No. 635,149. Patented Oct. 17, 1899.

F. SCHREIDT.

SAFETY VALVE.

(Application filed Oct. 6, 1898.)

(No Model.)

2 Sheets—Sheet 1.

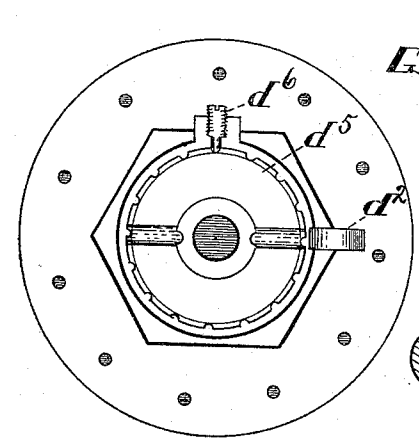


Fig 2

Fig 1

WITNESSES

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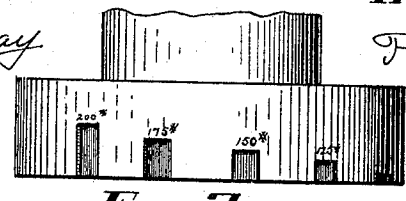


Fig 3

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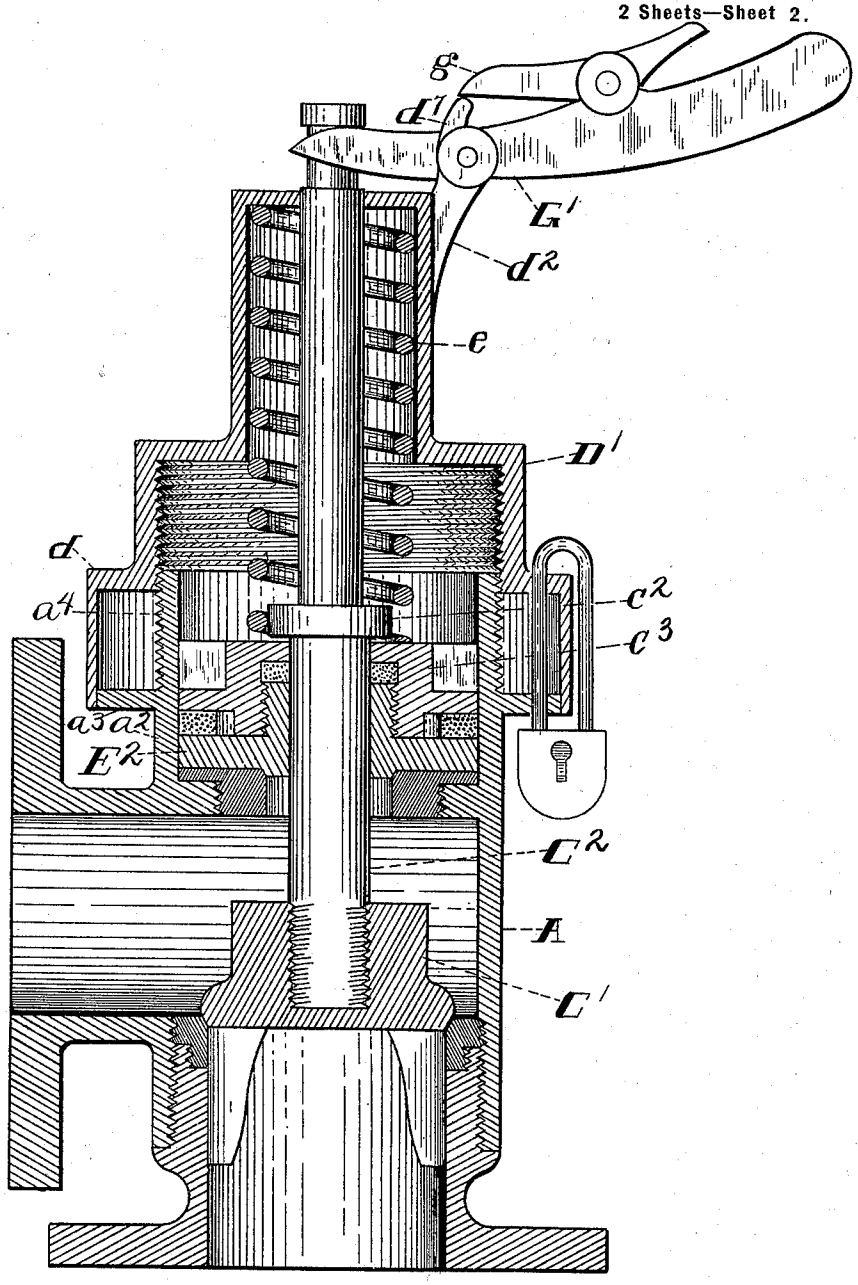
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Fig 4



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UNITED STATES PATENT OFFICE.

FRANK SCHREIDT, OF MANSFIELD, OHIO.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 635,149, dated October 17, 1899.

Application filed October 6, 1898. Serial No. 692,803. (No model.)

To all whom it may concern:

Be it known that I, FRANK SCHREIDT, a citizen of the United States, and a resident of Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Safety-Valves, of which the following is a specification.

My invention relates to safety-valves for steam-boilers. Its principal objects are to simplify the construction of this class of valves, to provide simple means to readily adjust the valve to the desired pressure, to regulate the closing of the valve after it has been unseated, and to lock the parts when adjusted.

There are other objects attained by my invention, which will be readily understood from the following description of the annexed drawings, illustrating my invention:

Referring to the drawings, Figure 1 is a view in axial section of my preferred form of safety-valve. Fig. 2 is a detail plan view of the upper shell of the case removed, with the top adjusting-nut in place, and the hand-lever also removed. Fig. 3 is a detail elevation of the lower portion or hood of the upper shell, showing the index-notches in its periphery, indicating the pressure at which the spring controlling the trigger-valve is set. Fig. 4 is a longitudinal central sectional view of a modification, with the position of some of the parts changed to adapt my invention to be used as an automatic relief-valve as well as a safety-valve.

Referring to the parts, and particularly to Figs. 1 to 3, inclusive, of the drawings, A is the main body of the case. It has four lateral branches radiating at right angles from it, the branch a being the inlet-port and the branch a' being interiorly screw-threaded to receive the union B, which is the outlet-port screwed into the branch a' and has an inwardly-projecting flange b to guide the wings of the main valve C and receive a seat b', which is preferably of nickel or similar non-corrodible metal. The upwardly-projecting branch a^2 has an annular projecting flange a^3 and above it a screw-threaded neck a^4 to engage the interiorly-screw-threaded upper shell D, by which the hood d, which snugly fits over the periphery of the flange a^3, is adjusted up or down over said flange for the purpose of compressing or relaxing the tension of the spring e, which holds the trigger-valve E to its seat.

The branch a^5 is to receive the piston-valve F, which controls the opening of the main valve C. It is screw-threaded on its end outside of the annular flange a^6 to receive a cap a^7, which has a tubular neck a^8 to receive a compression-spring f which is coiled around a stem or extension f' of the piston F, the purpose of the spring being to hold the main valve C to its seat when there is no pressure in the boiler. The body of the valve-case A is divided by a partition a^9, forming a steam-chamber between said partition and the face of the piston-valve F. In the horizontal web of this partition is fitted the seat e' of the trigger-valve E. The vertical web of the partition a^9 has a tubular inner extension around a central perforation to receive a packing-nut f^2, through which the stem c, which connects the main valve C and the piston F, slides. The nut f^2 is longitudinally grooved to receive the point of a set-screw f^3, which locks the packing-nut from rotating when the packing c' is sufficiently compressed to make a steam-tight joint.

The trigger-valve E has an upper tubular extension e^2, which acts as a housing for the spring e. Within this housing slides a piston e^3, which has a downward conical projection to bear in a step in the top of the valve, and an upwardly-projecting stem E', which passes through the inner tubular part d' of the shell D, extends to the outside of the case, and has an annular groove around it to engage the forked lever G, which is fulcrumed in a bracket d^2, which bracket is formed integral with the shell D. The housing e^2 is covered by a cap e^4, which has four wings around it to guide it within the shell D and allow space for the steam to pass up around it through perforations in the web d^3 and out through longitudinal grooves d^4 in the neck of the tube d' and between the neck and inner ring of the nut d^5. The nut d^5 has transverse grooves in its top to receive a key by which the nut may be adjusted up or down in the upper part of the case D to regulate the discharge of steam, and this nut, like the nut f^2, is grooved to receive the point of a set-screw d^6, which locks the nut.

The larger inner extension of the piston F is transversely perforated, and the stem *c* has a longitudinal perforation through it which registers with this transverse perforation and with a central perforation in the main valve for the purpose of relieving the pressure in the chamber in the extension a^5 back of the piston-valve when it is quickly moved to throw the main valve open when the pressure in the boiler overcomes the pressure of the spring upon the trigger-valve E. The pressure of the spring is regulated by screwing up or down the shell or upper part D to compress or relax the spring *e* between the plunger or tube *d'* and the piston e^3. The top of the hood *d* has a series of perforations around it which register with similar perforations through the annular flange a^3 of the upper branch of the main case-body A to pass the loop *h* of the padlock H, by which the hood and flange are locked together. The rim of the hood *d* has a series of gradually-deepening notches, as plainly shown in Fig. 3, and the pressure at which the trigger-valve E is held to its seat is determined by the index-figures over each notch. For instance, if the trigger-valve is set to open at one hundred and five pounds the hood is adjusted, as shown in Fig. 1, so that the lower side of the flange a^3 is on a level with the top of the smallest notch, and if the pressure of the spring is adjusted to resist two hundred pounds pressure in the boiler the hood is screwed down until the lower face of the flange a^3 is on a level with the highest notch shown in Fig. 3. When it is adjusted to this condition, one arm of the loop *h* is passed through the perforations in both hood and flange into the lock H and locked in the desired position.

The operation of the device so far as described is as follows: Whenever the pressure in the boiler exceeds the pressure at which the trigger-valve E is set, the valve is thrown from its seat. The steam passes into the chamber between the partition and face of the piston F, which, having a large area, instantly throws the main valve C from its seat and holds it open until the steam passing from the boiler through the outlet falls to or below the limit at which the valve E is set, when it closes more or less rapidly, as regulated by the nut d^5, when the pressure of steam being cut off from the face of the piston F bears upon the back of the main valve C and closes it upon its seat. Any steam that may have escaped past the piston F will be exhausted through the transverse perforation in the enlargement of the piston and through the tubular stem *c*.

In the modification shown in Fig. 4 the body of the case A is varied so far as the inlet and outlet ports are concerned; but the upper branch of the case-body is the same as shown in the preceding figures—that is, its lateral projecting branch has the same annular projecting flange a^3 and above it the screw-threaded neck a^4 to engage the interiorly-screw-threaded upper shell D', by which the hood or apron *d*, which passes over the flange a^3, is adjusted up or down over said flange for the purpose of compressing or releasing the tension of the spring *e*, which holds the trigger-valve E^2 to its seat. The hood or apron *d* is notched from its lower edge upwardly and numbered the same as in Fig. 3. In fact, this part differs in no respect from the adjusting means shown in the preceding figures. The main valve C' in this figure, with its seat and outlet-ports, is the same as before described, and the valve is held to its seat by the pressure of steam in the same manner, and the trigger-valve E^2, with its seat, differs only in that it is also a piston-valve sliding in the neck a^2 and has a cylindrical packing and a packing-nut with suitable packing for the piston and also for the valve-stem C^2 to prevent steam passing up into the chamber formed by the upper part of the neck a^2 and the casing D'. The stem C^2 has also a collar c^2 slightly above the packing-nut c^3, so that when the trigger-valve is thrown from its seat to expose the full area of its face to the pressure the main valve C' is quickly thrown from its seat. The valve-stem in this case, as in the other, has an annular depression in its extended end to receive a forked lever G', by which the main valve may be thrown from its seat when desired. The lever G' also carries a locking-arm *g*, which when the lever is thrown down engages a detent d^7, projecting up from the bracket-arm d^2.

What I claim is—

1. The valve-case, the main valve and trigger-valve seated therein, said case having its inlet-port to admit steam under pressure to the face of the trigger-valve and the back of the main or discharge valve and also having a lateral branch inclosing the spring-pressed trigger-valve, said branch having an annular projecting flange and screw-threaded neck above it, the upper casing engaged by screw-threaded connection with the neck of the branch inclosing the trigger-valve and having an apron or hood to pass over said annular flange, a spring pressed between said casing and the trigger-valve to regulate the pressure at which said valve is held to its seat when the upper casing is screwed up or down on the neck to compress or relax said spring, and means such as shown to lock the parts when the spring is set to the desired pressure, substantially as shown and described.

2. In a safety-valve the combination of the main case, the trigger-valve and main discharge-valve seated therein, said case having its outlet-port arranged to receive steam under pressure against the face of the trigger and back of the main valve, an upwardly-projecting branch incasing the trigger-valve, said branch having an annular flange and screw-threaded neck above it to receive an outer upper casing and also a lateral branch in axial alinement with the outlet-port to receive a piston and a dividing-partition to shut

off steam under pressure from the face of the piston until the trigger-valve is thrown from its seat, a stem connecting the valve controlling the outlet and the piston valve, the upper case adjustable by a screw-thread connection upon the neck of the branch inclosing the trigger-valve and having a hood or apron to slide over the annular flange upon said branch, the spring compressed between the back of the trigger-valve and said outer casing whereby the trigger-valve is held to its seat and the pressure at which it is held regulated by adjusting the outer casing up or down upon said screw-threaded neck, means such as shown to lock the spring at the desired pressure, and a spring to hold the outlet-valve to its seat when there is no pressure in the boiler.

3. In a safety-valve the combination of the main valve-case having an inlet and an outlet port, a trigger-valve and a main or outlet valve seated in said case to receive steam from the inlet-port against the face of the trigger-valve and the back of the main valve and a laterally-projecting branch in axial alinement with the main valve, a partition in the main case to close off steam under pressure from said lateral branch until the trigger-valve is unseated, a spring-pressed piston in said lateral branch to hold the main valve to its seat when there is no pressure in the boiler or generator, a tubular stem connecting said piston and the main valve, and a port in the back of the piston communicating with the tubular stem to relieve the chamber back of the piston-valve from pressure, substantially as shown and described.

4. The combination of the main case having seats for a spring-pressed trigger-valve and a main or outlet valve, the main valve and trigger-valve seated thereon, the said case having an inlet-port to receive steam under pressure against the face of the trigger-valve and back of the main valve, said case having also an upper extension having an annular projecting flange and a screw-threaded neck above it, the upper or outer shell having an annular projecting hood or apron to pass over said flange and screw-threaded to engage the screw-threaded neck of the branch of the main case, the hood and flange being perforated to register with each other when the case is turned to adjust the pressure of the trigger-valve spring and receive the arm of a lock to lock the adjustment, and having also index-notches of varying depths cut over the lower edge of the apron to come in alinement with the lower face of the flange and determine the pressure at which the trigger-valve is set, and the lock to lock the hood to the flange when the spring is adjusted to the proper pressure.

FRANK SCHREIDT.

Witnesses:
LOUIS P. BENNETT,
CHAS. E. SCHREIDT.