(No Model.)

H. P. TIPPETT.

SAFETY VALVE.

No. 582,445. Patented May 11, 1897.

Fig 1.

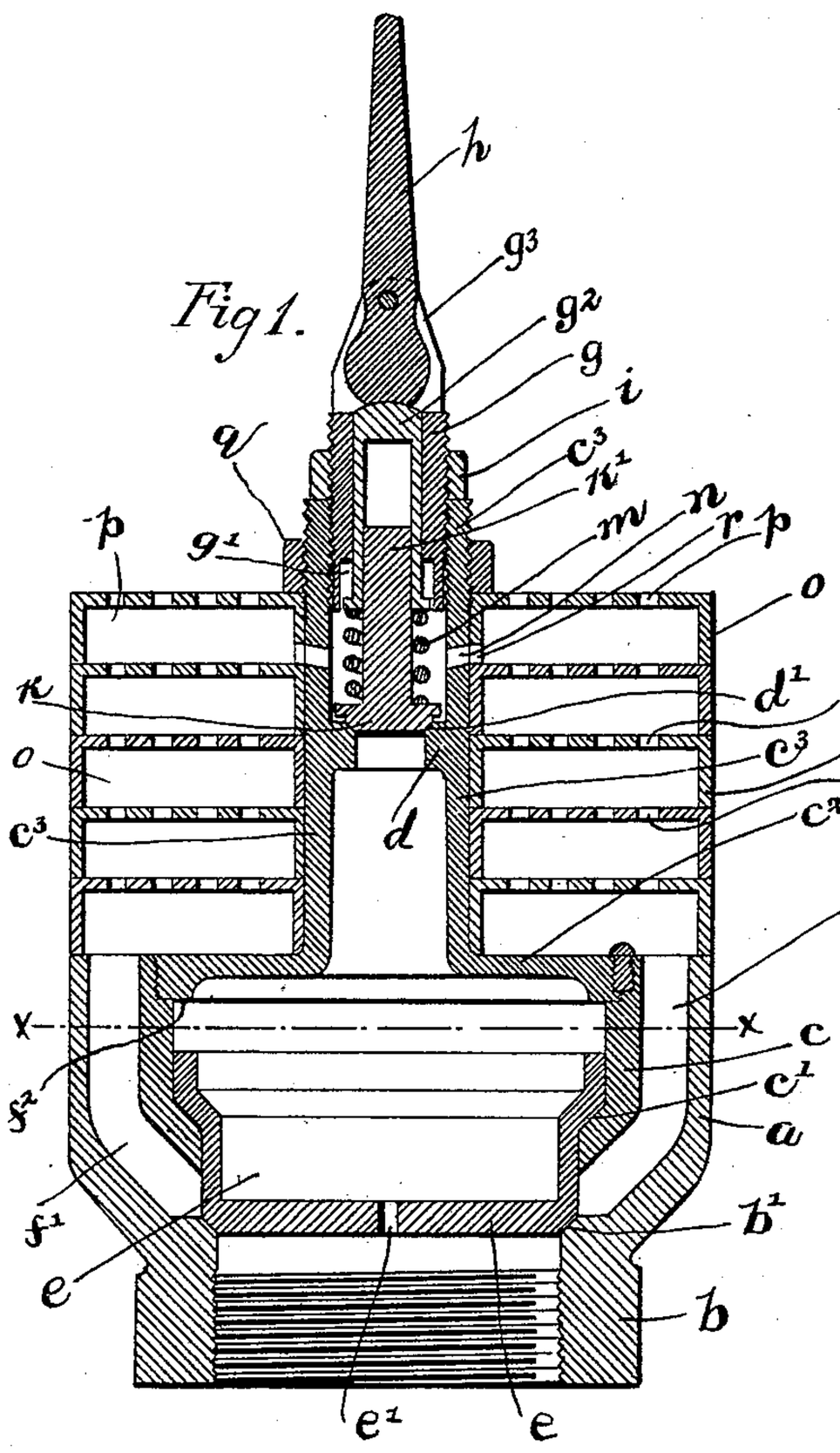


Fig 2.

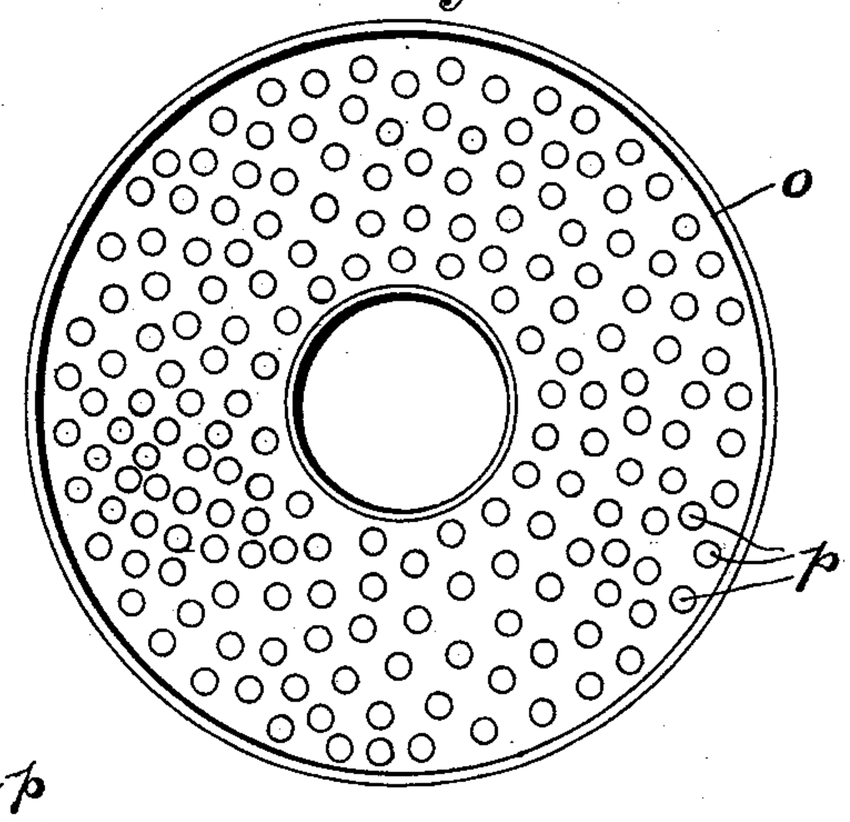
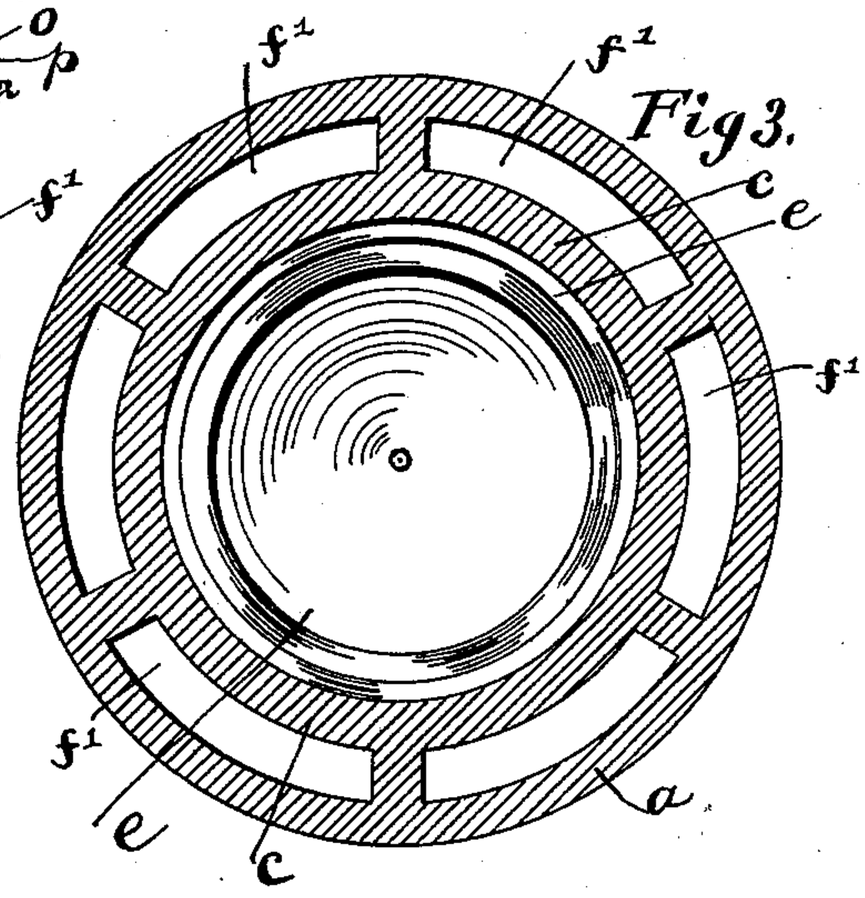


Fig 3.



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SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 582,445, dated May 11, 1897.

Application filed December 21, 1896. Serial No. 616,461. (No model.)

To all whom it may concern:

Be it known that I, HAROLD P. TIPPETT, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Safety-Valves, of which the following is a specification.

My invention relates to the improvement of safety-valves for locomotive and other boilers; and the objects of my invention are to provide an improved construction of safety-valves of this class, the details of which will be pointed out hereinafter.

In the drawings, Figure 1 represents a central vertical section of my improved safety-valve. Fig. 2 is an under side view of one of the muffler-plates, and Fig. 3 is a sectional view on line *x x* of Fig. 1.

Similar letters refer to similar parts throughout the several views.

In the construction of my improved safety-valve I employ a body or external casing *a*, which is adapted to have its smaller and lower end portion *b* engaged and in communication with a steam-boiler. The portion *b* is in the form of a neck, the opening through which is, as shown, of less diameter than the interior of the main or upper portion of said casing. Within the casing at the junction of the neck portion and body *a* is formed a circular valve-seat *b'*. Within the upper or larger portion of the casing *a* is provided an internal valve-casing *c*, which extends downward to a point above the shoulder *b'* and has its lower end portion inclined inwardly to form an annular inclined seat *c'*. This inner casing is formed integral with the outer casing *a*. The internal casing *c* is provided with a detachable top plate c^2, which has formed therewith an upwardly-extending central neck or tube c^3. This tubular portion c^3 is provided with an internal circular shoulder *d*, the upper side of which is beveled to form a valve-seat *d'*.

e represents the main valve, which is substantially of a cup shape and which is adapted to bear and rest on the seat *b'*. The upper portion of this cup-shaped valve *e* is made flaring, this flaring portion forming an inclined shoulder which is adapted to bear on the inclined seat *c'* of the casing *c* when the lower portion of the valve *e* is seated upon the seat *b'*. Through the central portion of the lower end of the valve *e* is formed a port *e'*. The annular space which is between the inner and outer casings *c* and *a* is by means of ribs *f* divided into ports *f'*, the inner ends of which are normally closed by the main valve *e* and the outer ends of which open through the top of the valve-casing body.

As indicated in the drawings, the inner-casing top c^2 is so connected with the wall of the inner casing *c* as to form an internal stop-shoulder f^2.

The valve-casing neck c^3 has its upper portion internally and externally threaded, as shown, and into this internally-threaded neck is screwed a tubular adjusting-screw *g*, the hollow of which is enlarged to form an inner end recess or socket *g'*. Within the hollow or screw *g* is adapted to fit and slide a bushing g^2, which is provided with a socket extending to a point near its outer end. This bushing-plug or socket-piece has its inner end portion flanged, said flanged portion projecting within the end recess *g'* of said screw.

Rising from the upper end of the screw *g* are lugs g^3, between which is fulcrumed a cam-lever *h*, the cam-head of the latter being adapted to bear on the upper end of the bushing g^2 and being of such shape as to retain said bushing in a depressed position when said cam-lever is in the vertical position indicated in Fig. 1 of the drawings.

i represents a nut which engages with the external thread of the screw *g* and which is adapted to bear upon the top of the valve-casing neck c^3.

k represents an adjusting-valve, the stem *k'* of which is adapted to fit and slide within the socket of the bushing g^2. The valve-body *k*, which is on the inner end of the stem *k'*, is adapted to bear upon the internal valve-seat *d'* of the neck c^3, in which position said valve is normally held by means of a coil-spring *m*, which surrounds the stem *k'* and bears between the valve-body *k* and the inner end of the bushing g^2. At a point above the valve-seat *d'* the tubular neck c^3 is provided at suitable intervals with outlet-openings *n*.

o represent muffler-plates, each of which is in the form of a channel-ring. These muf-

fler-plates are arranged about the neck c^3 one upon the other and are made to communicate with each other through the medium of perforations p, which are formed through their upper sides. q represents a nut which is screwed onto the external threads of the neck c^3 and which, as indicated in the drawings, is adapted to bear on the upper side of the upper muffler-plate o, thereby retaining said muffler-plates one against the other in their proper positions. The upper muffler-plate is provided at suitable points with openings or ports r, which communicate with the openings n of the neck c^3.

The lower and smaller end portion b of the safety-valve casing herein described being attattached and made to communicate with a boiler, the operation of my improved valve is substantially as follows: The steam contained in the boiler and under pressure passes through the port e' of the main valve e into the casing c and into that portion of the neck c^3 which is below the valve k. Owing to the fact that the upper end of the valve e is of greater circumference than the lower end thereof, it is obvious that the upper portion of said valve presents a greater area than the lower end portion thereof, thus resulting in a corresponding increase of steam-pressure over the pressure exerted on the under side of said main valve and operating to retain said main valve seated. In case the steam-pressure against the under side of the valve k is such as to overcome the tension of the spring m it is obvious that said valve k will be lifted from its seat d' and the steam allowed to escape into the upper portion of the neck c^3, from whence it will pass outward into the upper muffler through the ports n. The valve-opening through the internal shoulder d being of greater diameter than the opening e' in the main valve, it is evident that when the valve k is lifted from its seat, as described, the escape of steam from the chamber above the main valve must be proportionately greater than the entrance of steam through said opening e'. In this manner it will be seen that the pressure on the upper side of the main valve will not be sufficient to overcome the pressure on the under side thereof, thus resulting in the main valve being unseated and in the steam from the boiler being allowed to escape through the ports f', thence through the mufflers, and out to the atmosphere. As soon as the steam-pressure in the boiler is so reduced by the means above described as to admit of the spring m exerting its influence to close the valve k it is obvious that a sufficient steam-pressure will again accumulate above the main valve to retain the latter in its seat.

Owing to the fact that the total area of the openings p in the muffler-plates is greater than the area of the annular openings or ports f', it will be seen that the flow of the steam to the atmosphere will not be retarded by said muffler-plates and that these plates will serve the usual purpose of muffling the sound of the escaping steam.

The employment of the hand-lever h provides, in connection with the mechanism hereinbefore described, a relief attachment for the safety-valve, which may readily be operated by hand. By turning said lever downward to a horizontal position and thereby relieving the top of the bushing g^2 it is obvious that said bushing, through the influence of the spring m, will be lifted sufficiently to allow the valve k to rise from its seat, thereby admitting of the escape of the steam to the atmosphere through the ports n and muffler-plate. It is obvious that I may omit the bushing g^2 and cam-lever h and cause the spring m to bear directly against the screw g or its equivalent. It is evident that the construction of the above-described valve mechanism is simple and that its operation is positive.

It will be observed that the boiler steam-pressure serves without the aid of a spring to retain the main valve seated and by the construction and operation described that said main valve cannot remain balanced or nearly balanced when either opened or closed, but is provided with a positive force to hold it either in the open or closed position. It will also be seen that without increasing the size of the valve-body a valve-opening is attained which will insure the certain and quick release of the boiler-pressure. The hand relief mechanism is so constructed as to relieve the slight tension of a small spring instead of increasing the already excessive tension of a large spring, as is common in safety-valve constructions. It will be observed that the parts of my improved valve are simple and few in number, thus reducing the cost of manufacture and repairs.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a safety-valve the combination with the body thereof, said body being adapted to be connected with a boiler, annular ports f', a tubular body extension or neck c^3 and an adjusting-valve arranged therein, of a main valve e arranged in said body, and adapted to normally close communication between the ports f' and the lower portion of the valve-body, said main valve being provided with a small port e' and having a greater circumference on its upper side than on its lower side, substantially as and for the purpose specified.

2. In a safety-valve the combination with the valve-body, said body being adapted to be connected with a steam-boiler and having an inturned portion to form a seat c', neck extension c^3 and an adjusting-valve therein, of a main valve having a small port e', the lower end of said main valve being normally seated on an internal seat, of the valve-body and the upper portion of said main valve being normally seated on the inturned seat c' and the circumference of said main valve

being greater at its upper than at its lower end, substantially as and for the purpose specified.

3. In a safety-valve the combination with a valve-body, a tubular extension or neck c^3 leading therefrom, an internal valve-seat d' in said neck, a spring-actuated valve k normally upon said internal seat and ports n leading through said neck at points above the valve-seat d', of a main valve e normally seated on the internal seat b' of the valve-body, and a port e' through said main valve, the circumference of the upper portion of said valve e being greater than the circumference of the lower end portion thereof, substantially as and for the purpose specified.

4. In a safety-valve the combination with a valve-body, a neck extension c^3, an internal valve-seat d' in said neck, a spring-actuated valve k normally upon said internal seat, perforated muffler-plates arranged about said neck extension and ports n leading through said neck at points above the valve-seat d', of a main valve normally seated by steam-pressure within the valve-body and adapted to be unseated when said adjusting-valve is opened, substantially as and for the purpose specified.

5. In a safety-valve the combination with the body, a central neck extension c^3, an internal valve-seat in said neck, an adjusting-screw g having a threaded engagement with said neck, and a spring-actuated valve k normally seated on said internal seat d', of a main valve seated in the lower portion of the valve-body and an opening e' in said main valve of less diameter than the valve k, substantially as and for the purpose specified.

6. In a safety-valve the combination with the body, a central neck extension c^3, annular ports f' in said body, an internal valve-seat in said neck c^3, an adjusting-screw g having a threaded engagement with said neck c^3, a bushing fitting and sliding within said adjusting-screw, a valve k normally seated on the internal seat d' of said neck and having a stem k', said valve-stem and bushing adapted to slide one within the other, a spring normally retaining the valve seated and a cam-lever h fulcrumed above said bushing and adapted to bear thereon, of a main valve seated in the lower portion of the valve-body and normally closing communication between the ports f' and the entrance to the boiler, said main valve having an opening e' of less diameter than the valve k and having its upper portion of greater circumference than its lower end portion, substantially as specified.

HAROLD P. TIPPETT.

In presence of—
C. C. SHEPHERD,
E. W. BRINKER.