J. M. PRADAIROL.

APPARATUS FOR PURIFYING AND DRYING STEAM.

APPLICATION FILED SEPT. 9, 1918.

1,335,602. Patented Mar. 30, 1920.

4 SHEETS—SHEET 1.

Fig. I.

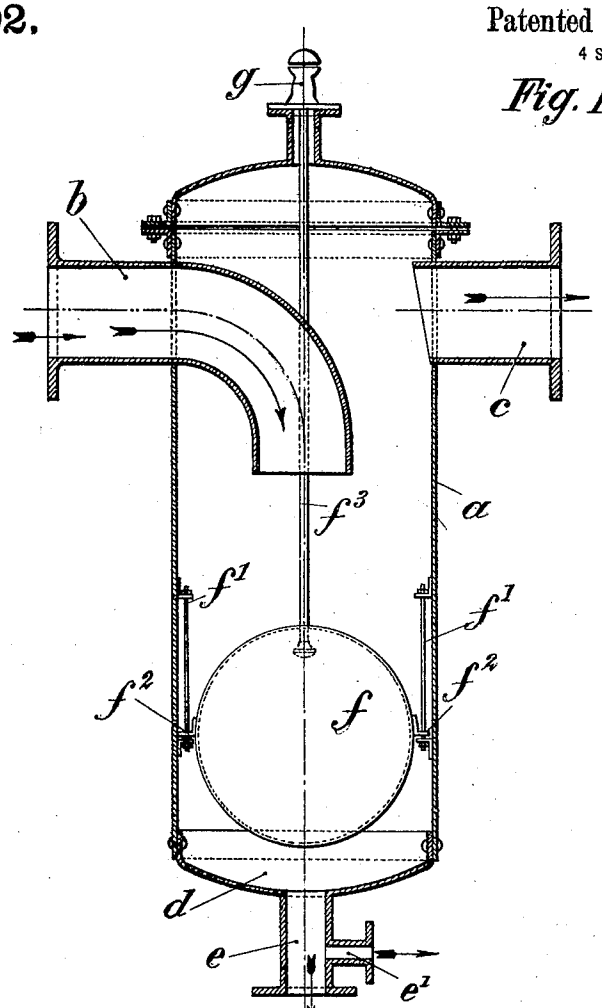
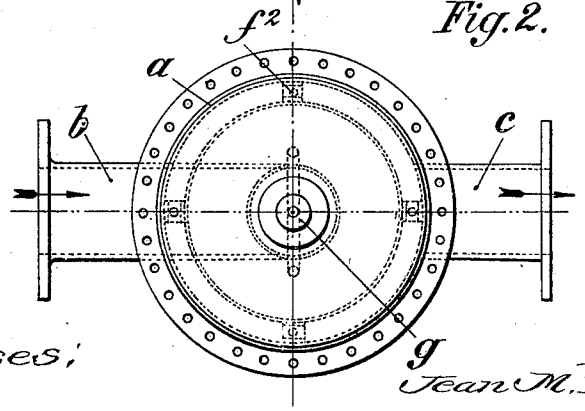


Fig. 2.



Witnesses;

Norris L. Sumby

Inventor

Jean M. Pradairol

by James L. Norris,

Attorney

J. M. PRADAIROL.

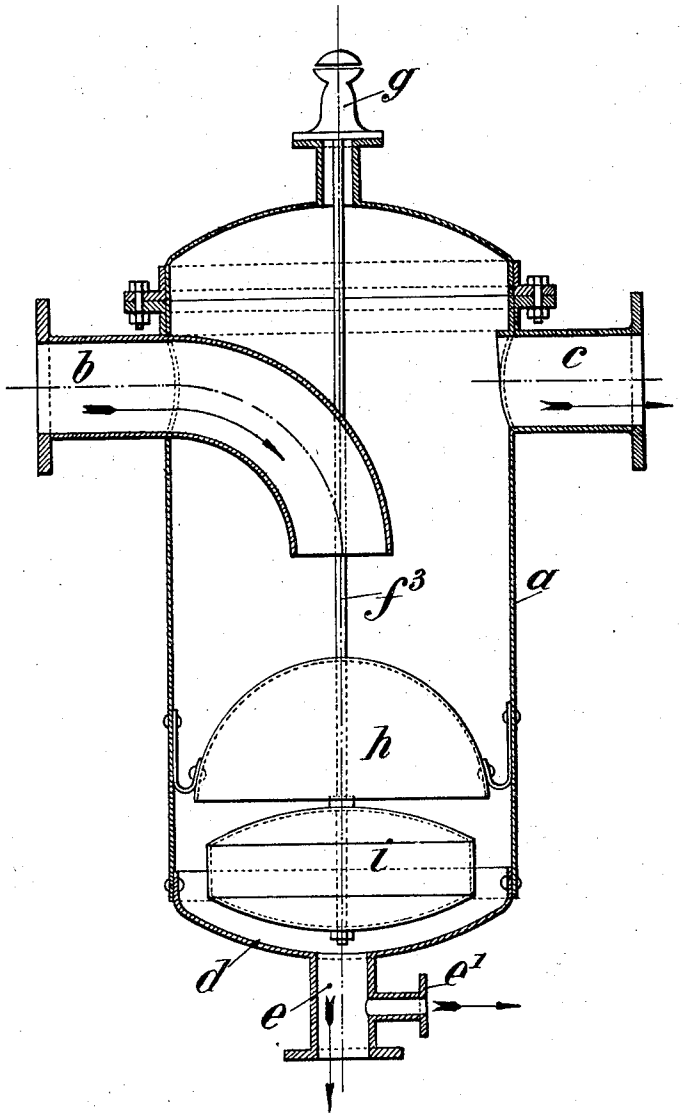
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4 SHEETS—SHEET 2.

Fig. 3.



Witnesses:

Norris L. Sumby

Inventor
Jean M. Pradairol

by James L. Norris
Attorney

J. M. PRADAIROL.

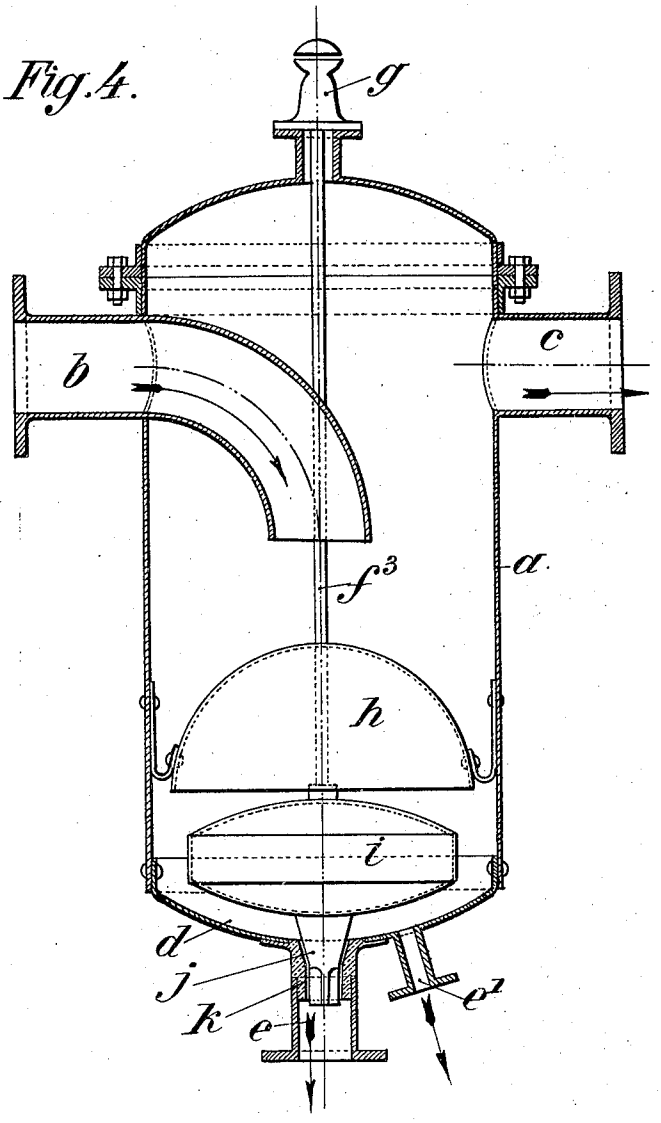
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4 SHEETS—SHEET 3.

Fig. 4.



Witnesses:

Norris L. Sumby.

C. E. Keelen

Inventor
Jean M. Pradairol

By James L. Norris
Attorney

J. M. PRADAIROL.

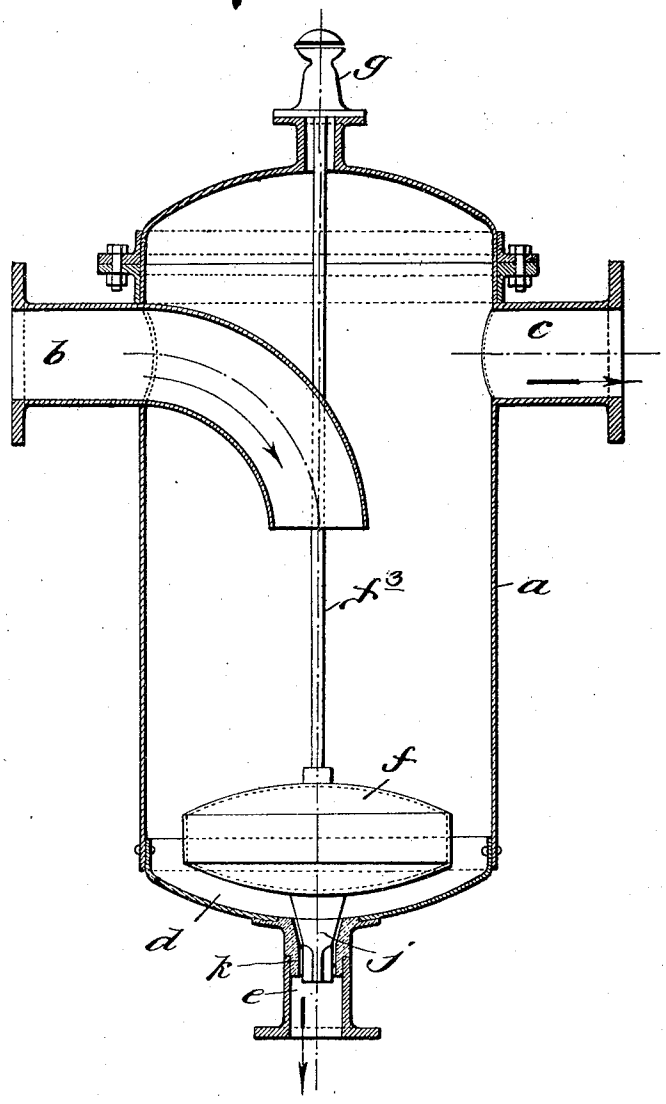
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4 SHEETS—SHEET 4.

Fig. 5.



Witnesses:

C. D. Kosler

Arthur L. Calver.

Inventor

Jean M. Pradairol

by James L. Norris

Attorney

UNITED STATES PATENT OFFICE.

JEAN MARTIN PRADAIROL, OF BORDEAUX, FRANCE.

APPARATUS FOR PURIFYING AND DRYING STEAM.

1,335,602. Specification of Letters Patent. Patented Mar. 30, 1920.

Application filed September 9, 1918. Serial No. 253,286.

To all whom it may concern:

Be it known that I, JEAN MARTIN PRADAIROL, manufacturer, a citizen of the Republic of France, residing at 9 and 11 Rue des Fours, at Bordeaux, Gironde, France, have invented new and useful Improvements in Apparatus for Purifying and Drying Steam, of which the following is a specification.

Apparatus for purifying and drying steam have already been proposed which separate the steam from the minute drops and other substances therein contained in suspension. The steam is delivered from the apparatus in a thoroughly dry state, while the drops and other substances therein contained in suspension accumulate at the bottom of the apparatus, from which they are removed periodically, either manually, by means of suitable valves or mechanically, by means of automatic traps.

Now these apparatus, whatever may be their particular construction, are all open to a serious drawback in that if the accumulated matter is not normally evacuated, it accumulates until it is finally carried away by the steam, thus giving rise to well known accidents. It may happen that the attendant in charge of the periodical evacuation does not conscientiously attend to his duty or that the trap, in the event of the evacuation taking place automatically, does not, from some cause or another perform its function. In both cases, an accident is to be feared.

The purpose aimed at by the present invention is to provide an apparatus which shall provide absolute safety against the hereinbefore mentioned inconvenience.

Broadly speaking, the invention consists in applying a signaling means which automatically acts as soon as the amount of accumulated water exceeds a given volume and thus at once notifies the attendant that either a removal by manual operation is necessary or that the automatic trap is no longer operative for some reason or other.

Another object of this invention is to provide a steam separator of novel construction wherein an audible signal is sounded when the device is functioning properly, that is, in the normal operation of the machine the signal will be heard at stated intervals.

On principle, the said apparatus is characterized by the novel application of a float which follows the level of the accumulated water and eventually acts automatically upon a signaling device, such as a steam whistle for instance, in order to indicate that the level has risen above normal limits.

Another characteristic feature of the said apparatus resides in that the float, irrespective of the part it is called upon to play normally, also serves as a baffle or surface against which the small drops of water impinge and deposit when the steam strikes it.

The accompanying drawing illustrates, but merely as an indicative and in nowise limitative example, an apparatus for purifying and drying steam, constructed in accordance with the invention.

Figure 1 is a vertical section showing a first arrangement.

Fig. 2 is a top view thereof.

Figs. 3, 4, and 5 are views similar to Fig. 1 illustrating modified forms of the invention.

As in all known apparatus, it mainly comprises a vessel *a*, a bent pipe *b* for the inlet of the steam to be dried, a nozzle *c* for the delivery of the steam when once dried, a bottom *d* into which accumulates the separated water and a nozzle *e* for the evacuation of the water, which nozzle may be connected to a branch e^1 on which may be fitted a valve. To the nozzle *e* is connected, if desired, an automatic trap of any known system, not shown.

f is a hollow body playing the part of a float; it may be guided in its movements by a suitable contrivance, such as the rods f^1 and the lugs f^2. To this float is hermetically fixed a rod f^3 which, in turn, is connected to a signaling member of any appropriate kind. The same is assumed here to be a steam whistle *g*, but instead of actuating an acoustic device, the rod could just as well operate a visual signal or even an electric bell. The signaling device *per se* can therefore be any acoustic, visual, electric or other instrument, at the will of the manufacturer and according to the conditions of each installation.

Irrespective of its normal function, the float *f* forms the baffle or surface against which impinges the steam admitted by the bend *b*, the minute drops of water adhering to the said surface and subsequently accumulating in the bottom *d*.

The operation is as follows, assuming a valve to be fitted to the branch e^1 and an

automatic trap to be connected to the nozzle *e*: the steam, laden with substances in suspension, enters the body *a* through the bend *b*, meets the upper surface of the float *f*, by means of which the minute drops, as they separate from the steam, accumulate in the bottom *d*, while the dried steam escapes through the nozzle *c* and is led to an engine or to the place of consumption. The separated water accumulates and is evacuated either by the attendant or by the trap. If, for any cause, either for want of attention on the part of the attendant or for non-operation of the trap, the said water is not evacuated, it rises within the apparatus until it surrounds the float *f* and raises it; the float, on rising, then carries along the rod f^3 and actuates the signaling device *g*. A signal is thus given and the evacuation of the water may be effected and risk of danger avoided.

Fig. 3 illustrates a second arrangement, which only differs from that shown in Figs. 1 and 2 as regards construction. Here, the surface or baffle against which impinges the steam is formed not by a movable spherical surface, acting at the same time as a float, as in the first case, but by a stationary semi-spherical surface *h*, fitted above a float *i*. The latter is connected to the signaling device by the rod f^3 which, in this instance, passes through the surface *g*. The other parts, designated by the same letters of reference, remain the same.

This arrangement offers, over the preceeding one, an advantage in case the velocity of the steam admitted into the apparatus is a high one. The steam, when striking the float *f* of Fig. 1, might, if its velocity were high, interfere with the operation of the float, while, on the contrary, if the velocity is relatively low, the float would not be influenced to any serious extent. By thus decomposing this element into two parts, one of which acts as a surface and the other as a float, any inconvenience is obviated without complicating the construction of the apparatus or increasing its cost of manufacture.

Finally, Fig. 4 shows a third arrangement which only differs from that shown in Fig. 3 in that the float is connected directly to the trap. Here, the semi-spherical baffle or surface *h* is also a fixture; the float *i* is arranged beneath and it is likewise connected to the signaling device *g*, but it is furthermore connected to a valve *j*, the seat *k* of which is located, for instance, in the nozzle *e*. The bottom *d* in which the separated water accumulates forms at the same time the pan of the trap, at the lower part of which is fitted and operates the valve *j*. The trap is thus embodied in the apparatus and furthermore a saving in manufacture is effected in that the float acts at the same time as the float for the trap, instead, as for instance in the case of Fig. 1, of the float *f* being connected to another float forming part of the trap.

In the form of the invention shown in Fig. 5 a float *f* is employed which, as in the case of the float shown in Fig. 1, is arranged to receive the impact of the entering moisture laden steam, and to which is connected a trap valve *j* similar to the valve *j* shown in Fig. 4. This device, therefore, constitutes a combined separator and trap, the single float *f* performing the triple function of a baffle for separating the moisture and impurities from the steam, of a trap float for controlling the valve *j*, and of operating means for the signal or alarm *g*.

It will be seen that when the separator is in operation and a certain amount of water has been accumulated in the separator the float will be raised thereby effecting a discharge of the fluid through the valve and at the same time operating the signal or alarm thereby indicating that the device is functioning properly. It will be apparent that if the discharge valve should not operate as intended to discharge the fluid the actuation of the signal will be prolonged which will be notice that the device is not functioning as it should.

Claims:

1. An apparatus for separating the steam from minute drops and other substances contained in suspension therein, comprising a vessel, an inlet for the steam to be dried, a float acting as a separator, a signaling member operated by the float, an outlet for the dried steam and an outlet for the separated water.

2. An apparatus for separating the steam from minute drops and other substances contained in suspension therein, comprising a vessel, an inlet for the steam to be dried, a float acting as a separator, a steam whistle operated from the float, an outlet for the dried steam and an outlet for the separated water.

3. An apparatus for separating the steam from minute drops and other substances contained in suspension therein, comprising a vessel, a float therein having a surface against which the steam impinges, an alarm operated by said float, and a valve operated by said float for controlling the discharge of water from said vessel.

4. An apparatus for separating the steam from minute drops and other substances contained in suspension therein, comprising a vessel, an inlet for the steam to be dried, a float (*i*) acting as a separator, a signaling member operated by the float, a trap valve connected to the float, an outlet for the dried steam and an outlet for the separated water.

JEAN MARTIN PRADAIROL.