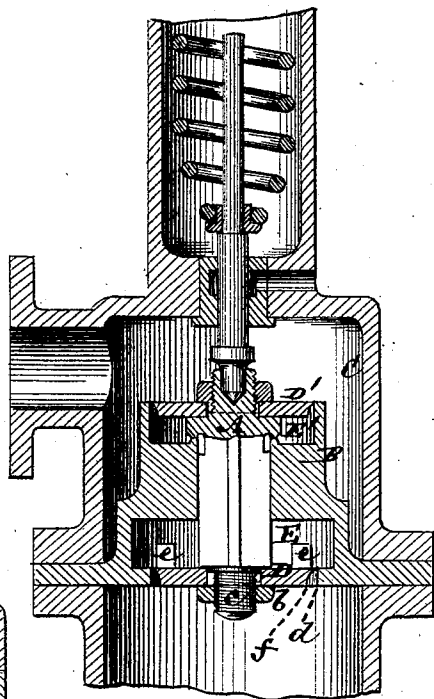


G. COCKBURN.  
Safety-Valves.

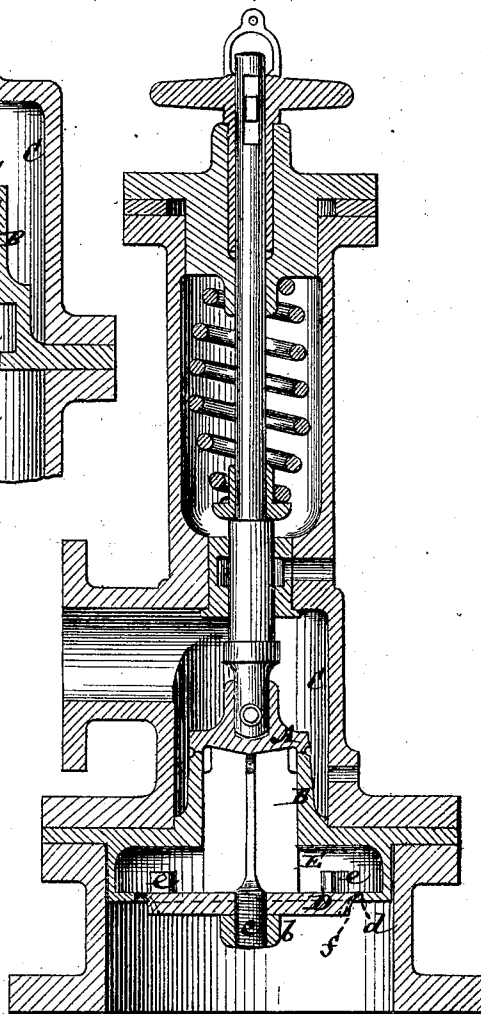
No. 146,873.

Patented Jan. 27, 1874.

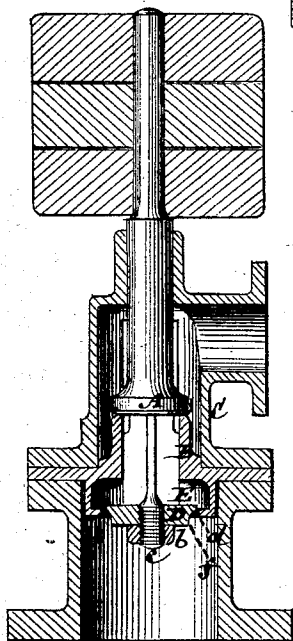
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



*Witnesses*  
*John Becker*  
*Frederick Wagner*

*George Cockburn*  
*By his Attorneys*

# UNITED STATES PATENT OFFICE.

GEORGE COCKBURN, OF GLASGOW, NORTH BRITAIN.

## IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. **146,873**, dated January 27, 1874; application filed December 9, 1873.

*To all whom it may concern:*

Be it known that I, GEORGE COCKBURN, of Glasgow, in the county of Lanark, North Britain, pattern-maker, have invented Improvements in Safety-Valves, of which the following is a specification:

This invention, which relates to safety-valves for steam-boilers and other purposes, consists in a construction of the valve proper with one or more disks of larger diameter than said valve, and arranged to freely fit as loose pistons within receiving-chambers or openings thereto, for the escaping steam, gas, or vapor under pressure, and said disks having their edges, or those of the openings in which they fit, made beveling, to give free relief when the valve is lifted, and the disks exerting an additional or preponderating influence in raising the valve proper, over and above that which is due to the area of the latter.

In the accompanying drawing, Figure 1 represents a vertical section of a safety-valve having my invention applied to both its upper and under sides. Figs. 2 and 3 are vertical sections, showing the invention applied to the under side of the valve only, under different forms of general construction.

Similar letters of reference indicate corresponding parts.

Referring, in the first instance or more particularly, to Fig. 1 of the drawing, A is the valve proper, and B the valve casing or seat, inclosed by a chamber, C. D is a plate or disk, of larger diameter or area than the valve A, secured to the lower part of the valve A by a nut, *b*, made to fit a screw-thread, *c*, formed at the lower part of the valve A. Between the outer marginal portion of the disk D and a lower chambered portion, E, of the valve-casing, an annular space, *d*, is formed, through which steam, supposing the invention to be applied to a steam-boiler, passes into the chamber E. The downward weight or load upon the valve is represented by a helical spring; but it may be by a weight or weights, or by a lever and weight.

When the pressure of steam upon the under side of the valve exceeds the resistance presented by the load, and the valve begins to rise from its seat, the steam escapes from the chamber E, and by so doing the pressure with-

in said chamber is reduced—that is to say, the pressure on the upper side of the plate or disk D becomes less than the pressure on the under side thereof. This sudden reduction of pressure above the disk D momentarily gives the steam acting on the under side of the disk a preponderating influence to raise the valve A farther from its seat, thus imparting to the valve a greater relieving effect than would be due to it without the disk or plate D.

Stops *e* are arranged on the upper side of the disk D, to limit the extent of its lift. The periphery of the disk D is curved or beveled, as at *f*, to a greater or less extent, as indicated by dotted lines in Fig. 2, so that, as the valve is lifted to a greater or less extent, the difference of pressure above and below the disk or plate D is variable.

Instead, however, of forming the periphery of the disk or plate curved or beveled, as shown at *f* in Fig. 1, the curved or beveled surface may be formed on the angular opening surrounding the disk, which beveled construction of the opening *d* in a reverse direction to that shown for the periphery of the disk D is equivalent to beveling the edges of the disk.

The valve A in Fig. 1 is also shown with a disk, D', on its upper side, fitting within an upper chamber, E', and curved, cut away, or beveled at its edge, as in the case of the lower disk; or the annular opening of the chamber in which said upper disk fits may be curved, cut away, or beveled instead, as and for the purpose hereinbefore referred to with reference to the lower disk.

When the pressure of steam on the under side of the valve A exceeds the load, and the valve rises from its seat, the steam passes into the chamber E', and from thence outward through the annular space surrounding the disk, and, accordingly as the outward passage of the steam is retarded by a greater or less curvature or bevel on the edge of either disk or its surrounding opening, as the case may be, or, in other words, according to the extent of the opening, so will the steam, after passing over the valve-seat, act upon the bottom of the chamber E', and so enable the steam to exert an additional or preponderating influence in lifting the valve over or above that which is due to the area of the valve proper. The up-

per disk D' is, accordingly, but a supplement of the lower disk D, and acts in the same manner for a like purpose, but still further increases the efficiency of the valve as regards its relieving effect. Either the upper or lower disk, however, may only be used, if desired, instead of being used conjointly, as in Fig. 1. Thus, in Fig. 2 of the drawing, which represents the invention as applied to a lock-up safety-valve, the lower disk D only is used. Such also is the case in the modification shown in Fig. 3.

I claim—

The combination, with the valve proper A and its casing or seat B, of one or more piston-like disks, D D', of greater area than said

valve, and one or more receiving-chambers, E E', for the steam, gas, or vapor under pressure, said disks, in connection with the chambers E E', operating to assist in raising the valves, and being beveled on their edges to give a quick relief, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE COCKBURN.

Witnesses:

EDWARD FISHER BAMBER,  
JOHN CAMPBELL MACANDIE.