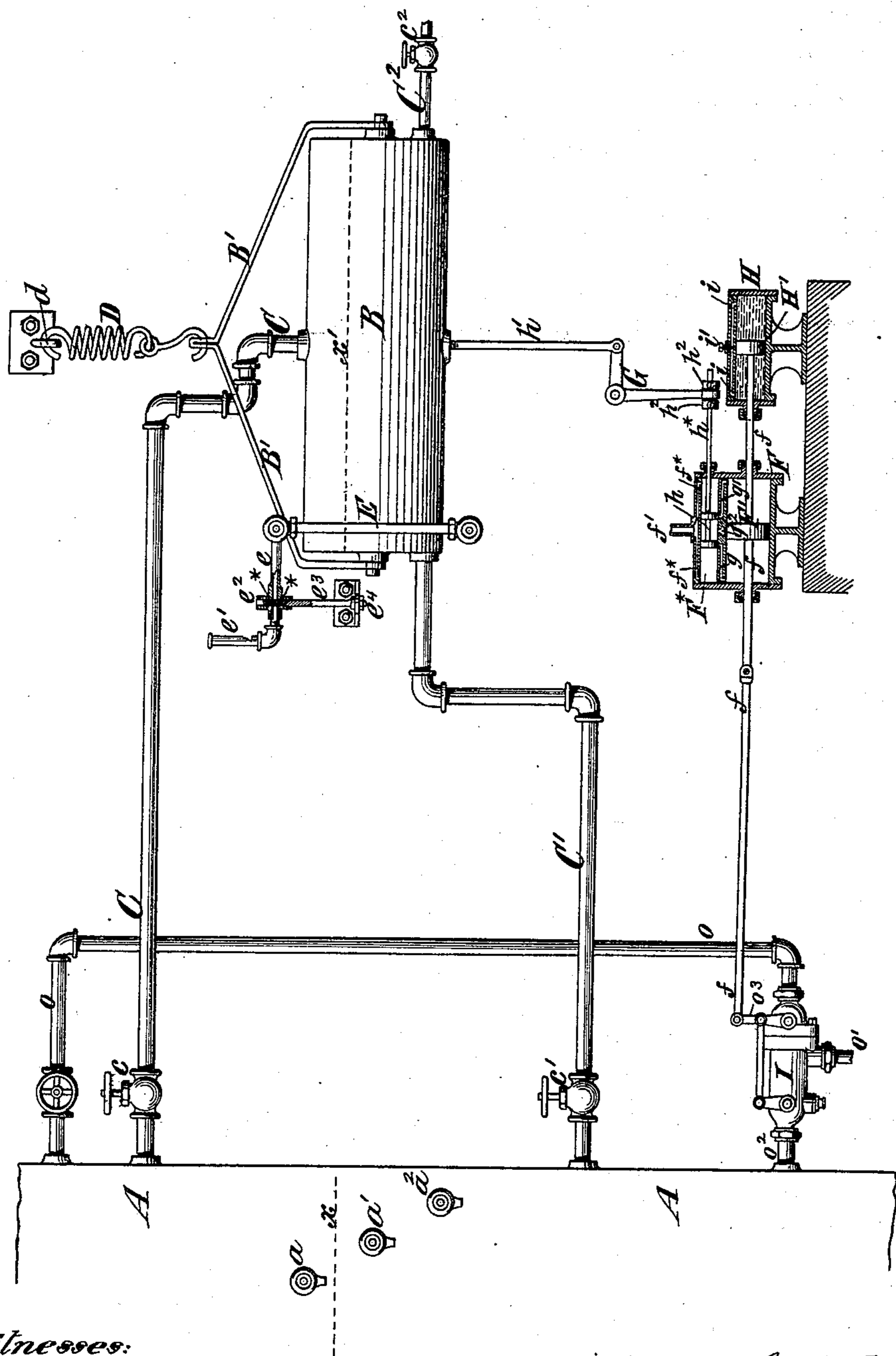


(No Model.)

C. F. WILSON.
BOILER FEED REGULATOR.

No. 316,212.

Patented Apr. 21, 1885.



Witnesses:
 O. Sundgren
 Fred Haynes

Inventor:
Charles F. Wilson
by his Attys.
Brown & Hall

UNITED STATES PATENT OFFICE.

CHARLES F. WILSON, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF
TO M. MELVIN BEMIS, OF SAME PLACE.

BOILER-FEED REGULATOR.

SPECIFICATION forming part of Letters Patent No. 316,212, dated April 21, 1885.

Application filed May 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. WILSON, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Boiler-Feed Regulators and Alarm Apparatus, of which the following is a specification.

My invention relates to apparatus in which the necessary movement for letting on or shutting off the supply of feed-water to the boiler is obtained by a vessel which is connected with the boiler above and below the water-line by flexible connections, so that the said vessel may fall or rise by reason of the greater or less volume of water contained in it, the volume of water varying with the water-level in the boiler.

My invention consists in the combination, with a boiler, an outside vessel flexibly connected with the steam and water spaces of the boiler, so that it may rise and fall with the variations in the volume of water contained within it, and balancing devices for the vessel, of a steam cylinder and piston whereby the admission of feed-water to the boiler may be controlled, and an induction-valve for said steam-cylinder, so connected with the said rising and falling vessel as to be controlled by it and moved by its movement. The moving piston of said steam-cylinder may be connected with the steam-inlet valve of a feed-injector, with the belt-shifter of a belt feed-pump, or with the throttle or stop valve of a steam-actuated feed-pump, thereby controlling through any of these ordinary boiler-feeding devices the admission of feed-water to the boiler. The steam-inlet valve of a feed-water injector should always be opened and closed slowly to insure the proper operation of the injector; and to the end that such slow movement of the piston of the aforesaid steam-cylinder may be produced, I combine with the steam-cylinder and piston a cataract cylinder and piston, the latter cylinder containing liquid which is circulated from end to end of the cataract-cylinder by the movement of the piston therein, the speed of movement being controlled by more or less throttling the passage through which circulation is effected.

The invention also consists in the combina-

tion, with a boiler and the balanced vessel flexibly connected with the steam and water spaces of the boiler, of a steam-whistle the valve of which is controlled by the rising and falling movements of the cylinder in a novel and simple manner, particularly hereinafter described, and pointed out in the claims.

The accompanying drawing represents an elevation of a part of a boiler and a partly sectional elevation of an apparatus embodying my invention and connected therewith.

A designates the portion of the boiler, which may be of the upright type, and a a' a'' designate the several gage-cocks. The proper water-line is indicated by the dotted line x .

B designates a closed vessel, here shown as of cylindric form, and which may be of any desired size. This vessel is connected by a pipe, C, with the steam-space of the boiler, and by a pipe, C', with the water-space of the boiler. In the pipes C C' are valves c c' , whereby the passage of steam or water through them may be shut off, when desired, and the pipes are of such length that they will allow the vessel B to rise and fall, thereby forming flexible connections between the vessel and the boiler. As here shown, the pipes C C' are provided with several bends or elbows, thus allowing for considerable flexure by distributing the strain between the several joints.

At the end of the vessel B is a blow-off pipe, C'', provided with a blow-off valve, c'' .

The vessel B is so supported and balanced that when the volume of water therein corresponds to the normal water-line x of the boiler it will occupy a definite and intermediate position, as shown. In this example of my invention the vessel is provided with a bail or hanger, B', and is supported by a spring-hanger, D, from a hook or fixed support, d ; but a weight or a weighted scale-beam may be applied in any suitable way for balancing the vessel.

From the above description it will be understood that when the water-line x' in the vessel corresponds with the normal water-line x in the boiler the vessel will be balanced; but if the water rises above the water-lines x x' the vessel will fall, and if the water falls materially below said lines the vessel will rise.

E designates a water-gage on the vessel, and from the upper or steam connection of the gage with the vessel there extends a pipe, *e*, terminating in a steam-whistle, *e'*. In the pipe *e* is a valve shell or body, *e²*, and *e³* designates a stem or valve-spindle secured at *e⁴* to a fixed support, and up and down which said shell or body *e²* will be moved by the rising and falling movement of the vessel B. When the vessel is in its intermediate position, as shown, the stem or valve *e³* closes the passage through the pipe *e*; but in said stem or valve are two cross-ports, * *, and when the pipe *e* in rising or falling comes opposite one or other of these cross-ports, steam will escape through the whistle and sound an alarm, thus giving notice that the level of water in the boiler is above or below the desired level. The whistle forms an audible alarm controlled by the rising and falling vessel.

F designates a steam-cylinder, and F' its piston, the rod *f* of which is to be connected with the steam-inlet valve of a feed-injector, the belt-shipper of a belt feed-pump, or the throttle-valve of a steam feed-pump. I have here shown a feed-injector, I, which is supplied with steam by a pipe, *o*. The water-inlet or suction of the injector has a pipe, *o'*, which is extended to a suitable source of supply, and the water-outlet *o²* from the injector is connected with the boiler. The handle *o³*, which controls the operation of the injector, is connected with and moved by the rod *f*.

The valve-chest F* of the cylinder F receives steam from a pipe, *f'*, which steam is conducted through passages *f* f** to opposite ends of the chest.

The cylinder F has induction and eduction passages *g g'* leading to its opposite ends, and an intermediate main exhaust-port, *g²*.

In the valve-chest F* is a cylindric slide-valve, *h*, which by its movement opens either passage, *g* or *g'*, to the steam and places the other passage, *g'* or *g*, in communication with the main exhaust *g²*.

The rising and falling vessel B is connected by a rod, *h'*, with an arm of an elbow or bell-crank lever, G, and the other arm of said lever is connected with the valve-stem *h** of the valve *h*. The arm of the lever G is placed between collars *h² h²* on the stem *h**, and by adjusting these collars the vessel B and valve *h* may be brought into such relation that when the vessel is motionless in its intermediate and balanced position the valve *h* will cover both the ports *g g'*, and the piston F' will be in an intermediate position, as shown. If the water-level in the boiler rises, the volume of water in the vessel will increase and the latter will fall, thereby moving the valve *h* to admit steam to the port *g'* and right-hand end of the cylinder F, and permit the exhaust from the left-hand end thereof. The piston F' will then move toward the left and will decrease or stop entirely the admission of feed-water to the boiler. When the water-level in the boiler falls, the vessel will rise and will there-

by uncover the port *g* to the steam and place the port *g'* in communication with the exhaust-port *g²*. The piston F' will then move toward the right, and will increase the admission of feed-water to the boiler.

In connection with the above I employ a liquid cataract cylinder and piston for compelling the piston F' to move slowly in either direction. Such controlling device or retarder is particularly desirable when the piston-rod *f* is connected with the steam-inlet valve of a feed-injector, which valve should be opened and closed slowly.

H designates the liquid-cylinder, and H' the piston thereof, which is fixed upon the rod *f*. The two ends of the cylinder are in communication by a passage, *i*, which is controlled by a valve, *i'*, which may be adjusted to more or less close the passage, and thus control the circulation from end to end of the cylinder H through the passage *i*. In this way the rapidity of movement allowed the pistons H' F' may be nicely regulated.

The valve *i'* may consist of a simple set-screw, as here shown.

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

1. The combination, with a steam-boiler, an outside vessel flexibly connected with the steam and water spaces of the boiler so that it may rise and fall with variations in the volume of water contained within it, and balancing devices for the vessel, of a steam cylinder and piston, whereby the admission of feed-water to the boiler may be controlled, and an induction-valve for said steam-cylinder so connected with the rising and falling vessel as to be controlled by the movements of said vessel, substantially as and for the purpose herein described.

2. The combination, with a steam-boiler, an outside vessel flexibly connected with the steam and water spaces of the boiler, and balancing devices for said outside vessel, of a steam cylinder and piston for controlling the admission of feed-water to the boiler, an induction-valve for said cylinder connected with and capable of movement by a rising and falling movement of said vessel, and a cataract cylinder and piston connected with the piston of the steam-cylinder, and serving to retard the movements of the latter, substantially as and for the purpose herein described.

3. The combination, with the boiler A, of the rising and falling vessel B, flexibly connected with the steam and water spaces of the boiler, and provided with a steam-pipe terminating in a whistle, and formed with a valve shell or body, *e²*, and a valve-stem or valve, *e³*, attached to a fixed support and controlling the passage of steam to said whistle, substantially as herein described.

C. F. WILSON.

Witnesses:

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