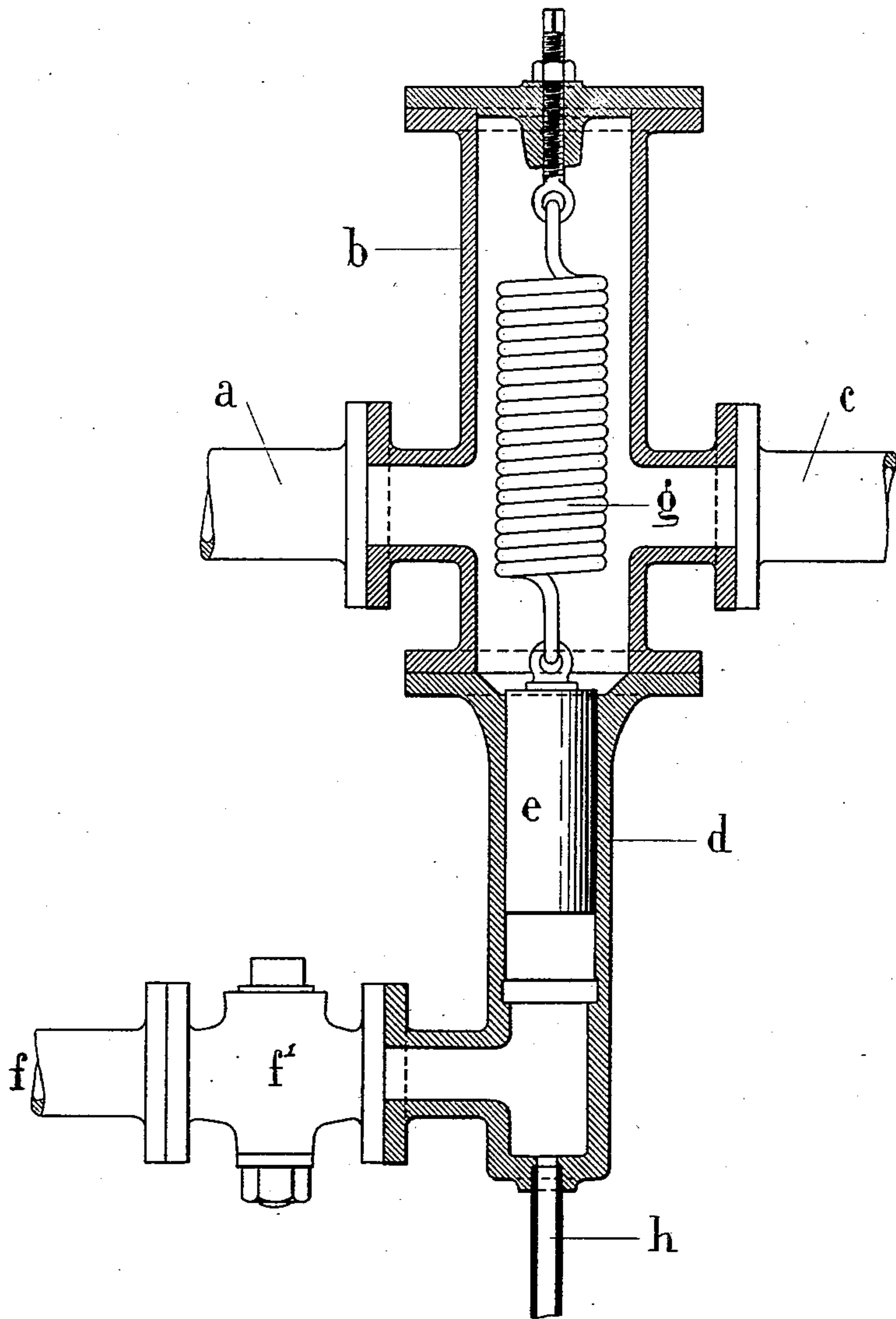


(No Model.)

C. G. P. DE LAVAL.  
MEANS FOR SUPPRESSING CONCUSSION OR HAMMERING SHOCKS IN  
PUMPING WATER TO BOILERS.

No. 563,192.

Patented June 30, 1896.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

CARL GUSTAF PATRIK DE LAVAL, OF STOCKHOLM, SWEDEN.

MEANS FOR SUPPRESSING CONCUSSION OR HAMMERING SHOCKS IN PUMPING WATER TO BOILERS.

SPECIFICATION forming part of Letters Patent No. 563,192, dated June 30, 1896.

Application filed April 4, 1896. Serial No. 586,162. (No model.) Patented in Sweden December 20, 1894, No. 5,710.

*To all whom it may concern:*

Be it known that I, CARL GUSTAF PATRIK DE LAVAL, a citizen of Sweden, residing in Stockholm, Sweden, have invented certain  
5 new and useful Improvements in Means for Suppressing the Concussions or Hammering Shocks in Pumping Water to a Boiler, (for which I have obtained Letters Patent in Sweden, No. 5,710, dated December 20, 1894,) 10 of which the following is a specification.

For suppressing the concussions or hammering shocks arising from the pumping of a fluid by piston-pumps, an air-containing chest coupled in the pressure-conduit has  
15 been used, in which the air, on account of its elasticity, takes up, or suppresses at least, the greater portion of the shocks. When, however, the pump is intended for high fluid-pressures, the air-chest must be of such large  
20 dimensions, for working with practical success, that it is considered as too inconvenient and cumbersome.

The present invention has for its object to avoid this inconvenience by the employment  
25 of a steel spring or the like, which is so utilized and adapted as to take up the arising shocks. As even such a spring would require too large dimensions, if alone arranged to balance the fluid-pressure, an elastic fluid  
30 of suitable pressure is used, which, together with the spring-pressure, establishes the proper balancing and accomplishes the end in view. As the apparatus is especially intended for use in connection with steam-boilers for high pressures, an elastic fluid of suitable pressure is always at hand, namely, the  
35 generated steam.

In the accompanying drawing is shown in longitudinal section an apparatus constructed according to the present invention.  
40

From the pump the water is forced into a casing *b*, through inlet-pipe *a*, and flows out through the diametrically opposite outlet-pipe *c*. Connected to the lower end of the casing *b* by suitable means is an alined cylinder *d*, in which the piston *e* is longitudinally movable. Said piston *e* is acted on by  
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the water-pressure on the one end and by the steam-pressure from the steam-boiler in question on the other, steam being conducted to  
50 the other side of the piston through the pipe *f*, controlled by cock *f'*. Moreover, the piston *e* is acted on by a helical spring *g*, fixed at one end to the top of the casing *b*, and at its other end to the piston *e*, the tension of which  
55 spring, together with the steam-pressure, keeps the piston balanced against the feed-water pressure. Said spring can be arranged, as shown, as a tension-spring on the water side or as a pressure-spring on the steam side, the  
60 last-named adaptation being evident without detailed illustration. The steam-pressure being usually only slightly less than the pressure of the feed-water, said spring evidently has for its principal object to take up  
65 or suppress the shocks produced in feeding the water to the boiler. Its dimensions, therefore, will be reasonable even for a very high water-pressure.

For leading away the condensed steam and  
70 leakage water, which gather in the lower part of the cylinder *d*, a pipe *h* is provided.

Having thus described my invention, I claim as new and desire to secure by Letters  
75 Patent—

In an apparatus for suppressing the concussions or hammering shocks in pumping water to a boiler, the combination of a casing provided with inlets and outlets for the water from the pump, a cylinder on the casing having an inlet for steam, a piston arranged in the cylinder between its steam-inlet and the casing, and a spring, acting on the piston and adapted, together with the steam-pressure, to balance said water-pressure, substantially as and for the purpose set  
80 forth.  
85

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

CARL GUSTAF PATRIK DE LAVAL.

Witnesses:

WALDEMAR BOMAN,  
HUGO PALMQUIST.