

(No Model.)

2 Sheets—Sheet 1.

T. BELCHER.

STEAM AND AIR FEEDING DEVICE FOR FURNACES.

No. 537,962.

Patented Apr. 23, 1895.

Fig. 3.

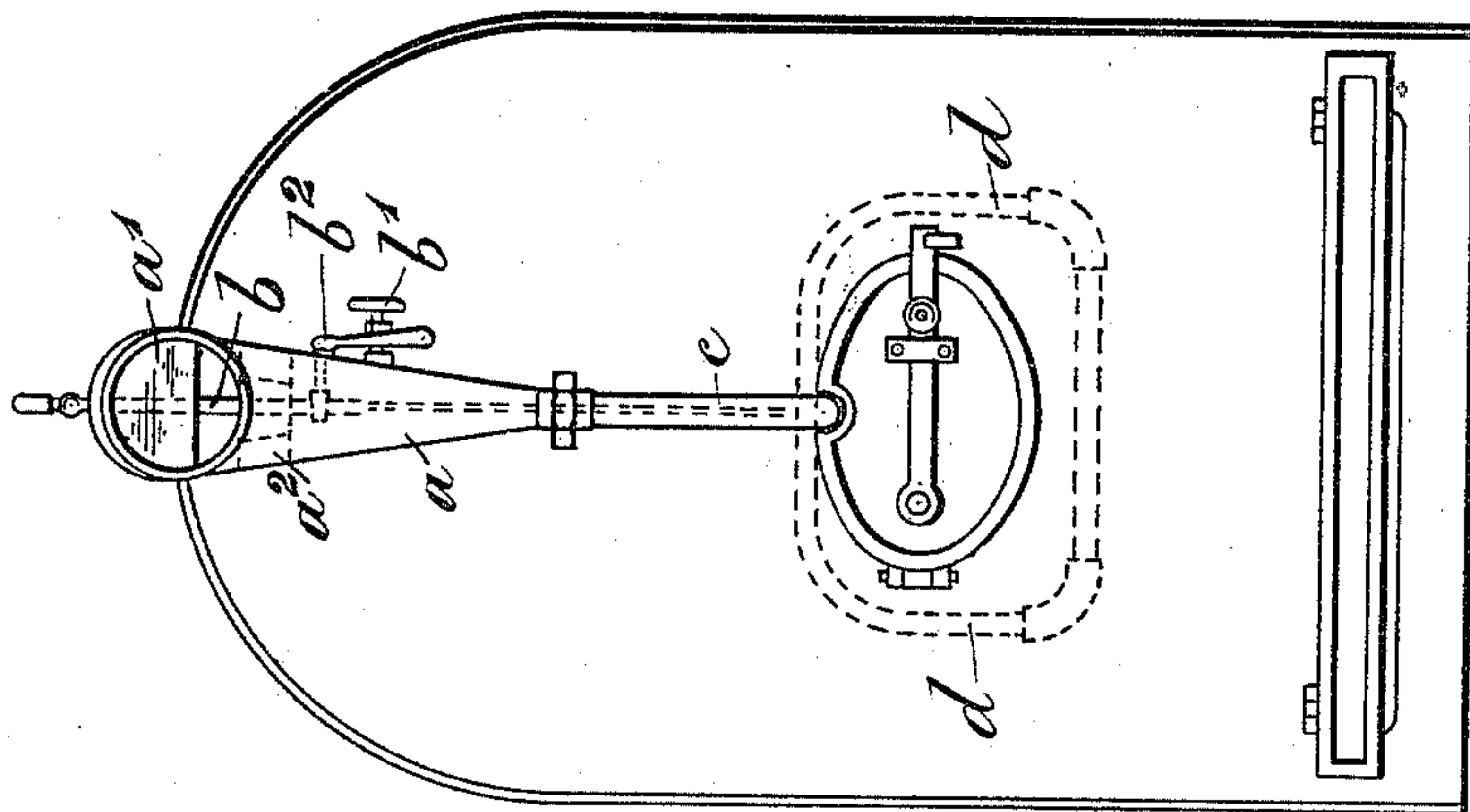


Fig. 2.

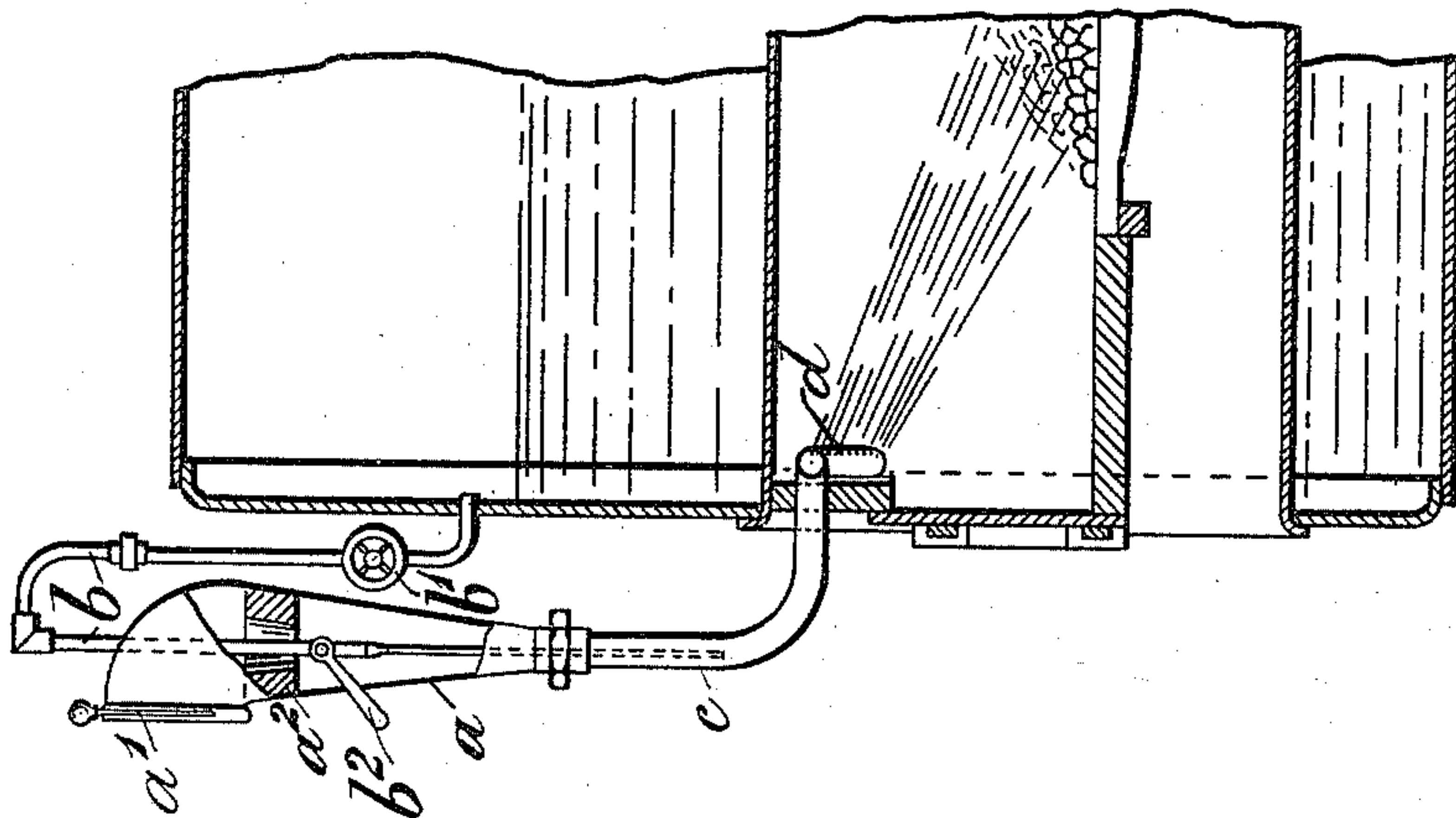
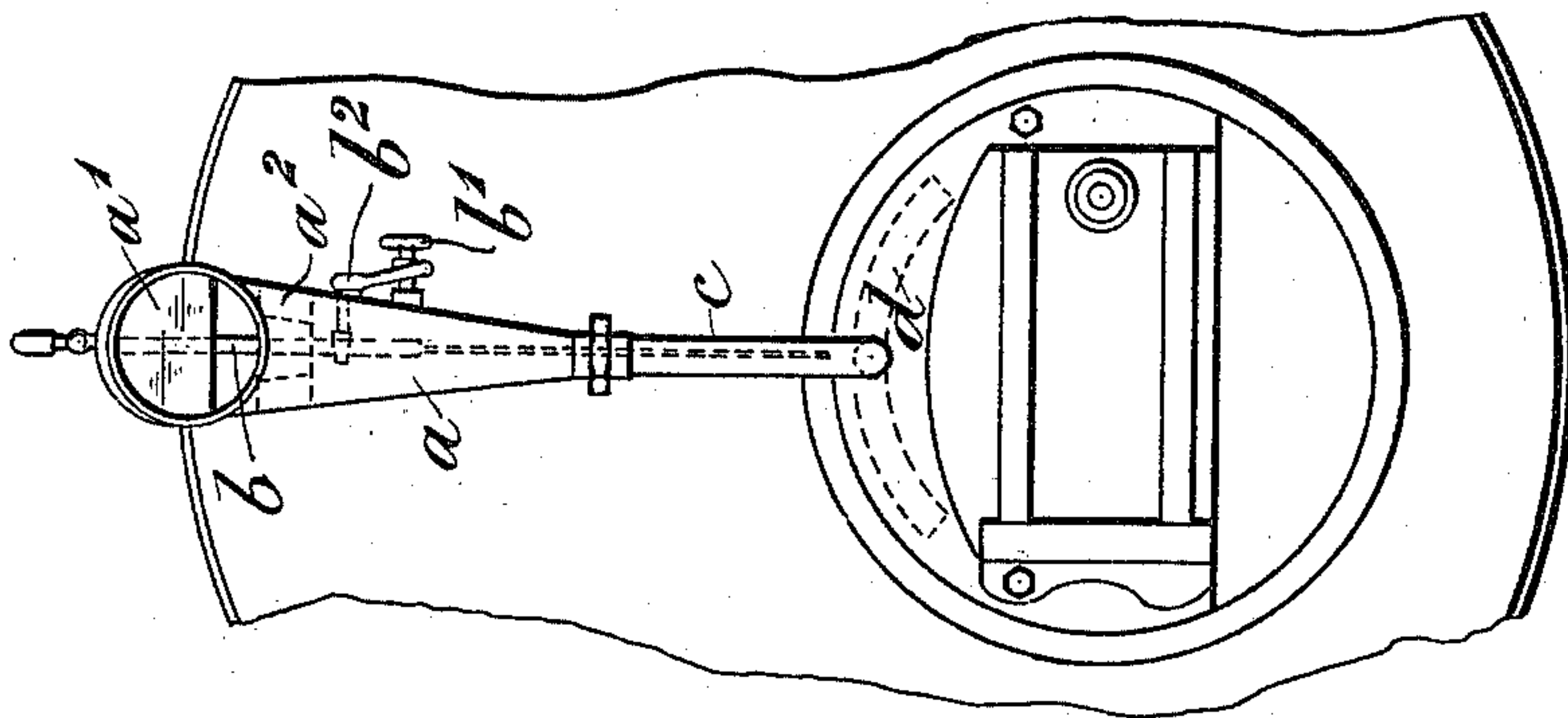


Fig. 1.



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Fig. 5.

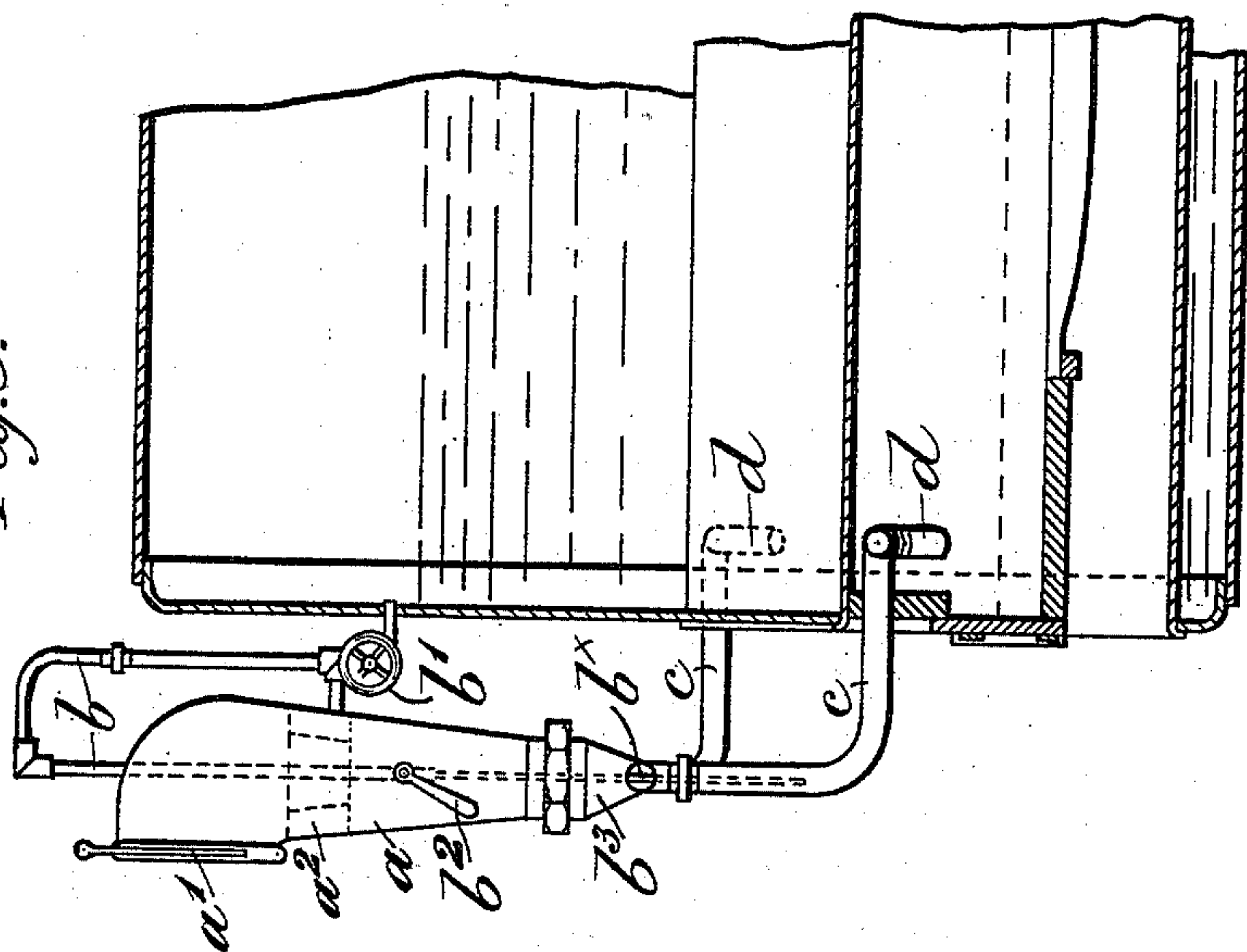
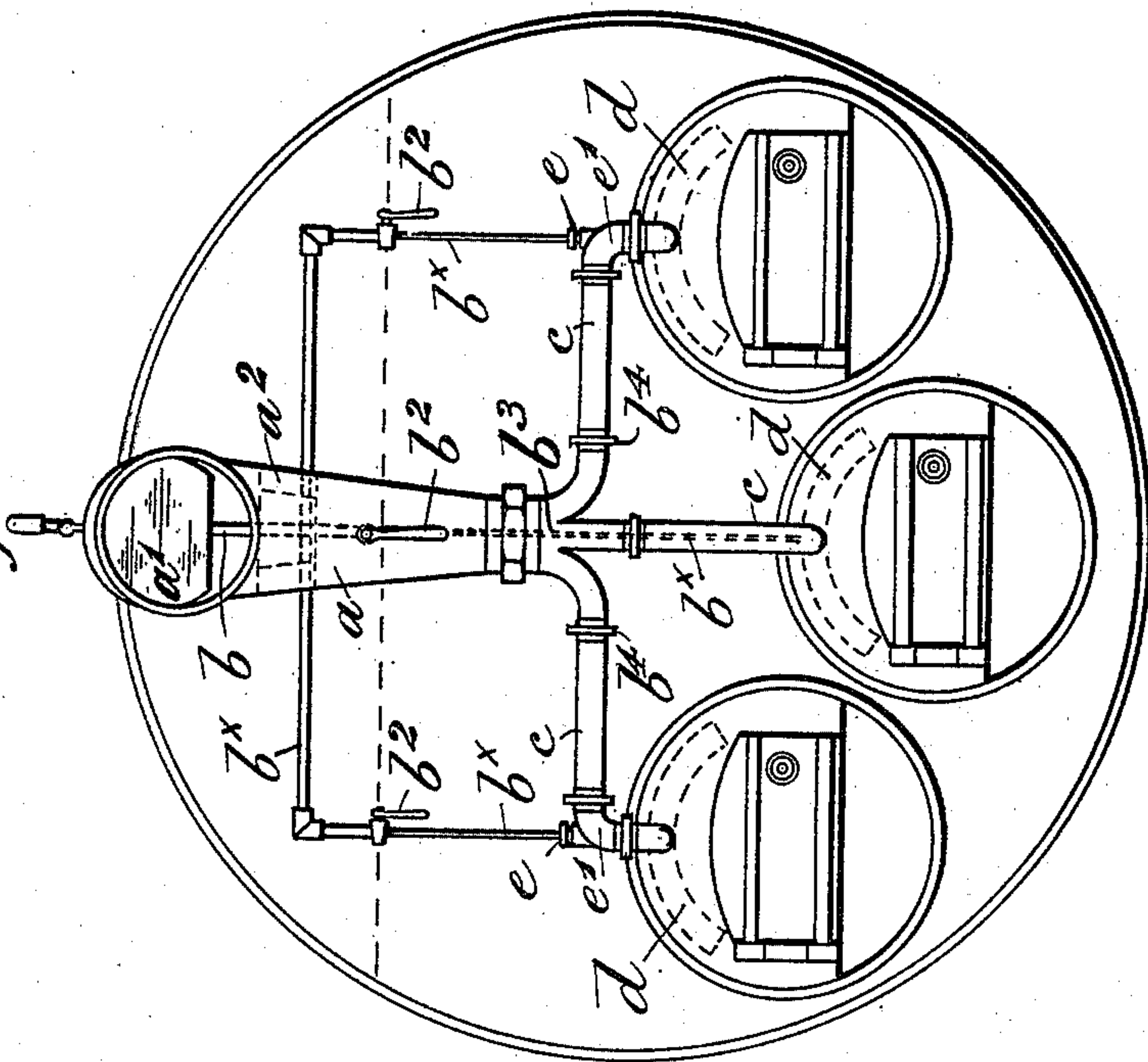


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS BELCHER, OF LONDON, ENGLAND, ASSIGNOR TO THE BELCHER'S PATENT SMOKE PREVENTER COMPANY, LIMITED, OF SAME PLACE.

STEAM AND AIR FEEDING DEVICE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 537,962, dated April 23, 1895.

Application filed August 3, 1894. Serial No. 519,399. (No model.) Patented in England May 17, 1892, No. 9,340.

To all whom it may concern:

Be it known that I, THOMAS BELCHER, a subject of the Queen of Great Britain and Ireland, residing at London, England, have invented certain new and useful Improvements in Steam and Air Feeding Devices for Furnaces, (the same having been patented in Great Britain May 17, 1892, No. 9,340,) of which the following is a specification.

This invention relates to improvements in apparatus for preventing smoke and promoting combustion in steam boiler furnaces, and has reference more particularly to that class of apparatus in which a mixture of steam and air is injected onto the burning fuel.

The improved apparatus about to be described comprises a conical or trumpet-shaped air collector, a steam pipe, leading from the steam space of the boiler, for the purpose of inducing a current of air, an air pipe or bend forming a continuation of the air collector, or connected therewith at an angle by a suitable union, and extending into the furnace, and a suitably shaped spreader or distributor, terminating said air pipe or bend, and through which the mixture of steam and induced air is projected onto the burning fuel. The said conical or trumpet shaped air collector may be arranged either vertically, or horizontally, or in any other convenient position, and is provided with a damper, and, if desired, with means for deadening the noise caused by the inrushing air. If the boiler has more than one furnace, each furnace would be provided with a separate steam pipe and spreader, and, if desired, one or more trumpet shaped air collectors may be employed.

In the drawings, Figure 1 is a front elevation of a cylindrical boiler having a single furnace provided with the improved apparatus. Fig. 2 is a vertical central section thereof, portions of the apparatus being shown in elevation for sake of clearness. Fig. 3 is a front elevation, corresponding to Fig. 1, but showing the invention applied to a locomotive type of boiler. Fig. 4 is a front elevation showing the arrangement of apparatus I employ with a triple furnaced boiler, say for marine purposes; and Fig. 5 is a vertical central section thereof, certain of the parts being shown in elevation.

Like letters of reference indicate similar parts in all the figures.

Referring to Figs. 1 and 2, *a* is the trumpet-shaped air collector provided with a damper *a'*, and with a cone *a²*, or like device, for deadening the noise caused by the inrush of air. *b* is the steam pipe provided with a shut-off cock *b'*, and regulating-cock *b²*. It enters the air collector at its upper part, and the continuation of this steam pipe, below the regulating cock, is of reduced diameter. *c* is the air pipe or bend in which the steam pipe *b* terminates, and which passes through an aperture in the frame of the furnace door, or otherwise, into the furnace, where it is provided with a spreader or distributor *d*, of curved or arc shape, having perforations directed toward the fire bars.

In the arrangement shown in Fig. 3, the same apparatus is employed, with the exception that the spreader *d* is of approximately square or rectangular shape, and the mixture of steam and air is discharged all round the spreader.

In Figs. 4 and 5 the steam pipe *b* has three branches *b^x*, one for each furnace, and the cock *b'* serves to shut off steam from all the branches simultaneously while the cocks *b²* serve to enable the flow through each branch to be regulated, as desired, independently of the others. From the base of the trumpet-shaped air collector *a*, three air pipes or bends *c* extend, one to each of the three furnaces of the boiler, the connection with the air collector being effected by means of a specially shaped three-way piece *b³* provided with unions *b⁴*. The steam pipe for the central furnace is led down the trumpet-shaped air collector in the same manner as shown in Fig. 1, but the steam pipes for the other furnaces pass direct into their air pipes through stuffing boxes *e*, formed on elbows *e'*, and without entering the air collector. By this arrangement the furnaces can be dealt with separately, or all together. If desired, however, a separate and independent air collector, with its connected parts, may be used for each furnace, and be arranged as shown in Fig. 1.

The action of the apparatus is as follows:— The shut-off cock *b'*, and regulating cock (or cocks) *b²*, being open, steam enters the pipe

b (or pipes b^x), and discharges into the pipe (or pipes) c , thereby drawing air down the air collector a and causing a mixture of steam and air to be projected through the perforations in the spreader (or spreaders) d , on to the burning fuel, with the result that the production of black smoke is stopped in a very short time, combustion promoted to a very great extent, and economy of fuel is effected.

10 In the drawings I have shown an apparatus for supplying a single furnaced boiler, and a triple furnaced boiler, yet it is obvious that the same arrangement may be applied to a double furnaced boiler, or to boilers having
15 more than three furnaces.

I do not wish to limit myself to the particular location of the air collector or air pipe shown as changes may be made in the relative arrangement of the parts without departing from my invention.

20 What I claim, and desire to secure by Letters Patent of the United States, is—

In an apparatus for preventing smoke and promoting combustion in steam boiler furnaces, the combination of a trumpet shaped
25 air collector a having a damper a' and silencing cone a^2 , an air pipe c leading from the air collector into the furnace, a perforated tubular spreader or distributor d , of curved or other suitable shape, at the end of such air pipe,
30 inside the furnace, and a steam pipe b having a shut off cock b' and a regulating cock b^2 and passing concentrically through the air collector and silencing cone, and terminating in the air pipe c , substantially as described. 35

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THOMAS BELCHER.

Witnesses:

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