

(No Model.)

2 Sheets—Sheet 1.

H. C. WILDER
SAFETY VALVE.

No. 322,084.

Patented July 14, 1885.

Fig. 1.

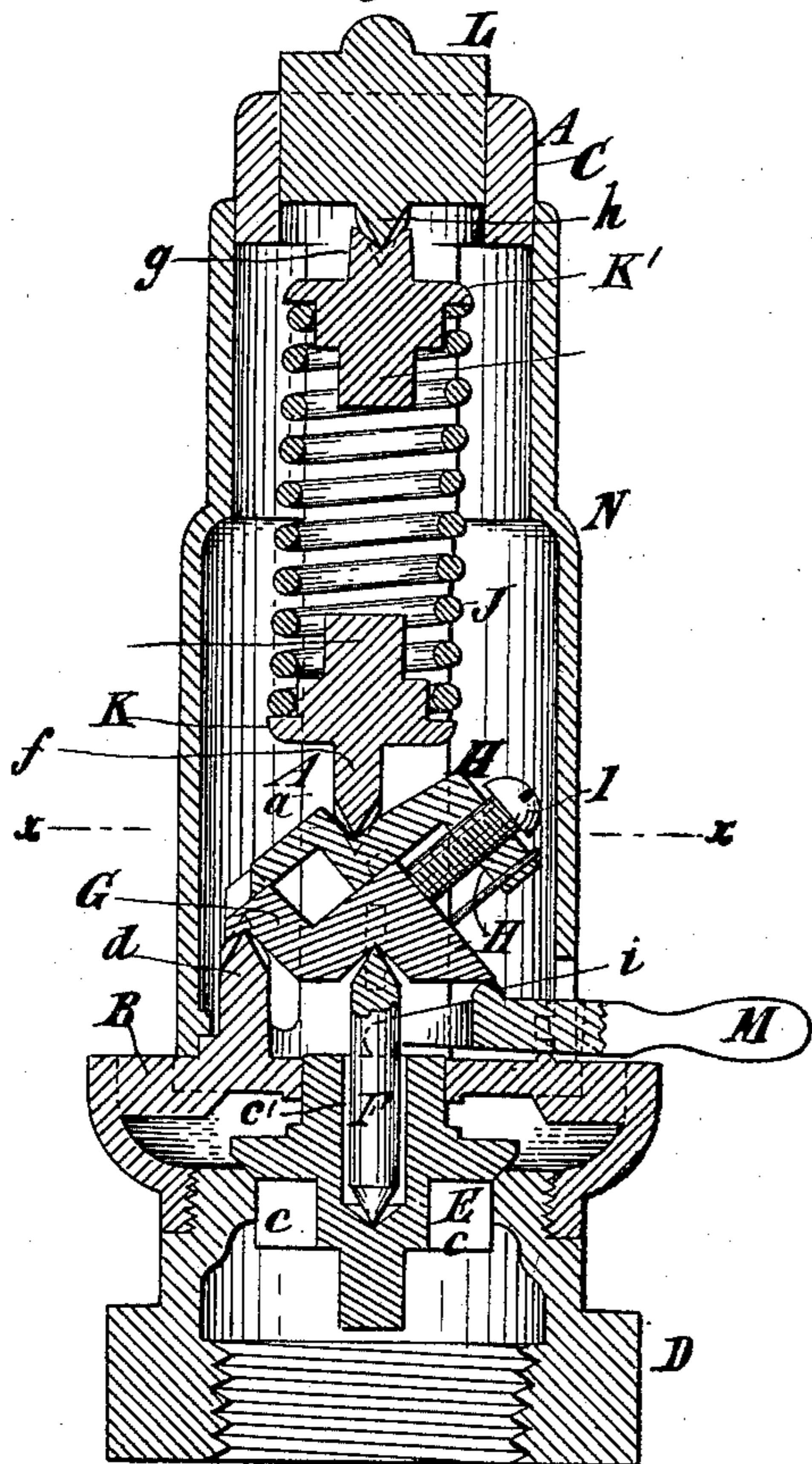


Fig. 2.

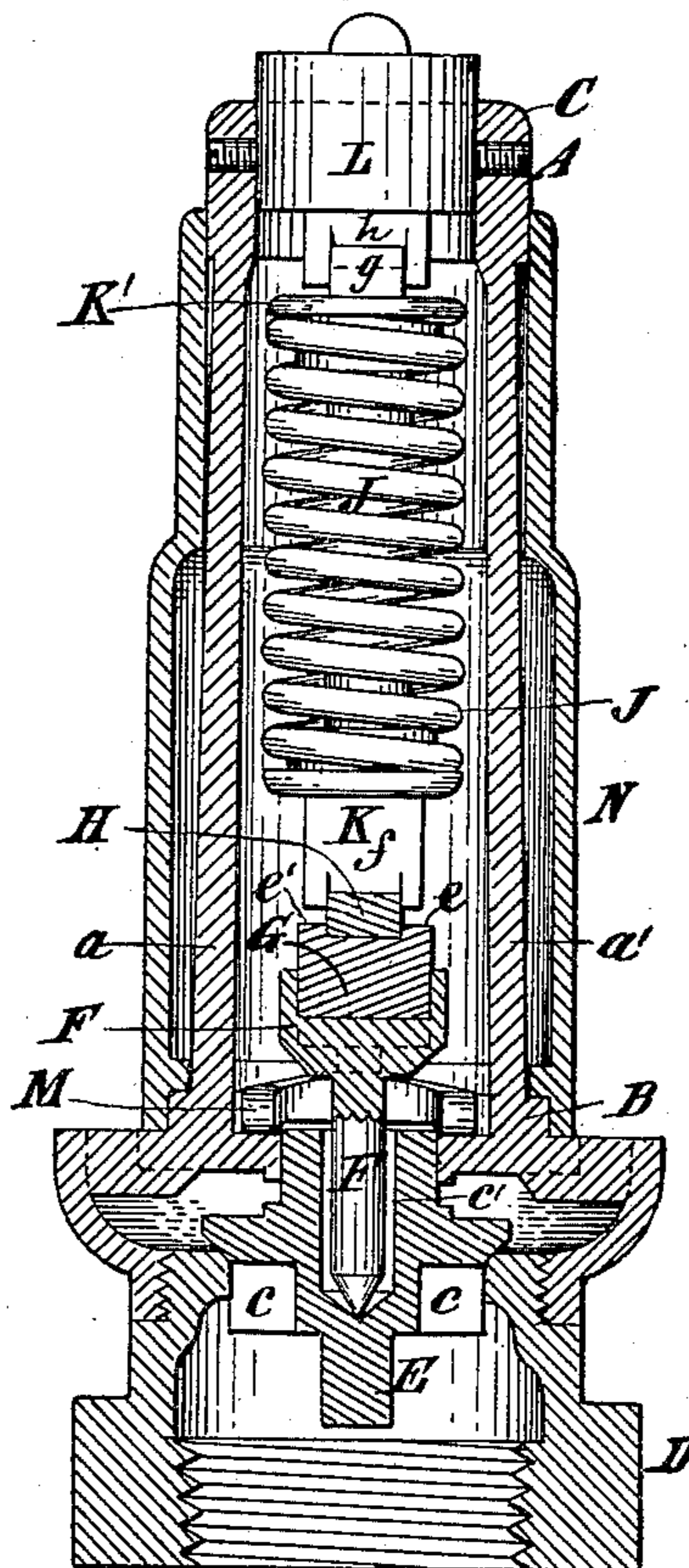


Fig. 3.

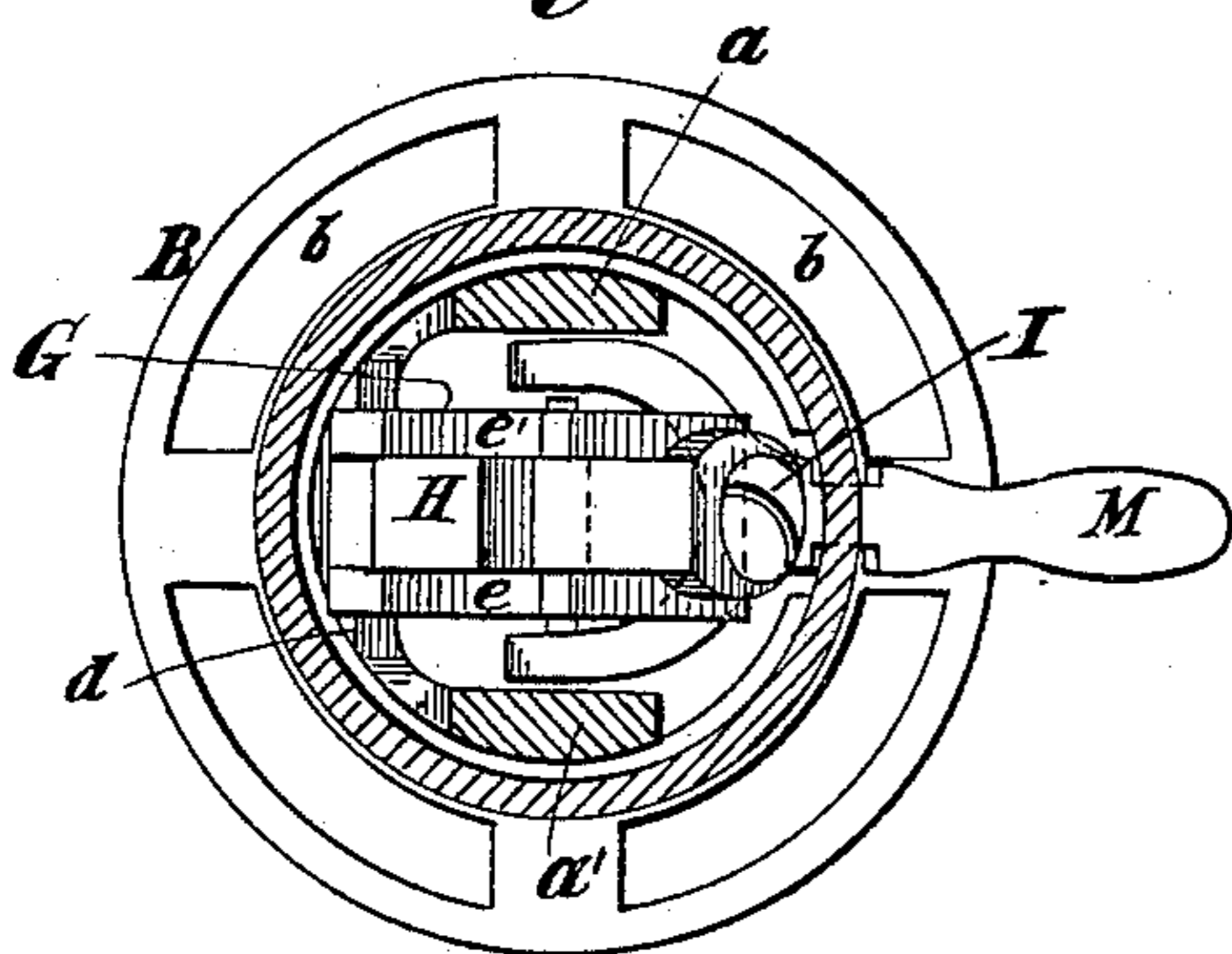
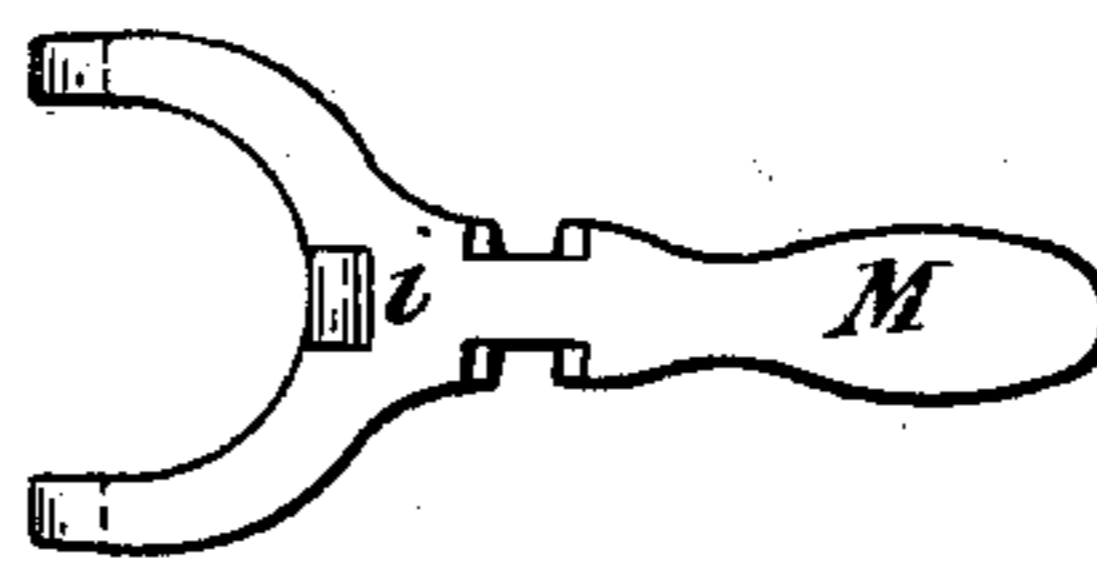


Fig. 4.



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(No Model.)

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2 Sheets—Sheet 2.

SAFETY VALVE.

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Fig. 5.

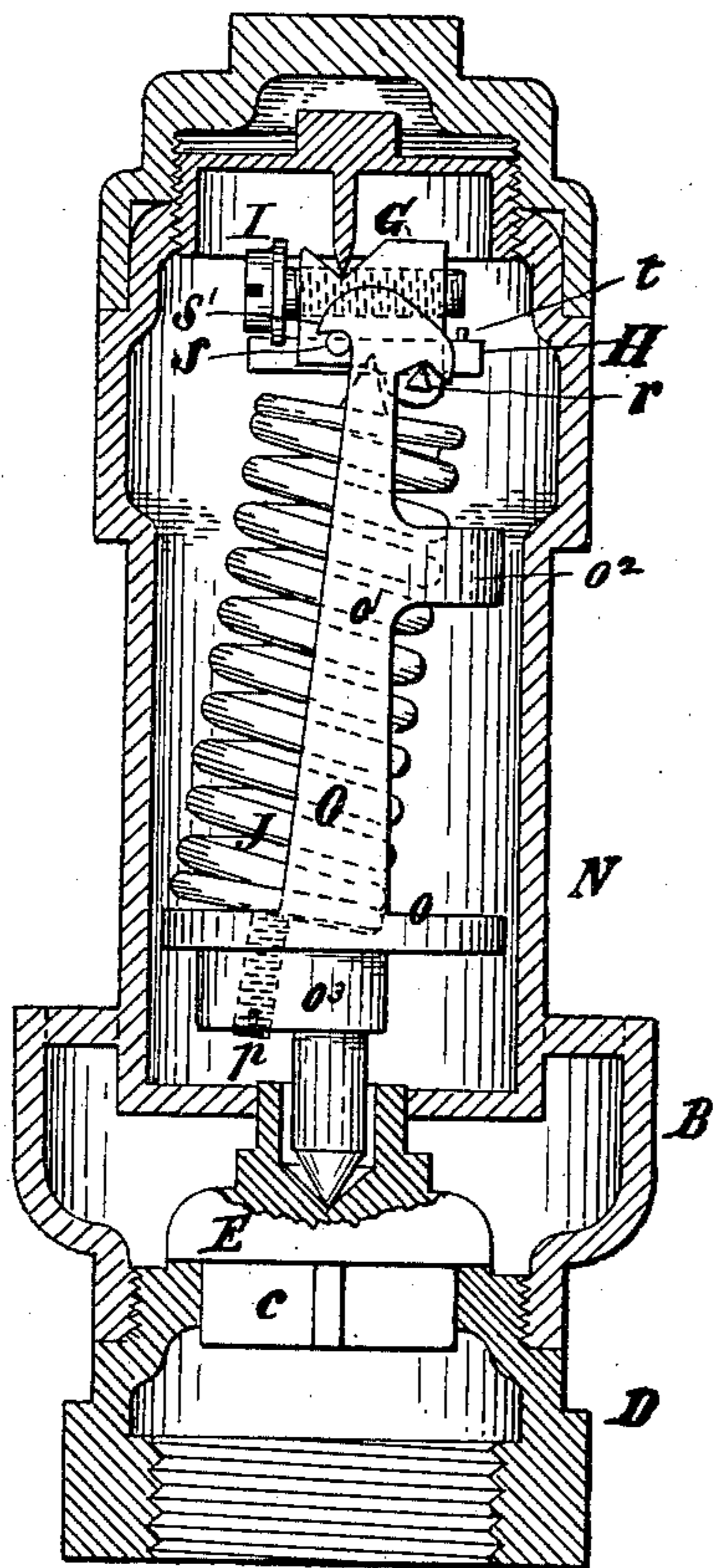


Fig. 6.

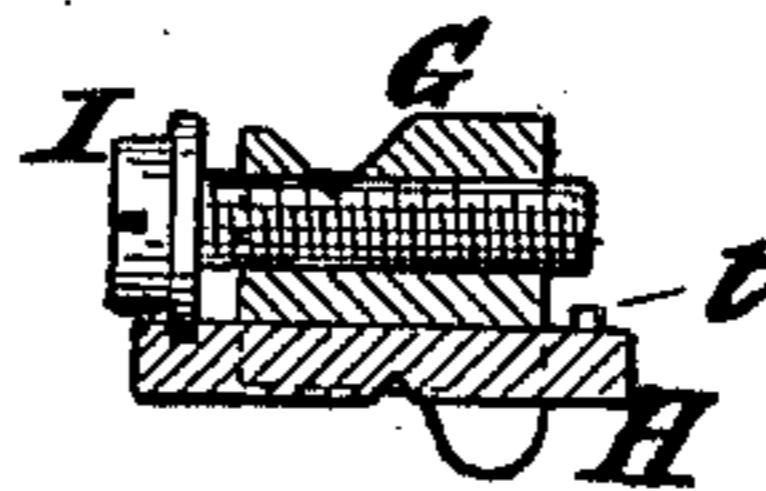
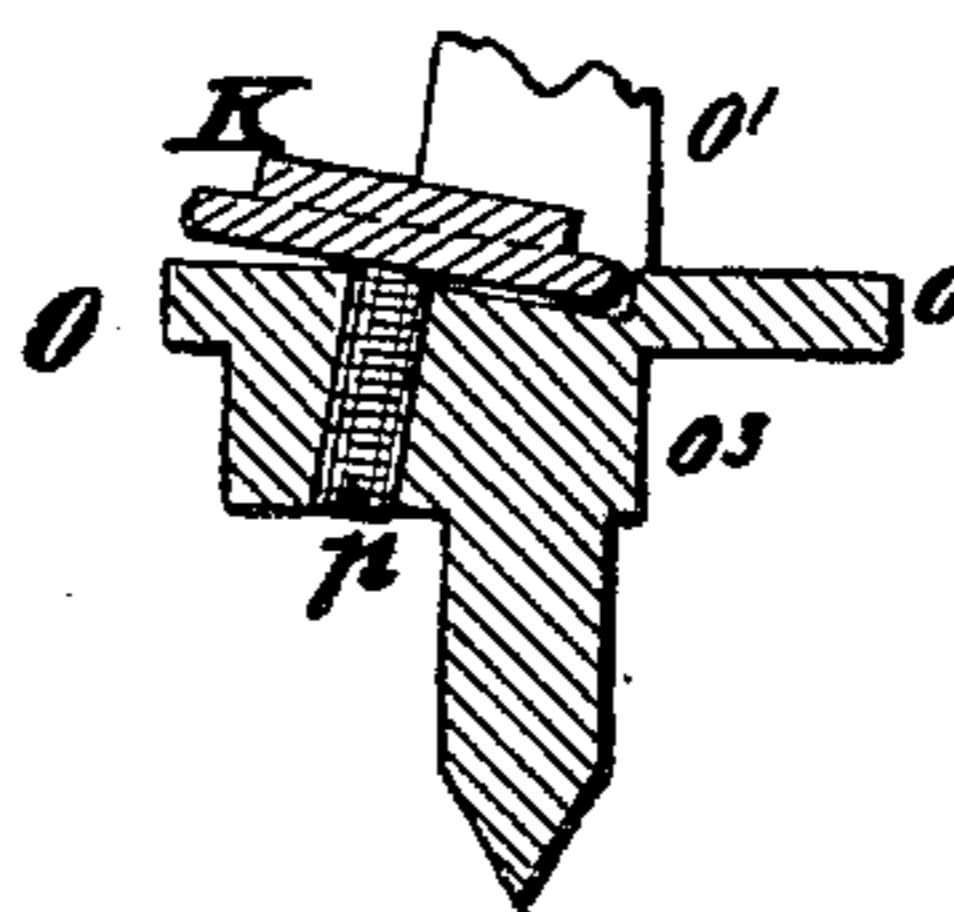


Fig. 7.



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UNITED STATES PATENT OFFICE.

HENRY C. WILDER, OF ASHBY, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
TO JOEL G. WILLARD, OF NEW YORK, N. Y.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 322,084, dated July 14, 1835.

Application filed December 10, 1834. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. WILDER, of Ashby, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Safety-Valves, of which the following is a specification.

This improvement relates to safety-valves in which springs are employed to resist the force tending to move the valve away from its seat.

I will describe a safety-valve embodying my improvement, and then point out the improvement in claims.

In the accompanying drawings, Figure 1 is longitudinal section of a safety-valve embodying my improvement. Fig. 2 is a longitudinal section taken in a plane at right angles to that of Fig. 1. Fig. 3 is a transverse section thereof taken on the lines *x x*, Fig. 1. Fig. 4 is a detail view thereof. Fig. 5 is a longitudinal section of a valve, showing a modification thereof. Fig. 6 is a sectional detail view of the same, and Fig. 7 is another sectional detail view of the same.

Similar letters of reference designate corresponding parts in all the figures.

A designates the frame of the valve by which the various parts are supported. As shown, it consists of two arm-like portions, *a a'*, fast upon a base-piece, B, and bearing at their ends a cylindrical rim-like portion, C. The said arm-like portions, the base-piece, and the ring-like portion are preferably made integral.

The base-piece B is of circular form and hollow. It extends for a considerable distance laterally beyond the arm-like portions *a a'*. This is to afford provision for the escape of steam through apertures *b* in the upper portion of the base-piece B.

A coupling-piece, D, is adapted to be screwed into the lower portion of the base-piece B. Said coupling-piece is adapted to be secured in any suitable manner to a steam-boiler. Near its upper end the coupling-piece constitutes a valve-seat for a valve, E. Guides *c* on the valve E guide the valve in its movements. A recess in a projection, *c'*, in the upper portion of the valve is adapted to receive one end of a pin, F. The valve is further guided in its

movements by the projection *c'*, which is adapted to move through an aperture in the upper portion of the base-piece B. As shown, the outwardly-extending end of the pin F is bifurcated.

G is a lever fulcrumed near one end upon a fulcrum-piece, *d*, forming part of the frame A. About midway of its length the lever G is recessed upon its under side to receive the bifurcated end of the pin F. It will be seen that when the valve E is raised from its seat it operates to move the lever G, through the medium of the pin F.

H is an adjustable section of the lever G. It is adapted to be moved backward and forward upon the upper surface of the lever G. Owing to the contour of the upper surface of the lever G the adjustable section H may be moved thereon in a direction obliquely to the direction of the movement of the valve.

A set-screw, I, engaging with one end of the adjustable section H, and bearing at its free end upon the main section of the lever G, may be adjusted to vary the position of the adjustable section H upon the main section of the lever G. Guides *e e'* on the main section of the lever G guide the adjustable section H in its movements.

J is a spring, shown as helical, arranged between the arm-like portions *a a'* of the frame A. Bearing-pieces K K' are arranged one upon each end of the spring J. The bearing-piece K is provided with a projection, *f*, upon its lower side. Such projection is preferably knife-edged at its lower extremity, and is adapted to bear upon the upper surface of the adjustable section H of the lever G. The bearing-piece K' is provided upon its upper surface with a projection, *g*, adapted to receive a knife-edged projection, *h*, upon the inner end of a cylindrical plug, L, fitting within the rim-like portion C of the frame A, and secured therein by screws or otherwise. The plug L may be adjusted inwardly and outwardly to vary the resistance of the spring J. Obviously the knife-edge may be arranged upon the bearing-piece and the projection which receives it upon the plug, if desirable.

I preferably combine with the lever G a device whereby the valve may be opened at

pleasure. A convenient form of device for this purpose is shown in the drawings. It consists of a lever, M, having a bifurcated end extending between the arm-like portions *a a'* of the frame A. The bifurcate arms of the lever pass one upon each side of the pin F, and so as not to interfere with the rising of the valve. A projection or rib, *i*, upon the upper surface of the lever M, is shown for acting against the lever G. By manipulating the lever M the valve E may be raised from its seat.

N is a cylindrical case or shell adapted to inclose the parts. It may be moved on and off longitudinally at pleasure.

Steam entering the coupling-piece D operates to raise the valve E from its seat. Force is thereupon exerted upon the lever G by means of the pin F, which force the spring J has a tendency to counteract. As the lever G is raised, however, it operates to oscillate the spring J in one direction, thus shifting the point upon the lever where the resistance of the spring is exerted, and moving such point of resistance more and more out of the line of application of force exerted by the escaping steam. By this arrangement the tendency of the resistance of a spring to increase when arranged to receive the application of a force exerted to overcome such resistance in a direct line is overcome, and the danger arising from sudden and undue increase of boiler-pressure is averted.

By varying the position of the adjustable section H of the lever G, the valve may be set to operate at any desired steam-pressure, as by such variation the resistance of the spring may be increased or decreased.

In the example of my improvement shown in Figs. 5, 6, and 7 the frame A, as shown in Figs. 1, 2, and 3, is not needed, and for this reason the shell N and the base-piece B are preferably made integral.

O designates a frame having a circular base portion, *o*, and arm-like portions *o'*. A semi-circular connecting-piece, *o''*, extends between the arm-like portions *o'*, but the same may be omitted. In this example of my improvement the pin F is preferably made integral with the frame O. A projection, *o'''*, upon the under side of the circular base portion *o* of the frame serves to raise said base portion somewhat above the bottom of case or shell N.

The spring J is arranged within the frame O. The lower end of the spring rests upon a bearing-piece, K. A screw, *p*, passing through a screw-threaded aperture in the projection *o'''* on the base portion *o*, is affixed to the bearing-piece K. A bearing-piece, K', is arranged upon the opposite end of the spring J. Said bearing-piece has a knife-edged projection upon its upper surface adapted to bear upon the adjustable section H, arranged beneath and adapted to be moved backward and forward within guides upon the lever G. The lever G is fulcrumed at *r* upon downwardly-extending parts of the arm-like por-

tions *o'* of the frame O. Pins or projections *s* on the lever G are adapted to abut against projections *s'* near the upper end of the arm-like portions *o'*, and prevent the lever G from moving so far in one direction as it would otherwise do.

The set-screw I has upon it a circumferential rim adapted to engage with a slot in the adjustable section H of the lever G, whereby, when the screw is turned, it will carry with it in its forward and backward movement the said adjustable section. A stop, *t*, on the adjustable section H prevents a too-extended movement in one direction.

The knife-edged projection upon the cylindrical plug L bears upon the upper surface of the lever G.

By adjusting the screw *p* inwardly or outwardly the resistance of the spring J may be varied.

The operation of this example of my improvement is that of toggle-levers, of which the frame O constitutes one lever, and the lever G the other. When pressure is exerted upon the valve, it operates to raise the frame or lever O. The lever G is then caused to be moved against the resistance of the spring J, the result being that the levers are oscillated.

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

1. In a safety-valve, the combination of a valve, a lever having an adjustable section, a connection between the valve and the lever, and a spring exerting force at one end against the adjustable section of the lever for operating the lever in one direction, substantially as specified.

2. In a safety-valve, the combination of a valve, a lever having an adjustable section, a connection between the lever and the valve, a spring exerting force at one end upon the adjustable section of the lever, and at the other end upon an adjustable bearing-point, substantially as specified.

3. In a safety-valve, the combination of a valve, E, a pin, F, a lever, G, fulcrumed upon a fixed portion of the frame of the valve, and having an obliquely-adjustable section, H, the spring J, and the plug L, substantially as specified.

4. In a safety-valve, the combination of a valve, E, a pin, F, a lever, G, fulcrumed upon a fixed portion of the frame of the valve, and having an obliquely-adjustable section, H, the spring J, and the trip M, substantially as specified.

5. In a safety-valve, the combination of a frame, A, having the base-piece B, extending beyond the main or upper portion of the case or shell, apertures *b* in the base-piece B, the valve E, the pin F, the lever G, and the spring J, substantially as specified.

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Witnesses:

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