

R. E. Bond,
Steam-Boiler Indicator.
N^o 44,702. Patented Oct. 18, 1864.

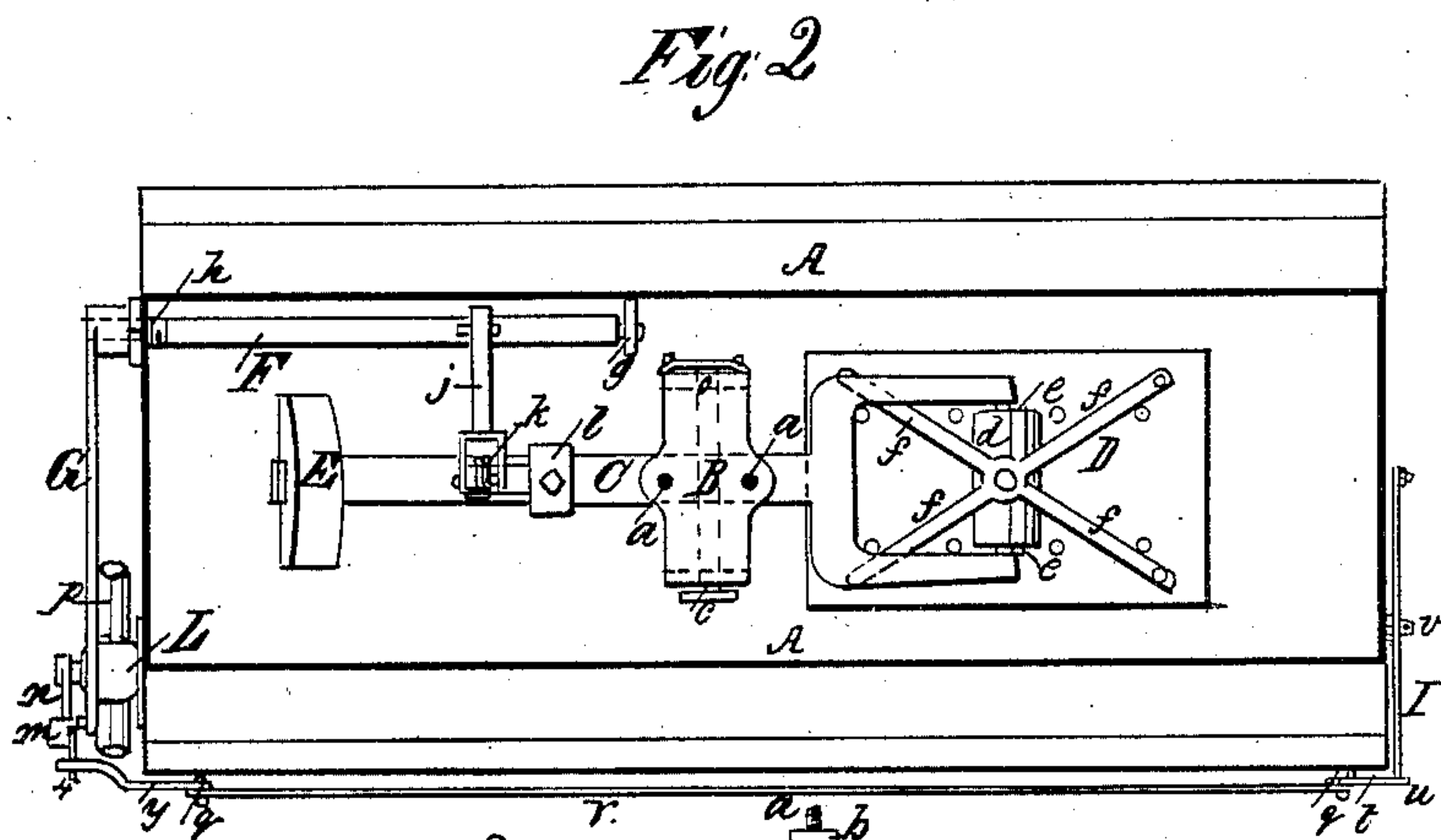
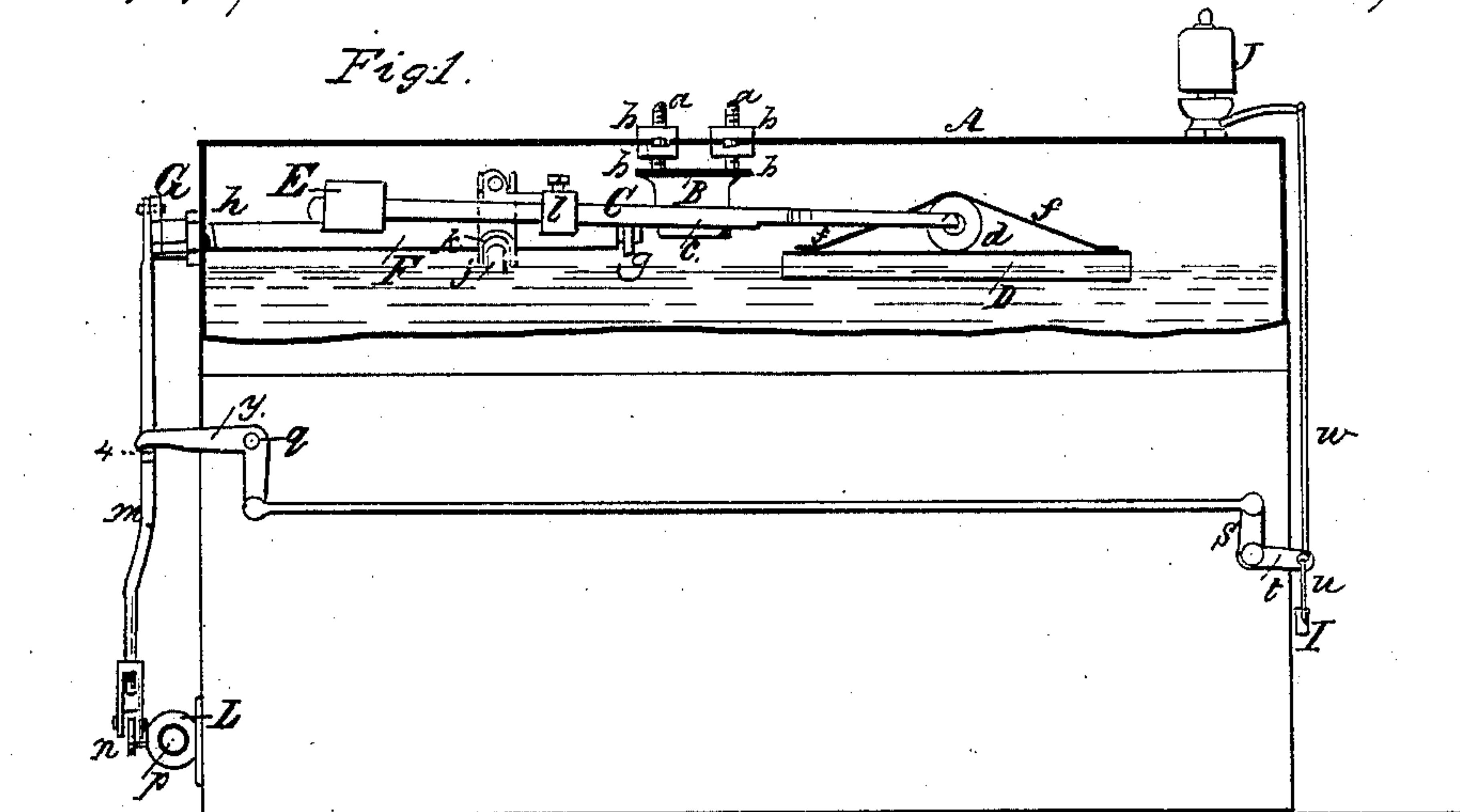
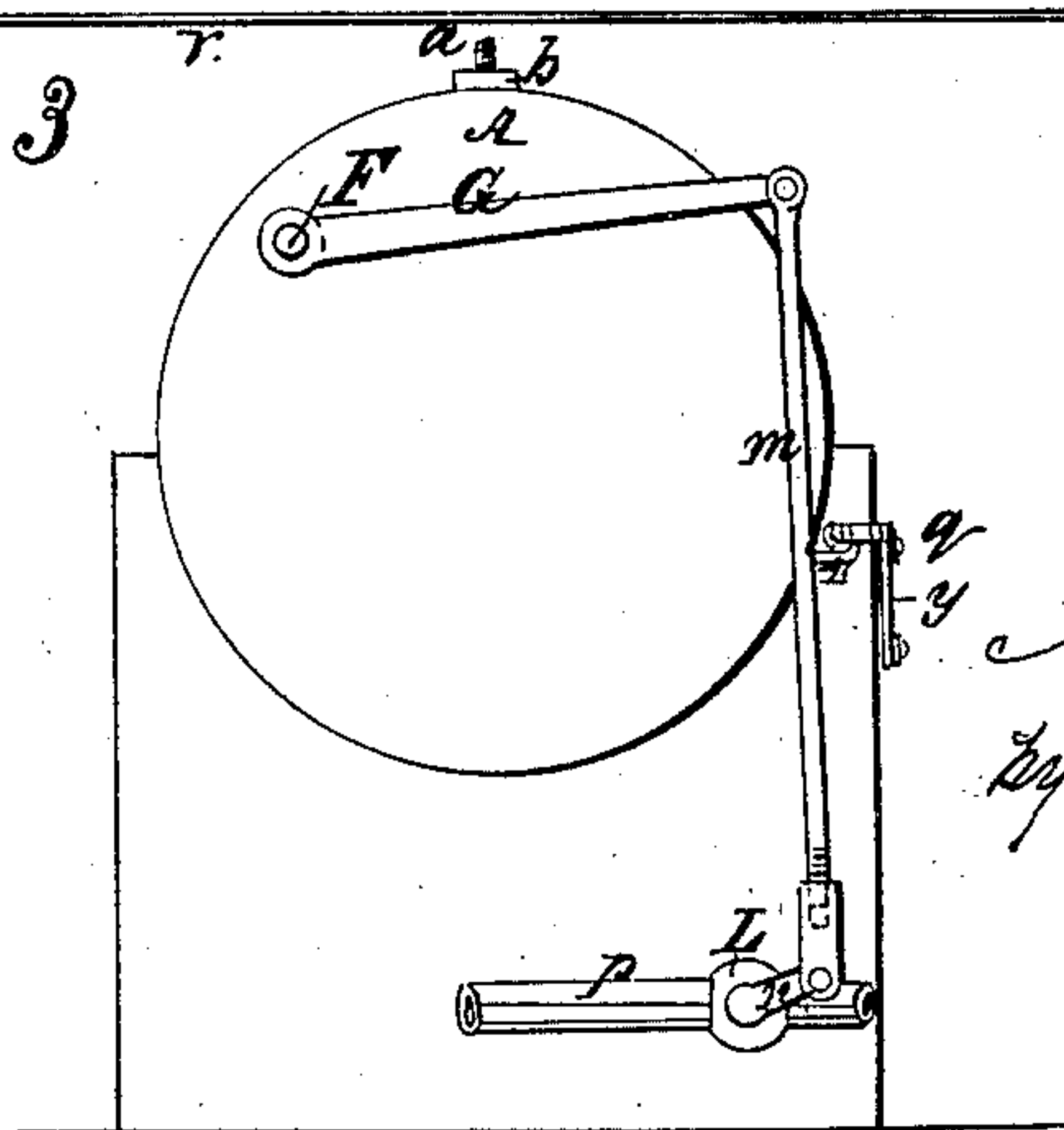


Fig. 3



Witnesses:

J. M. Bonds.
G. W. Reed

Inventor:

R. E. Bond
by Munn & Co.
Attys

UNITED STATES PATENT OFFICE.

RICHARD E. BOND, OF DETROIT, MICHIGAN.

IMPROVEMENT IN FEED-WATER REGULATORS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 44,702, dated October 18, 1864.

To all whom it may concern:

Be it known that I, RICHARD E. BOND, of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Combined Feed-Regulator and Low-Water Detector for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of a boiler with my invention applied, the upper part of the shell being represented in section to show the parts within. Fig. 2 is a plan of the same, with the shell partly in section. Fig. 3 is an end view of the same.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in a novel mode of applying a float within a steam-boiler, and of combining the same with the cock or other device for controlling the feed, and with a steam-whistle, or its equivalent, whereby it is made to regulate the feed under ordinary circumstances, and to give an alarm if, under extraordinary circumstances, the water should get below a safe level.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the shell of the boiler. B is a hanger attached rigidly by bolts *a a* and nuts *b b* to the upper part of the shell of the boiler, and containing the bearings for the knife-edge pivots *c* of a lever, C, which works like a scale-beam inside of the boiler. At one end of this beam there is attached a float, D, and at the other a counterbalance-weight, E, which keeps the float D partially immersed in the water to any desired depth, and which is itself always above the surface of the water. The float D may be made of metal; or, to lessen its specific gravity, it might be made of stone, glass, porcelain, or other suitable substance, and partially covered with sheet metal to prevent any parts which might break off from falling down. To allow the steam generated beneath it to escape upward, a number of holes are drilled through the said float, which is attached to the lever by means of knife-edge pivots *e e*, secured in opposite prongs of a fork, which is formed on that end of the lever to which it is attached, as shown, the

said pivots entering a box, *d*, which is secured exactly over the center of the float by means of four metal braces, *f f*, connected with the float near its corners and by a bolt through the middle of said float-box and braces.

Some distance below the fulcrum or bearing of the lever C, and near one side of the boiler, there is a horizontal rock-shaft, F, which is arranged parallel with the plane of oscillation of the lever C, one of its journals being supported in a bearing, *g*, attached to the side of the boiler, and the other in a short tube, *h*, which is screwed into the head of boiler, the latter journal protruding through the outer end of the said tube *h*, and having firmly secured to it an arm or lever, G.

Around the journal which fits the tube *h* there is formed upon the rock-shaft a shoulder, which is pressed against the inner end of the said tube and caused to fit steam-tight thereto, and prevent leakage around the journal by the pressure of the steam on the opposite end of the rock-shaft. Within the boiler there is secured to the rock-shaft F an arm, *j*, which is connected with the lever C, between its fulcrum and the weight E, by means of a link, *k*, which is attached to the same arm and lever by means of universal joints. The arm *j* is adjustable lengthwise of the shaft and secured by a key, or its equivalent, and the upper universal joint of the link *k* is attached to a slide, *l*, which is adjustable lengthwise of the lever C to a position corresponding with that of the arm *j*, and secured by a set-screw, or its equivalent.

The extremity of the outer arm G of the rock-shaft is connected by a rod, *m*, with the lever or handle *n* of a cock or valve, L, placed in the suction pipe *p* of the feed-pump or with the throttle-valve of a donkey-engine used for working the feed-pump or water-pipe *p* of an injector or boiler feeder.

On one side of the rod *m* there is a tappet, 4, which is situated below one arm of an elbow-lever, *y*, which works on a fixed fulcrum, *q*, and the other arm of which is connected by a rod, *r*, with one arm of a second elbow-lever, *s*, which works on a fixed fulcrum, *t*. The other arm of this second lever is connected by a rod, *u*, with one arm of a lever, I, which works on a fixed fulcrum, *v*, and the other arm of this latter lever is connected by a rod, *w*, with a steam-whistle, J.

The operation of the apparatus is as follows: The float D, rising and falling with the level of the water in the boiler, produces a reversed movement of the opposite end of the lever C, and so causes a downward or upward movement of the arm *j* of the rock-shaft and a corresponding movement of the arm G, which acts through the rod *m* on the lever or handle *n* of the cock or throttle-valve L, and so produces a less or greater opening of the said cock or valve, and regulates the supply of water to the boiler as required, and if the water gets a certain level the cock or valve is closed entirely and the further supply cut off. If from the derangement of the feed pump, or from any other cause, the water in the boiler gets below a certain level, the tappet 4 on the rod *m* rises into contact with the lever *y*, and by its upward pressure thereon moves the said

lever in such manner that by means of the rod *r*, lever *s*, rod *u*, lever I, and rod *w*, the valve of the steam-whistle is opened and the whistle blown to give the alarm of low-water.

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

The float D, lever C, and counter-balance E, all within the boiler, in combination with the rock-shaft F, and its arms *j* G, the whole arranged substantially as herein described, to operate either upon a cock or throttle or other valve by which the operation of the pump or other feeder is controlled, or with a steam-whistle, or with both such cock or valve and whistle, for the purpose herein set forth.

RICHARD E. BOND.

Witnesses:

JOHN RUSSELL FITZ GERALD,

JOHN SLATER.