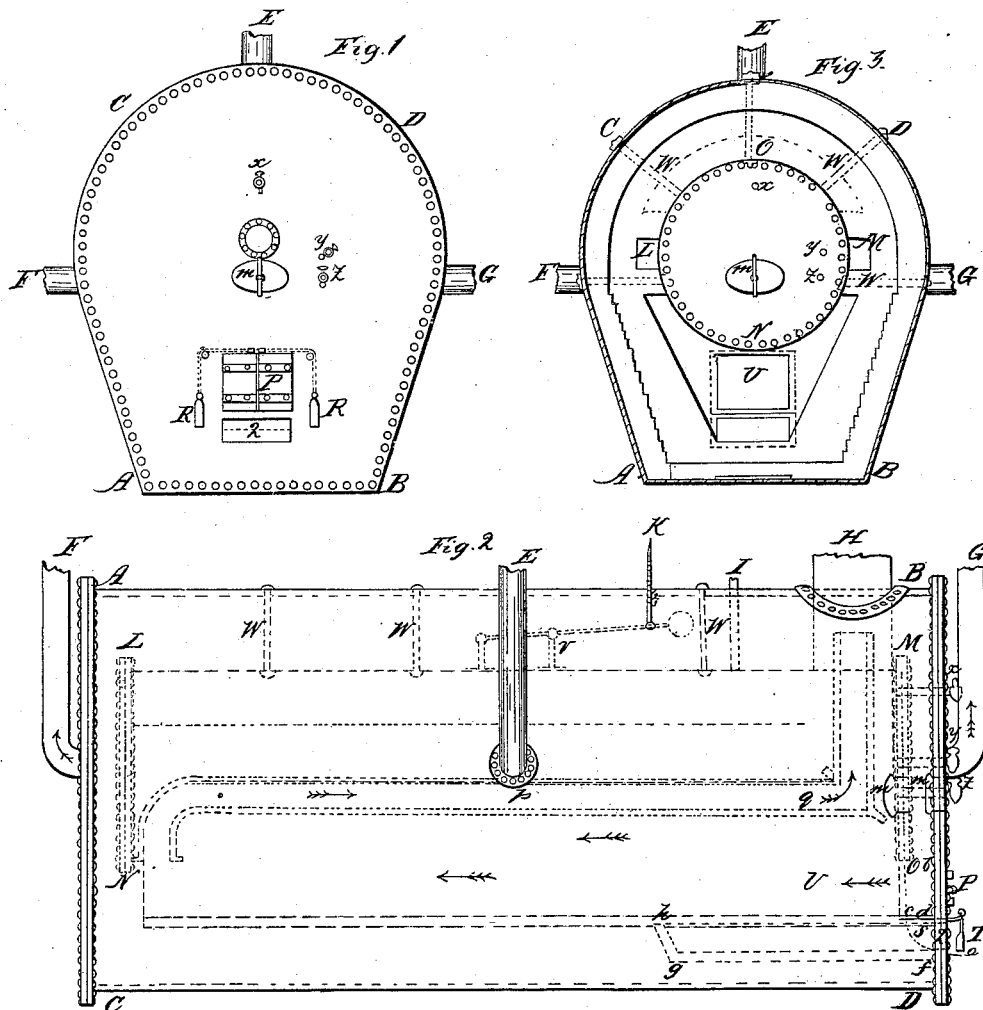


P. C. Frieze,
Steam Safety Valve.
N^o 1118. Patented Apr. 10, 1839.



UNITED STATES PATENT OFFICE.

PHILIP C. FRIESE, OF BALTIMORE, MARYLAND.

MODE OF PREVENTING ACCIDENTS FROM THE EXPLOSIONS OF STEAM-BOILERS BY SURROUNDING THEM WITH A JACKET.

Specification of Letters Patent No. 1,118, dated April 10, 1839.

To all whom it may concern:

Be it known that I, PHILIP CHRISTOPHER FRIESE, of the city of Baltimore and State of Maryland, have invented a new and improved mode of preventing injury to persons and property by the steam, hot water, and fragments rushing and cast from steam-boilers in the act of exploding; and I do hereby declare that the following is a full and exact description.

The nature of my invention consists in providing a steam boiler with a jacket of peculiar construction, which will be hereafter described, and taking advantage of two principles, one of which is the elasticity of steam, the other is the principle of relation with regard to the difference of strength between the boiler and the jacket.

To enable others skilled in the art to make and use my invention I will proceed to describe first its construction, and secondly its operation.

First, to arrive at a clear understanding of the construction of my invention, it is necessary to premise that the steamboiler (represented in the accompanying drawings by L, M, N, O) to which it is to be attached may be made in any of the known forms and provided with safety valve (V) and gage-cocks and steam cocks (*x*, *y*, *z*) and the other appendages of such boilers. But in order to prevent the injury to persons and property always at present attendant on the explosion of a steamboiler (L, M, N, O) and caused by the steam, hot water and fragments of the boiler, I inclose it with a jacket (A, B, C, D) of boiler iron or other metal. The peculiarities in the structure of this metallic jacket consist in three things: First, in its surrounding every part of the boiler and being held at a convenient distance from it by stays (W, W, W.) Secondly, in its being provided with a convenient number of vents, which vents are fitted with pipes (E, F, G) bent to whatever direction it may be considered most harmless to lead the steam in the event of an explosion of the boiler. Thirdly, in its being capable of resisting on every square inch a pressure (say ten per cent.) greater than the maximum bearable on every square inch of the boiler.

The combination of the above three peculiarities constitute the principle of the construction of my invention. But for the

purpose of presenting my idea more at large to the understanding I will describe some minor details concerning the furnace door, draft hole, safety valve, gage- and steam-cocks, manholes, steam pipe and smokestack; although these particulars do not form any part of my invention but are merely consequences arising from its application and may be altered according to the suggestions of convenience or opinion.

The furnace door (P) is in the jacket and is composed of two leaves opening toward the furnace (U); and when closed will resist as much pressure from within as any other part of the jacket. Weights (R, R,) are attached to the door continually tending to close it, so that it only remains open while fuel is passing through into the furnace. The draft hole (Q) is also in the jacket and is furnished with a shutter (S) hung on the top of the draft pole. This shutter is balanced by a weight (T) which may rest on a sliding shelf (*a*), by which means the draft can be regulated. From the fact, that the shutter is nearly balanced by a weight, it will appear that the slightest draft from the inside will close it. When the shutter is closed it is as strong as any other part of the jacket.

For the purpose of preventing any communicating with the furnace except through the furnace door (P,) and the draft hole (Q), a sheet of metal (*c d*) is placed on the bottom of the furnace door and extended to the bottom of the mouth of the furnace (U), another sheet (*O b*) extends from the top of the furnace door to the top of the mouth of the furnace, a third sheet (*O b c d*) extends from one side of the furnace door to the corresponding side of the mouth of the furnace, a fourth sheet (likewise represented by *O b c d*) extends from the remaining side of the furnace door to the remaining side of the mouth of the furnace. These four sheets of metal form a casing that cut off all communication except through the door (P) and the furnace grate (*h c*). A similar casing extends from the draft hole (D) to the innermost extremity of the furnace grate (*h c*). The top sheet (*c d*) is the same as the bottom sheet of the above described casing for the furnace door, the bottom plate is (*g f*), the side plates or sheets are both represented by (*h g f d*);

the back plate is (*h g*). The ashes fall through the furnace grate (*h c*) on the bottom plate (*g f*) of the draft hole casing.

The safety valve apparatus (*V*) is contained in the space between the boiler and the jacket and by means of a graduated limb (*K*) attached to the lever and protruding through the jacket makes known its motion. The gage- and team-cocks (*X*, *Y*, *Z*) extend by a neck through the jacket.

The pipe that conveys the steam from the boiler to the engine is represented by (*I*) and goes through the jacket, as does also the smokestack (*H*).

Secondly, the operation of my invention is founded upon the elasticity of steam and the relation existing between the strength of the boiler and of the jacket. From the nature of an elastic body it follows that the steam within the boiler can in no one instant of time acquire more than an infinitely small degree greater power than the maximum bearable by the boiler. At this instant the boiler must give way and the steam, hot water and fragments will be forced against the jacket by the power of the steam at the moment of explosion. But the jacket is stronger than the projecting power and will consequently withstand the shock, unless the steam can acquire an increase of power. The lastic quality of steam prevents, however, any increase, because the moment a rupture takes place in the boiler, the steam will fill the intervening space

between the boiler and the jacket and by expansion through the large pipes (*E*, *F*, *G*,) rapidly lose all its power. When a flue (*o p q*) bursts, the steam, &c., escapes through the smokestack (*H*). When there is more than one boiler they may be all enveloped with one common jacket, the strength of which must be (say ten per cent.) greater than that of the strongest boiler.

What I claim as my invention and desire to secure by Letters Patent is the application to steam boilers of a jacket possessing in its construction the following three peculiarities, viz:

1. This jacket must envelop the steam-boiler entirely leaving throughout a certain intervening space between the jacket and the boiler.

2. This jacket must have a convenient number of holes in it, each hole to be fitted with pipes bent to whatever direction it may in each case be considered most harmless to lead the steam in the event of an explosion of the boiler.

3. This jacket must be able to resist on every square inch of its inner surface a pressure somewhat greater than the maximum that can be withstood on every square inch of the boiler.

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Witnesses:

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