

No. 730,951.

PATENTED JUNE 16, 1903.

A. G. MUMFORD & A. ANTHONY.

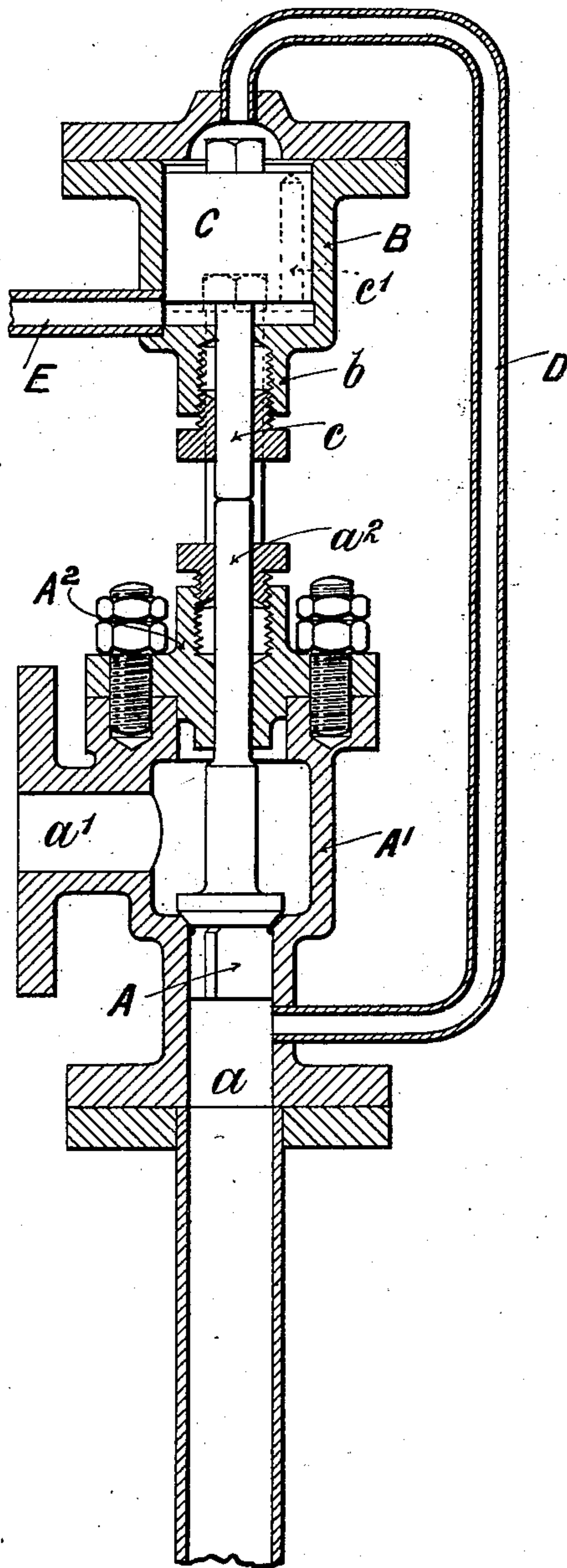
FEED WATER REGULATOR.

APPLICATION FILED FEB. 24, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

J. V. Symes.

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INVENTORS.

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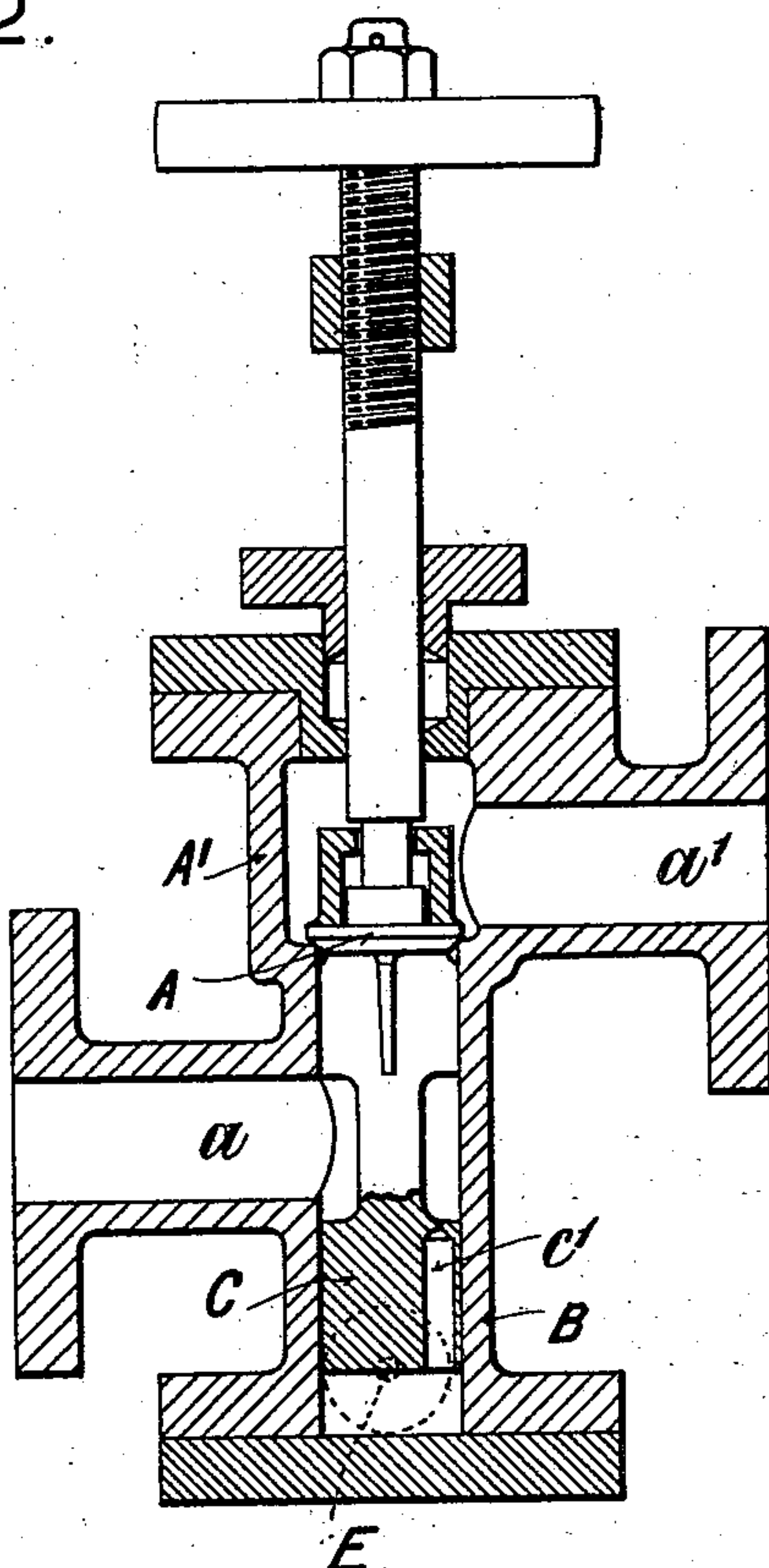
FEED WATER REGULATOR.

APPLICATION FILED FEB. 24, 1903.

NO MODEL.

3 SHEETS—SHEET 2.

FIG. 2.



WITNESSES:

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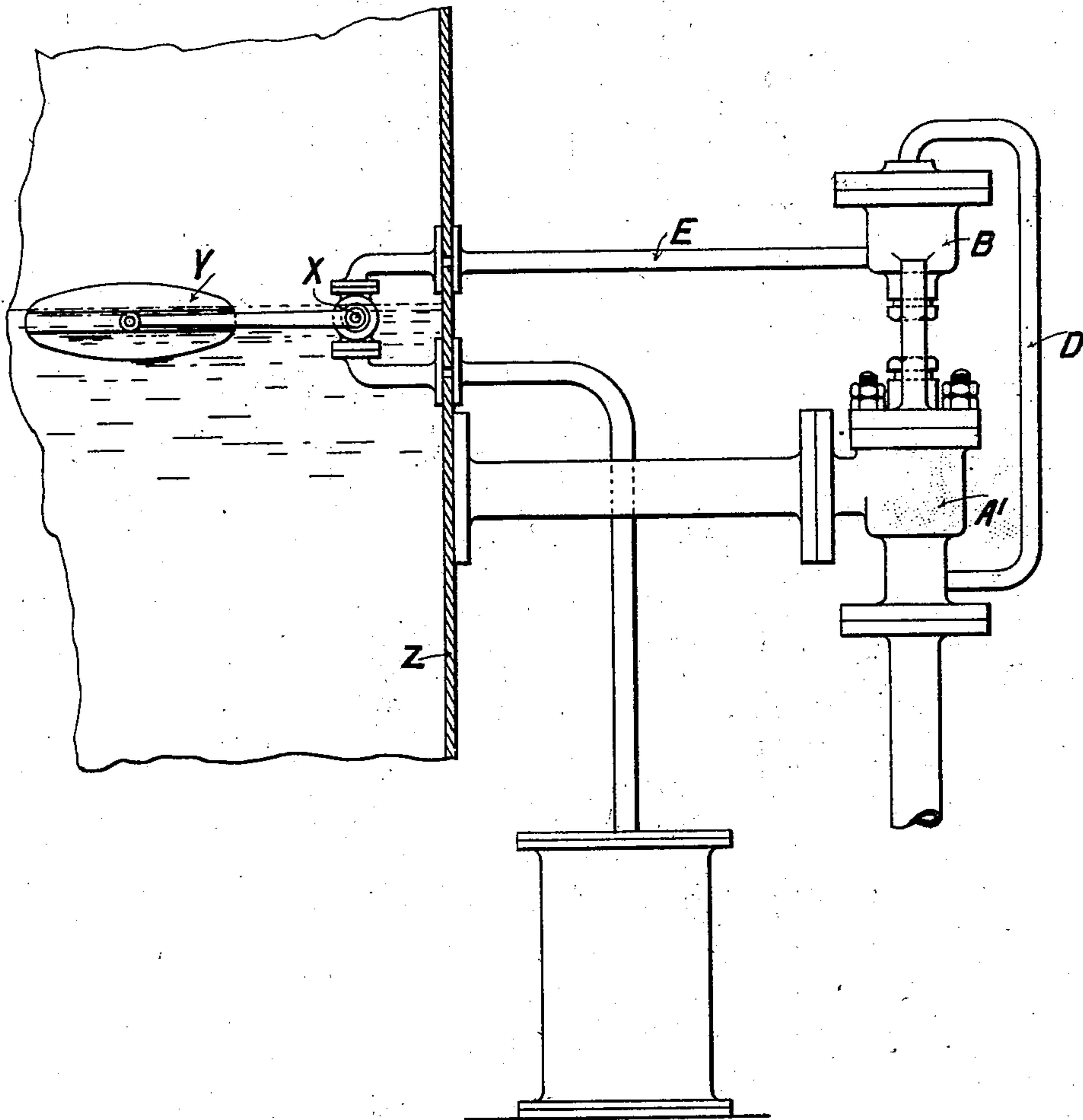
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NO MODEL.

3 SHEETS—SHEET 3.

Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ARTHUR GEORGE MUMFORD AND ALFRED ANTHONY, OF COLCHESTER,
ENGLAND.

FEED-WATER REGULATOR.

SPECIFICATION forming part of Letters Patent No. 730,951, dated June 16, 1903.

Application filed February 24, 1903. Serial No. 144,905. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR GEORGE MUMFORD, engineer, of the Culver Street Iron Works, Colchester, and ALFRED ANTHONY, engineer, of Beaconsfield avenue, Colchester, in the county of Essex, England, subjects of the King of Great Britain, have invented a new and useful Improvement in Feed-Water Regulators for Steam-Generators, (for which we have applied for Letters Patent in Great Britain by an application dated the 19th of July, 1902, and numbered 16,097,) of which the following is a full and complete specification.

This invention relates to an improved feed-water regulator for steam-generators, and it comprises an ordinary non-return valve, such as is commonly employed between the feed-pump and the boiler, a cylinder in axial alignment with said valve, a piston working in a cylinder and connected directly or indirectly with the non-return valve, a pipe or passage connecting the upper end of said cylinder with the casing of the non-return valve below said valve, pipe connecting lower end of said cylinder with the atmosphere, a valve controlling the outlet of said pipe, and a float operating said valve actuated by the variations in the water-level in the boiler.

In the accompanying drawings, which illustrate this invention, Figure 1, Sheet No. 1, is a view in sectional elevation of one form the invention may assume. Fig. 2, Sheet No. 2, is a view in sectional elevation of an alternative construction; and Fig. 3, Sheet No. 3, is a view showing the general arrangement of the parts.

In the views similar parts are marked with like letters of reference.

The non-return valve A is mounted in a suitable casing A', having a flanged opening *a* for the attachment of the pipe connected to the feed-pump and a flanged opening *a'* for the attachment of the pipe leading to the boiler.

The stem *a*² of the valve A is of such a length that it projects through a suitably-arranged stuffing-box A². Above the casing A' and attached to or supported by it is a cylinder B, in which is a piston C, having a greater area than the valve A. The piston C either has a small hole or passage *c'* through it, or it is of

such a fit in the cylinder B that water can leak through or past it from one end of the cylinder to the other. The rod *c* of the piston passes out through the lower end of said cylinder through a suitably-arranged stuffing-box *b*, the length of said piston-rod being such that it rests on the top of the stem of the valve A when the piston is in about mid-position in the cylinder, the clearance-space at each end being but slight. The upper end of the cylinder B is in communication with the casing A' below the non-return valve A by means of a pipe D, and the lower end of said cylinder has a free outlet which may be in communication with the hot well, feed-tank, or other sources of feed-supply by means of a pipe E, the orifice of which is closed by any suitable form of valve X, controlled by a float Y, operated by the rise and fall of the water-level in the generator Z.

The action of the apparatus is as follows: As the feed-pump delivers water to the non-return valve A to force it into the boiler it also delivers it to the top of the cylinder B by means of the pipe D, and thereby exerts pressure on the upper side of the piston C. As, however, this piston has an area in excess of that of the non-return valve, the pressure of the water on the said piston acts to keep the said non-return valve tightly closed. The piston C, however, being arranged to allow a certain amount of water to leak through or past it, the space in the cylinder below it will gradually become filled with water if the outlet of the pipe E is closed. By this means the pressure on each side of the piston will be equalized, which will allow the non-return valve A to be lifted by the pressure of the feed-pump, and thus permit water to pass into the generator. When the level of the water in the generator rises to its predetermined height, the float Y operates the valve X, regulating the outlet of the pipe E, so as to open said outlet, thereby allowing the water accumulated in the cylinder under the piston to flow away, whereby the pressure on the upper side of the piston is again increased and said piston operated to close said non-return valve and hold it tightly on its seating.

It will be seen that as soon as the float Y falls, closing the outlet of the pipe E, the

piston C is restored to a state of equilibrium, so that the non-return valve A can lift to admit the feed-water into the generator; but when the float Y rises it opens outlet in
 5 said pipe and by allowing the water in the cylinder under the piston to flow away increases the pressure on the top of said piston, causing it to operate to close and retain the non-return valve tightly on its seating. It
 10 will be apparent that the greater the pressure exerted by the feed-pump the tighter the non-return valve is held on its seating, so that no water can be forced into the generator when the valve has been shut by the regulator.

15 In the modification shown in Fig. 2 the cylinder B is made in one with the casing A', and the piston C is made in one with the valve A', the feed-water being admitted between the valve and the piston—i. e., under
 20 the valve and above the piston. In this construction the area of the piston need not be greater than that of the valve, as the pressure of the feed-water acts both ways—namely, downward on the piston and upward on the
 25 valve. It is thus perfectly balanced. As the whole pressure in the generator is on the upper part of the valve the said valve is kept tight on its seat, and no matter how much the pressure in the feed-pipe is increased it does
 30 not alter the conditions and no water can be forced into the generator. As, however, a certain amount of water leaks through the hole in the piston or past said piston, it gradually fills up the space beneath the piston, so
 35 that the pressure on the upper side of said piston is balanced, thereby allowing the pressure on the under side of the valve to lift it and allow the water from the feed-pump to pass into the generator. This construction
 40 permits of the easy application of a device for opening and closing the valve by hand when necessary.

What we claim, and desire to secure by Letters Patent, is—

45 1. A feed-water regulator for steam-generators, comprising a non-return valve located between the feed-pump and the generator, a cylinder having one end open to the pressure of the feed-water and the other end having a
 50 free outlet, a piston working in said cylinder the rod of which contacts the stem of the non-return valve, means of leakage from one end of the cylinder to the other through or past said piston, and a valve-controlling outlet of cylinder said valve being opened and
 55 closed by the rising and falling of the water-level in the generator, as set forth.

2. In a feed-water regulator for steam-generators, the combination with a non-return
 60 valve located between the feed-pump and the generator, of a cylinder fitted with a piston the rod of which contacts the stem of the non-

return valve, of a pipe or passage connecting the end of said cylinder behind the piston with the casing of the non-return valve beneath said valve, of means of leakage through
 65 or past said piston from one end of cylinder to the other, of an outlet-pipe leading from end of cylinder in front of piston of a valve-controlling orifice of said pipe, and of a float
 70 operating said valve by the rise and fall of the water-level in the generator, as set forth.

3. In a feed-water regulator for steam-generators, the combination with a non-return valve located between the feed-pump and the
 75 generator, of a cylinder fitted with a piston having a greater area than the non-return valve, of a rod connected to said piston which contacts the stem of the non-return valve, of
 80 a pipe or passage connecting the end of said cylinder behind the piston with the casing of the non-return valve beneath said valve, of means of leakage through or past said piston from one end of cylinder to the other, of an
 85 outlet-pipe leading from end of cylinder in front of piston, of a valve-controlling outlet of said pipe, and of a float operating said valve by the rise and fall of the water-level in the generator, as set forth.

4. In a feed-water regulator for steam-generators, the combination with a casing forming both a valve-chamber with seating and a cylinder for the regulating-piston, of a non-return valve and a piston formed or arranged
 90 to act in unison, of a feed-inlet located between the valve and the piston, of a feed-outlet located above the valve, of means for the water above the piston to leak through or
 95 past it to the other end of the cylinder, of an outlet in said other end of cylinder adapted to be opened and closed by the rising and falling of the water-level in the generator, as set forth.

5. In a feed-water regulator for steam-generators, the combination of a non-return valve
 105 mounted in a casing and having a feed-inlet below it and a feed-outlet above it, of a cylinder one end of which is in communication with the casing below the valve and the other end of which has an outlet to the atmosphere,
 110 of a piston working in said cylinder and having a rod contacting with the stem of the non-return valve, of means of leakage from one end of the cylinder to the other through or past the piston, of a valve in the outlet of the
 115 cylinder, and of a float in the generator or in a chamber in connection therewith operating said valve, as set forth.

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Witnesses:

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