No. 860,797. PATENTED JULY 23, 1907.

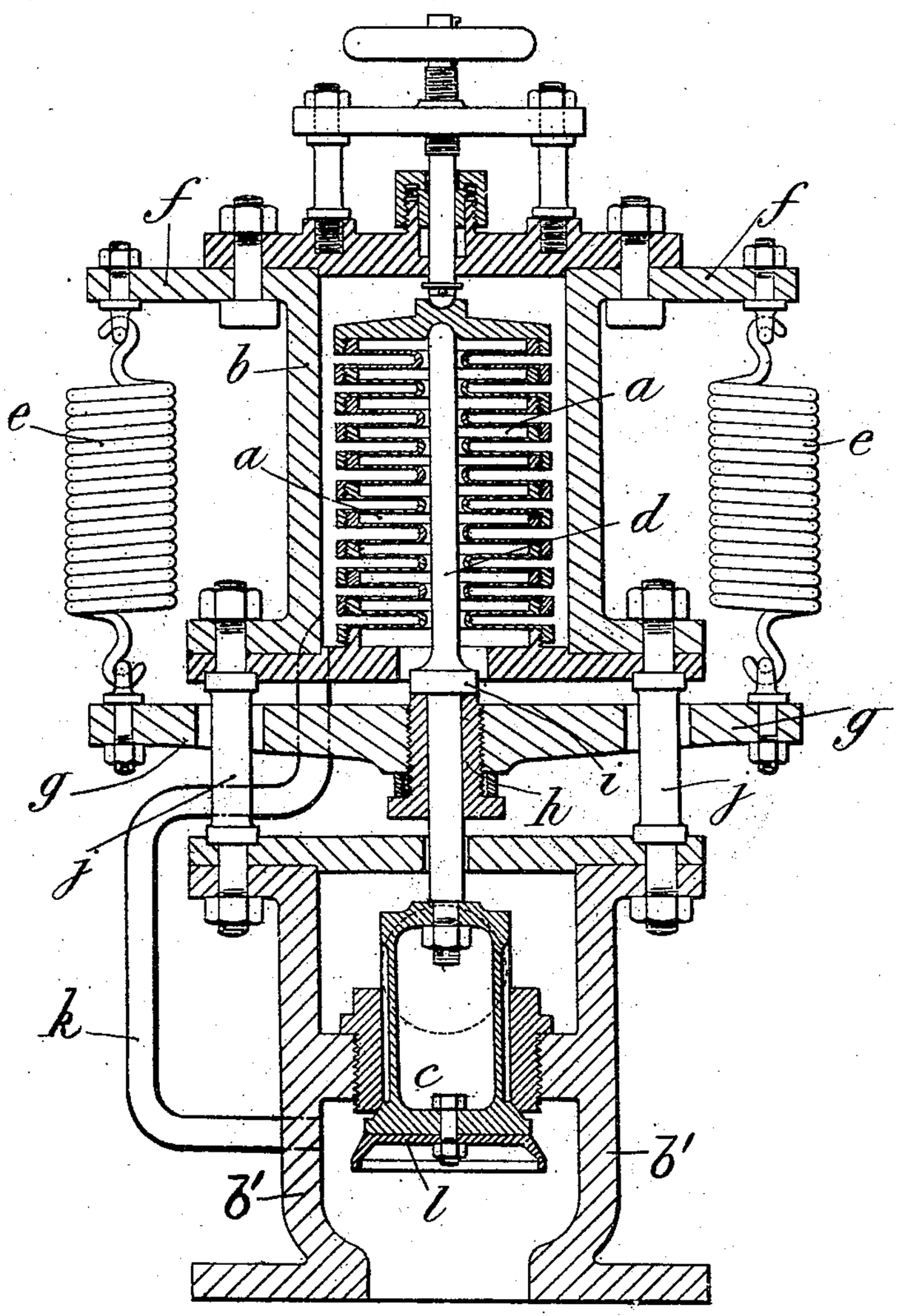
F. GAUDIN.

SAFETY VALVE.

APPLICATION FILED JAN. 27, 1906.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses:

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SAFETY VALVE.

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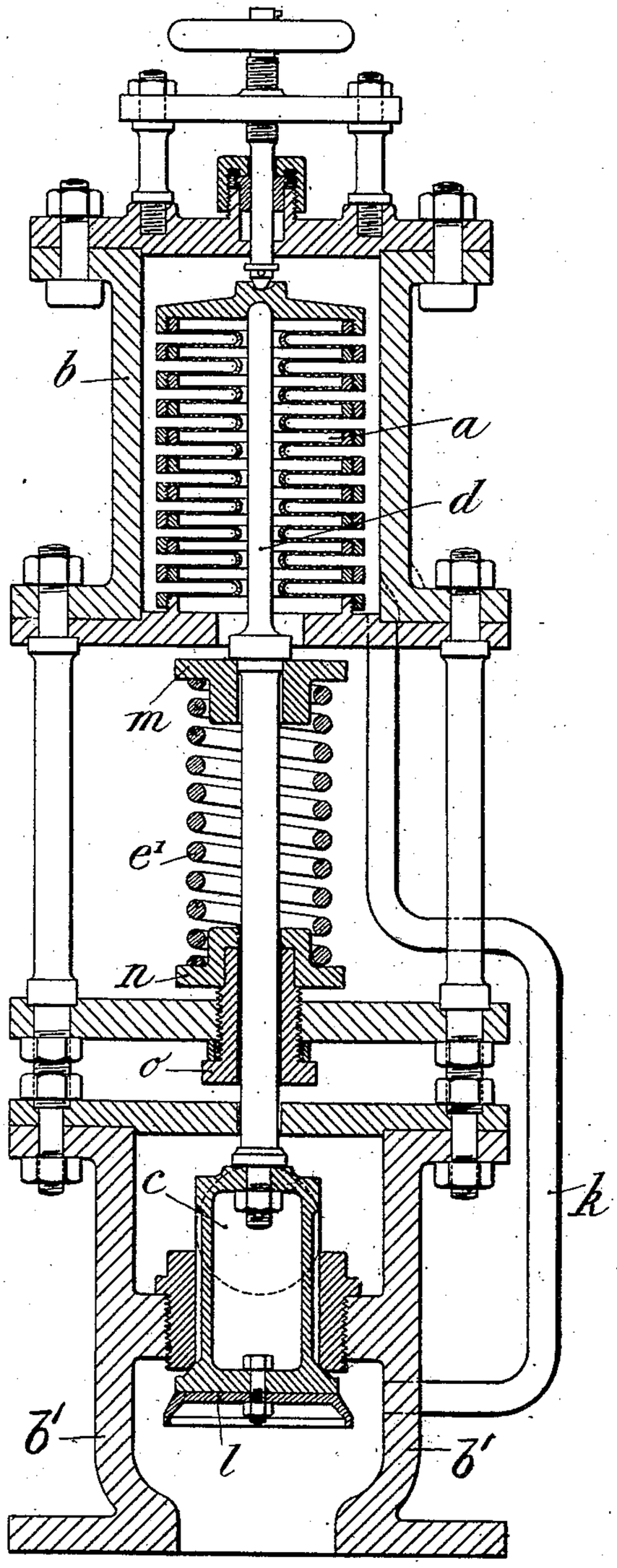
2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

FELIX GAUDIN, OF NANTES, FRANCE.

SAFETY-VALVE.

No. 860,797. Specification of Letters Patent. Patented July 23, 1907.

Application filed January 27, 1906. Serial No. 298,189.

To all whom it may concern:

Be it known that I, FELIX GAUDIN, a citizen of the Republic of France, and a resident of 13 Rue St. Yves, Nantes, Loire-Inférieure, in the said Republic, engineer, have invented certain new and useful Improvements in Safety-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The safety valves such as they are usually constructed do not work satisfactorily. Their lift is too limited, that is to say they do not open in full and, consequently, their discharge is not sufficient or when their discharge is satisfactory, it often happens that they do not close until the pressure in the boiler is lowered considerably under normal pressure, and this constitutes a great loss of steam as well as a great inconvenience for the operators; moreover a sufficient discharge can only be obtained under one condition, that of giving to the valve opening a much larger diameter than would be necessary if the lift was equal to the quarter of the diameter, this being, as is well known, the necessary condition for producing the greatest possible discharge of a valve; now with such a large diameter, it is very difficult to make the valve steam tight especially in the case of large boilers.

The object of these improvements is to remedy all the said inconveniences in securing a normal lift of the valves that is a lift equal to a quarter of their diameter and in making them so sensitive that they will close as soon as the normal pressure has again been established.

The invention is illustrated in the accompanying drawings in which:—

Figure 1 is a sectional elevation of a valve embodying the present invention. Fig. 2 is a similar view of a modification.

The same numerals of reference indicate corresponding parts in both figures.

The improved device consists of a hollow metallic member *a*, capable of being collapsed like a pair of bellows, which is inclosed in a cylinder *b*, this latter being kept in constant communication with the boiler by a pipe *k* which leads from the cylinder into the valve casing *b'*. The cylinder is of larger diameter than that of the valve opening, so that the steam pressure acting on these bellows depresses it at least a degree equal to a quarter of the diameter of said opening and thus causes the opening of the valve *c* through its vertical rod *d*.

The device is balanced by means of two helical springs *e*, *e* under tension fixed on the one part to lugs *f*, *f* of the cylinder *b*, and on the other part, to the ends of a cross-piece *g* provided in the center with a hollow nut *h* which slides on the rod *d* and bears against a shoulder *i* of said rod. The cross-piece *g* is guided by two uprights *j*, *j*.

As will be seen at Fig. 2, a single spring e^1 under compression may be used, the same surrounding the rod *d;* in this case the spring bears at its upper end, by means of a ring *m*, against a shoulder of said rod, and at its lower end, by means of another ring *n*, against a fixed adjustable nut *o*.

The strength of the spring or springs is equal to the difference between the pressures which act upon the valve and upon the bellows respectively, less the pressure necessary to the compression of the latter.

The bellows consists of a larger or smaller number of members according to the value of depression desired and such that the limit of elasticity of this part of the apparatus shall not be exceeded.

From the foregoing description it will be seen that the steam pressure on the driving part of the valve, that is on the bellows, is always effective in any position of the valve and that this latter cannot fail to open in full as soon as the pressure for which the apparatus has been adjusted is reached or slightly overreached. It will even be found advantageous to limit its opening by an abutment. On the other hand, owing to the fact that there is no friction besides that of the valve ribs on the walls of the orifice, the great sensibility of the apparatus will cause its closing as soon as the normal pressure is again established. In order of insuring more forcibly this result, the valve head is advantageously provided with a concave truncated part *l*, which is slightly larger than the orifice and upon which the steam exerts a kind of reaction compelling the closing of the valve.

Having thus described my invention, I declare that what I claim is:—

1. In a safety valve, a cylinder, a hollow collapsible member whose interior communicates with the atmosphere, a valve, a rod therefor extending into the collapsible member, means to resiliently hold the valve rod in engagement with the collapsible member to hold the latter expanded, and means to admit steam into the cylinder around the collapsible member.

2. In a safety valve, a cylinder having an aperture in one end, a hollow collapsible member mounted in the cylinder communicating with the atmosphere through the aperture, a valve, a rod therefor extending into the collapsible member, means to resiliently hold the valve rod in engagement with the collapsible member to hold the latter expanded, and means to admit steam into the cylinder around the collapsible member.

3. In a safety valve, a cylinder, a valve-rod therein, a normally expanded collapsible member mounted in the cylinder and having its top plate resting on the valve-rod, a rigid member adjustably mounted on the rod, and springs connecting the cylinder and rigid member, in combination with a valve casing having a port therein of less diameter

than the collapsible member, a valve on the rod seated in said port, and a conduit connecting the valve casing and cylinder for the purpose specified.

4. In a safety valve, a cylinder, a valve-rod projecting into the cylinder, a normally expanded collapsible member seated on the bottom of the latter and having a top plate supported by the valve-rod, a bar movably mounted on the rod, an abutment on the latter to depress said bar, and springs connecting the bar and cylinder, in combination with a valve casing having a port therein of smaller diameter than the collapsible member and means to maintain constant communication between the valve casing and cylinder.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

FELIX GAUDIN.

Witnesses:
GEORGES GANGNÉ,
ALEXANDER DAVIDSON.