

No. 703,757.

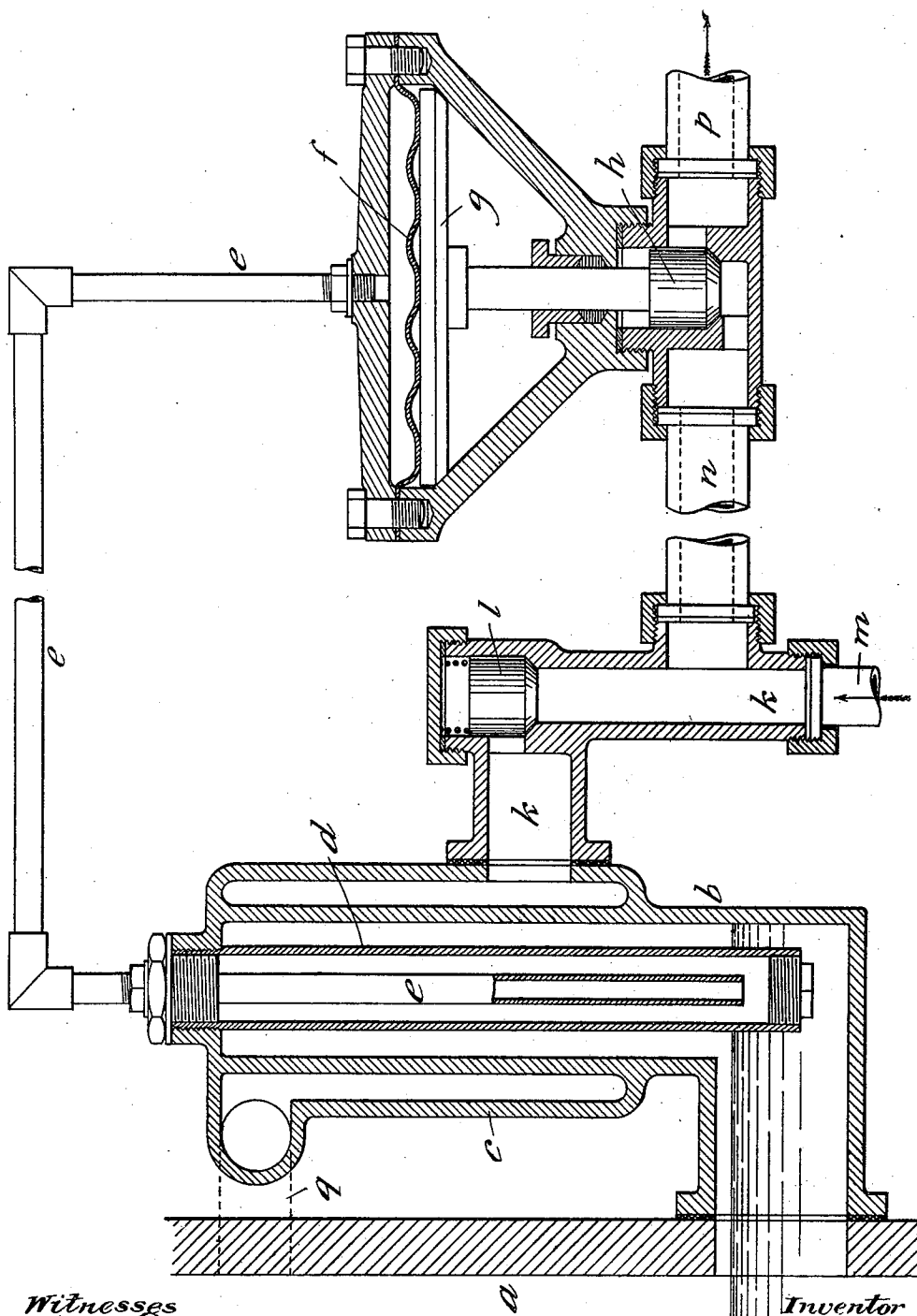
Patented July 1, 1902.

J. S. V. BICKFORD.

AUTOMATIC FEED REGULATOR FOR STEAM BOILERS.

(Application filed Mar. 7, 1902.)

(No Model.)



Witnesses
J. M. Corwin
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UNITED STATES PATENT OFFICE.

JOHN S. V. BICKFORD, OF CAMBORNE, ENGLAND.

AUTOMATIC FEED-REGULATOR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 703,757, dated July 1, 1902.

Application filed March 7, 1902, Serial No. 97,024. (No model.)

To all whom it may concern:

Be it known that I, JOHN SOLOMON VIVIAN BICKFORD, a citizen of England, residing at Camborne, in the county of Cornwall, England, have invented a certain new and useful Automatic Feed-Regulator for Steam-Boilers, (for which I have applied for a patent in Great Britain, dated August 15, 1901, No. 16,410,) of which the following is a specification.

My invention relates to an automatic feed-regulator for steam-boilers, being an apparatus by which a valve is automatically moved, so as to allow feed-water to enter a boiler when the water in the boiler sinks below the normal level and to stop the supply when the boiler-water rises above the normal level, as I shall describe, with reference to the accompanying drawing, which is a vertical section of apparatus according to my invention.

To the boiler *a*, at about the normal water-level, I connect by a pipe the lower end of a tubular vessel *b*, which is formed with an annular jacket *c*, that communicates at its upper part with the boiler, either directly, as indicated by the dotted lines *q*, or through a feed-heater. Within the vessel *b* is an inner closed tubular vessel *d*, and from near the bottom of this, which is closed, a pipe *e* leads to a chamber having as its bottom a flexible diaphragm *f*, which bears upon a disk *g*, resting on the stem of a valve *h*. The annular jacket of the vessel *b* communicates by a passage *k*, provided with a check-valve *l*, with the discharge-pipe *m* of the feed-pump, the passage *k* having a lateral by-pass *n* to the space under the valve *h*, from above which there is a passage to a pipe *p*, leading to the suction-pipe of the feed-pump, which being no part of my invention is not shown, as it may be of any known kind, or instead of which an injector may be employed.

The apparatus operates as follows: The vessel *d*, the pipe *e*, and the space above the dia-

phragm *f* being charged with water or other suitable liquid, if the water in the boiler is below normal level, as shown in the drawing, steam enters the vessel *b*, and the liquid in the inner vessel *d* is thus heated or partially vaporized. By the expansion and consequent increase of pressure transmitted by the pipe *e* the diaphragm *f* is depressed, so that the valve *h* is held to its seat, in which case the feed-water passes from the pipe *m* and passage *k*, raising the valve *l* into the jacket *c*, and thence into the boiler until the water-level in the boiler is raised above the mouth of the entrance into *b*. The vessel *b*, and in time the vessel *d*, being cooled by the fresh feed-water, the pressure on the diaphragm *f* is relieved, and the valve *h* rises from its seat, allowing feed-water to pass from *k*, through *n* and the pipe *p*, back to the suction of the feed-pump, instead of passing by *k* to the boiler.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

An automatic feed-regulator for a steam-boiler comprising a vessel communicating at its bottom with the boiler at the normal water-level, and having a jacket communicating with the boiler and through a check-valve with the feed-pipe, within the said vessel an inner vessel communicating with a space covered by a flexible diaphragm bearing upon the stem of a valve situated in a by-pass to the suction of the feed, arranged and operating substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN S. V. BICKFORD.

Witnesses:

TITO BECHERINE,
JOHN BARNARD.