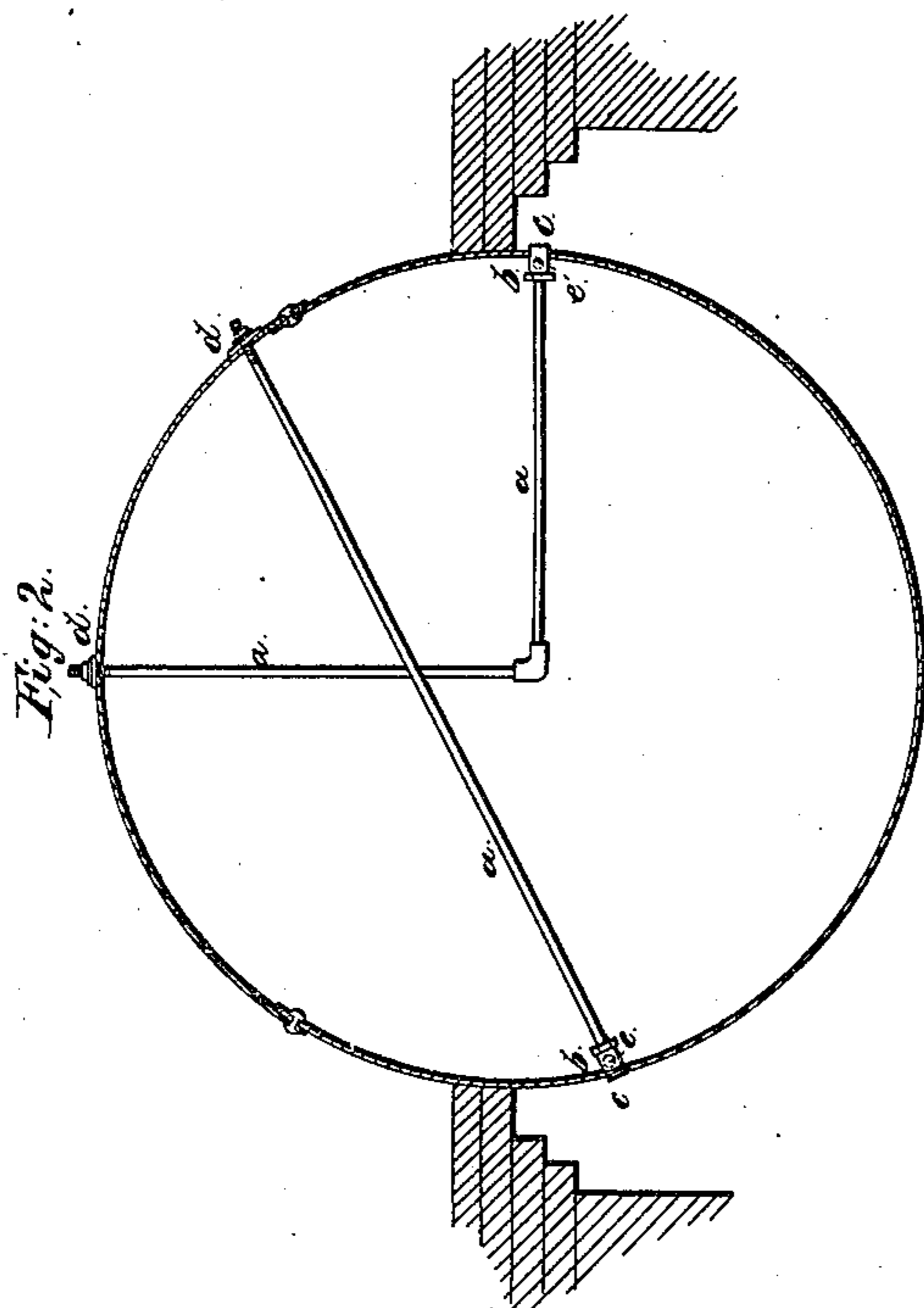


*E. H. Ashcroft,*  
*Steam Safety Valve.*

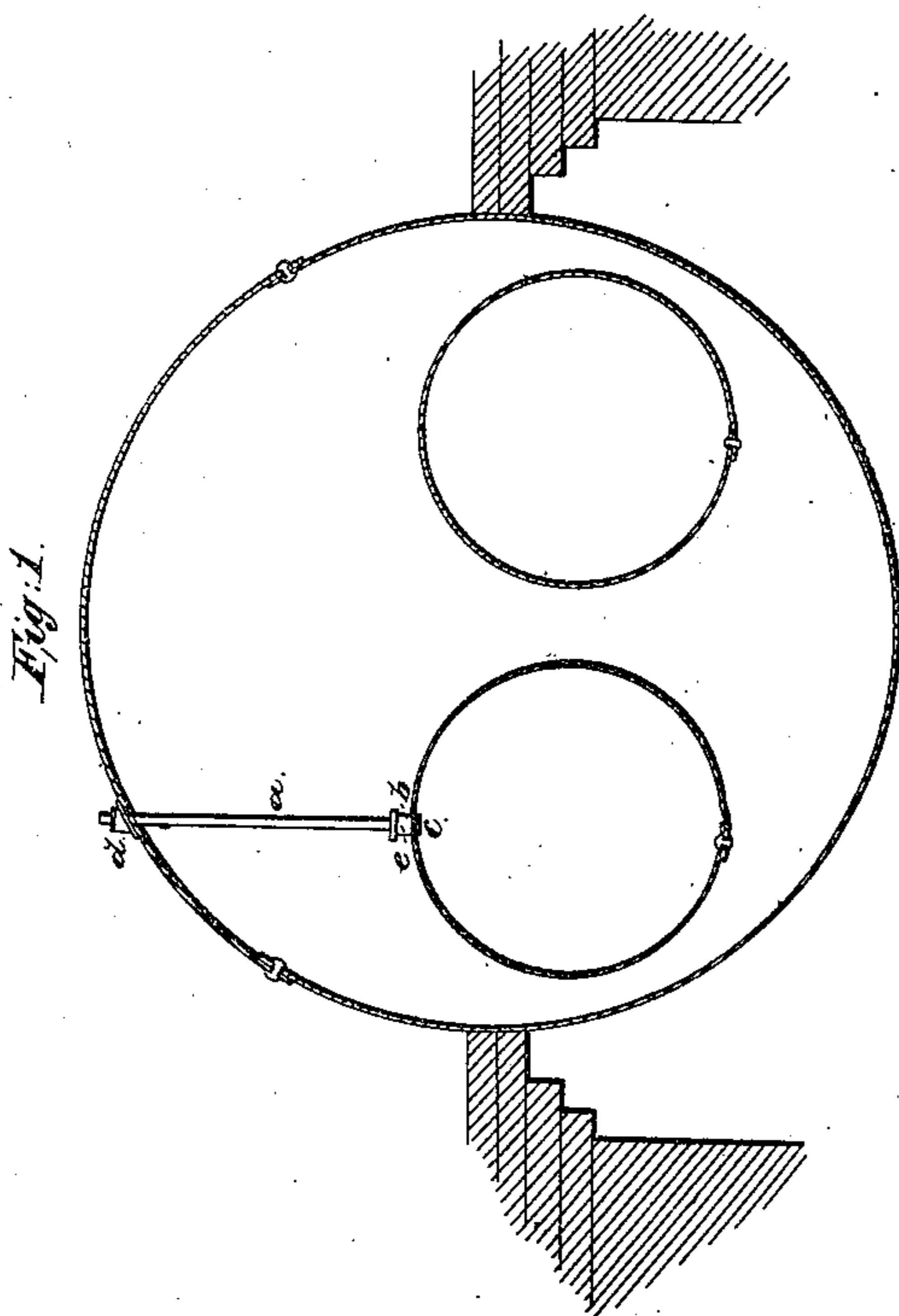
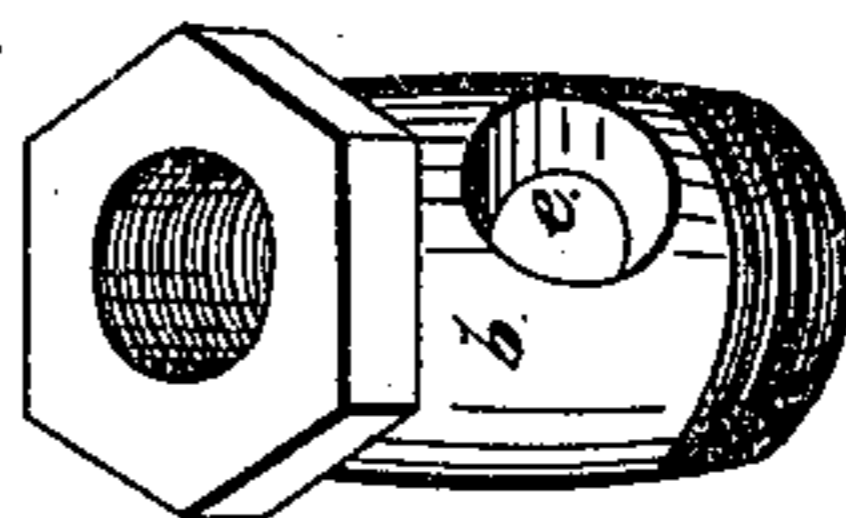
*N<sup>o</sup> 7,179.*

*Patented Mar. 19, 1850.*



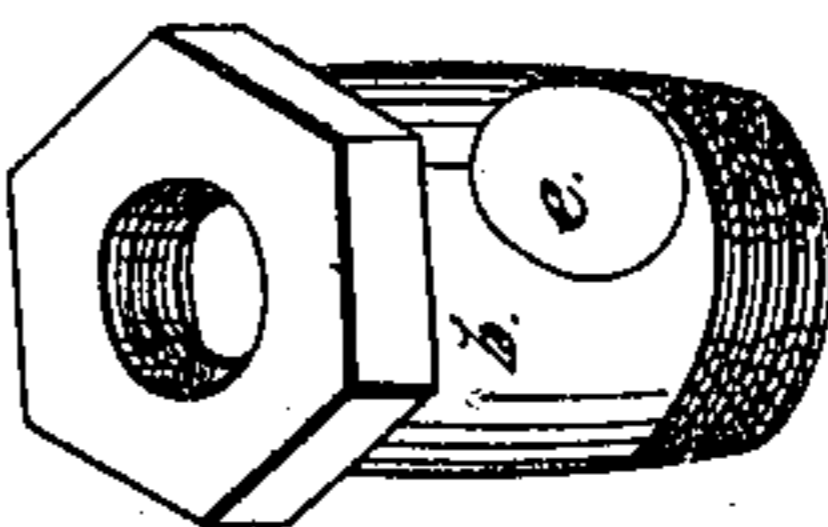
*Fig. 2.*

*Fig. 4.*



*Fig. 1.*

*Fig. 3.*



# UNITED STATES PATENT OFFICE.

EDWARD H. ASHCROFT, OF BOSTON, MASSACHUSETTS.

## METHOD OF APPLYING FUSIBLE METAL TO BOILERS.

Specification of Letters Patent No. 7,179, dated March 19, 1850.

*To all whom it may concern:*

Be it known that I, EDWARD H. ASHCROFT, of Boston, in the county of Suffolk and State of Massachusetts, have invented  
5 a new and useful Improvement in Safety Apparatus for Steam-Boilers, which I denominate a "Protected Safety Fusible Plug;" and I do hereby declare that the following is a full, clear, and exact de-  
10 scription of my invention, reference being had to the accompanying drawing, which forms part of this specification, and in which—

Figures 1 and 2 are sections of boilers  
15 with my apparatus applied thereto, Fig. 3 is a view in perspective of the cap containing the fusible plug, and Fig. 4 is a similar view of an empty cap.

My invention consists of a tube closed by  
20 a perforated cap filled with fusible metal; the cap is protruded through and secured in an opening made in that part of the fire or flue surface of the boiler which soonest becomes unduly heated so that its bottom  
25 is acted upon directly by the flame, and the open extremity of the tube is passed through the boiler and communicates with the external air; when the fusible metal melts, it  
30 no longer opposes an obstacle to the passage of the steam through the perforations of the cap into the tube, but allows it to escape through the latter and give notice of the heated state of the boiler.

In the drawing *a* is the tube, and *b* the  
35 cap screwed onto one of its ends and formed of some metal which is a good conductor of heat, but which is sufficiently refractory to withstand the most intense heat to which the boiler may be subjected; it is formed  
40 in this instance of copper which is a better conductor of heat than the iron plates of which boilers are generally constructed. The sides of the cap are perforated at *e* and the cavities are filled with fusible metal  
45 composed of lead, tin and bismuth, the quantities of the several metals being proportioned in such manner that the alloy will melt at that degree of heat of which it is desired notice should be given. An opening  
50 is made through that part of the boiler which is most likely to become unduly heated (as at *c*) and the cap is screwed into it, its bottom being thus directly exposed to the flame. The tube, *a*, is passed through the  
55 exterior shell of the boiler and is open at its outer extremity, hence, as soon as the

fusible metal is melted, it, either running out of the cap or being blown through the tube by the pressure, allows the steam to escape through the tube into the open air  
60 and thus give notice of the excessive heat of the boiler.

To facilitate the removal of the tube and the application of a filled cap to replace one which has acted, I screw it in a plate *d*  
65 which is bolted to the shell of the boiler.

I am aware that in one of the arrangements of C. Evans the fusible metal is in-  
closed in a cap or tube bolted upon the wa-  
ter side of any fire surface in the boiler  
70 but not protruded through the sheet constituting such surface. I am also aware that safety plugs in combination with a tube have been used before, such for example as the one patented by Stillman where the  
75 end of the tube is closed by a cap of fusible metal which rests upon the plates of the boiler and is kept in place by the pressure of the tube against it, but these are so defective that they have never come into gen-  
80 eral use; first, because the tube is merely pressed against the cap which being wholly exposed corrodes so quickly that leakage very soon takes place between the two; secondly, the saline and earthy incrustations,  
85 which are continually forming in boilers, accumulate around and between the fusible metal at its juncture with the plate of the boiler, frequently prevent its action; thirdly, the fusible metal when unprotected is  
90 quickly corroded and rendered useless; fourthly, in replacing the fusible metal, unless great care is taken to clean the surface of the boiler, the metal is separated from the boiler plates by a stratum of earthy or  
95 saline deposits which being bad conductors prevent the transmission of the heat from the boiler plate to the fusible metal and thus prevent its acting; fifthly, they can only be applied to those parts of the boiler which  
100 admit of the plate being kept in position by the pressure of the tube against it, and hence they can not be applied with advantage in many cases where their presence would prevent accident; and sixthly, even  
105 if a fusible metal cap was secured to the end of the tube and pressed against the boiler plates only that part in contact with the plates would melt leaving a sufficient mass around the tube to close it and prevent the  
110 escape of steam. These disadvantages are all obviated by my apparatus; first, the cap

being screwed onto the tube prevents leakage; secondly, the cap being screwed into an opening made in the boiler is exposed directly to the heat, and as it is formed of  
5 a good conducting metal it quickly transmits the heat to the entire mass of the fusible metal plug within it, and protects it from any saline or earthy deposits; thirdly, the fusible metal is protected by  
10 the cap from corrosion except at the perforations, as these are the only points unprotected and as the metal at these parts is of considerable thickness, it requires a long space of time to alter it sufficiently to re-  
15 quire a renewal; fourthly, as the cap is screwed into the boiler and not pressed against its plates, when one cap is removed a new one is screwed directly in the same hole, and hence no sediment can intervene  
20 to prevent the transmission of heat; fifthly, as the fusible metal is not held in place by the pressure of the tube, but by the cap which is screwed into the boiler plate, it can be applied to any part of the boiler, and  
25 the tube leading from it may be bent, (see Fig. 2) to accommodate it to the position of

the cap; and sixthly, as the fusible metal is inclosed in a better conductor than the boiler it will be certain to melt throughout its whole mass, and thus opening the capped  
30 extremity of the tube, allow the steam to escape.

Having thus described my protected safety fusible plug, what I claim therein as new and desire to secure by Letters Pat-  
35 ent is—

Inserting the fusible metal in a perforated cap which is protruded through and screwed into any sheet of the fire or flue surface of the boiler substantially as herein set forth  
40 in such manner that the bottom of the cap is exposed directly to the action of the heat, the fusible metal within the cap closing the end of the tube through which the steam rushes to give warning when the  
45 metal melts.

In testimony whereof I have hereto subscribed my name.

EDWARD H. ASHCROFT.

Witnesses:

E. S. RENWICK,  
E. G. ALLEN.