

C. W. SULZBACH.

APPARATUS FOR PREVENTING EXPLOSIONS OF STEAM-BOILERS.

No. 172,898.

Patented Feb. 1, 1876.

Fig. 1.

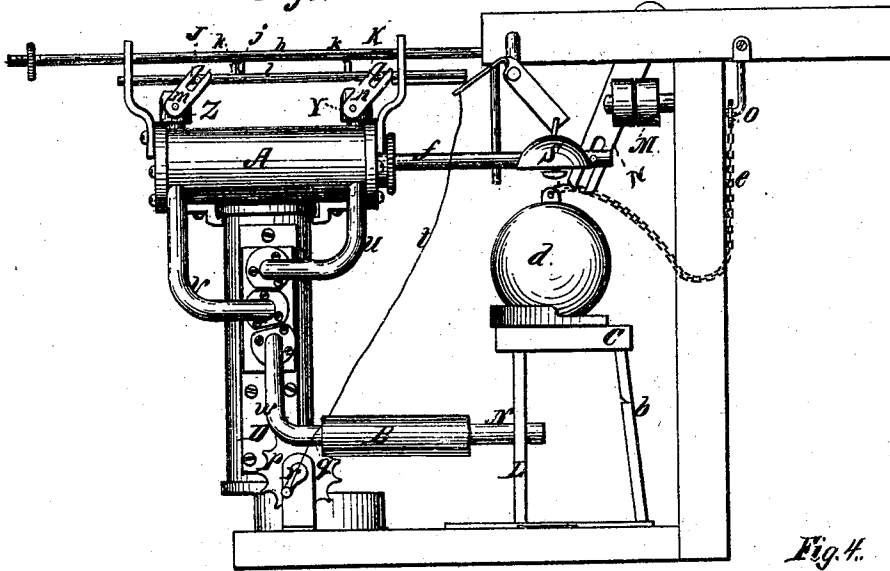


Fig. 2.

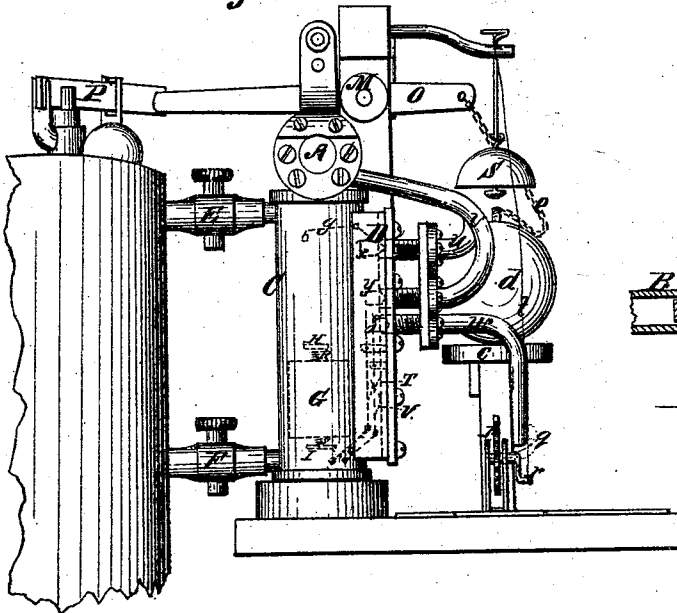


Fig. 4.

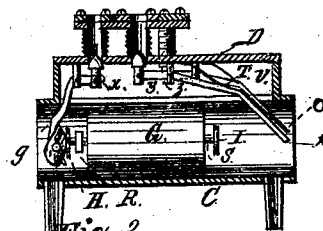
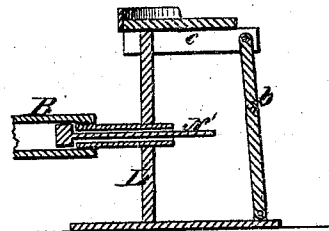


Fig. 3.



Witnesses

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IMPROVEMENT IN APPARATUS FOR PREVENTING EXPLOSIONS OF STEAM-BOILERS.

Specification forming part of Letters Patent No. **172,898**, dated February 1, 1876; application filed February 25, 1875.

To all whom it may concern:

Be it known that I, CARL WILHELM SULZBACH, of Virginia City, in the county of Storey and State of Nevada, have invented certain new and useful Improvements in Machinery for Regulating the Supply of Water, Giving the Alarm, and Preventing Explosion in Steam-Boilers, of which the following is a specification:

In order to a full understanding of the subject-matter of my invention it must be borne in mind that the ultimate object of the same is to secure steam-boilers against explosion. To effect this object I have constructed an apparatus to work automatically having two precautionary actions and a final action, removing all possibility of explosion. It also acts to prevent too great a supply of water, making, in all, four distinct operations. It will be more fully understood by reference to the accompanying drawings.

Figure 1 is a perspective view, showing the general construction and arrangement of the same. Fig. 2 is a vertical section, showing the general construction of the interior. Fig. 3 is a sectional view of the alarm attachment.

A represents the cylinder, which is operated for the purpose of operating the feed-gear or water-supply. In the cylinder A is the piston, to which the connecting-rod is attached, for the purpose of operating the exhaust-valve rod *l* by means of the projection or stop *j* upon the same coming in contact with the projections *k* upon the exhaust-valve rod *l*. The pins J and K operate the slotted valve-levers *m* and *m*. The piston *p* operates the belt-shifter N, which operates the feed-gear or pump by means of the tight and loose pulleys M. The cylinder B operates the counter-weight *d*, for the purpose of opening the safety-valve *a*, by means of the safety-piston N', the jointed leg *b*, the tilting tube *c*, the counter-weight *d*, the chain *e*, and lever O, which connects with and operates the safety-valve lever P. In the safety-pipe *w* is the small opening *g*, in the rear of the safety-cylinder B, designed to throw a jet of steam upon the alarm-wheel *p*, upon the axis of which is the crank *r*, which connects with the bell *s* by means of the wire *t*. Connected with the float-cylinder C is the valve-chamber D, in which *x*, *y*, and *z* are valves, which have the levers *g*, *i*, and *o*. The valves *x*, *y*, and *z* reg-

ulate the supply of steam to the pipes *u*, *v*, and *w*. The pipes E and F are connecting-pipes, for the purpose of connecting and disconnecting the float-cylinder C with the boiler. G is the float. H is the upper, and I the lower, tripping-plates, which are adjustable upon the rods R and S, upon a screw-thread, for the purpose of operating the valves *x*, *y*, and *z*, by tripping the levers *g*, *i*, and *o*. The levers *i* and *o* are returned to their seats by the springs T and V, and the lever *g* by its own weight, thus closing the valves *x*, *y*, and *z*.

The following is the operation of same: The water being at the required level, the connecting-pipes E and F maintain the same water-level in the float-cylinder as that of the boiler. The float G resting in the water, and the plates H and I being adjusted upon screw adjusting-rods R and S to suit the necessary variation in the water-line between high and low water, so long as the pump-injector or other feeding apparatus supplies the boilers properly, and the right level is maintained, no action is caused; but, should the pump feed too fast, and the water rise to the upper limit of the water-line, then the float G rises, and the plate H comes in contact with and operates the valve-lever *g*, opening the valve *x*, allowing the steam to pass through the pipe *u* to the cylinder A before the piston *f*, withdrawing the piston-rod, and shifting the belt to the feed-pulleys M upon the loose pulley, when the pump immediately stops, and the water recedes in the boiler. At the same time that the belt is shifted the connecting-rod *h* is drawn back, and the projection *j* meets the projection *k*, and forces back the exhaust-valve rod *l*, operating the slotted levers W and X, and opening the exhaust-valve Y, and closing the exhaust-valve Z at the same time. The water continues to recede in the boiler, and, reaching the low-water line, the float G operates the lever *i* by means of the lower plate I, thus operating the valve *y* through the pipe *v* to the cylinder A, behind the piston *f*, forcing the piston-rod out, and again shifting the belt to the tight pulley M, thus setting the pump or water-feed in motion, and raising the level of water, as will be readily understood.

Should, by the failure of the pump, or from other cause, the supply of water fail or be in-

sufficient, and the water-line still continue to recede, then the float G will descend with the same until the plate I trips the valve-lever *o*, the valve *z* is opened, and the steam passes through the pipe *w* to the safety-cylinder B, and immediately commences to discharge, through the opening *q*, against the alarm-wheel *p*, revolving the crank *r*, which rings the bell or other alarm by means of the wire *t*, and continues alarming until the piston N touches the jointed leg or toggle-joint *b*, tripping the same, and dropping the edge of the tilting table *c*. The counter-weight *d*, then resting in equilibrium over the leg L, is set in motion and liberated, operating the lever O by means of the chain *e*, and immediately opens the safety-valve *a* by raising the valve-lever P, thus relieving the boiler from all pressure by highly-heated steam or gases which might be produced by too low a stage of water, and preventing all danger of explosion, while the water is still at a safe stage to allow time for extinguishing the fires, or taking other precautionary measures.

The communication may be cut off from the boiler at any moment without interfering with the ordinary feeding apparatus, or in any way with the working of the boiler, in the ordinary way, by simply operating and closing the stop-cocks in the pipes E and F.

The advantages of my improvement are, first, that it is self-acting and thoroughly adjustable, for the purpose of regulating the water-supply, as has been shown; second, it works automatically to give notice at any and all points where those interested may be employed when danger of explosion is near—for instance, in the engine-room, factory-rooms, or superintendent's office; third, it operates au-

tomatically to relieve the boiler from all danger of explosion before the water is sufficiently low in the boiler to be unsafe; fourth, it is attachable and detachable, for the purpose of examination and cleaning, without interfering with the working of the pumps or ordinary feeding apparatus, or in any way hindering the working of the boiler or machinery.

Having thus described my invention, what I claim is—

1. The cylinder C, provided with the float G, the adjustable plates H and I, and the pipes E and F, in combination with the cylinders A and B, and pipes *u*, *v*, and *w*, all arranged substantially in the manner and for the purposes set forth.

2. I claim the cylinder A, having the piston *f* and pipes *u* and *v*, in combination with the valves *y* and *z*, the whole being arranged and operating substantially as described.

3. The pipe *w*, having the opening *q*, to operate the alarm or bell *s* by means of the alarm-wheel *p*, the crank *r*, and the connecting-wire *t*, in combination with the valve *z*, plate I, and float G, when constructed and operated substantially as and for the purposes set forth.

4. The cylinder B, piston N, jointed leg *b*, and tilting table *c*, when combined and operated substantially as and for the purposes set forth.

5. A counter weight, *d*, in combination with the tilting table *c*, when operated by the means substantially as and for the purposes set forth.

CARL WILHELM SULZBACH.

Witnesses:

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JOHN H. REDSTONE.