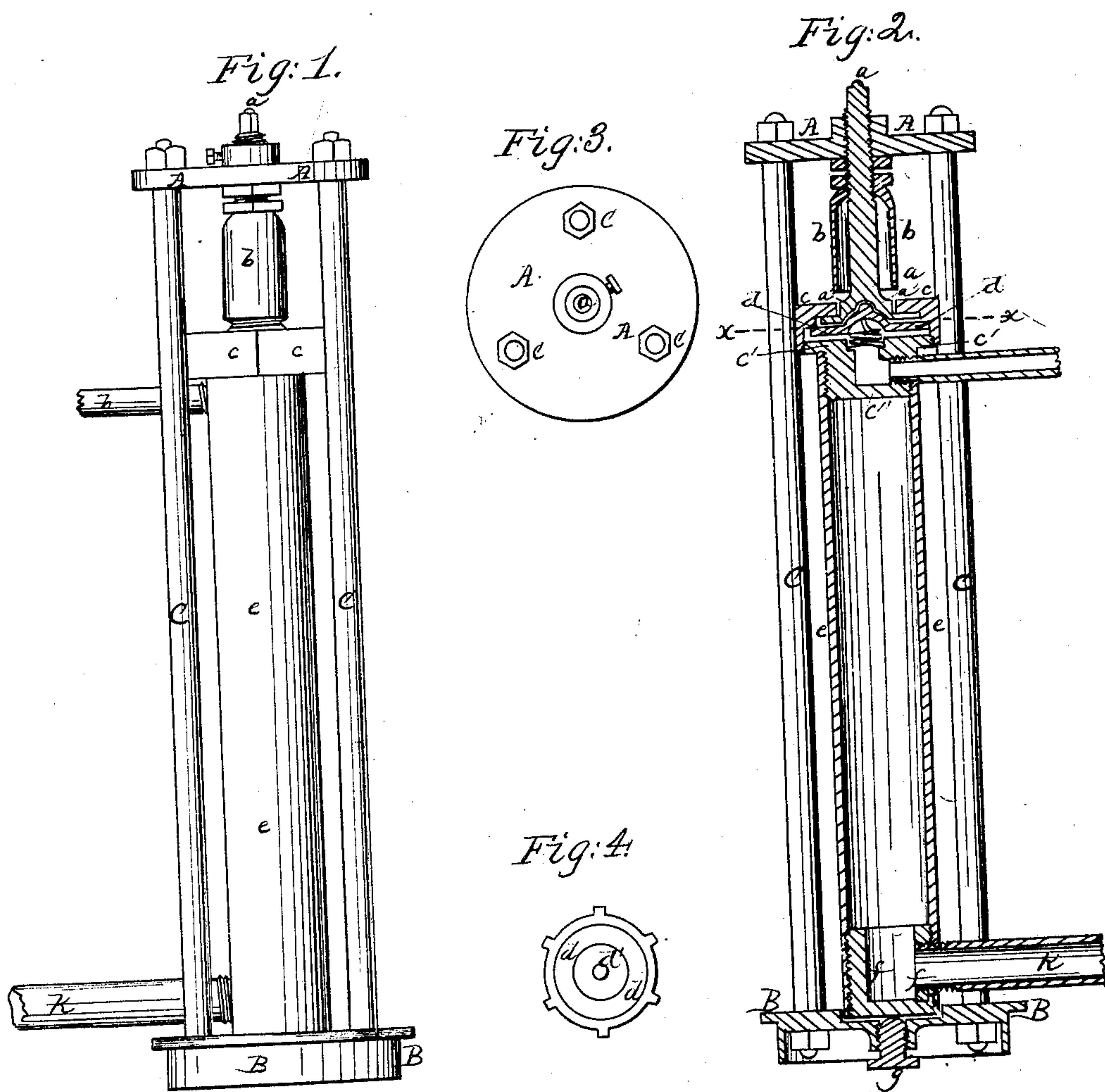


L. E. Lincoln,
Steam-Boiler Indicator.
No 21,686. Patented Oct. 5, 1858.



UNITED STATES PATENT OFFICE.

LEVI E. LINCOLN, OF LOWELL, MASSACHUSETTS.

WATER-ALARM FOR STEAM-BOILERS.

Specification of Letters Patent No. 21,686, dated October 5, 1858.

To all whom it may concern:

Be it known that I, LEVI E. LINCOLN, of Lowell, county of Middlesex, State of Massachusetts, have invented a new Instrument
5 for Giving Warning of Insufficiency of Water in Steam-Boilers; and I do hereby declare that the following is a full and exact description of the construction and operation thereof, reference being had to
10 the accompanying drawings by letters of specification marked thereon.

The nature of my invention, consists in making the expansive and contractive power of heat operative, or adjustive, of the seat
15 of a steam valve.

To enable those skilled in steam boiler appurtenances to construct and use my invention I give, by means of the accompanying drawings, which are on a scale of four
20 inches to the foot, Figure I representing a side elevation, and Fig. II, a vertical, central, longitudinal cross section, and Fig. III, a vertical perspective view, the same parts in each figure being designated by corresponding letters, the following description.

A, A, is an iron disk, receiving the three rods C, C, C, near its outer edge. The rods are equidistant from each other, and by them is the disk A, A, elevated and sustained. B, B, is a similar disk, into which
30 the rods C, C, C, are, in a like manner, secured; and this disk is the pedestal of the instrument.

a, a, is the stem of a steam whistle. This stem enters into the central portion of the upper disk, A, A, and is therein firmly secured.

b, b, is the bell of a steam whistle.

c, c, c, c, is a case or shell, which is let
40 over the whistle stem a, a, and rests upon its expanding shoulders a', a'.

c', c', c'', is a plug, screwed into the bottom of the case c, c, c, c.

a', a', c, c, c, c, and c', c', form the walls of a chamber, having an annular opening between a', a', and c, c; and into this chamber is a permanent and free communication,
45 with the steam space of the boiler.

d, d, d', is an unattached valve; exactly
50 fitting, by bearing points, (see Fig. IV, which represents a vertical perspective view of the valve,) into the chamber formed by a', a', c, c, c, c, and c', c', and having a diameter, exclusive of its points, greater than the
55 diameter of the circle described by the lower annular plane x, x, of the case c, c, c, c.

This valve has an elevation from its center, terminated by a ball point d', which fits into a socket in the center of the under surface of the stem of the whistle. The central elevation of this valve is such, as that, when the ball point is applied into the socket, its extreme disk parts come to juncture with the lower annular plane x, x, of the shell c, c, c, c; which plane of the shell c, c, c, c, is the
60 allotted seat of the valve; and toward, or upon which seat, by the steam, the valve is forced; (and in which, if desired, it may be adjusted, by a spiral spring.)

e, e, is an iron pipe, passing over and
70 tight upon, the part c'', of the upper plug, and also over, and tight upon, f, f, the lower plug; and by these plugs the pipe e, e, is tightly closed.

g, is a set screw, in the central portion of
75 the foot disk or pedestal. This screw comes so near to the lower plug in the iron pipe, that by being turned upward, it supports or elevates said pipe, and that, by being turned downward, said pipe is suspended.

h, is a pipe, which, by the perforation of the pipe e, e, through the upper plug, entered in the part c'', passes steam beneath the unattached valve, from the steam space of the boiler; and also passes steam, in case said
80 valve is parted from its seat, around said valve to the whistle.

k, is a pipe, larger than h, entering the foot of the pipe e, e, and also entering into the water space of the boiler; whence, when
90 the boiler is properly filled, water is maintained in the pipe e, e; and whence, when the water in the boiler has sunk below k's connection to the boiler, steam is supplied to the pipe e, e.

The low water alarm herein described, consists of two parts; the frame, or support, A, A,—B, B,—C, C, C,—g; which is firm and unyielding; and the operative or contained parts a, a, a', a'; b, b; c, c, c, c, c', c', c''; d, d, d'; e, e; and f f; the contained parts being all suspended by the neck of the whistle, that is, by that portion of the stem of the whistle, which is superior, and external, to its bell. When the pipe e, e, of the
105 contained parts, is brought, by turning upward the screw g, to just touching distance from said screw, the least expansion of the pipe e, e, will raise upward so much of the "contained parts," as is designated by c, c, c, c, c', c', c''; and as the valve d, d, d', on account of its ball point in the socket of the
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whistle stem, can not rise therewith, the juncture of this valve with the annular plane x, x , will, by said expansion, be broken; and thereby a passage will be afforded, around this valve, to the pendent edges of the whistle bell.

The operation of this instrument is as follows: Having attached the instrument by the pipe k , to the water space of the boiler, to that elevation below which it is determined that the water shall not fall without giving an alarm, and also to the steam space of the boiler by the pipe h ; the pressure accruing upon the water in the boiler, if above k , will force water upward through k , into the pipe e, e ; and steam will rise through the pipe h , and fill the chamber formed within $a', a', c, c, c, c, c', c'$, to the extent of the portion which lies below that part of the valve marked d, d ; steam keeping the valve up to the seat x, x , by its pressure; and since there will be no circulation through the pipe k , the pipe e, e , will remain cool. But should the water in the boiler fall below the attaching point of k , in the boiler, the water which had been supported in the pipe e, e , will fall downward, and out, into the boiler; and steam will take its place; and steam having gained admission to the pipe e, e , will impart thereto its own degree of temperature; causing the pipe e, e , to expand; and the longitudinal expansion thereof (the set screw g , having previously been so adjusted that no increase in the length of the pipe e, e , could be downward,) will raise the annular plane x, x , (the seat of the valve) from the valve; and the steam from the boiler will thereby pass freely; and when water shall again rise in the boiler over the end of the pipe k , the pipe e, e , will be cut off from a steam supply,—the steam therein will condense, and the pipe will again, and from the same cause as at first, be filled with water; and this water, as before, having no circulation through it, from the boiler, together with the pipe e, e , will begin to cool; and as it cools, the contraction of the pipe will bring down x, x , the valve seat; and when this seat has been brought down to its original juncture with the valve, the steam to the whistle will be cut off and the alarm will cease.

It requires but a few degrees increase of heat to expand the pipe, e, e , sufficiently to allow the required amount of steam, (and the required amount of expansion, is, of course, in inverse ratio to the inner diameter of the

valve seat,) to pass to the mouth of the whistle; and hence the screw g , may so be set, that no alarm shall be given, until the temperature of the pipe e, e , shall have arrived to a prescribed degree; for instance, the screw may be so set (the natural condition of the "contained or operated parts" being pendulous,) that the temperature of hot water, say 212° F., will only be sufficient to bring the foot of the pipe, to contact with the screw; and then, the difference between this temperature and the temperature of steam under pressure in the boiler, will be the allotted increment to produce the alarm.

What I claim as my invention and wish to secure by Letters Patent, is.

1. The application of an alarm whistle exclusively to the water space of a steam boiler to obtain controlling motive power, in conjunction with an application exclusively to the steam space of said boiler, to obtain warning or acoustic power.

2. The application of a self adjusting valve to the stem of a steam whistle, in manner such, that a current may be intercepted thereby.

3. The application to a whistle, of a metallic tube, or pipe, in such manner that, unexpanded, it shall be pendent from the whistle, and that, by expansion and contraction, it shall have the office to effect the operation of the whistle.

4. The application of a set screw, or mechanical equivalent, to an expansion tube, in such manner that the effective expansion and contraction of said tube, may be prescribed thereby.

5. The application of a whistle to its support, standard, or frame work, in such manner that the whistle shall be suspended from said frame work, by that portion of itself which extends upward from its bell.

6. The holding of a valve seat in position for its valve, by pendulous attachment; by suspension.

7. The operating of a valve seat, upon its valve, by the expansion and contraction of a metallic tube, or by the expansion and contraction of any mechanical equivalent thereof; all substantially, as described and set forth in this specification and the drawings accompanying.

LEVI E. LINCOLN.

Witnesses:

EDWIN LOVEJOY,
E. LYMAN COLE.