(No Model.) 2 Sheets—Sheet 1.

C. PINEL.

LIQUID GAGE.

No. 483,485. Patented Sept. 27, 1892.

Fig. 1.

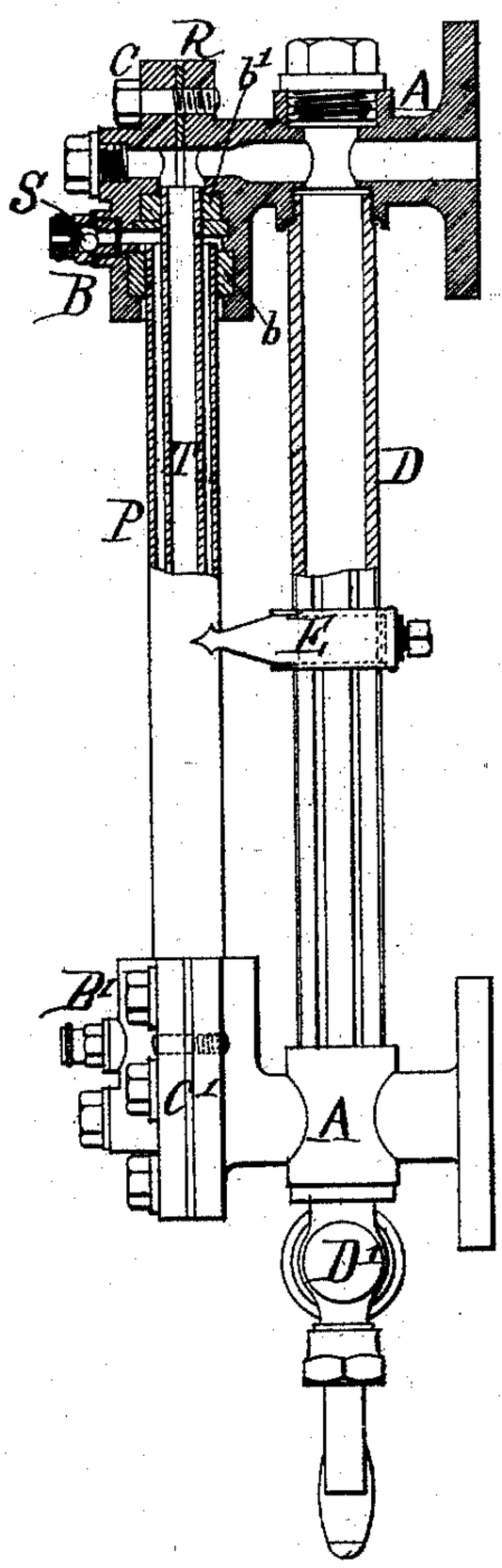

Fig. 2.

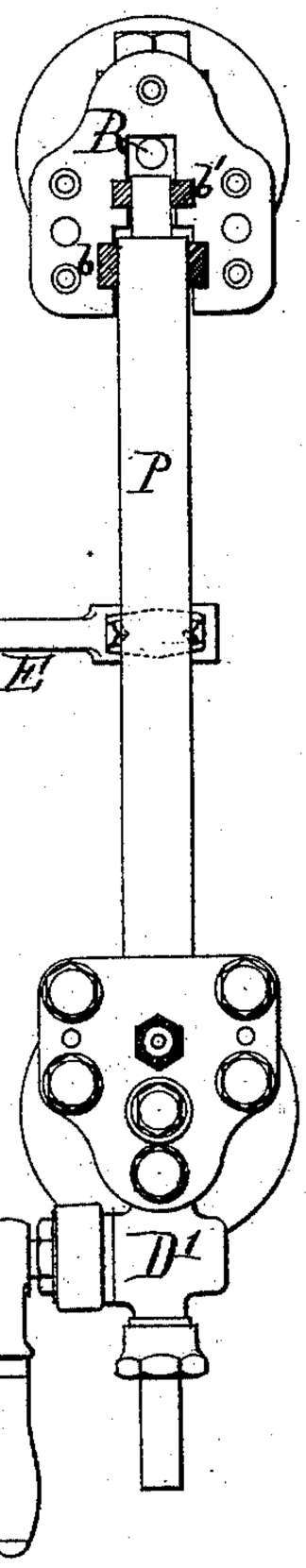

Fig. 3.

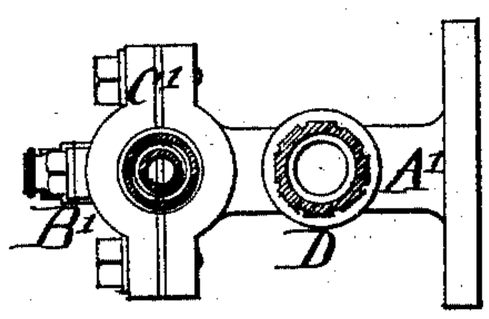

Fig. 4.

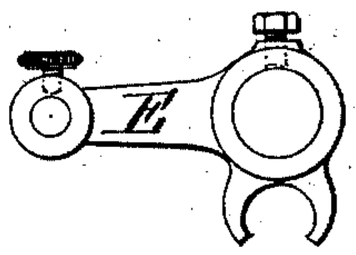

Fig. 13.

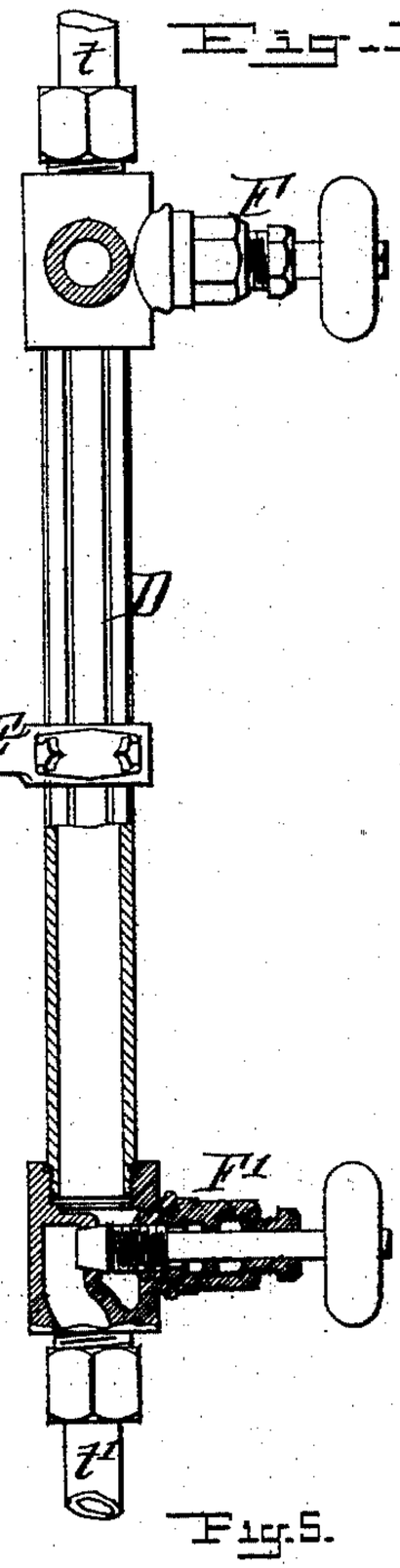

Fig. 5.

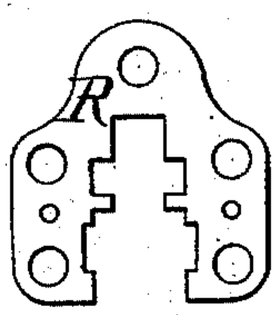

Fig. 6.

Fig. 7.

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(No Model.) 2 Sheets—Sheet 2.

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LIQUID GAGE.

No. 483,485. Patented Sept. 27, 1892.

Fig. 8. Fig. 9. Fig. 11. Fig. 12.

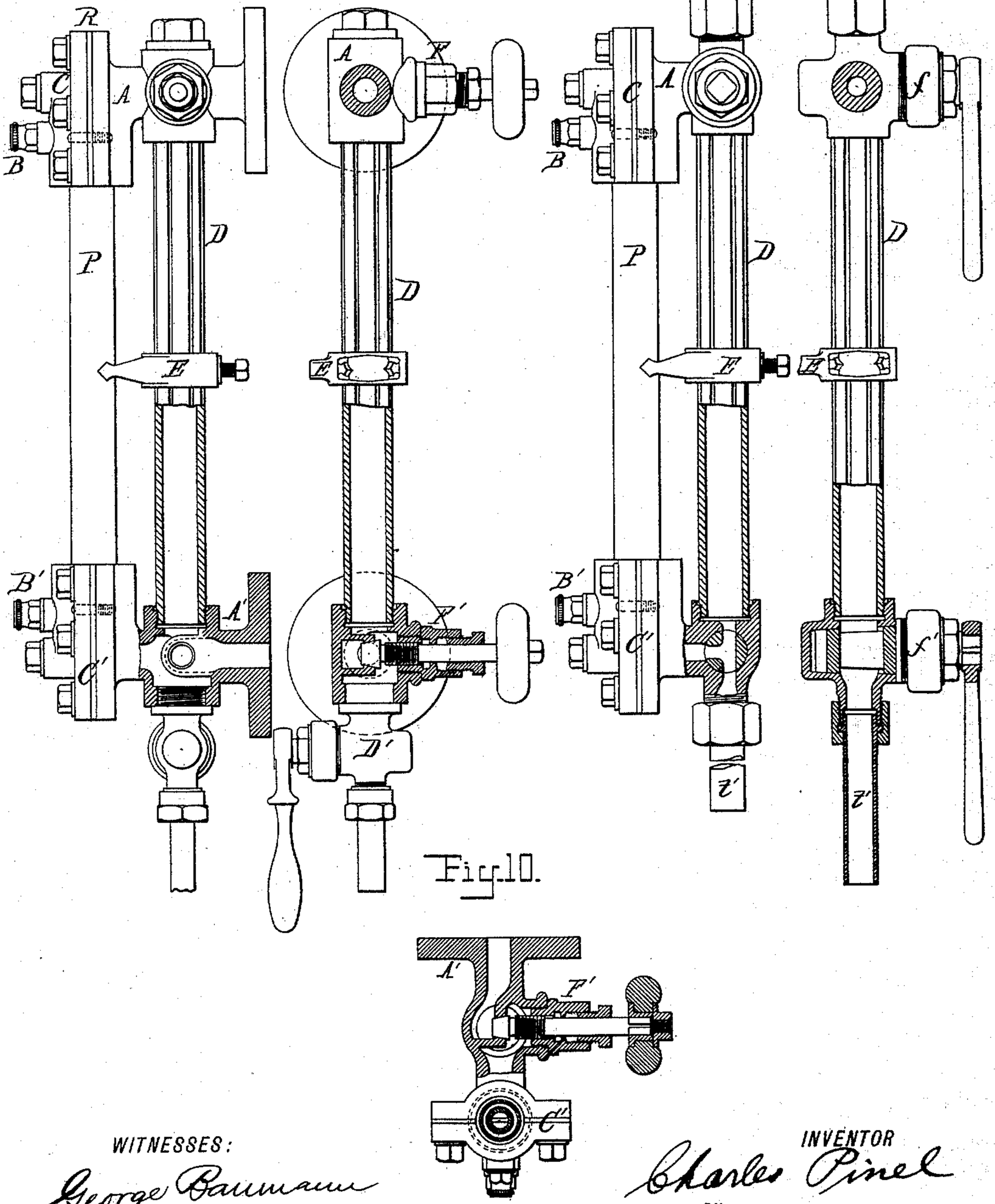

Fig. 10.

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UNITED STATES PATENT OFFICE.

CHARLES PINEL, OF ROUEN, FRANCE.

LIQUID-GAGE.

SPECIFICATION forming part of Letters Patent No. 483,485, dated September 27, 1892.

Application filed July 25, 1891. Serial No. 400,722. (No model.) Patented in France May 5, 1890, No. 205,446; in Germany July 29, 1890, No. 56,136; in Belgium April 13, 1891, No. 94,500, and in England April 15, 1891, No. 6,488.

To all whom it may concern:

Be it known that I, CHARLES PINEL, a citizen of France, and a resident of Rouen, France, have invented an Improved Liquid-Gage, (for which I have obtained Letters Patent in Great Britain, No. 6,488, dated April 15, 1891; in Belgium, No. 94,500, dated April 13, 1891; in France, No. 205,446, dated May 5, 1890, and in Germany, No. 56,136, dated July 29, 1890), of which the following is a specification.

The object of this invention is to provide liquid-gages which obviate danger of bursting and the dangerous consequences thereof.

In an efficient liquid-gage it is necessary, first, that the level of the water inside the tube be capable of being read off with ease, both from the front and from the sides, at as great a distance as possible; second, the tube should be as free from liability to breakage as possible, and in any case it should not, if broken, cause further damage, and it should be capable of being easily and quickly replaced even while the boiler or other apparatus with which it is used is at work; third, the tube should be capable of being frequently cleaned without liability to breakage, and provision should be made to render breakage incapable of doing mischief in case it should occur; fourth, the tube should be so arranged as to be incapable of being put in place in an inclined position in which it is unequally supported and rendered liable to be broken. The first of these conditions may be fulfilled by employing self-luminous tubes or by employing small floats for rendering the level of the water plainly visible. The three other conditions are provided for by the novel arrangements hereinafter described.

In the accompanying drawings, Figure 1 represents in side elevation, partly in section, Fig. 2 in front view, and Fig. 3 in horizontal section, a gage constructed according to this invention, the cocks communicating with the boiler not being shown. Fig. 4 shows detached the index designed for showing the normal level of the liquid and combined with a lamp holder or support. Figs. 5, 6, and 7 are detail views of the junction or packing plate and the two washers of india-rubber or other easily-compressible substances serving to prevent leakage from the two concentric indicating-tubes. Figs. 8, 9, and 10 represent in elevation, section, and plan an apparatus similar to the preceding, but provided with two cocks communicating with the boiler. These cocks are provided with conical valves worked by a small hand-wheel at the end of a screw-rod. In Figs. 11 and 12 the apparatus is furnished with plug-cocks, the sockets being closed at one end to prevent leakage. This type has no flanges, but has two screwed ends, which enable connection to be made with the boiler by means of tubes of suitable lengths. Fig. 13 shows another example in which the cocks are replaced by conical valves.

It should be, first of all, pointed out that in this system the protection of the glass tube T against currents of air or blows is effected by a second glass tube P, in which it is inclosed, an arrangement which has been tried, but without success, owing to the want of practical means of putting together or fitting up.

I have devised the following means of rendering the fitting of both the inside and outside tubes at once accurate, simple, and expeditious, which is the main feature of my new system: For this purpose the two tubes are connected at their ends by two rings or washers *b* and *b'* and by a packing-plate R of a special shape and made of india-rubber or any other material capable of producing a tight joint. The washers and the plate are arranged in such a way that the tubes may be used simultaneously or separately, according as required. The two tubes furnished above and below, with their rings or washers, are connected with the boiler by connections A and A', which, together with the metallic tube D, make up the tube-support. These two connections are provided with semicircular recesses for the reception of the said rings (see plan, Fig. 2) and are cast with ears to receive the caps C and C' of corresponding shape, the packing-plate R being inserted between, (for details see Fig. 5,) and the whole is tightened together by means of screws in the same way as the cap of a plumber-block is screwed down on the brasses of a shaft. On fitting, the washers and the plates are separate; but after the apparatus has been in

use, in consequence of the high temperature to which the apparatus is exposed, the plates and the washers adhere, so that the three parts of each connecting-tube form one piece, establishing a perfect joint, which is rendered even more secure by the pressure of the cap. It will be observed that the caps C and C′ of the connecting-tubes A and A′ are provided with small boxes B and B′, inclosing spherical valves S.

Under ordinary circumstances—that is to say, with two tubes—a current of air is set up through the apertures not closed by the valves, which prevents condensation of vapor between the two tubes; but should the inside tube burst, these valves close automatically under the pressure of the steam and water contained in the protecting-tube, so that no escape can take place.

I have still to draw attention to an improvement in construction of considerable importance. It consists in replacing the plate which under ordinary circumstances connects the two tubes A and A′ by a metallic tube-support D, arranged so as to receive the extremity of the clearing-cock D′. This tube, preferably polygonal in shape to enable it to be turned with greater ease by hand, is tapped with a screw-thread at the ends—a right-handed screw at one end and a left-handed one at the other—to enable the connecting-tubes to be approached or drawn together simultaneously, and consequently to insure with perfect accuracy the proper distance between their axes, the connecting-tubes themselves being correspondingly tapped. This tube consequently unites in this manner the two tube-carriers as if they were cast in a single piece, the result being to insure the proper fitting of the glass tubes when the apparatus is correctly put together.

The index or pointer E is attached to the tube D at the desired level (seen in detail, Fig. 4) and may be fitted, as indicated above, with an arm for receiving a small gas or oil lamp, which will enable the level of the water to be read off at night.

My improved construction of apparatus has the following advantages:

First. That under ordinary circumstances the water finds its level only in the inside tube T, but is visible through the two tubes.

Second. That if the outside tube is broken by a blow or other cause the level is still shown in the inside tube, which then acts as an ordinary water-gage.

Third. If the inside tube burst, the level is still indicated in the outside tube, which in its turn becomes an ordinary water-gage. The effect of this is that the two concentric tubes are capable of acting simultaneously or successively—simultaneously when both are intact and successively when one is fractured. By means of this arrangement any escape is rendered impossible. The outside tube not being subjected to any internal pressure, there is nothing to propel its fragments outward if it breaks, and the internal tube cannot have its fragments thrown outward, as it is protected by the external tube. In any case the fragments would remain inside the protecting tube, as the distance between them is too small for the particles to acquire sufficient impetus to break the latter.

Figs. 8, 9, 10, and 13 show the various modifications which I have devised for the purpose of rendering my invention applicable to a variety of cases; but in every case the tube carrier or support D, uniting the two small tubes or connecting-tubes A A′, is retained whether these latter are provided with conical valve-communications F F′, Figs. 8, 9, 10, and 13, or with closed sockets *f* and *f′*, Figs. 11 and 12, or whether they have in both cases flanges for attaching direct to the boiler, or whether they have unions *t* and *t′* for connecting them with existing fittings.

I claim as my invention—

1. A multitubular liquid-gage with supports for the tubes, having removable cover-plates enabling the tubes to be inserted into the supports from the front or horizontally.

2. The tubes and tube supports or carriers with packing-plates and rings or washers *b b′*, in combination with retaining or compressing caps or cover-plates C and C′, enabling the tubes to be inserted into the supports from the front or horizontally, as described.

3. The combination of inner and outer tubes with two valve-boxes having automatic valves serving in case of failure of the internal tube to prevent escape of steam and water from the outer tube, substantially as hereinbefore described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CH. PINEL.

Witnesses:
MATHER,
HENRY COKE POWELL.