

No. 678,131.

Patented July 9, 1901.

P. N. GAMMELGAARD.

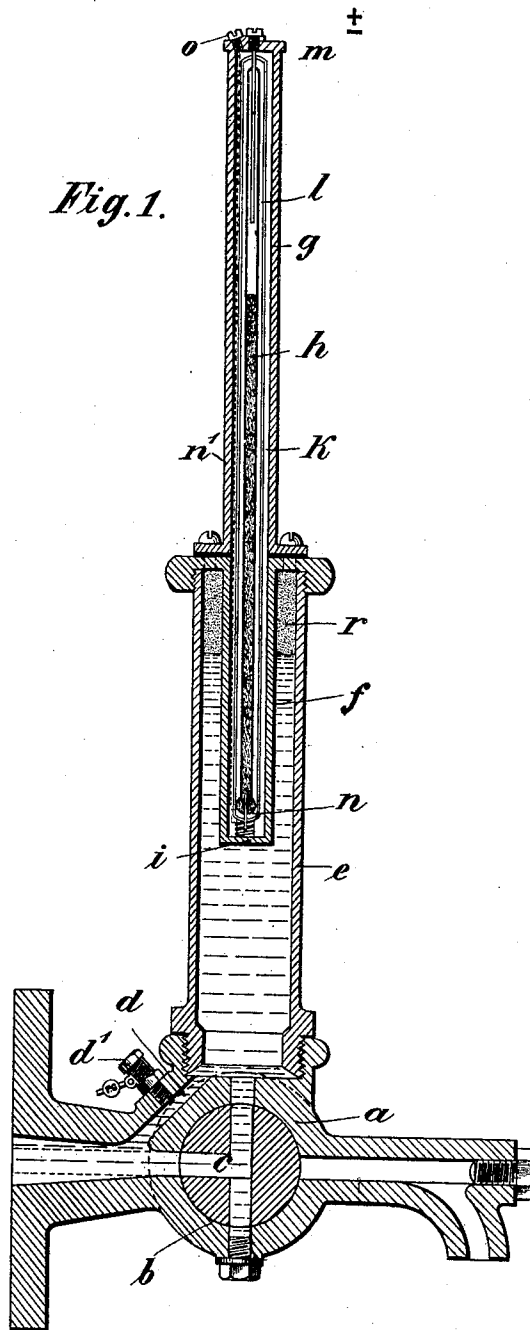
ALARM APPARATUS FOR INDICATING LOW LEVEL OF WATER IN BOILERS.

(No Model.)

(Application filed May 9, 1900.)

2 Sheets—Sheet 1.

Fig. 1.



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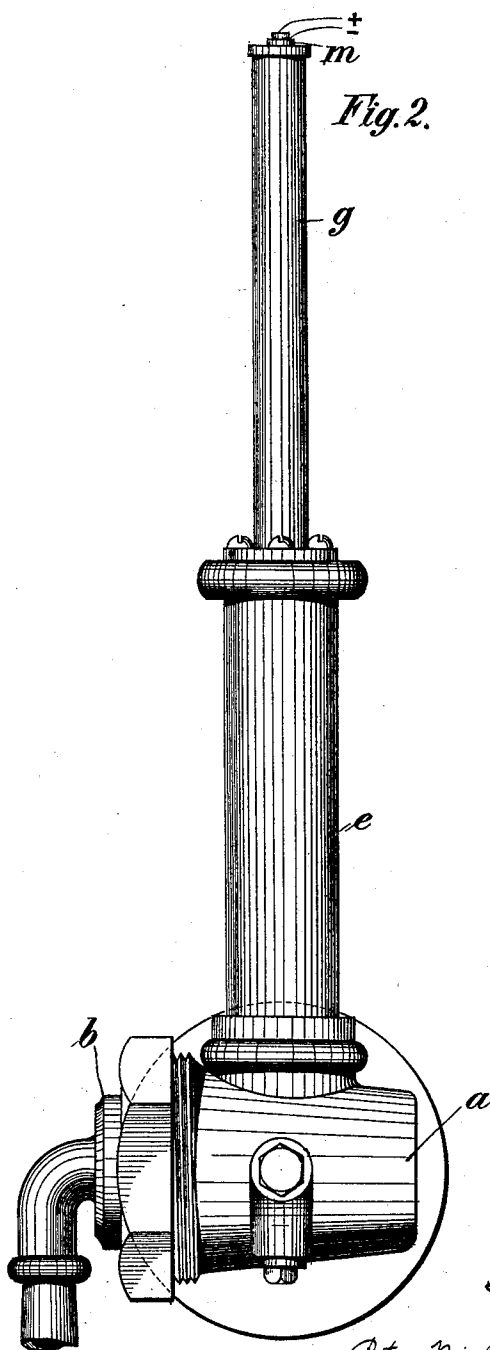
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ALARM APPARATUS FOR INDICATING LOW LEVEL OF WATER IN BOILERS.

(Application filed May 9, 1900.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

PETER NIELSEN GAMMELGAARD, OF CAPPELN, GERMANY.

ALARM APPARATUS FOR INDICATING LOW LEVEL OF WATER IN BOILERS.

SPECIFICATION forming part of Letters Patent No. 678,131, dated July 9, 1901.

Application filed May 9, 1900. Serial No. 16,030. (No model.)

To all whom it may concern:

Be it known that I, PETER NIELSEN GAMMELGAARD, engineer, a subject of the Emperor of Germany, residing at Cappeln, (Schlei,) in the Kingdom of Prussia and Empire of Germany, have invented certain new and useful Improvements in Alarm Apparatus for Indicating a Low Level of the Water in a Boiler, of which the following is a full, clear, and exact description.

The subject of this invention is an electric low-water alarm for steam-boilers constructed with a thermometer-tube completely inclosed in a tight metal case, which in operation is partly immersed in water from the boiler contained in a vertical tube which communicates at bottom with the interior of the boiler, at or near the proper low-water limit, through the medium of a three-way cock, adapted to serve also as a try-cock and provided with a subsidiary connecting port or passage between the indicator-tube and the interior of the boiler, so as to prevent the apparatus being tampered with or thrown out of action.

In the accompanying drawings, Figure 1 is a vertical section of the apparatus. Fig. 2 is a front view of the same.

The apparatus is constructed with a three-way cock *a*, formed to serve as a try-cock, being fixed to a side or end of the boiler at the lower limit of the water-level and constructed with a plug *b*, having a T-shaped or three-way port *c*, adapted to communicate, as shown in Fig. 1, with any two of the ports in the wall of the cock, which consist of the usual boiler-port and discharge-port in the same horizontal line for testing, and a vertical port communicating with a vertical water-pipe *e*, which is thus placed in communication at the bottom with the water-space of the boiler. In the wall of the cock *a* is a subsidiary port *d*, which is in communication with the bottom of the water-tube *e* and in regular operation is never closed. It is, however, provided with a screw-plug *b'*, by which it may be closed for special purposes, as when the water-tube *e* is removed. This plug *b'* is provided with a lead seal, as shown, or other securing device to prevent its improper or surreptitious use for closing the port *d*.

Projecting downward from the top of the water-tube *e* and within the said tube, so as

to be immersed in the water therein, is a cylindrical casing *f*, open at top, and projecting upward from the top of the water-tube *e* is a corresponding casing *g*, forming, in connection with the member *f*, a complete and close casing for the reception of a mercury-thermometer *h*, which is preferably inclosed in a glass tube *k* within the casing *f g* and rests at bottom on a spring *i*, which is adapted to form an electric contact-wire, as hereinafter described.

In the upper part of the mercury-tube *h* is soldered a contact-wire *l*, projecting upward through an insulated sleeve *m* in the top of the casing *g* and projecting downward within the mercury-tube to a sufficient distance to form contact with the mercury in the tube when this is expanded by heat in customary manner by the presence of steam within the water-tube *e*. In the bottom of the mercury-tube *h* is a conducting-wire *n* in contact with the mercury within the tube and projecting from the bottom of the tube, so as to connect with the contact-spring *i*, which latter is in electrical connection with a conducting-wire *n'*, extending upward within the casing *f g* to an insulating-coupling *o* in the top thereof. The couplings *m o* form binding-posts for the attachment of the positive and negative wires leading from a suitable source of electricity and signaling apparatus (not shown) to the wires *l* and *n'*, respectively, the latter being connected, as explained, to the bottom contact-wire *n* of the thermometer.

The cock *a* is preferably provided, as shown in Fig. 1, with the customary closing-plugs in the end of the horizontal port and in the bottom port beneath the plug *d* for the purpose of cleansing the ports in the cock.

In normal operation water will be kept in the pipe *e* by the boiler action, so as to maintain the thermometer at normal temperature, or in the event of the water descending to the level of the communication with the alarm apparatus the water running out of the tube *e* by gravity will permit the tube to be filled with steam, the higher temperature of which expands the mercury in the thermometer, so as to close the electric circuit and sound the alarm, as in other electrical alarm apparatuses for steam-boilers.

My improvement possesses superiority in

the complete inclosure of the mercury-tube of the thermometer in a tight metal casing, which preserves the thermometer-tube from direct contact with the water and may be readily taken apart to permit of the removal of the thermometer, also in the provision of the subsidiary port or passage *d*, which being always open prevents any tampering with the apparatus and causes it to be constantly in effective operation during the manipulation of the try-cock, as at other times.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In an electric low-water alarm apparatus for steam-boilers, the combination of a try-cock *a*, having a plug *b*, formed with a T-shaped three-way port *c*; the vertical water-tube *e* communicating at bottom with the top of the try-cock, the two-part metal casing *f, g*, tightly connected together and projecting downward into the water-tube *e*; a mercury-tube *h* having contact-wires *l* and *n* projecting within its respective ends and extending beyond the same, and suitable electrical connections *m, i, n', o* to adapt the apparatus to close the circuit with a suitable source of elec-

tricity and alarm apparatus, by the expansion of mercury in the thermometer-tube, substantially as described.

2. The combination of the three-way cock *a* having vertical and horizontal outlets, a subsidiary passage *d*, and a plug *b* with T-shaped ports *c*; the vertical water-tube *e* communicating at bottom with the passage *d* and with the vertical outlet of the cock, the closed tubular casing *f, g*, the lower part of which projects downward within the water-tube *e*; the thermometer-tube *h* inclosed in the casing *f, g*, and conducting-wires *l* and *n* projecting within the thermometer-tube in position to be placed in electric connection through the mercury in the thermometer by the expansion of said mercury, and suitable conductors connected with the external ends of the wires *l* and *n*, substantially as and for the purposes set forth.

In witness whereof I subscribe my signature in presence of two witnesses.

PETER NIELSEN GAMMELGAARD.

Witnesses:

F. RÖPKE,
C. SPERLING.