

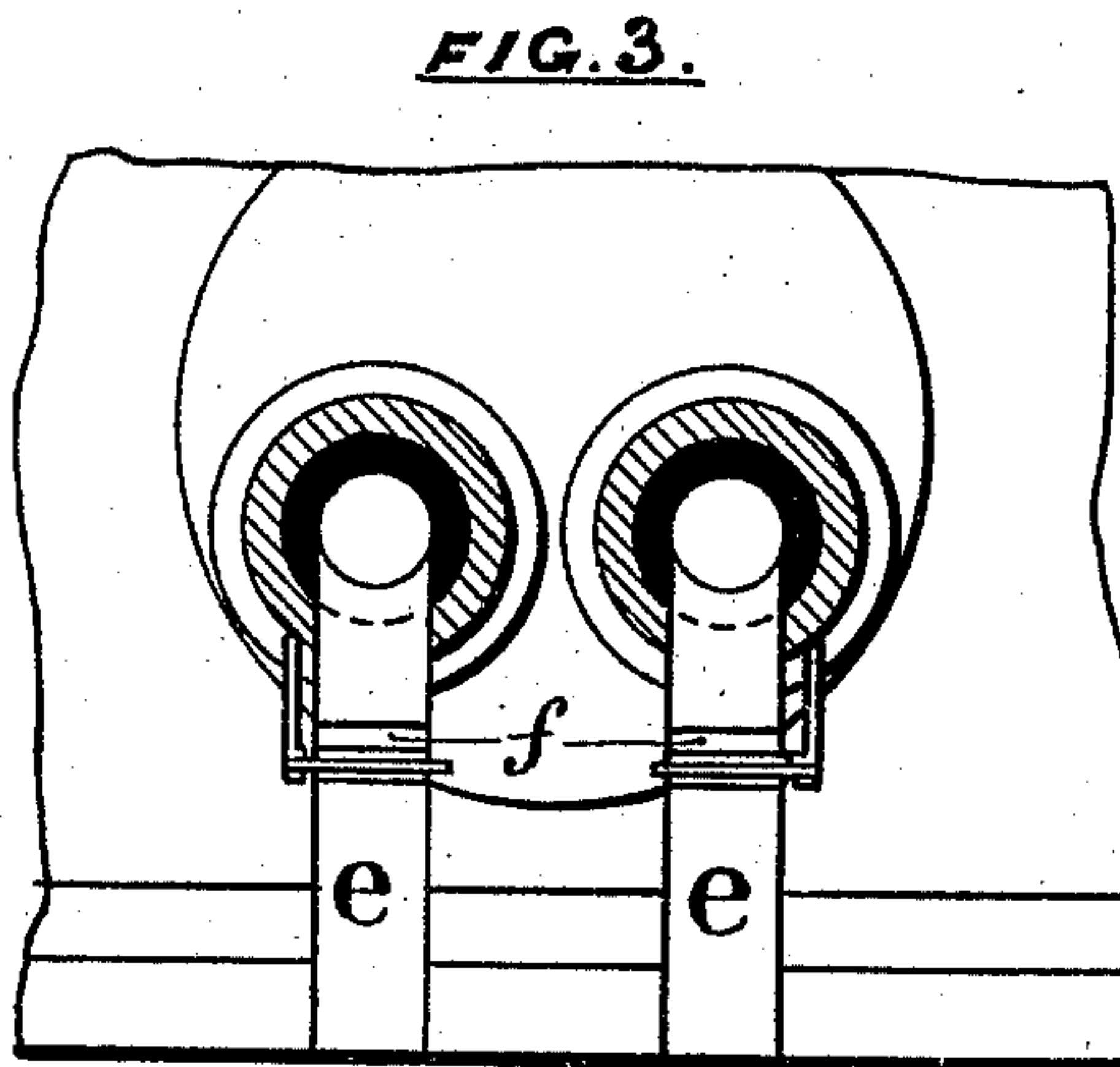
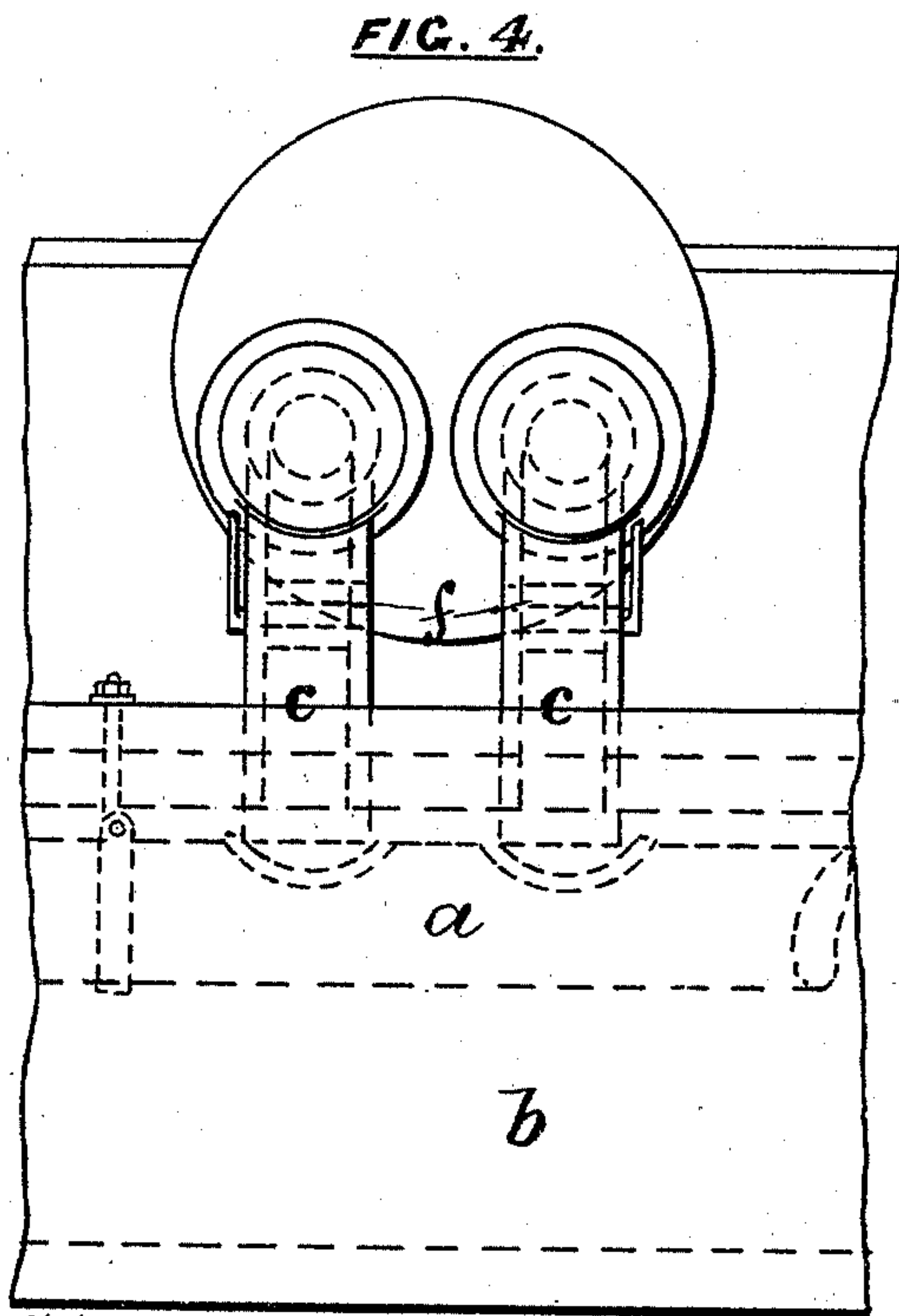
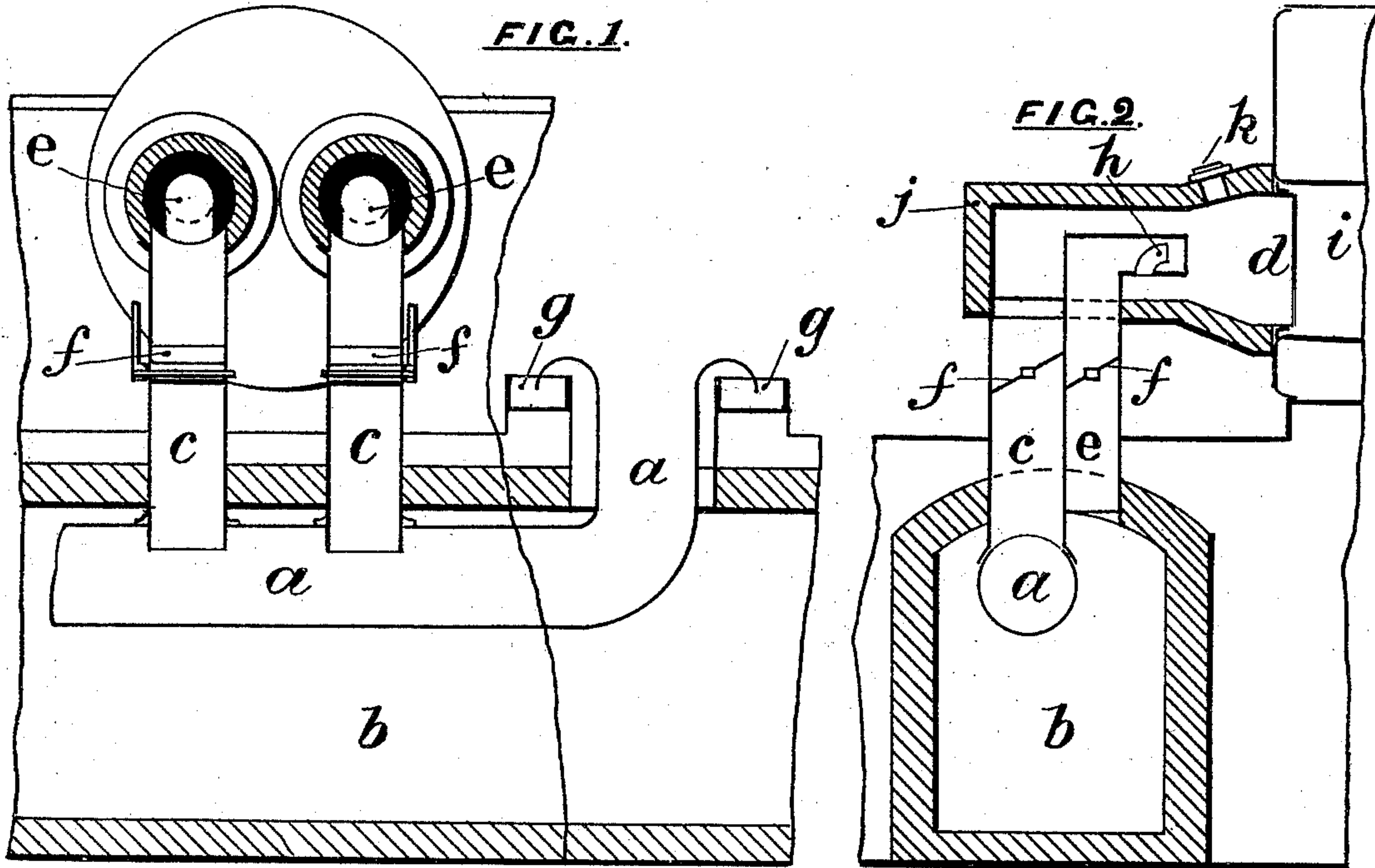
(No Model.)

2 Sheets—Sheet 1.

R. POTTER.
AIR HEATING DEVICE FOR FURNACES.

No. 492,428.

Patented Feb. 28, 1893.



Witness:
E. H. Sturtevant
Robert Thurnell

Inventor.
Richard Potter
By *Richard A. [Signature]*
attys

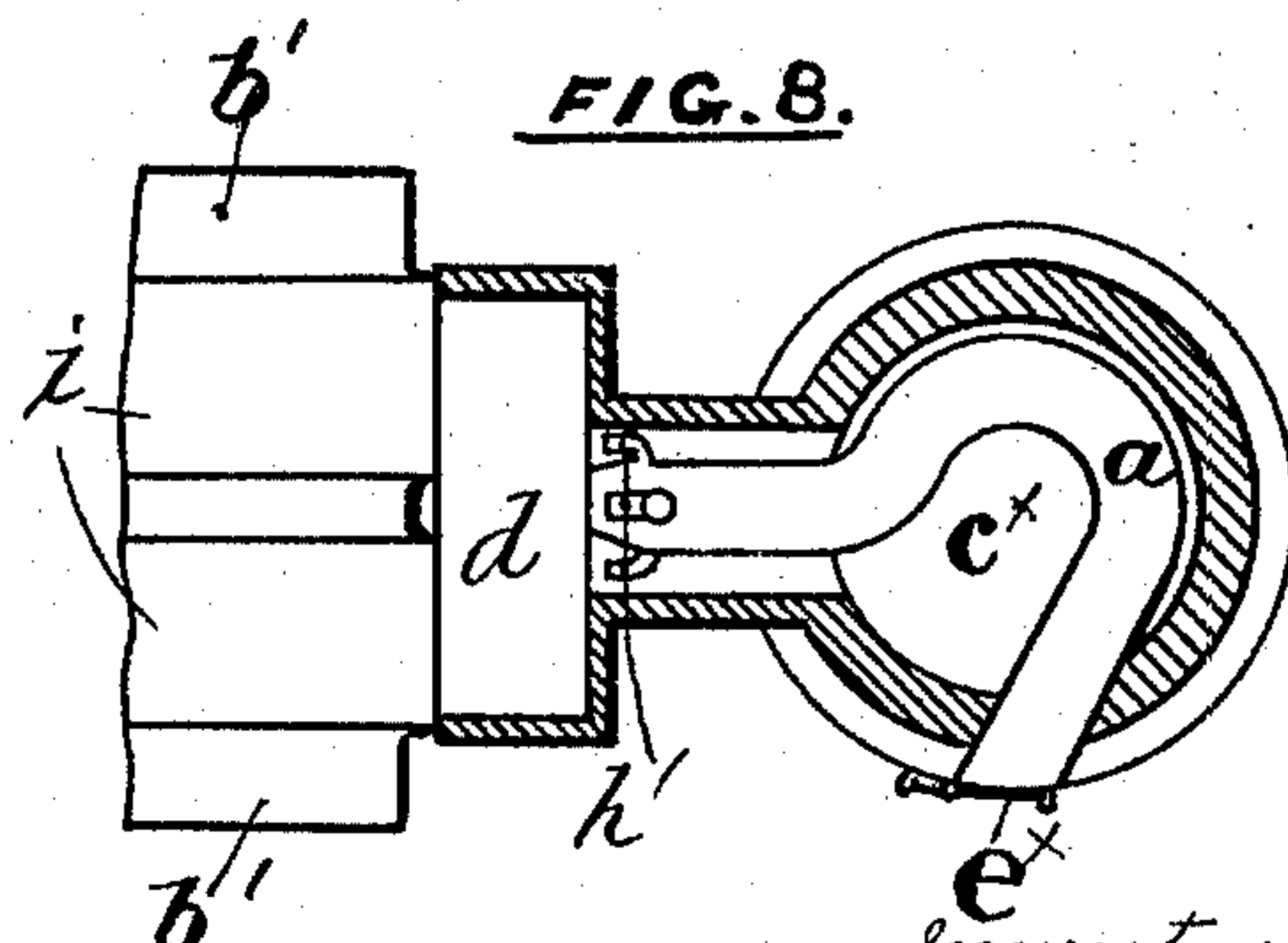
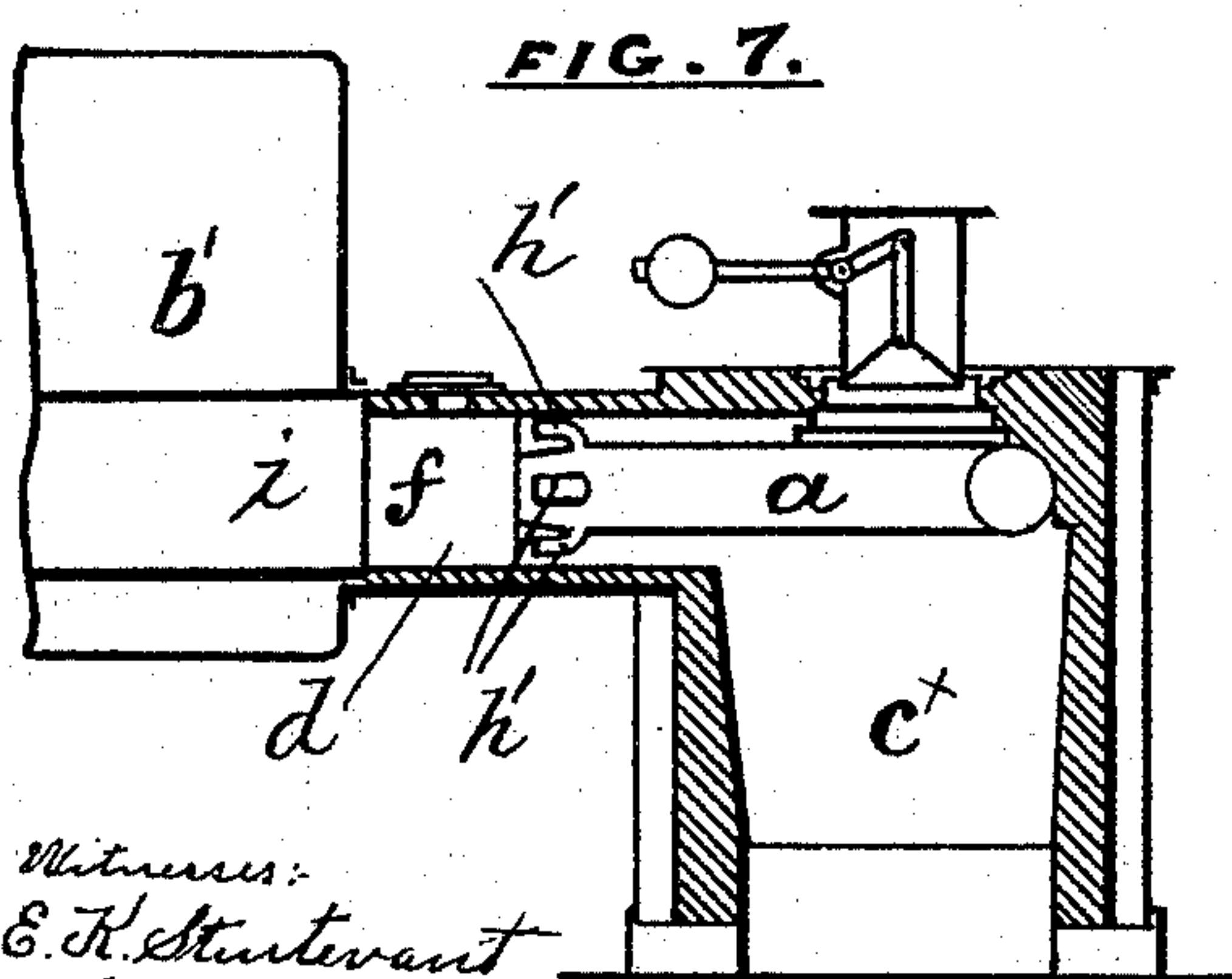
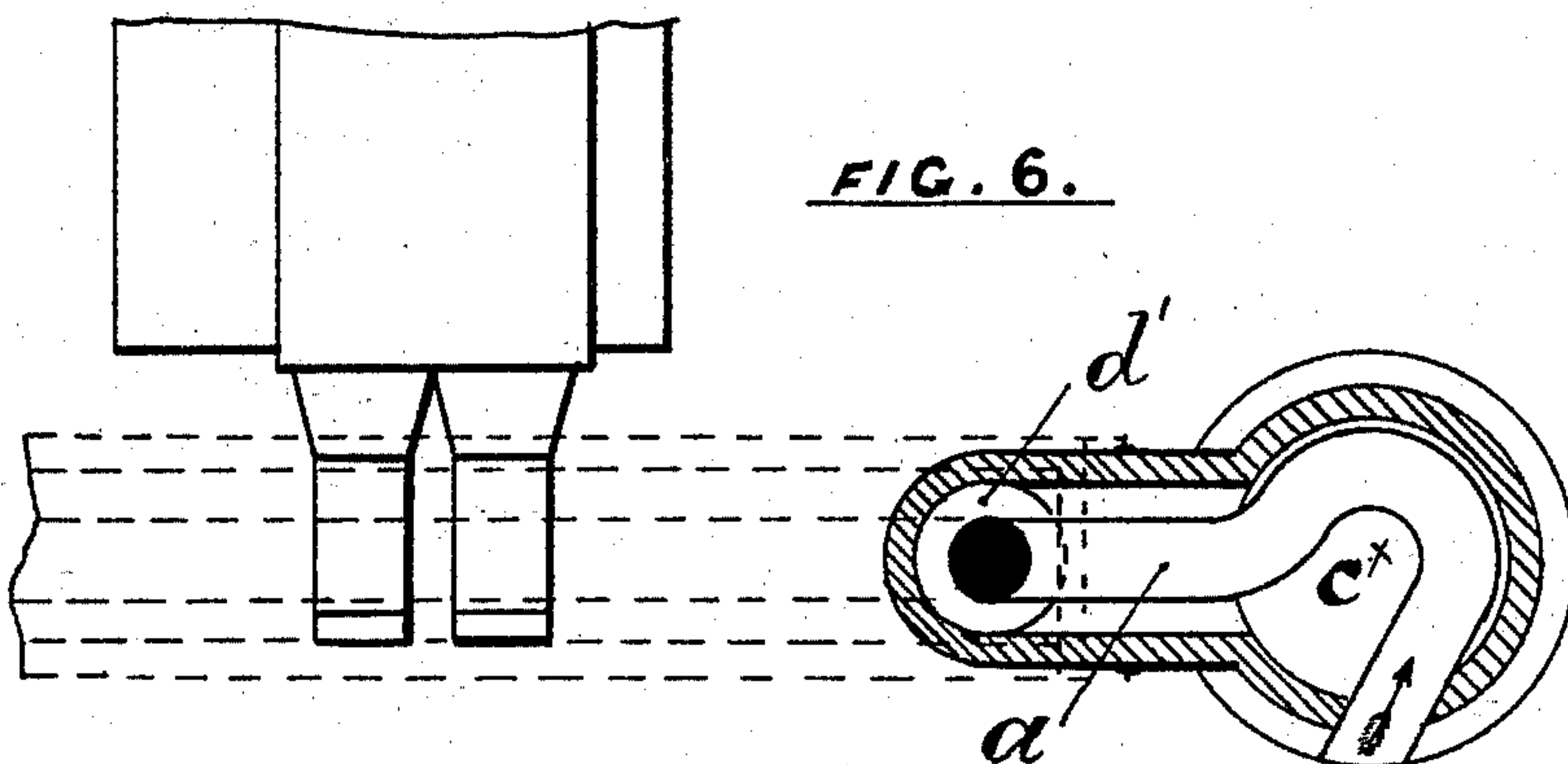
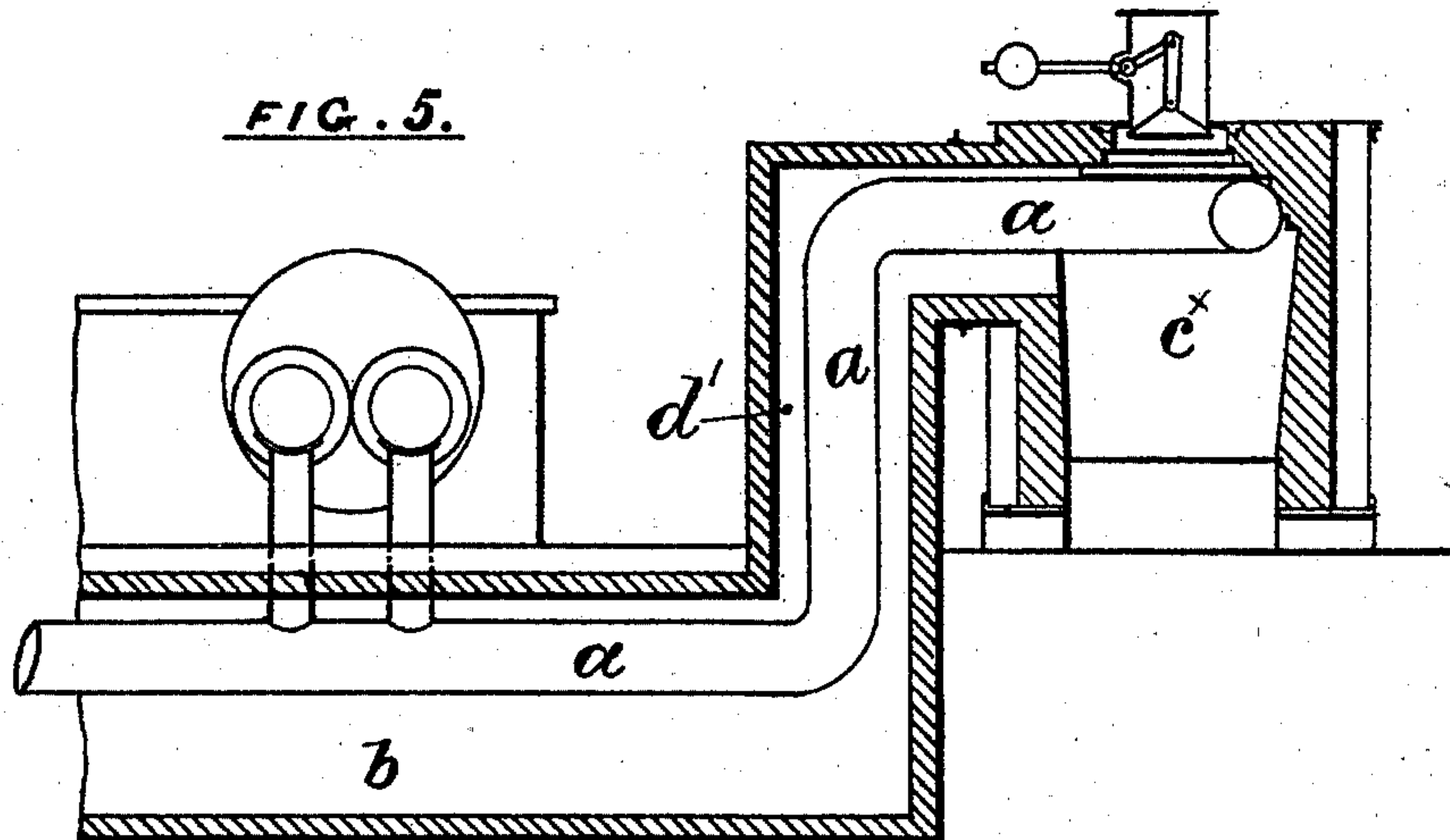
(No Model.)

2 Sheets—Sheet 2.

R. POTTER.
AIR HEATING DEVICE FOR FURNACES.

No. 492,428.

Patented Feb. 28, 1893.



Witnesses:
E. H. Sturtevant
Robert Russell.

Inventor:
Richard Potter
by Richard D. [signature]
att'y.

UNITED STATES PATENT OFFICE.

RICHARD POTTER, OF ARDSLEY, NEAR BARNESLEY, ENGLAND.

AIR-HEATING DEVICE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 492,428, dated February 28, 1893.

Application filed October 15, 1892. Serial No. 449,040. (No model.)

To all whom it may concern:

Be it known that I, RICHARD POTTER, furnace-builder, a subject of the Queen of Great Britain, residing at Ardsley, near Barnesley, in the county of York, England, have invented certain Improved Air-Heating Devices for Furnaces, of which the following is a specification.

My invention relates to certain improved and useful means for heating air in connection with steam boilers such as are heated by gaseous fuel, and has for its object the securing in an improved manner a better and more even combustion of the gases used in firing steam boilers together with greater economy in the consumption of fuel, and by the means of this invention complete combustion of the fuel, perfect ignition, and a thorough commingling of the hot air with the gaseous fuel, are effected.

I attain the object of my invention by the apparatus or arrangements of mechanism illustrated in the accompanying drawings.

Figures 1, 2, and 3 are sectional elevations, and Fig. 4 is an end elevation of a double flued steam boiler with my invention applied thereto. Fig. 5, is a sectional view of a gas producer with its connection to a steam boiler parts being in side elevation. Fig. 6, is a plan view of the same partly in section, and Figs. 7 and 8 are views similar to Figs. 5 and 6 of a modification.

Throughout the drawings similar letters refer to similar parts in the figures.

b, is the gas flue or conduit which is connected at any convenient point with the gas producer (as illustrated in Fig. 5) or with the blast furnace, or with any system of generating gaseous fuel. Within this gas flue *b*, is suspended a wrought iron or steel tube *a*, through which air for causing combustion passes and becomes highly heated in its course by the hot gases carried from the point of generation to the point of ignition along the gas flue *b*. At the incoming end of the air tube *a*, an expansion joint is formed by curving outward the extreme end of the tube so that it dips into the water seal *g*, as shown.

c, is a branch tube or pipe connecting the air tube *a*, with the combustion chamber *d*.

e, is a short branch tube or pipe connecting the gas flue *b*, with the combustion chamber *d*.

To regulate the flow of hot air and the gases respectively in the branch tubes *c*, *e*, the valves *f*, *f*, are provided. Near the delivery end of the branch tube *e*, a smaller air tube *h*, is fixed. This arrangement of tubes constitutes an annular burner as a jet of hot air from the small tube *h*, is thrown into the center of the incoming stream of gases from the branch tube *e*, resulting in a mixture of the elements by which complete combustion is accomplished.

The combustion chamber *d*, is constructed in a conical form having its widest end connected to the boiler tubes *i*; by this arrangement the flame is allowed room to expand and is assisted by the heat maintained in the fire-brick lining *j*, so that combustion is attained before the flame comes in contact with the surface of the boiler tubes *i*.

k, is a sight or inspection door placed conveniently above and near the end of the ignition part of the combustion chamber *d*, and through which a lighted torch can be introduced to set up ignition. In this arrangement the wrought iron or steel tube *a*, is first fixed inside the gas producer *c*^x, and is carried down the annular tube *d'*, and along the gas flue or conduit *b*, where the same means are adopted for causing ignition and complete combustion as shown and described with reference to Figs. 1, 2, 3, and 4 on Sheet 1.

In Figs. 7 and 8 there is shown an arrangement of the hot air tube *a*, within a gas producer *c*^x, and a simple method of mixing the gases and hot air. The producer *c*^x, is placed in front of the steam boiler *b'*, the air tube *a*, has a regulating door *e*^x, at its delivery end. Near the combustion chamber *d*, a number of small tubes *h'*, are inserted for the purpose of better mingling the hot air effectually among the gases; the combustion chamber *d*, is lined with fire bricks which assist ignition, the flame passes out of the combustion chamber into the boiler tubes *i*, and is carried through and around the boiler in the usual manner.

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

1. In combination, the steam boiler, the gas conduit, leading thereto, the air flue extending through said conduit to the steam boiler and out through the side of the conduit to the open air, the said tube having its edges at its

inlet end curved back and the water seal *g*, on the gas conduit into which said edge extends, substantially as described.

2. In combination, the steam boiler, the gas
5 conduit extending across one end of the boiler, the air flue, *a*, extending through the gas conduit and the branch pipes *c*, *e*, extending respectively from the air flue and gas conduit and at right angles thereto each of said branch
10 pipes having a valve and having their discharge openings arranged to discharge the air and gas to the boiler, substantially as described.

3. In combination, the steam boiler, the
15 combustion chamber fitted to the fire tube

thereof, the gas conduit the tube *e*, leading therefrom to the combustion chamber and centrally of the latter the air flue *a*, extending through the gas conduit, the tube *c*, extending therefrom to the combustion chamber and the
20 jet tube *h*, arranged centrally of the gas tube and opening into the combustion chamber laterally of the gas tube, substantially as described.

In witness whereof I have hereunto set my
25 hand in the presence of two witnesses.

RICHARD POTTER.

Witnesses:

BRISTOW HUNT,
W. H. MORTON.