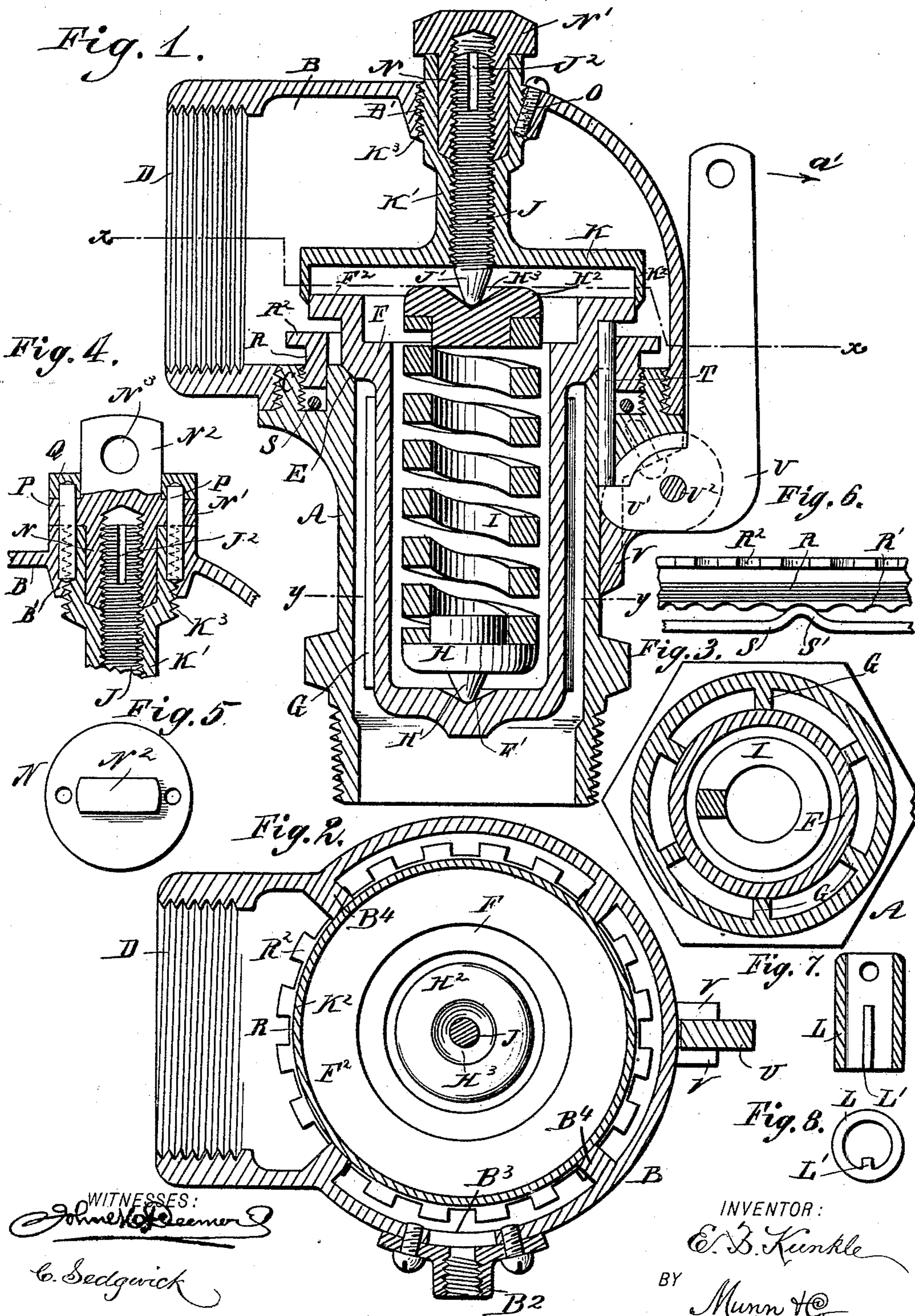


E. B. KUNKLE.
SAFETY VALVE.

Patented Feb. 17, 1891.



THE MORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ERASTUS B. KUNKLE, OF FORT WAYNE, INDIANA, ASSIGNOR TO HIMSELF
AND WILLIAM D. BOSTWICK, OF SAME PLACE.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 446,757, dated February 17, 1891.

Application filed September 22, 1890. Serial No. 365,819. (No model.)

To all whom it may concern:

Be it known that I, ERASTUS B. KUNKLE, of Fort Wayne, in the county of Allen and State of Indiana, have invented a new and Improved
5 Safety-Valve, of which the following is a full, clear, and exact description.

My present invention is an improvement upon those for which I have received Letters Patent No. 162,831 and No. 193,411; and it consists in certain novel features of construction
10 and combination of parts, as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification,
15 in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a sectional plan view of the same on the line xx in Fig. 1. Fig. 3
20 is a similar view of the same on the line yy of Fig. 1. Fig. 4 is a sectional side elevation of a locking device. Fig. 5 is a plan view of the locking-nut. Fig. 6 is a side elevation of a device for regulating the escape of steam.
25 Fig. 7 is a sectional side elevation of the key for adjusting the screw regulating the tension of the spring, and Fig. 8 is a plan view of the same.

The improved safety-valve is provided with
30 a valve-body A, on the upper end of which is held a cap B, formed semi-spherical, as is plainly shown in Fig. 1, and screwing on a flange C, formed at the upper end of the valve-body A. The cap B is provided with a
35 side outlet D, adapted to be connected with a pipe for carrying off the steam, the outlet being provided for this purpose with an interior screw-thread, in which is adapted to screw the outlet-pipe. For large safety-valves the
40 outlet may be provided with an annular flange adapted to be connected with a similar flange formed on the outlet-pipe.

A drip-pipe connection B² is screwed to cap B to screw a pipe into to conduct away the
45 condensed steam from the valve. A slot B³ is cut into cap B under drip-pipe connection to give access to a regulating-collar, hereinafter more fully described, to regulate the action of the valve when steam is in the boiler.
50 The drip-pipe connection, which covers the

slot B³, is to be disconnected when the regulating-collar is to be actuated.

On the upper end of the valve-body A is formed a valve-seat E, on which is adapted to be seated the valve F, formed in the shape
55 of a cup and guided vertically on a series of ribs G, secured on the inside of the valve-body A, as plainly illustrated in Fig. 3.

In the bottom of the cup-shaped valve F is formed a recess F', engaged by a point H',
60 formed on the under side of the disk H, on the top of which rests the lower end of the spring I, extending into the cup-shaped valve F and engaging with its upper end the under side of a second disk H², provided on its top
65 with a recess H³, engaged by the pointed end J' of the regulating-screw J. The latter screws into the hub K' of a disk K, provided on its rim with a downwardly-extending annular flange G², engaging the outer edge of a
70 flange F², formed on the upper end of the cup-shaped valve F. The disk K, with its flange K², prevents steam or water from passing to the spring I, as the said disk closes the upper end of the cup-shaped valve F.
75 The disk K is held centrally in place in the cap B by engaging with its flange K² lugs or wings B⁴, projecting from the cap B. The hub K' of the disk K is provided with an external screw-thread K³, screwing in the threaded opening B', formed in the top of the cap B, as is plainly illustrated in Figs. 1 and 4,
80 the said hub K' being enlarged at its upper end to receive a locking-nut N, screwing onto the upper part of the screw J. The nut N is
85 provided with a head N', adapted to be engaged by a wrench or other convenient tool for unscrewing the said locking-nut from the screw J. When the locking-nut N is removed from the screw J, the latter may be turned
90 so as to regulate the tension of the spring I by applying on the upper end of said screw J a cylindrical key L, provided on its inside with a lug L', adapted to engage a correspondingly-shaped groove J², formed in one
95 side of the screw J. When the latter has been adjusted so as to regulate the tension of the spring I, the key L is removed and the nut N is screwed onto the upper end of the screw J, so as to lock the latter in place.
100

The hub K' is locked to the top of the cap B by means of a screw O, screwing through the top of the cap B into the said hub K', as is plainly illustrated in Fig. 1. In order to additionally lock the screw J in place to prevent its being tampered with, the locking-nut N is provided on the top of its head N' with a projection N², having a transverse opening N³, through which is passed the hasp of a padlock of any approved construction. The head N' of the nut N is also provided with openings through which are adapted to pass the pins P, passing into corresponding openings formed in the threads K³ and B' of the hub K' and cap B. (See Fig. 4.) The upper projecting ends of the pins P are adapted to engage recesses formed in the under side of a washer Q, resting on top of the head N' and locked in place by the bolt of the padlock passed through the opening N³ of the nut N.

The flange C, previously mentioned, is also provided with an internal screw-thread, on which screws a collar R, provided on its under side with recesses R', (see Fig. 6,) adapted to be engaged by projections S', formed on a spring S, resting in the space formed between the seat E and the annular flange C. The upper end of the collar R is provided with an outwardly-extending flange R² provided with notches, as is plainly shown in Figs. 2 and 6, so as to conveniently apply a suitable tool to screw the collar R up or down to regulate the escape of steam passing through the seat E.

In order to raise the valve F off its seat, a pin T is provided, fitted to slide vertically in a suitable recess formed in the valve-body A. The upper end of the pin T is adapted to engage the under side of the flange F² of the valve F, while the lower end of said pin is engaged by a projection U', formed on the lever U, mounted to turn on a pin U², held in lugs V, formed on the valve-body A. When the lever U is moved in the direction of the arrow a', (see Fig. 1,) the lug U' moves the pin T upward, so that the cup-shaped valve F is raised off its seat E, thus permitting the steam to flow through the valve-body A past the collar R and flange K² into the cap B, and from the latter through the outlet D.

The regulating-collar R serves to regulate the lifting force of the steam on the extended area of the valve. By screwing the collar up it increases the lifting force of the steam by confining the steam in the port or space between the collar and the upper part of the valve F. By screwing the collar R down the lifting force is diminished.

By hanging the compressing-spring I between the centers J' and H' all undue friction on the valve F is prevented, as the latter cannot bind on the ribs G of the valve-body A. In order to adjust the tension of the spring I, it is necessary, in case the construction shown in Fig. 1 is used, to remove the nut N and then apply the key L. In case the construction shown in Fig. 4 is used the padlock has first to be removed, then the collar Q,

then the pins P, and then the nut N is unscrewed from the upper end of the screw J, after which the key L is applied to adjust the screw J by screwing it up and down in the hub K', so as to regulate the tension of the spring I.

When the spring I is once set and the several parts are put in proper position to lock the screw J in place, the device can hardly be tampered with without it being noticed by the proper parties.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a safety-valve of the class hereinbefore indicated, the combination, with the valve-body and the semi-spherical or hood-shaped cap B, secured thereto and having a side outlet, of the cup-shaped valve seated in said body, the helical spring contained in the latter, the vertically-adjustable flanged disk K, having the vertical tubular extension or hub K', which screws through the rounded top of said cap, and the tension-adjusting screw working in said hub, as shown and described.

2. In a safety-valve, the combination, with a valve-body and a cap secured thereto, of a cup-shaped valve held in the said valve-body, a spring pressing on the said valve, a flanged cap screwing in the said valve-body cap and engaging with its flange the upper end of the said valve, and a set-screw screwing in the said flanged cap and connected with the said spring to regulate the tension of the latter, substantially as shown and described.

3. In a safety-valve, the combination, with a valve-body and a cap secured thereto, of a cup-shaped valve held in the said valve-body, a spring pressing on the said valve, a flanged cap screwing in the said valve-body cap and engaging with its flange the upper end of the said valve, a set-screw screwing in the said flanged cap and connected with the said spring to regulate the tension of the latter, and a cylindrical key provided on its inside with a lug adapted to engage a groove in the said screw to turn the latter, substantially as shown and described.

4. In a safety-valve, the combination, with a screw for regulating the tension of the spring, of a disk in which screws the said screw, a cap in which screws the hub of the said disk, a lock-nut screwing on the said screw and provided with a head and a lug projecting therefrom and adapted to be engaged by a padlock, pins passing through the said nut-head into the said hub and cap, and a collar held on top of the said nut-head and provided on its under side with recesses engaging the upper ends of the said pins, substantially as shown and described.

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Witnesses:

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