

(No Model.)

C. WARD.
SAFETY DEVICE FOR STEAM BOILERS.

No. 565,149.

Patented Aug. 4, 1896.

Fig. 1.

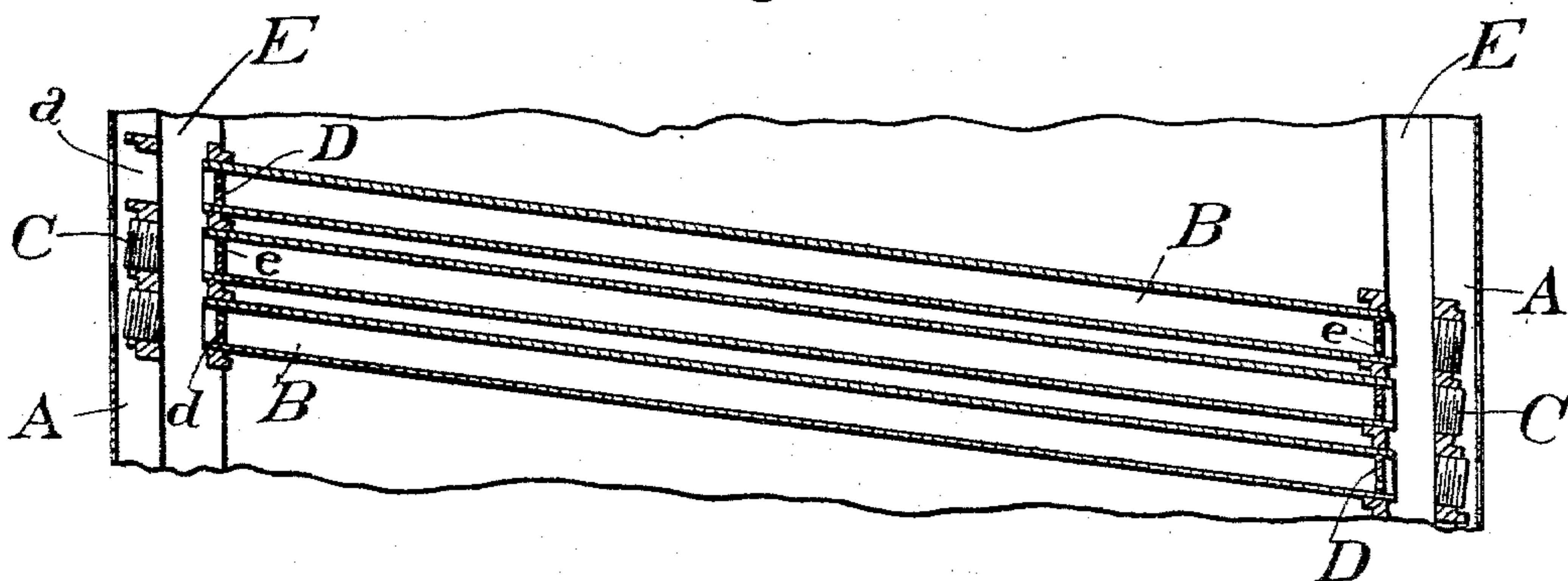


Fig. 2.

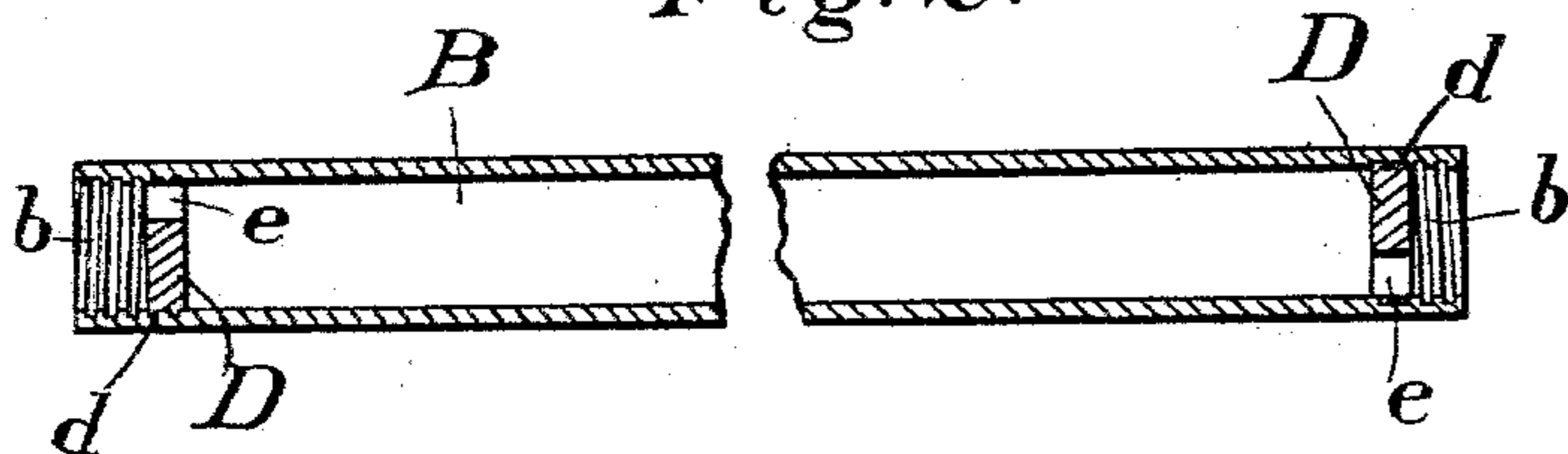


Fig. 3.

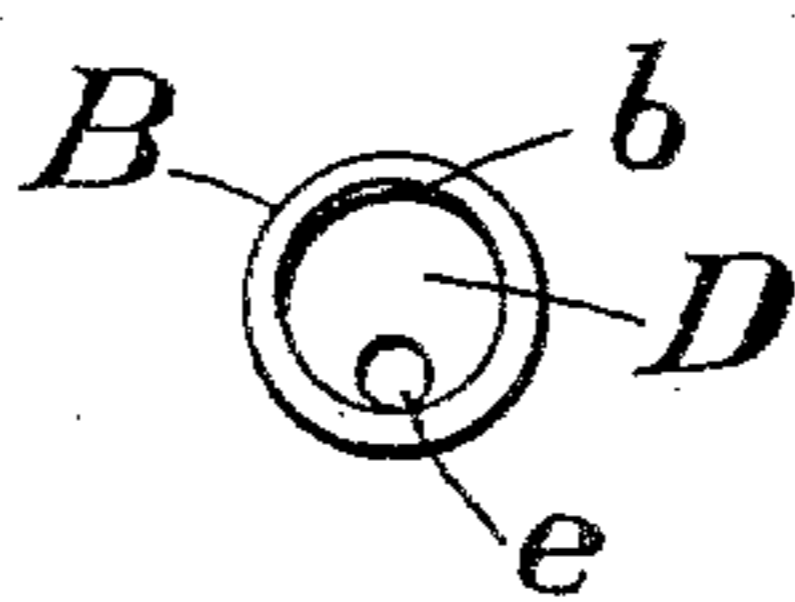
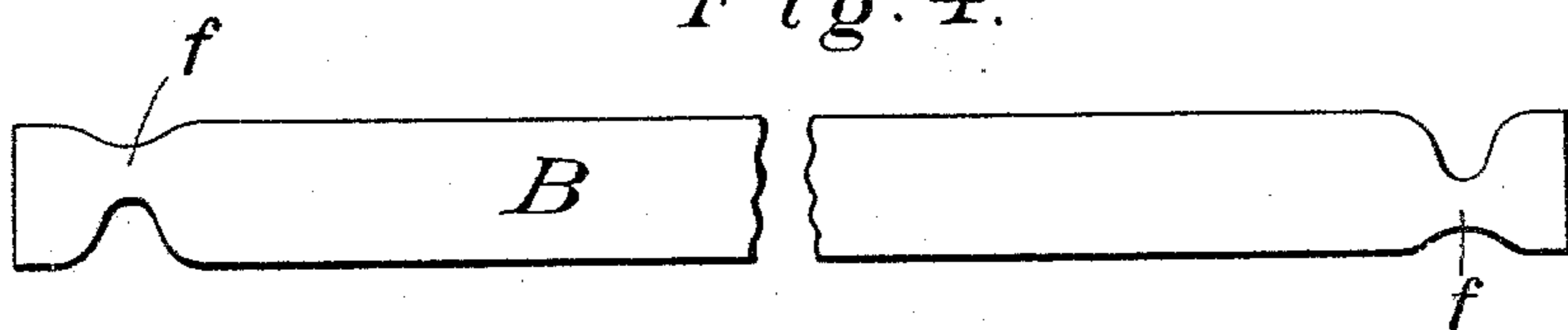


Fig. 4.



Witnesses
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SAFETY DEVICE FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 565,149, dated August 4, 1896.

Application filed August 14, 1895. Serial No. 559,236. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WARD, a citizen of Great Britain, residing at Charleston, in the county of Kanawha and State of West Virginia, have invented certain new and useful Improvements in Safety Devices for Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has relation to a water-tube boiler wherein each tube, placed horizontally or at an incline, is supplied at one end and delivers at the other. The object is to prevent or lessen the danger arising from the failure or bursting of any such tube. This object is accomplished by the formation of a curtailer, reducer, or constrictor at or near each end of such tube within the same, so that should the tube burst or fail the discharge of water and steam would be restricted by the smaller opening at either end and the effects of the disaster minimized.

In the accompanying drawings, wherein like letters represent like parts, Figure 1 is a vertical longitudinal section through part of a tubulous boiler, showing three water-tubes of a series in place and connection; Fig. 2, an enlarged and detached view of one tube, in longitudinal section, throttled at both ends; Fig. 3, an end elevation of such tube; and Fig. 4, a side elevation of a modification, showing such a tube with the throttles formed integrally therewith.

A is the boiler-casing. E represents the vertical tubes, called "headers," in which the water-tubes B are fitted at either end, and by which they are put into communication one with another, and C the screw-plugs fitted in and through orifices *a* of the boiler-shell, one plug opposite and in axial line with each end of each water-tube.

A screw-thread *b* may be cut inside each end of every water-tube, and into the tube is screwed a throttle D, having a screw-thread *d* formed on its periphery to enable it to be screwed into an open end of the tube; but inasmuch as it is practicable to make a tight fit between throttle and tube by driving or pressing the former into the latter the cutting of the screw-threads is a matter of choice and not of necessity.

In the periphery of each throttle is cut a recess *e* to give inlet or outlet to the tube. As will be seen by Fig. 2, I prefer to arrange the pair of throttles in a tube in such a way that the recess *e*, at what is to be regarded as the inlet end, shall be on a lower parallel than the throttle-recess at the outlet end, such arrangement being suited to the slightly-inclined position of the tubes and consequently upward movement of the water and having a tendency to restrict the area affected by the rupture of a tube.

Where the tubes are small, the expense of fitting each end of a water-tube with a detachable throttle might not be justifiable, but in such case a serviceable throttle can be formed integrally by making a constriction *f* in the circumference of the tube near each end.

It is evident that according to the foregoing-described construction and arrangement an explosion of the tube would be forced to spend itself within the boiler casing or area or beyond the casing or area with such diminished power as not to be a cause of serious anxiety or danger to those operating the boiler.

I am aware that it is not new to make or use tubes with reduced ends or concaved surfaces. Hence, I do not claim, broadly, the new invention of such a tube.

I claim as follows:

The combination, in a water-tube boiler, of the header-tubes, arranged vertically within the area of the boiler; the water-tubes arranged horizontally or at a horizontal incline, and at each end supported by and opening into said header-tubes, and the throttles fitted tightly within the ends of said water-tubes, and having each an aperture through the throttle into the tube; the pair of throttle-apertures for each tube being so arranged that the aperture adapted for ingress shall be in lower plane than the other; all substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES WARD.

Witnesses:

WILLIAM KEELY,
CHARLES E. WARD.