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PATENTED FEB. 20, 1906.

C. J. FANCHER.
SAFETY VALVE.

APPLICATION FILED MAR. 9, 1905.

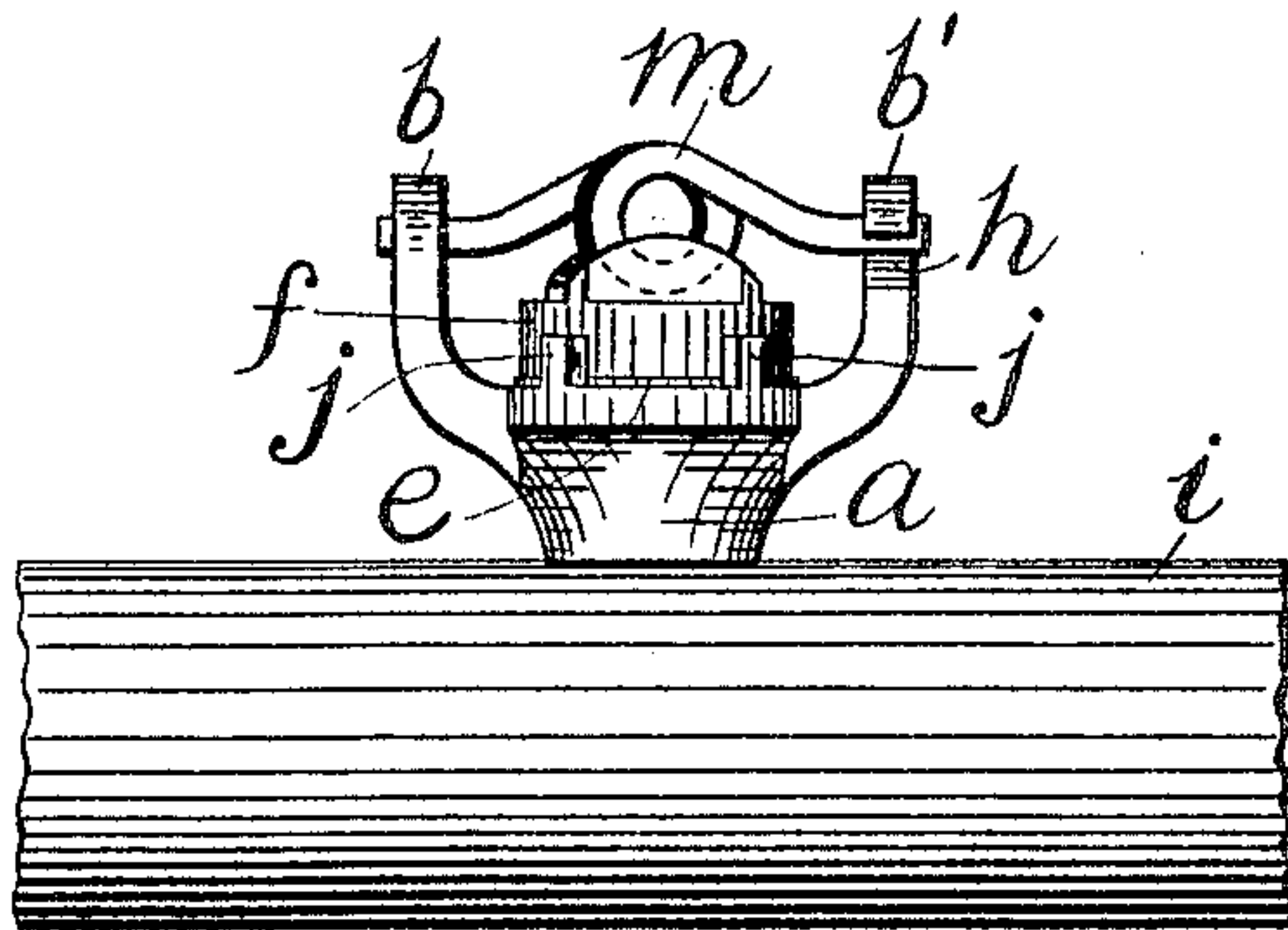


FIG. 1.

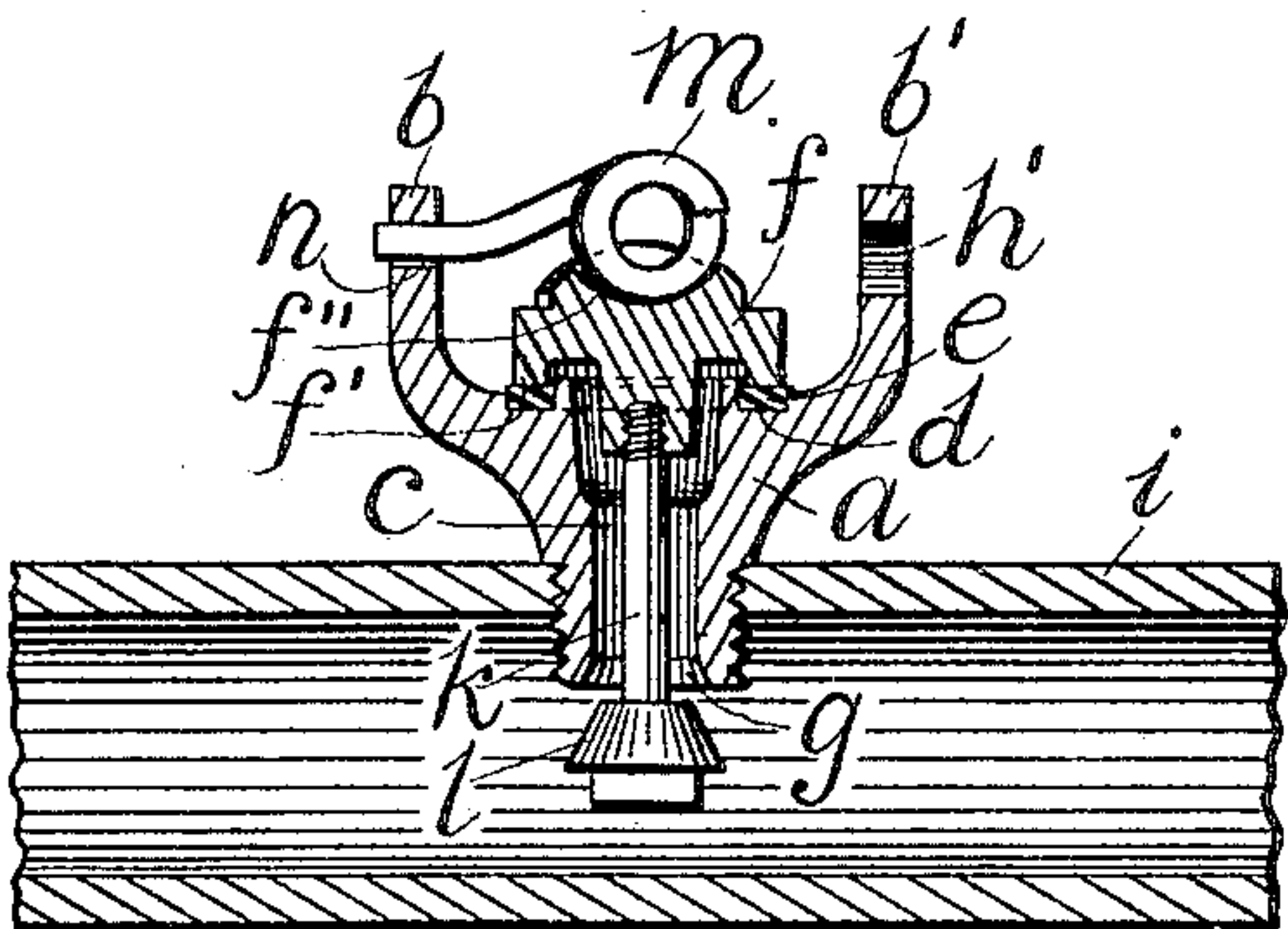


FIG. 2.

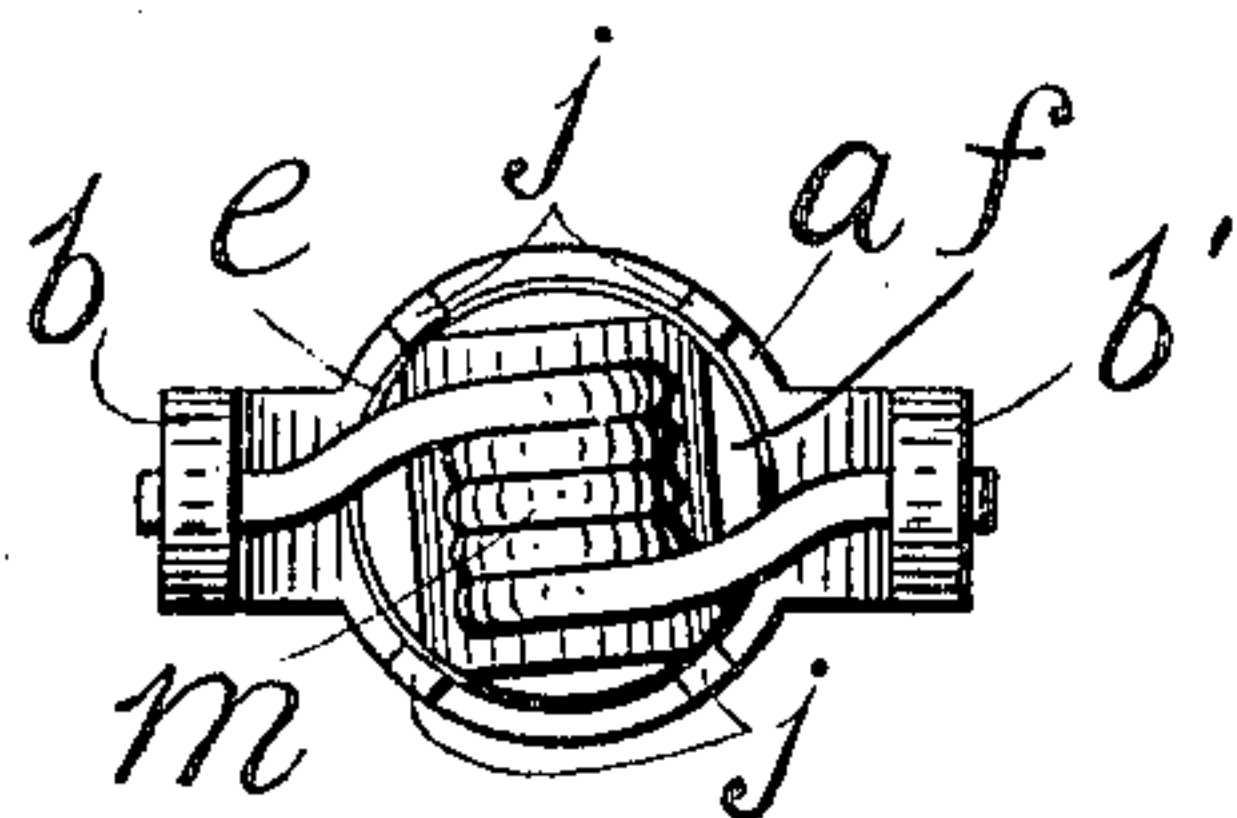


FIG. 3.

Witnesses
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SAFETY-VALVE.

No. 813,145.

Specification of Letters Patent.

Patented Feb. 20, 1906.

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To all whom it may concern:

Be it known that I, CHARLES JAMES FANCHER, a citizen of the United States of America, and a resident of West Granby, in the county of Hartford and State of Connecticut, have invented a certain new and useful Safety-Valve, of which the following is a specification.

My invention relates to improvements in devices for use particularly in connection with range-boilers, in which I employ a double valve spring-pressed in one direction, one of such valves being the main safety-valve and the other an auxiliary or supplemental safety-valve which comes into service only in case of accident to the first—that is, in the event that the spring which governs the main valve fails to operate properly or becomes broken.

Although primarily intended to be used with range-boilers, the device may be employed in connection with steam-boilers and the like to serve as a medium of safety in case the pressure within the boiler or other receptacle exceeds a certain predetermined limit.

The object of my invention is broadly to provide a safety-valve which is adapted to relieve the pressure in any gas or liquid receptacle—as, for example, in the water-front of a kitchen-range in case the water in the boiler associated with the range or in the connecting-pipes becomes frozen. In such case the main valve is forced open against the resiliency of the retaining-spring to an extent sufficient to permit steam and water to escape from the device, thus relieving the pressure in the water-front and avoiding danger of explosion.

A further object of my invention is to provide against accident if for any reason the main valve fails to operate properly, a secondary or auxiliary valve being provided to close or partially close the through-passage for this purpose.

When applied to a steam-boiler, the device serves the same purpose as when used in connection with a range-boiler, any excessive pressure opening the main valve and the auxiliary valve closing the through-passage in case the main-valve spring becomes weakened or broken.

Although the main valve yields under high

pressure, it is under ordinary circumstances steam and water tight.

I attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the safety-valve applied to a pipe by being tapped into the same; Fig. 2, a vertical section of said device and the pipe; and Fig. 3 a plan view of the safety-valve.

Similar letters refer to similar parts throughout the several views.

The invention consists, essentially, of a casing or body having a through-passage therein, a valve-seat being provided around the upper or outer end of said passage, and another valve-seat at the lower or inner end thereof, a main valve mounted on said body, a spring adapted to normally hold said valve in place on its seat, and an auxiliary valve below the body, suitably connected with the main valve, there being enough clearance between the last-mentioned valve and the inner end of the body to permit the normal operation of the main valve to take place.

In the drawings, *a* represents the casing or body, which is provided with upwardly or outwardly extending lateral arms *b* and *b'*. A through-passage *c* is formed in the body *a*, as is also an annular groove *d* around the outer end of said passage. A packing-ring *e* in the groove *d* forms a seat for the main valve *f*. At the inner end of the passage *c* is a valve-seat *g*. A transverse hole *h* is cut in the arm *b* and a transverse notch *h'* in the arm *b'*, said notch opening through one edge of the arm *b'*. The inner end of the body *a* is tapped into a pipe *i*, which latter may be assumed to be one of the connections between a range and its associated boiler, the body being attached to the pipe close to the range. The valve *f* is centered and guided on the body *a* by guides *j*, rising from the top of said body outside of the packing-ring *e*.

The main valve *f* is provided on the bottom with an annular flange *f'*, adapted to rest on the packing-ring, and the top of said valve is recessed, as shown at *f''* in Fig. 2. A spindle *k* has its upper end screwed into the valve *f* and is provided at its lower end with what is termed the "auxiliary" valve *l*. The valve *l* is suspended some distance be-

low the seat *g* when the valve *f* is seated on the ring *e*, and the spindle *k* is so small as not to take up too much room in the passage *c*. A coiled spring *m*, provided with laterally-
 5 extending arms, is adapted to have its coil rest in the recess *f''* in the valve *f*, while one of its arms engages the arm *b* of the body and the other engages the arm *b'*, the ends of the two spring-arms entering the hole *h* and the
 10 notch *h'*, respectively. The spring *m* should have sufficient resistance to hold the valve *f* on its seat under any ordinary pressure from within; but it should not be so strong as to overcome such pressure when the same be-
 15 comes great enough to approach the danger-line or, in other words, to burst the pipe *i* or any of its connections. For ordinary purposes in range-boiler use the spring *m* should be capable of resisting about one hundred
 20 pounds pressure to the square inch.

In practice while hot water (or steam) circulates freely in the pipe *i* there is no escape for the same by way of the safety-valve, since the outer or upper end of the passage *c*
 25 is tightly closed by the valve *f*; but if the hot water (or steam) in said pipe be held back from any cause, as in the event that the contents of the pipe become frozen between the safety-valve and the boiler, the accumulating
 30 pressure "impinging," so to speak, against the inner face or bottom of said valve *f* lifts the valve against the resiliency of the spring *m* from the packing-ring *e* before the point at which the pipe *i* would be ruptured is
 35 reached, and such opening of the valve permits a sufficient amount of steam and water to escape to relieve the excessive pressure in the pipe and remove all danger of explosion. The spring *m* returns the valve *f* to its seat and
 40 closes the passage *c* as soon as the excessive pressure is relieved, and the safety-valve is again in condition for a repetition of the operation just described, so that it will be seen
 45 that the device can be used for an indefinite length of time without repair or requiring the replacing of any of its members. During the opening of the valve *f*, as above explained, the auxiliary valve *l* approaches its
 50 seat *g*, but at no time comes near enough thereto to interfere with the escape of steam and water from the pipe *i*, and the arrangement of parts is such that all the relief necessary may be had through the passage *c* by
 55 the raising of the main valve without closing the inner end of said passage with said auxiliary valve. Should the spring *m*, however, lose its temper or become broken, the pressure within the pipe *i* will immediately raise both the main and auxiliary valves until the
 60 latter seats itself at *g*, and thereby cuts off the escape of water and steam from said pipe, thus preventing damage which might otherwise be done if the main valve were accidentally opened and the contents of the pipe *i*

permitted to flow freely through the passage 65
c. The valve *l* may be made to fit the seat *g* so closely as to completely close the passage *c*, or merely a loose fit may be provided, so that there shall be some escape of water or
 70 water and steam from the pipe *i*, which will give warning of the impairment or breakage of the spring. It is very rarely that the services of the auxiliary valve will be required; but the same is provided in order to enhance
 75 the usefulness and value of the device and add to the safety of the same. It will be understood that the auxiliary valve plays no important part in relieving excessive pressure, the main valve and its spring being all
 80 that are required for this purpose, but that said auxiliary valve serves merely in the capacity of a safety-valve for said main valve.

It should be noted that my construction obviates any liability or possibility of the
 85 main valve becoming stuck or wedged into place in any way, since said valve is free to move up and down between the guides *j*, as permitted by the spring *m*, there being no
 90 parts to bind the valve or prevent the free working thereof.

The spring *m* is the only member of my device which is at all liable to become seriously
 95 injured, (and that rarely,) and when such is the case it is simply necessary to replace the old spring with a new one, which can easily be done, owing to the presence of the hole *h* and the notch *h'* in the arms *b* and *b'* of the
 100 body *a*.

The function of the safety-valve is the same whether used for hot water or steam. 100

Such changes in shape, size, construction, and arrangement of parts as fall within the scope of my claims may be made without departing from the nature of my invention.

What I claim as my invention, and desire 105 to secure by Letters Patent, is—

1. A device of the class specified, consisting of a body having a through-passage therein, a valve adapted to normally close one end of said passage, a spring arranged crosswise 110 of and in engagement with said valve and having lateral engagement with said body, said spring being adapted to normally retain the valve in its closed position, and means of connection between the spring and valve to
 115 prevent the latter from rotating or turning.

2. The combination, in a device of the class specified, with a body having a through-passage therein, of a valve, and a coiled spring 120 provided with laterally-extending arms adapted to engage said body while the coil engages said valve to normally retain it in its closed position at one end of said passage.

3. The combination, in a device of the class specified, with a body having a through-passage therein and provided with upwardly-extending arms, of a valve, and a coiled spring 125 having laterally-extending arms adapted to

engage the arms of the body while the coil engages said valve to normally retain it in its closed position at one end of said passage.

4. The combination, in a device of the class specified, with a body having a through-passage therein, of a valve recessed at the top, and a coiled spring having laterally-extending arms adapted to engage said body while the coil is received into the recess in said valve to prevent the valve from turning and to normally retain the same in its closed position at one end of said passage.

5. The combination, in a device of the class specified, with a body having a through-passage therein and a valve-seat at each end of said passage and provided with upwardly-extending arms, of a main valve, a coiled spring having laterally-extending arms to engage the first-mentioned arms while the coil engages said valve to normally retain it on its seat, a spindle extending from the main valve through and beyond the passage, and an auxiliary valve on the inner end of said spindle, said auxiliary valve being adapted to contact with its seat only upon the abnormal release of the main valve.

6. The combination, in a device of the class specified, with a body having a through-pas-

sage therein and a valve-seat at the outer end of said passage and provided with valve-guides rising from said body around said valve-seat, of a valve operating within and guided by such guides, and a spring connected with the body to normally retain said valve on the valve-seat, said spring being arranged crosswise and in engagement with the valve and having lateral engagement with the body.

7. The combination, in a device of the class specified, of a body having a through-passage therein and provided with upwardly-extending arms, a valve for one end of said passage, and a coiled spring provided with laterally-extending arms adapted to be connected with and disconnected from the first-mentioned arms, the coil of said spring bearing against said valve which latter is normally retained in its closed position by the spring.

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

CHARLES JAMES FANCHER.

Witnesses:

JAMES A. FANCHER,
PORTIO M. REED.