

(No Model.)

M. CASTELNAU & C. MICHELET.

SAFETY VALVE.

No. 310,031.

Patented Dec. 30, 1884.

Fig. 1.

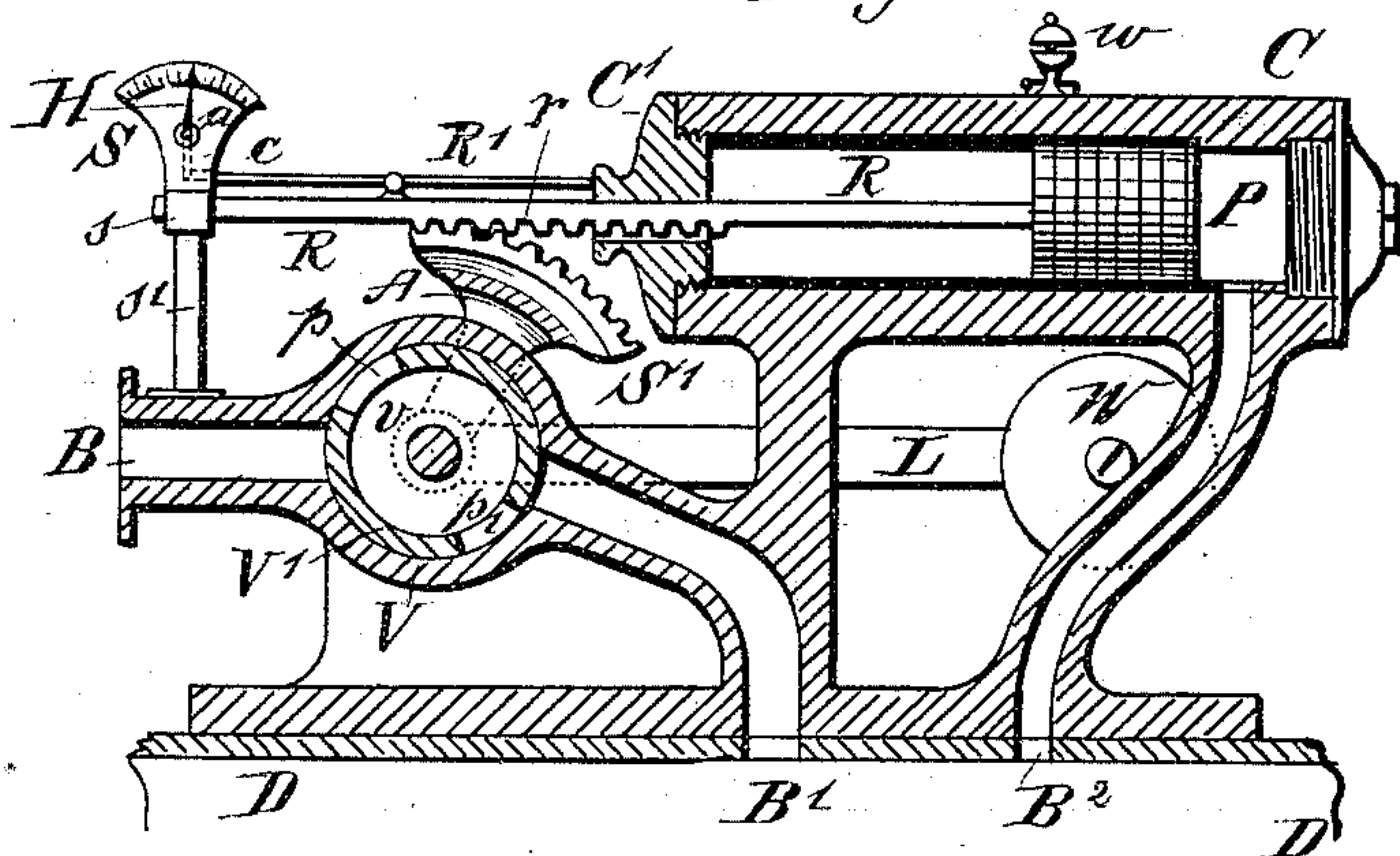


Fig. 2.

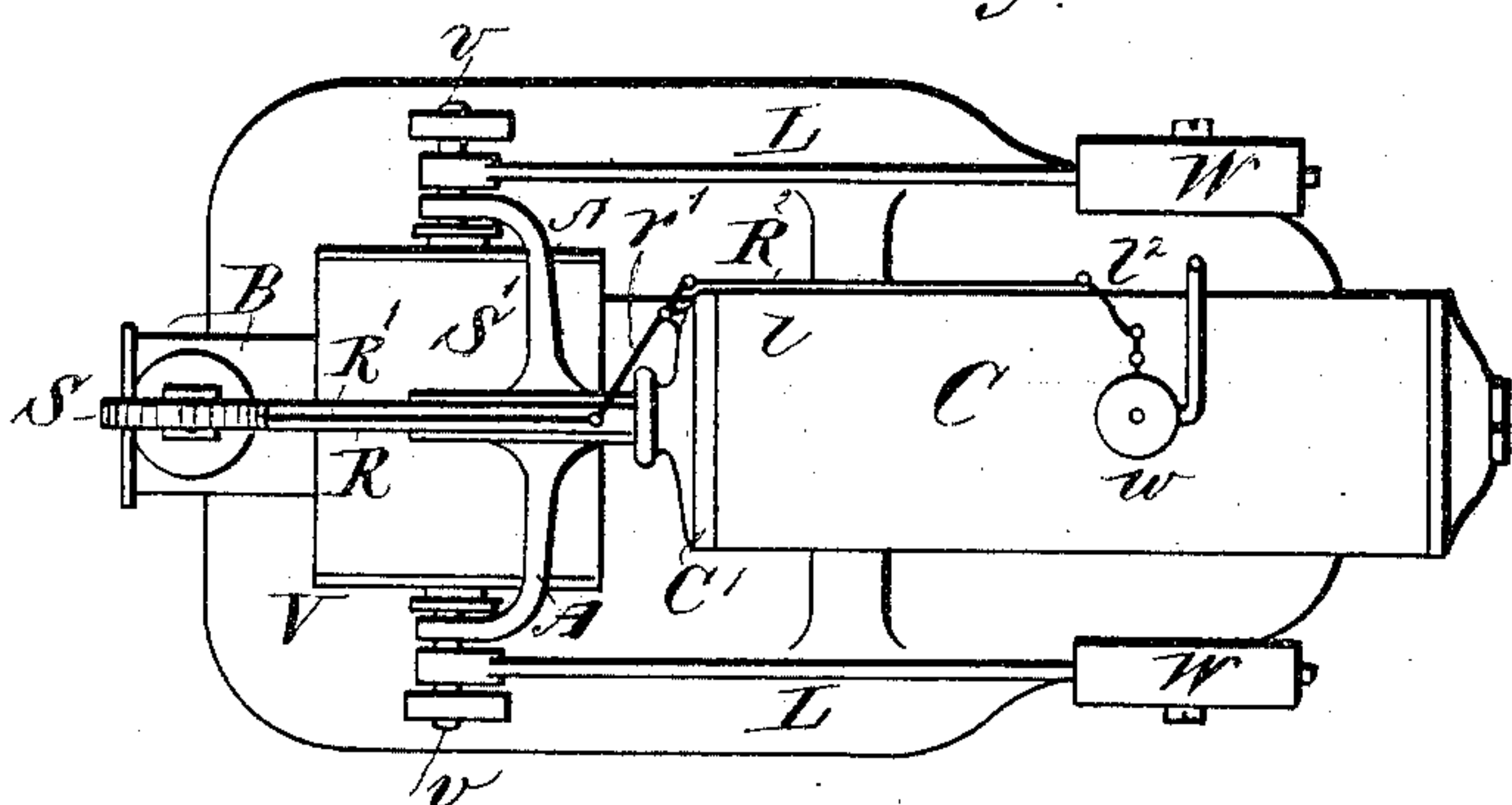


Fig. 4.

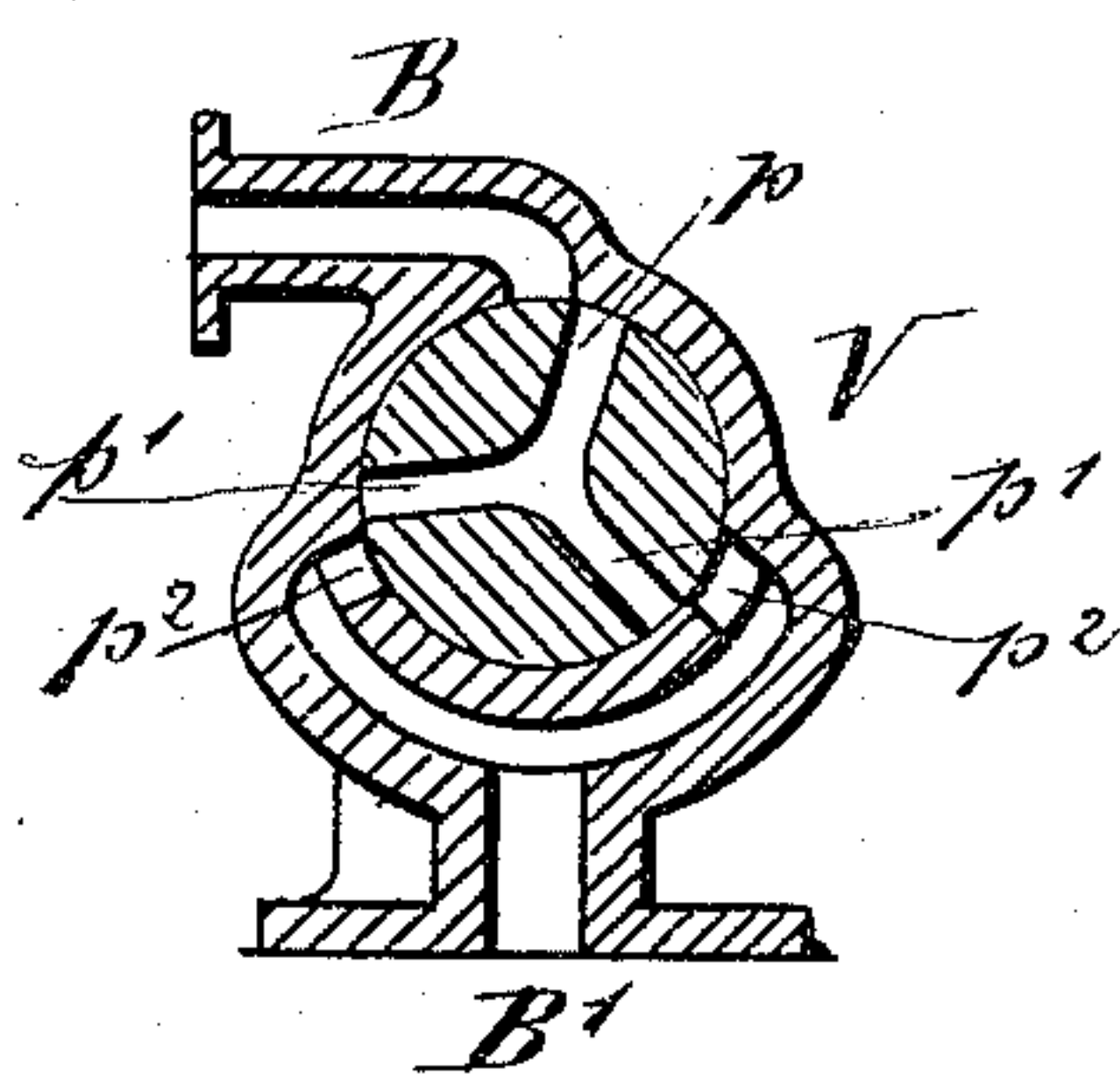
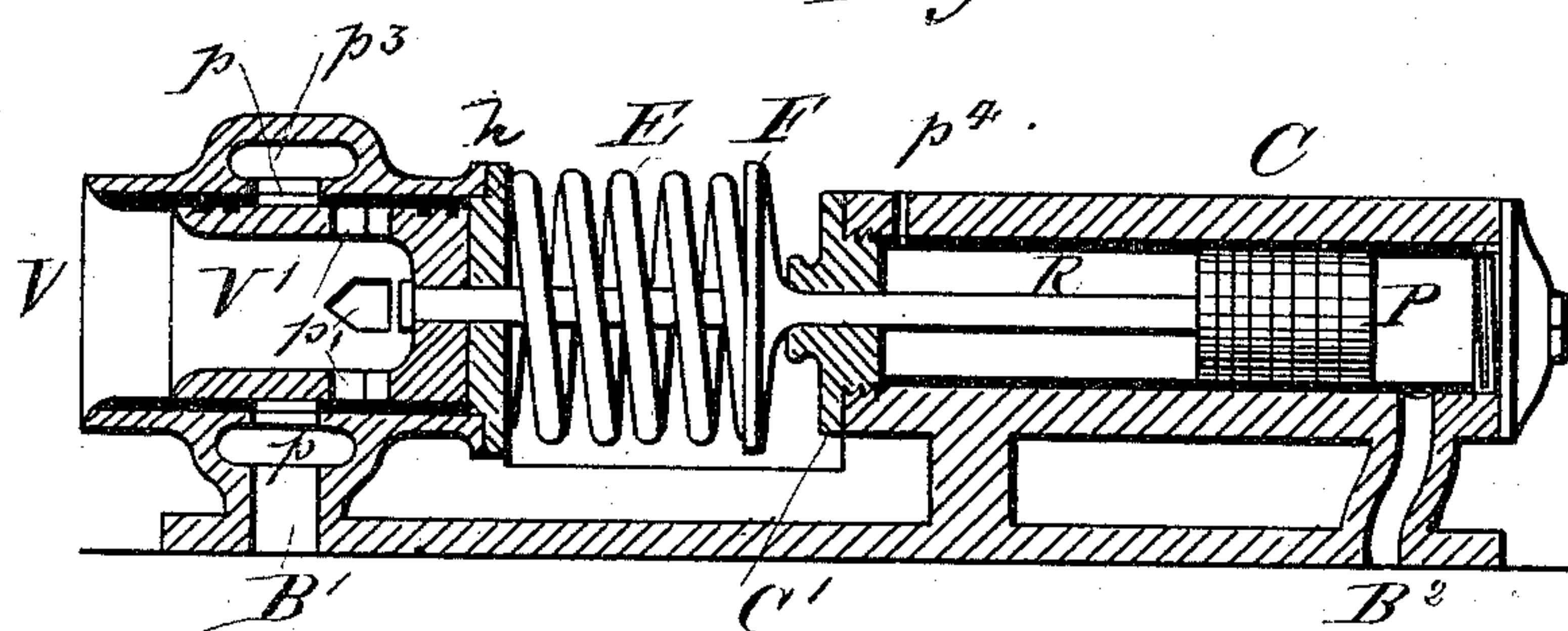


Fig. 3.



Witnesses.

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MARCELIN CASTELNAU AND CHARLES MICHELET, OF PARIS, FRANCE.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 310,031, dated December 30, 1884.

Application filed October 8, 1884. (No model.) Patented in France April 16, 1884, No. 161,556.

To all whom it may concern:

Be it known that we, MARCELIN CASTELNAU and CHARLES MICHELET, both citizens of the French Republic, residing at Paris, in said French Republic, have invented certain new and useful Improvements in Safety-Valves, (for which we have obtained Letters Patent in France, No. 161,556, under date of April 16, 1884;) and we 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.

This invention relates to appliances for preventing explosions of steam-boilers or other vessels in which a fluid is generated or stored under pressure, for maintaining such pressure at a normal or determined standard, or for maintaining a given depression or vacuum in a vessel from which the air has been exhausted.

The invention consists, essentially, in a loaded relief-valve operated by an excess in the pressure of a fluid or an excess in the depression or vacuum to allow fluid to escape when the pressure exceeds a normal or predetermined standard, or to admit air into the vessel in which the vacuum is established when the pressure therein falls below a normal or predetermined standard, and in the combination, with the relief-valve, of indicating and signal devices and of appliances for controlling the movements of the valve by the increase in the pressure or expansion of the fluid generated or stored or the reduction of pressure in a vessel in which a vacuum is established.

The invention is applicable not only to generators of steam or gases when such are held or stored under pressure, or to vessels or apparatus in which a vacuum is formed, but also to vessels or pipes employed for the storage or conducting of liquids under pressure.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a preferred form of apparatus embodying our improvements. Fig. 2 is a top plan view thereof. Fig. 3 is a vertical longitudinal section of a slightly-modified form of apparatus; and Fig. 4 is a section of a modified arrangement of relief-valve, its casing, and connections.

C indicates a cylinder, in which is arranged a piston, P, connected to a piston rod, R, a portion of which is provided with teeth *r*, forming a rack-bar. The end of the piston-rod R is guided in a sleeve, *s*, at the end of a standard, *s'*, rising from the inlet or outlet branch, as the case may be, of a valve-casing, *c*.

To the piston-rod R is secured a rod, R', one end of which is connected to a crank, *c*, secured to the arbor *a* of a pointer or index-hand, H, that projects vertically from said arbor in front of a scale, S, secured to the sleeve *s* of standard *s'*. The other end of the rod R' is pivotally connected with a connecting-rod, *r'*, Fig. 2, pivoted in or on a lug, *l*, projecting from the head C' of the cylinder C. The other end of the connecting-rod *r'* is pivoted to one end of a rod, R², the other end whereof is pivoted to a valve-lever, *l'*, that operates a valve (not shown) whereby steam or other fluid is admitted from the cylinder C to the whistle *w* in a well-known manner. The toothed portion *r* of the piston-rod R meshes with a toothed sector, S', that has diverging arms A keyed to a valve-spindle, *v*, on opposite sides of a valve-casing, V. Upon said spindle within the casing V is secured a cylindrical relief-valve, V', that is provided with valve-ports *p p'*, and upon the opposite ends of the valve-spindle *v* are keyed levers LL, carrying weights W W, adjustable on said levers by means of set-screws. The valve-casing V has a discharge branch or passage, B, and an admission branch or passage, B', which latter connects with the boiler or other vessel, D, in which a fluid or a liquid is stored under pressure, or in which a vacuum is formed, said boiler or other vessel being also in communication by a branch passage, B², with one end of the cylinder C.

The operation of the apparatus may be briefly described as follows: The weights W on levers L are first adjusted to a given pressure to be maintained in vessel D, or to a given depression or vacuum to be maintained therein when the piston P will be at some point between the limits of its course in either direction, or at the end of its course for a maximum pressure, as shown in Fig. 1.

It is obvious that when the pressure in the vessel D increases beyond that to which the relief-valve has been adjusted the piston P in cylinder C will be moved forward, its rod R will rotate the valve V' against the pressure

exerted thereon by its load, and communication will be established between the vessel D and the outer air through branch B', ports $p p'$, and branch B. At the same time the rod R', moving with the piston-rod R, will rotate the index-hand or pointer H, which latter will indicate the excess of pressure on scale S, and through rod R² communication will be established between the whistle w and the interior of the cylinder C, and an audible signal will be given, indicating that there is an excess of pressure in vessel D. The same results are obtained when a vacuum is established in vessel D and the pressure falls below a normal standard, with this variation, that instead an escape of the fluid air will be drawn in at the branch B and the whistle w . As soon as the pressure in vessel D has again been restored to its normal or predetermined standard the piston B will again move into its normal position by the power exerted by the weights W on the valve-spindle, said power being transmitted to the valve V', which will again close, and through the toothed sector S' to the piston-rod R, as will be readily understood.

The details of construction and arrangement of the essential elements of the apparatus or device may be modified without departing from the nature of my invention. For instance, instead of weights W, springs may be employed where a variable pressure is not required or desired, such springs holding the valve-levers L against movement until the pressure in vessel D is greater than the power exerted by the springs on said levers.

Instead of a hollow or cylindrical valve, V', a three-way valve, Fig. 4, may be employed in a valve-casing having ports $p^2 p^3$, the total sectional area of the ways or passage $p p'$ of the valve being equal to the sectional area of the inlet passage or branch B' and that of the outlet passage or branch B, respectively.

Instead of the valve mechanism described, a valve operated directly by the piston-rod R may be employed, as shown in Fig. 3, the valve being a tubular valve, V', open at one end and secured to one end of the piston-rod R, said valve operating in a valve-casing, V, also open at one end, and provided with ports $p' p'$, communicating through an annular passage, p^3 , with the vessel containing the fluid under pressure, and with corresponding ports, p , formed in the tubular relief-valve V', the fluid escaping from the latter through its open end and through the open end of the tubular valve-casing V, or, in case the apparatus is connected with a vessel in which a vacuum is established, the air enters through the open ends of the valve-casing and valve whenever the pressure falls below that to which the valve is adjusted. As shown in said Fig. 3, the adjustment of the pressure is effected by means of a coiled spring, E, on the piston-rod, one end of which is secured to a disk or head, F, on said piston-rod R, and the other end of said

spring bears on the head h of the valve-casing V.

The cylinder C, in the construction just described, is provided with a vent or port, p^4 , to allow the air to escape therefrom, without which said air would be compressed and offer a resistance to the movement of the piston. This vent is not necessary in the construction shown in Fig. 1, as the opening in the head C' of the cylinder has to be of such diameter as to permit the passage of a part of the toothed section r of the piston-rod R, whereby a tight joint is prevented, the air having free passage through the interspaces of the teeth. In said Fig. 1 we have shown the branches or passages B² B' B as formed integral with the cylinder, the valve-casing, and bed-plate of the apparatus; but it is obvious that this is not necessary. The cylinder and valve-casing may be connected by separate pipes with the vessel D, and the valve-casing may have a discharge (or an air-admission) branch connected thereto. This arrangement would be necessary in cases where it is undesirable to secure the apparatus directly to the vessel D.

The branches B B' B², or the pipes substituted therefor, may each be provided with a valve or stop-cock for obvious purposes.

Having now described our invention, what we claim is—

1. The combination, with a vessel containing a fluid under pressure, a piston-cylinder, and a piston, of a relief-valve and a signaling device operated by said piston, and communications from the piston-cylinder and the valve to said vessel, for the purpose specified.

2. The combination, with a vessel, D, a graduated scale, a piston-cylinder, and a piston, of a relief-valve, a pointer and a signaling device operated by said piston, and communications leading from the piston-cylinder and the valve to said vessel, for the purpose specified.

3. The combination, substantially as herein described, with the vessel D, a valve-casing, a piston-cylinder, and communications between said vessel and the valve-casing and piston-cylinder, of a relief-valve connected to and operated directly from the piston, for the purpose specified.

4. The combination, substantially as herein described, of the piston-cylinder C, valve-casing V, and branches B² B' B, formed of one piece, with a bed-plate, and constituting an attachment for generators, for the purpose specified.

In testimony that we claim the foregoing we have hereunto set our hands this 26th day of August, 1884.

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Witnesses:

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