(No Model.)

C. W. NASON.

SAFETY APPARATUS FOR AUTOMATIC DRAFT REGULATORS.

No. 337,013. Patented Mar. 2, 1886.

Fig. 1.

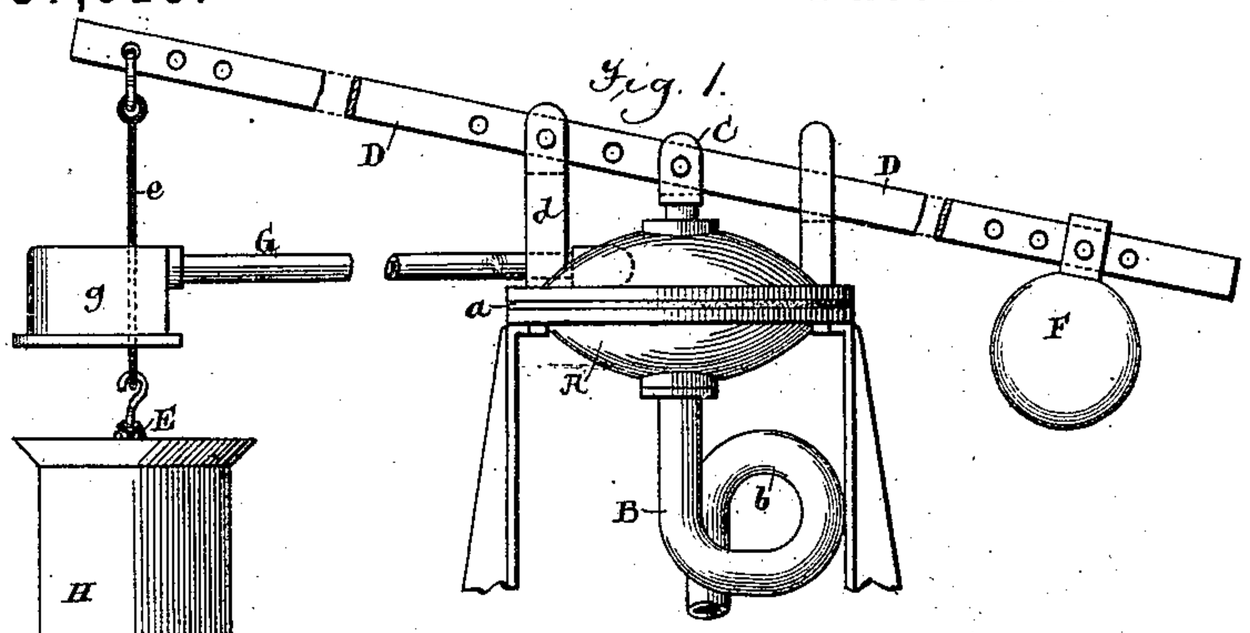

Fig. 2.

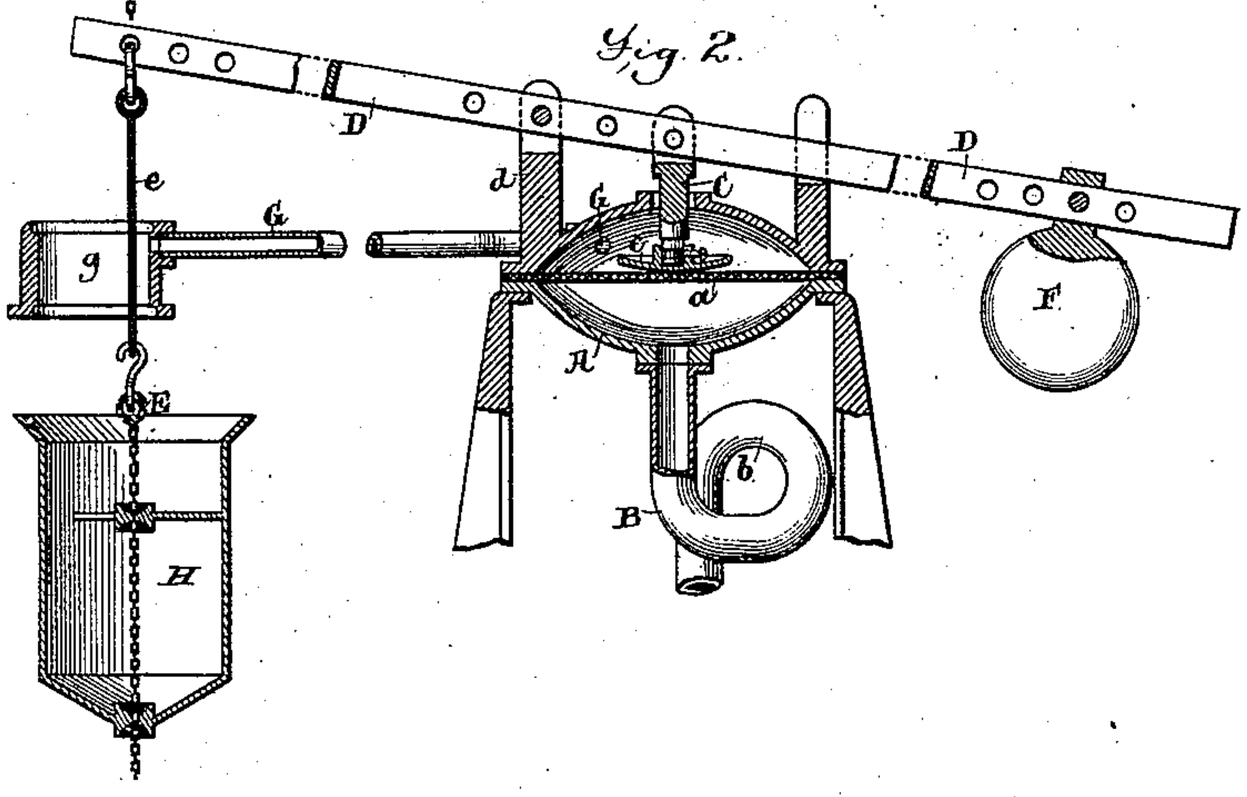

Fig. 3.

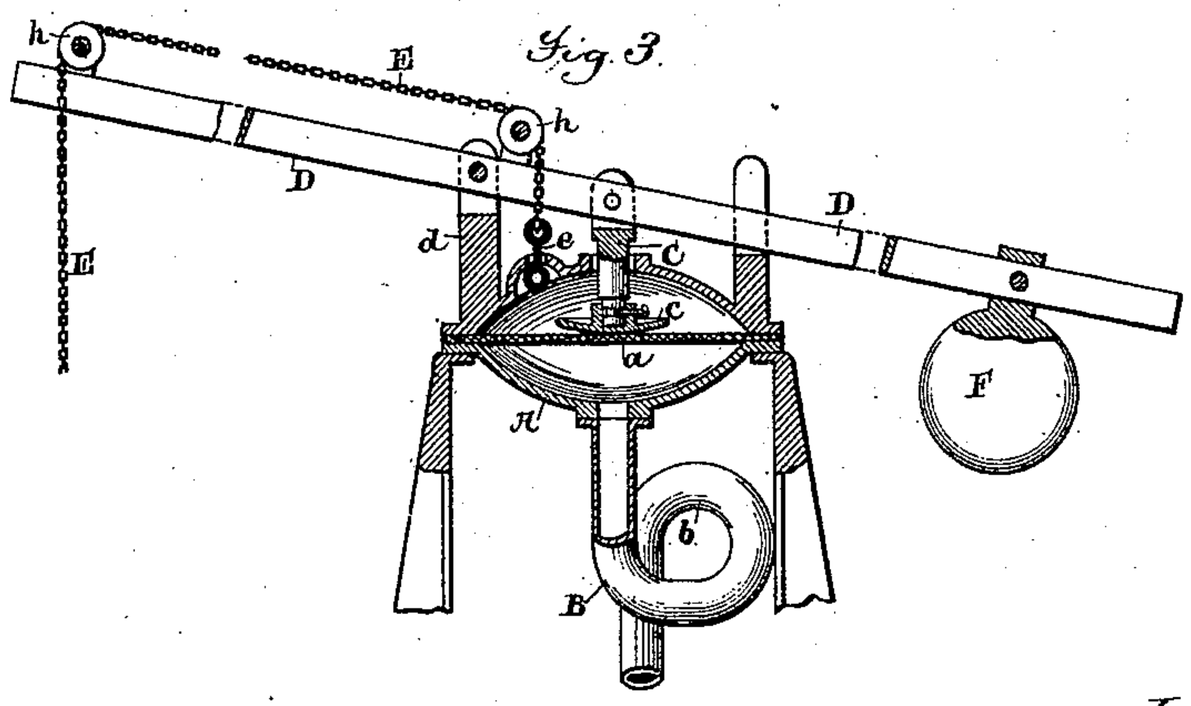

Fig 4.

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SAFETY APPARATUS FOR AUTOMATIC DRAFT-REGULATORS.

SPECIFICATION forming part of Letters Patent No. 337,013, dated March 2, 1886.

Application filed January 16, 1886. Serial No. 188,738. (No model.)

To all whom it may concern:

Be it known that I, CARLETON W. NASON, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Safety Apparatus for Automatic Draft-Regulators, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that class of draft-regulators in which the door or doors or damper or dampers of the furnace is or are automatically closed and opened to diminish and increase the draft by means of a diaphragm, which is subjected to the pressure in the steam-boiler, and is arranged to rise and fall as the pressure in the boiler increases and diminishes, and thus through suitable connections operate the furnace door or doors or damper or dampers, as stated. The regulators of this class, although applicable to all furnaces which are used in connection with a steam-boiler, are more particularly useful in connection with furnaces and boilers which are used for heating purposes, and which are usually operated without the attendant being present, except at intervals.

The connections between the diaphragm and the furnace door or doors or damper or dampers usually consist of a rod or follower, which rests upon the upper side of the diaphragm, and is connected to a pivoted lever, which is in turn connected by a rod or chain to the door or doors or damper or dampers which is or are to be operated. This lever is provided with a counterbalancing weight or weights, so adjusted upon the lever as to hold the rod or follower against the diaphragm, but at the same time so nearly balance the lever that comparatively little power will be required to rock it. These parts are so adjusted that when the diaphragm is in its normal position—that is to say, when the ordinary working-pressure exists in the boiler, the furnace door or doors or damper or dampers will be held sufficiently open to allow the proper amount of draft.

The diaphragm upon which the rod or follower rests is usually made of rubber, and it has been found in practice that the rubber, after having been for a long time in use, is liable to become so weakened that if it is subjected to a considerable pressure it will sometimes break. There is also, of course, more or less liability of the diaphragm being defective, so that it will break even before it has been long in use.

From what has been said it will readily be seen that whenever from any cause the diaphragm breaks, the rod or follower and the lever will remain in or at once fall to their normal position, thereby keeping open the draft, regardless of the steam-pressure in the boiler. If there should happen to be a considerable body of fuel in the furnace, and the attendant should not happen to be present, there being nothing to check the draft, the fuel would continue to burn, and the steam-pressure in the boiler might, and probably would, be increased to such a degree as to occasion serious danger, and perhaps damage.

It is the object of the present invention to avoid this difficulty and danger, and to provide means by which, in case the diaphragm breaks, the furnace door or doors or damper or dampers, instead of remaining open, or being at once opened, so as to continue or increase the draft, will be at once closed, so as to shut off all draft, and thus prevent the burning of the fuel and the increase of the steam-pressure in the boiler.

As a full understanding of the invention can be best imparted by a detailed description of the apparatus in which it is embodied, such description will now be given, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the apparatus embodying the invention in one form, the parts being shown in their normal position. Fig. 2 is sectional elevation of the same, the parts being in the same position. Fig. 3 is a view similar to Fig. 2, showing another embodiment of the invention; and Fig. 4 shows a detail, which will be hereinafter referred to.

Referring to said figures, it is to be understood that A represents the body or chamber of the apparatus; *a*, the flexible diaphragm contained therein; B, the pipe communicating with the steam-boiler, and with the chamber A beneath the diaphragm; C, the rod or follower, which extends through the top of the chamber A, and is provided with a head, *c*, which rests upon the upper side of the diaphragm; D, the lever to which the rod C is

connected, and which is fulcrumed to a stud, *d*, rising from the side of the chamber A; E, the chain connecting the lever D with the furnace door or doors or damper or dampers, and F the counterbalancing-weight, which is so adjusted as to rock the lever D and hold the head *c* of the rod C pressed against the diaphragm *a*. The part of the chamber A above the diaphragm communicates freely with the open air through the opening around the rod C; but the part of the chamber beneath the diaphragm is closed from the outside air. The pipe B is provided with the usual goose-neck, *b*, which, together with the portion of the pipe above the goose-neck and the space in the chamber A beneath the diaphragm, is filled with water, which serves to keep the diaphragm moist, and also prevents the steam from coming into contact with the diaphragm, and thus injuring it by reason of the heat.

The organization thus briefly described is of substantially the common form, and will be readily understood by those familiar with this class of apparatus.

The several parts of the apparatus, as before stated, are so adjusted that as long as the pressure of the steam in the boiler does not rise above what is required for the work to be performed the parts will remain in the position shown in Figs. 1 and 2—that is to say, the end of the lever to which the chain E is connected will be rocked upward, so as to hold the furnace door or doors or damper or dampers open sufficiently to permit the proper draft to maintain the steam-pressure in the boiler. If, however, at any time the pressure in the boiler increases beyond what is safe, this increased pressure will be communicated to the diaphragm *a*, so as to raise the latter and, through the rod C, rock the lever D, and permit the furnace door or doors or damper or dampers to close, and thus diminish the draft and reduce the pressure in the boiler. As the pressure in the boiler is thus reduced, the diaphragm *a* will fall back to its normal position, thus permitting the end of the lever D, to which the chain E is connected, to again rock upward and open the draft. It is to be remarked in passing that in some cases the end of the lever D opposite to that to which the chain E is connected, is connected by a chain or rod with a door or damper located above the fire, so that as the draft is closed by the raising of the diaphragm, and the consequent downward movement of one end of the lever, the door or damper above the fire is opened to admit air at that point, and thus further deaden the fire, and vice versa.

From the foregoing it will be seen that whenever, from any cause, the diaphragm *a* becomes broken the pressure in the boiler will no longer be communicated to the rod C, and, as a consequence, the lever D will remain in its normal position, so as to keep the furnace-draft open, regardless of the pressure in the boiler, and this, as before explained, is liable to occasion danger and damage. In order to avoid this, I provide the chamber A with a laterally-projecting pipe, G, which communicates with the chamber at a point above the diaphragm *a*, and extends to a point near the chain E, where it terminates in a small chamber, *g*, (see Figs. 1, 2, and 4,) having openings at its top and bottom, through which the chain E passes. The chain E, where it passes through the chamber *g*, is provided with a link, *e*, which is made of soft solder or other substance which melts at a comparatively low temperature.

From this construction it results that as soon as the diaphragm *a* becomes broken the body of water confined beneath the diaphragm and in the upper end of the pipe B will be forced out through the pipe G and the opening around the rod C, after which the steam will also pass out through the pipe G and into the casing *g*, where its heat will be sufficient to melt the link *e*, thereby breaking the chain E, and allowing the furnace door or doors or damper or dampers to close and shut off all draft from the furnace, and thus remove all danger of the boiler bursting or becoming damaged.

It will be seen from what has been said that the gist of the construction just described consists in the location of the fusible link *e* in such position that it will be exposed to the heat of the steam which is released by the breaking of the diaphragm *a*. It will also be seen that for this purpose the link may be located in other positions than that shown in Figs. 1 and 2. For example, it may be located wholly or partly inside the chamber A, above the diaphragm, as shown in Fig. 3. In this the pipe G and chamber *g* are dispensed with, and the chain E is carried to the outer end of the lever D over one or more small pulleys *h*, mounted in bearings upon the lever. In this case, as soon as the diaphragm *a* becomes broken, the water confined beneath the diaphragm will be forced out through the openings around the rod C and the link *e*, and the steam will enter the chamber, so that its heat will melt the link *e* and break the chain E; or the link *e* may be located in any other desired position, so long as its position is such that it will be exposed to the steam which is released by the breaking of the diaphragm.

In the organization shown in Figs. 1 and 2 it may sometimes be found desirable, in order to render the operation more certain, to provide the chain E, beneath the chamber *g*, with a receptacle or cup, as H, which will receive the water expelled through the pipe G. By this means the weight of this water is thrown upon the link *e*, thereby putting an additional strain upon the link, which will tend to insure its being broken. In some cases the weight of this water may be sufficient to rock the lever D and close the draft, even if the steam should fail to melt the link *e*.

What I claim is—

1. In a draft-regulator, the fusible link *e*,

located in position to be exposed to the steam released by the breaking of the diaphragm of the regulator, substantially as described.

2. The combination, with the diaphragm *a* and lever D, operated by the diaphragm, of the chain or rod E, having the link *e* located in position to be exposed to the steam released by the breaking of the diaphragm, substantially as described.

3. The combination, with the chamber A, diaphragm *a*, and lever D, operated by the diaphragm, of the chain or rod E, having the cup H, and the pipe G, communicating with the chamber and arranged to conduct the water from the chamber to the cup upon the breaking of the diaphragm, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CARLETON W. NASON.

Witnesses:
HENRY M. LARSON,
THOMSON H. PALMER.