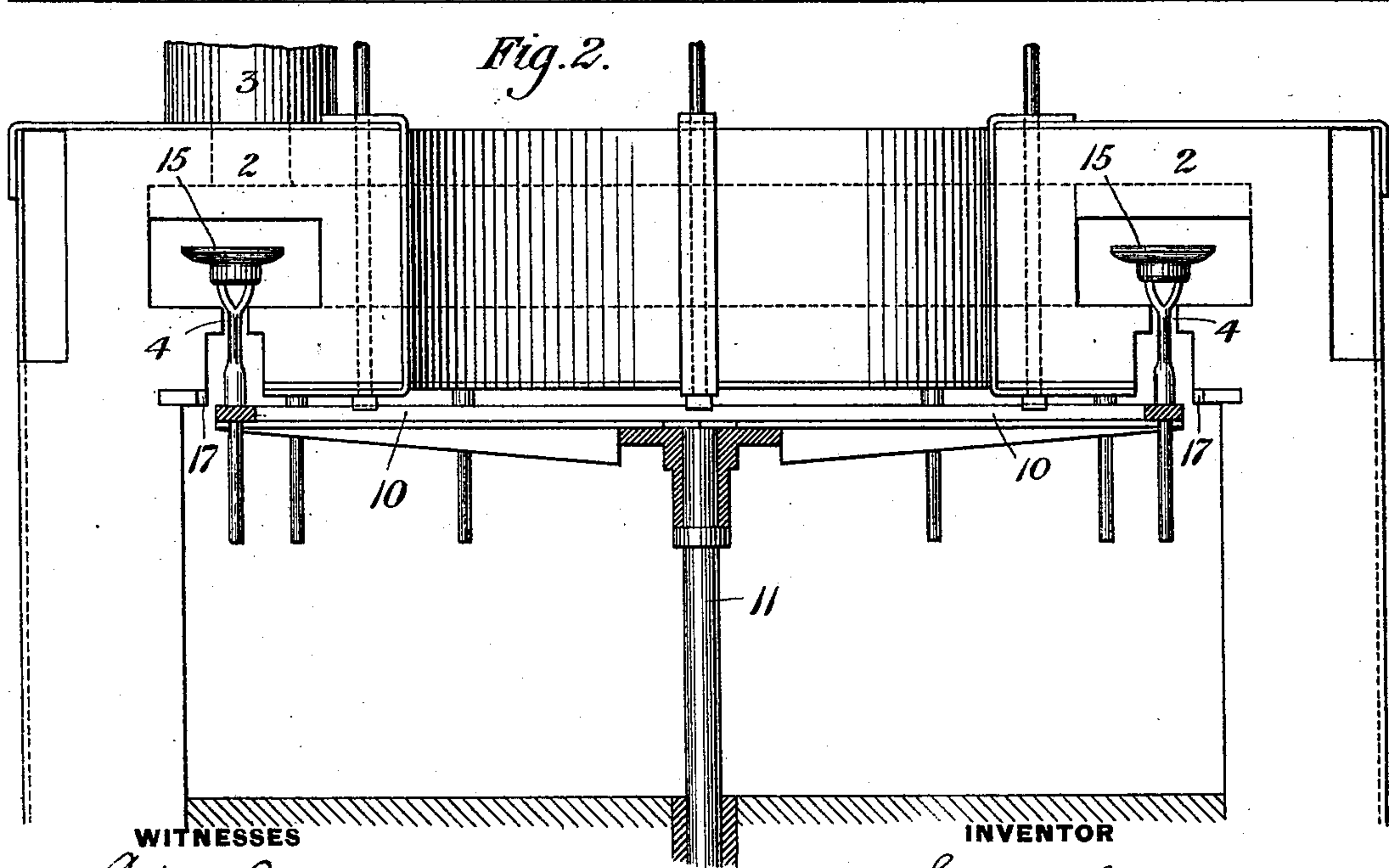


4 Sheets—Sheet 1.

No. 542,990.

Patented July 23, 1895.



**WITNESSES**

INVENTOR

C. M. Clarke  
H. M. Corwin

George C. Lewis  
by his Attorneys  
W. B. Baxwell & Sons

(No Model.)

4 Sheets—Sheet 2.

G. CLEIS.  
GLORY HOLE FURNACE.

No. 542,990.

Patented July 23, 1895.

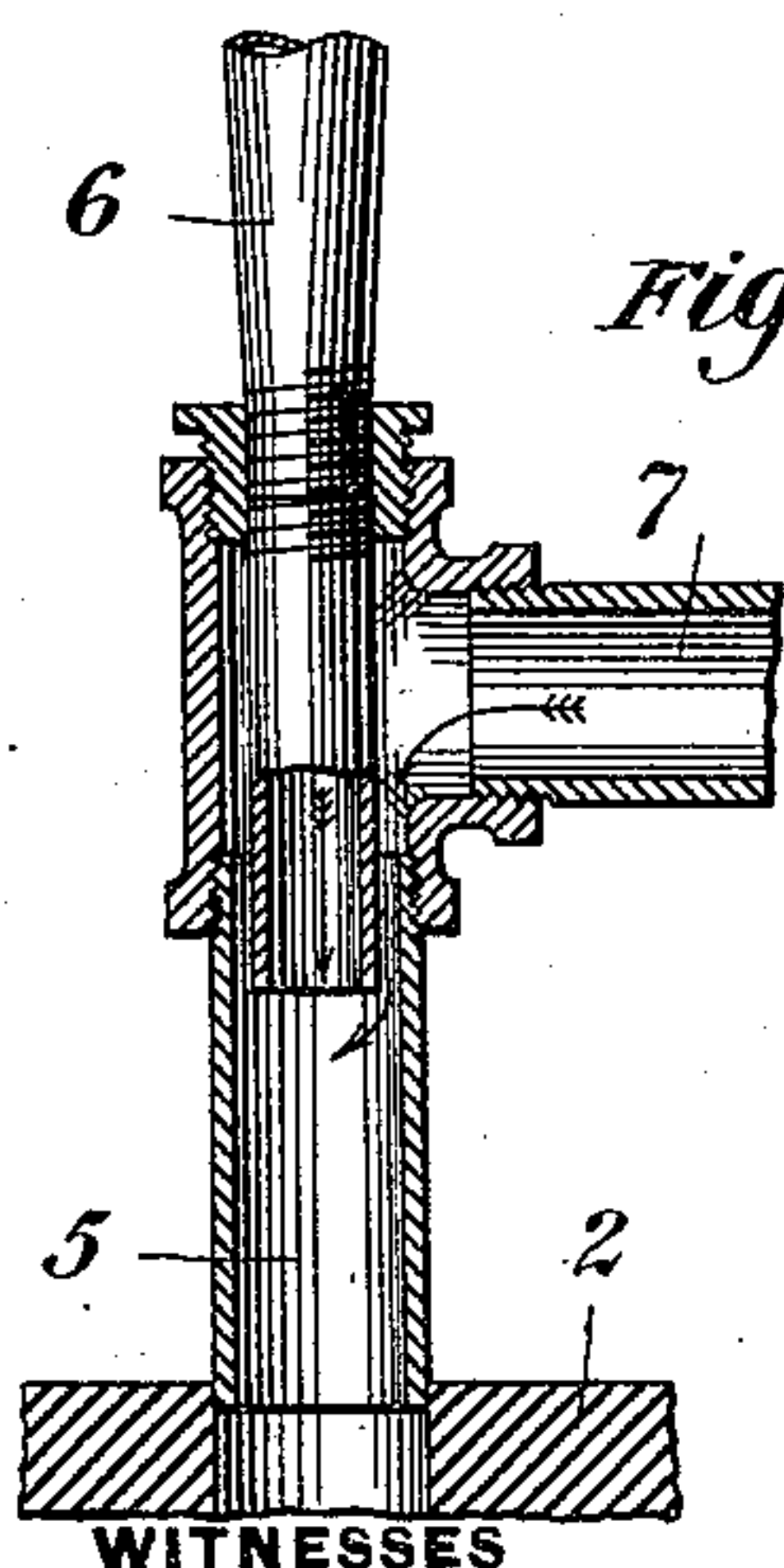
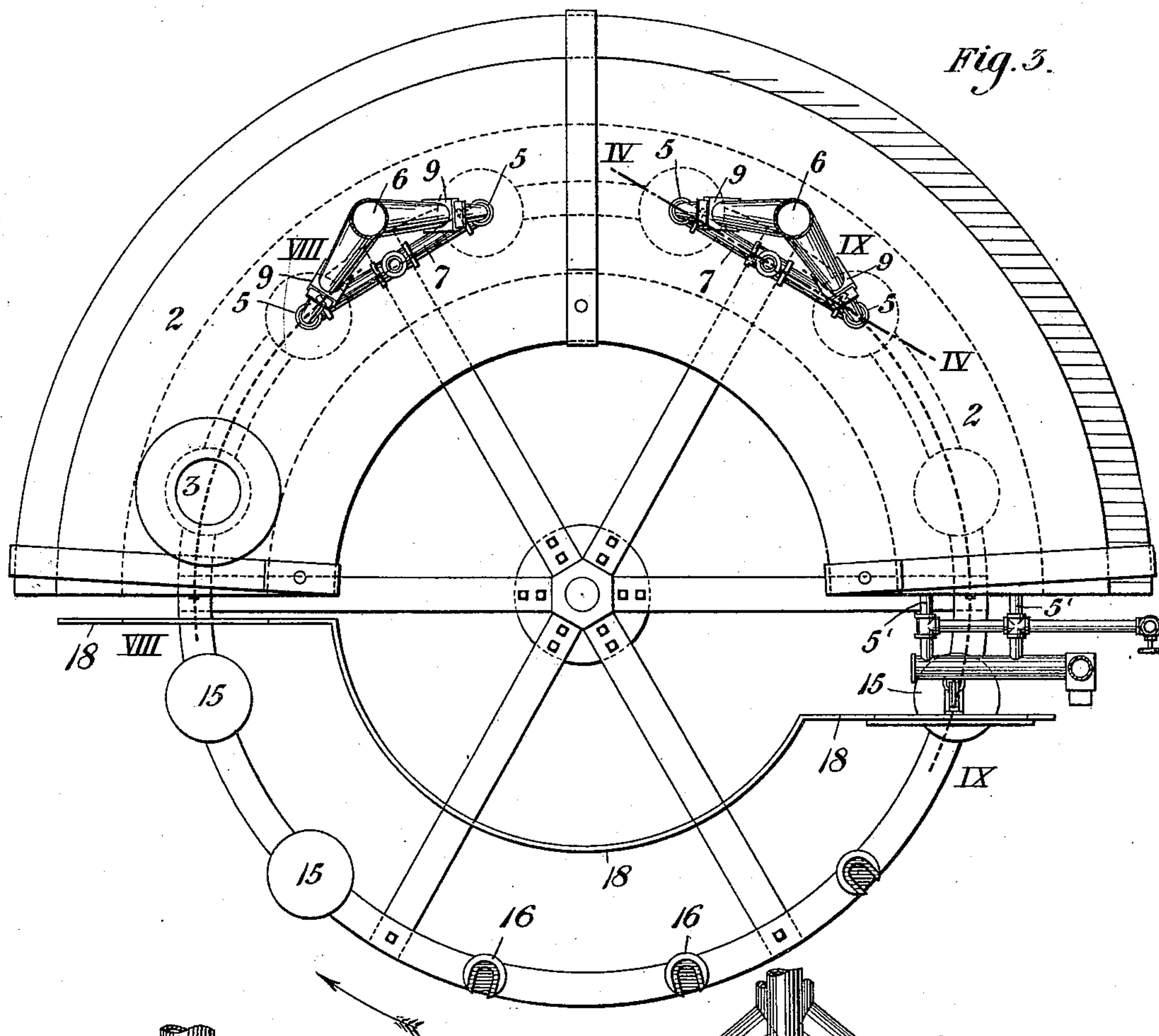


Fig. 5.

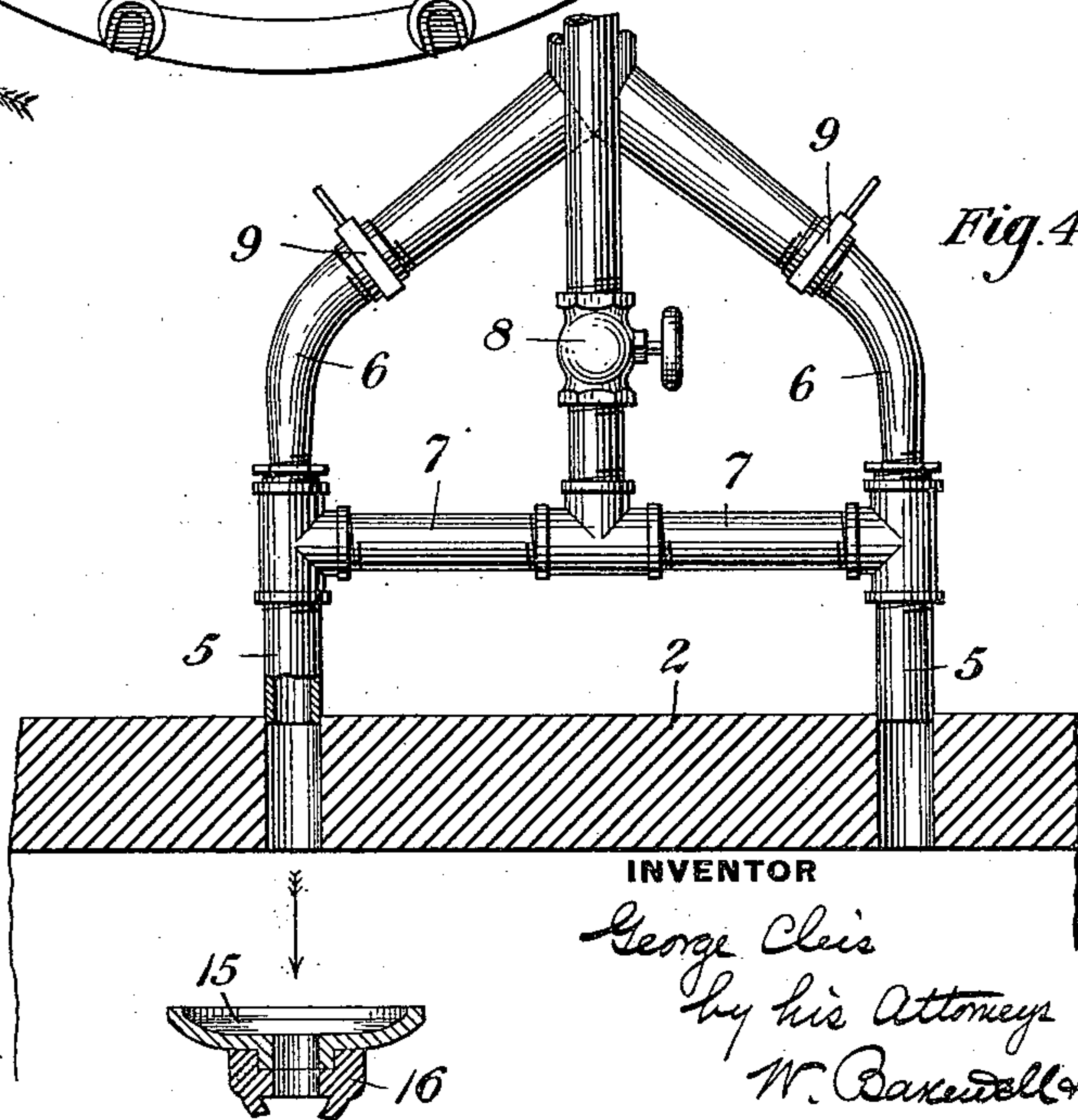


Fig. 4.

WITNESSES

C. M. Clarke  
H. M. Corwin

INVENTOR

George Cleis  
by his Attorneys  
W. B. Baxendale & Sons



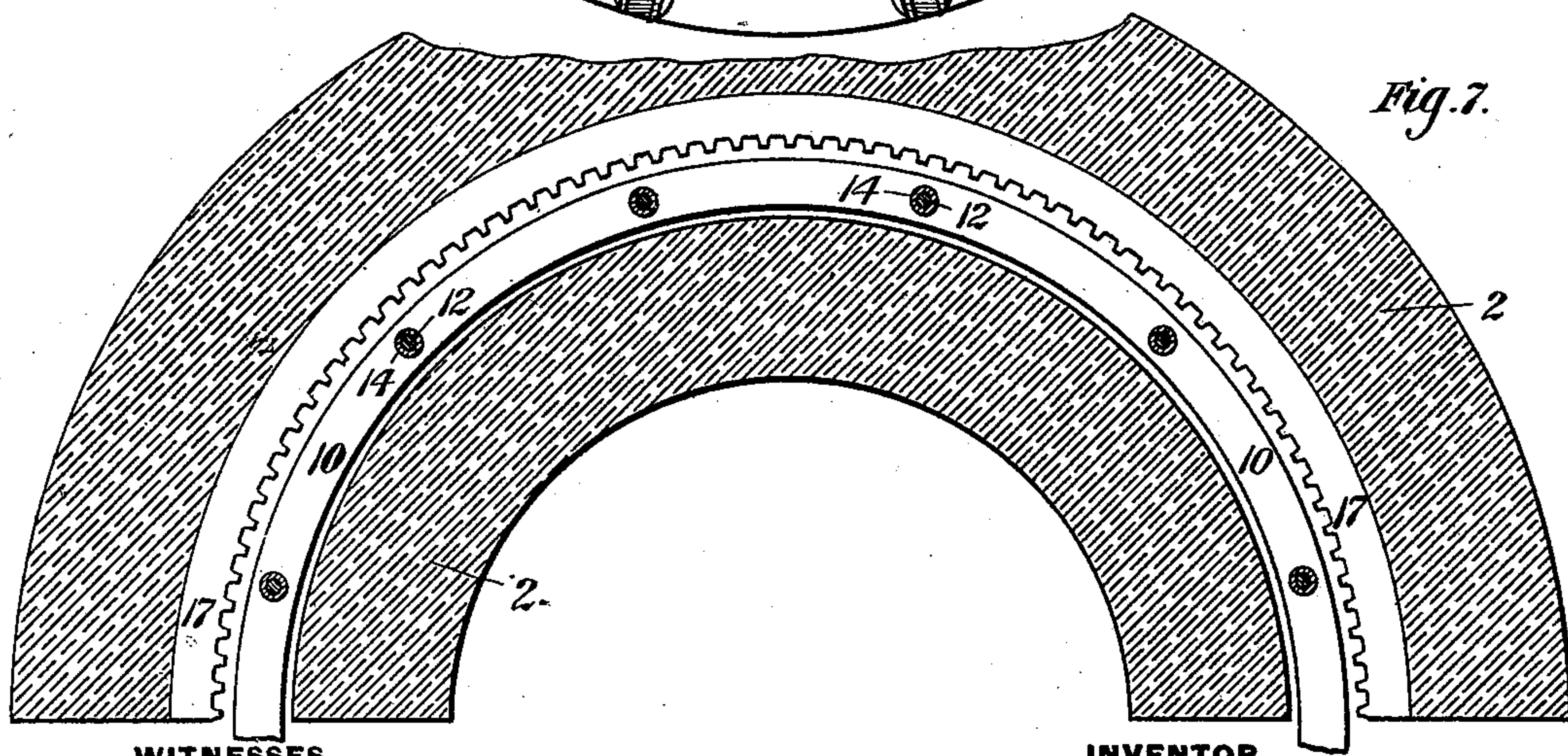
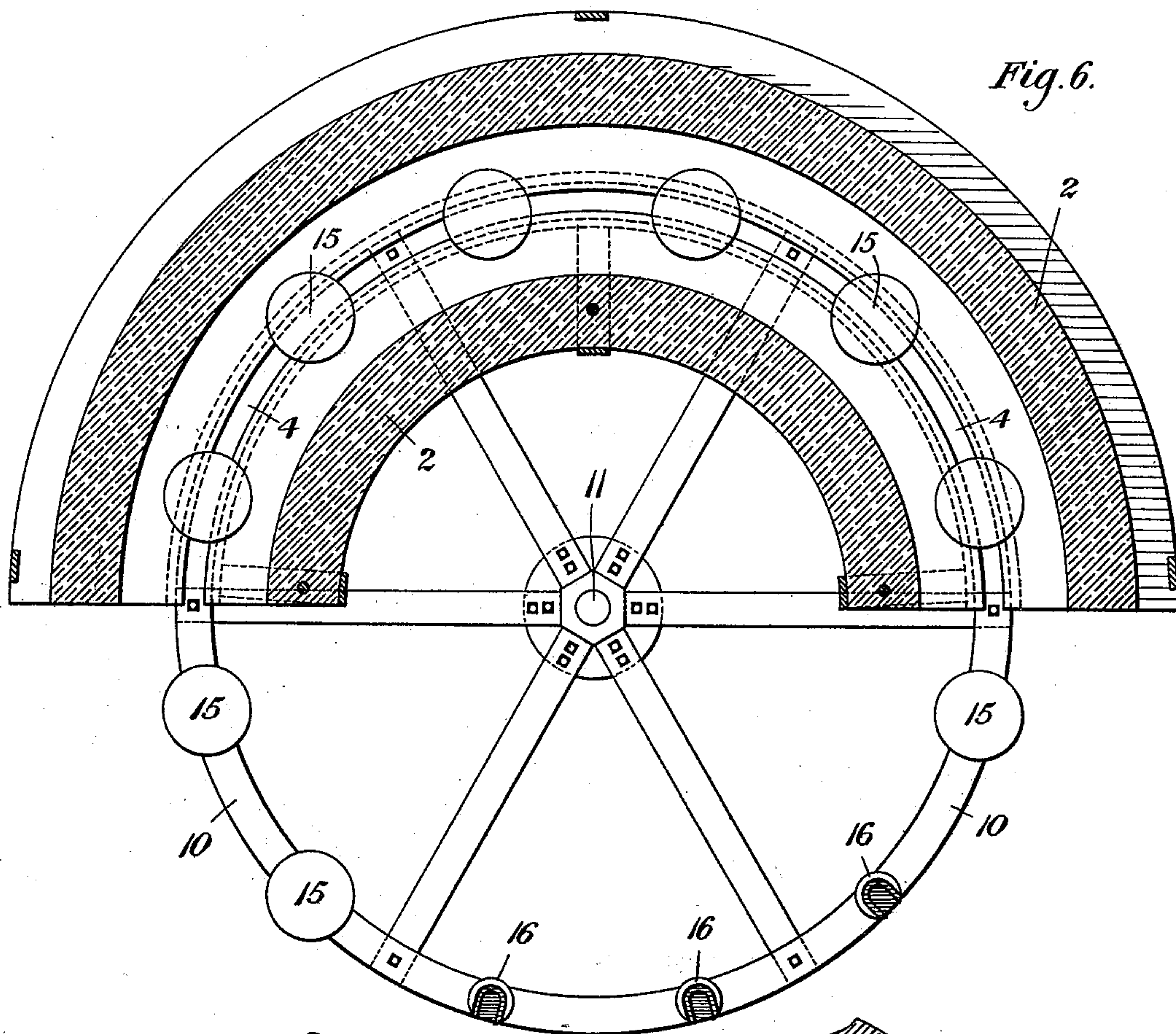
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G. CLEIS.  
GLORY HOLE FURNACE.

No. 542,990.

Patented July 23, 1895.



WITNESSES

*A. M. Clarke*  
*H. M. Corwin*

INVENTOR

*George Cleis*  
*by his Attorneys*  
*W. B. Caldwell & Sons*



(No Model.)

4 Sheets—Sheet 4.

G. CLEIS.  
GLORY HOLE FURNACE.

No. 542,990.

Patented July 23, 1895.

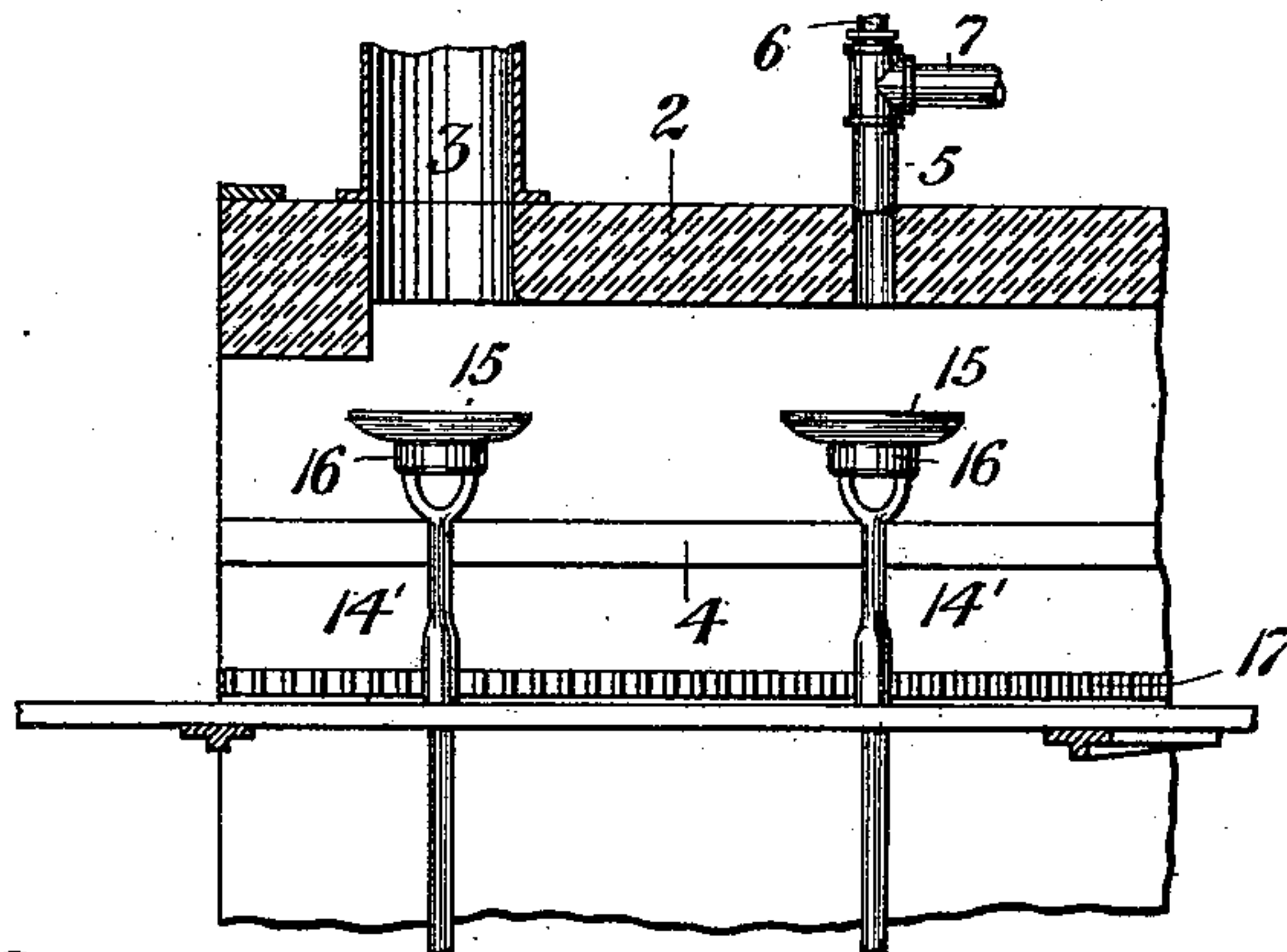


Fig. 8.

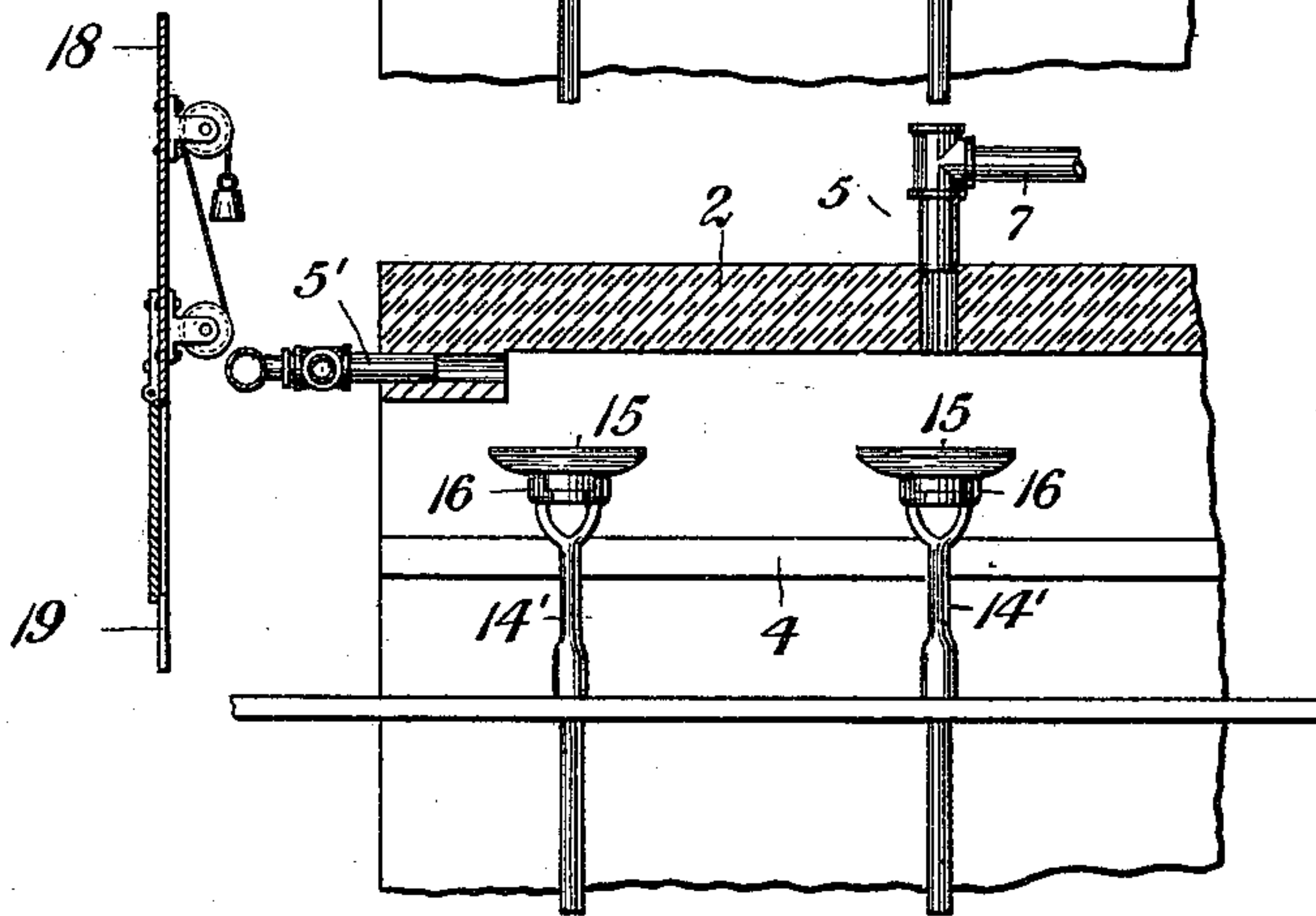


Fig. 9.

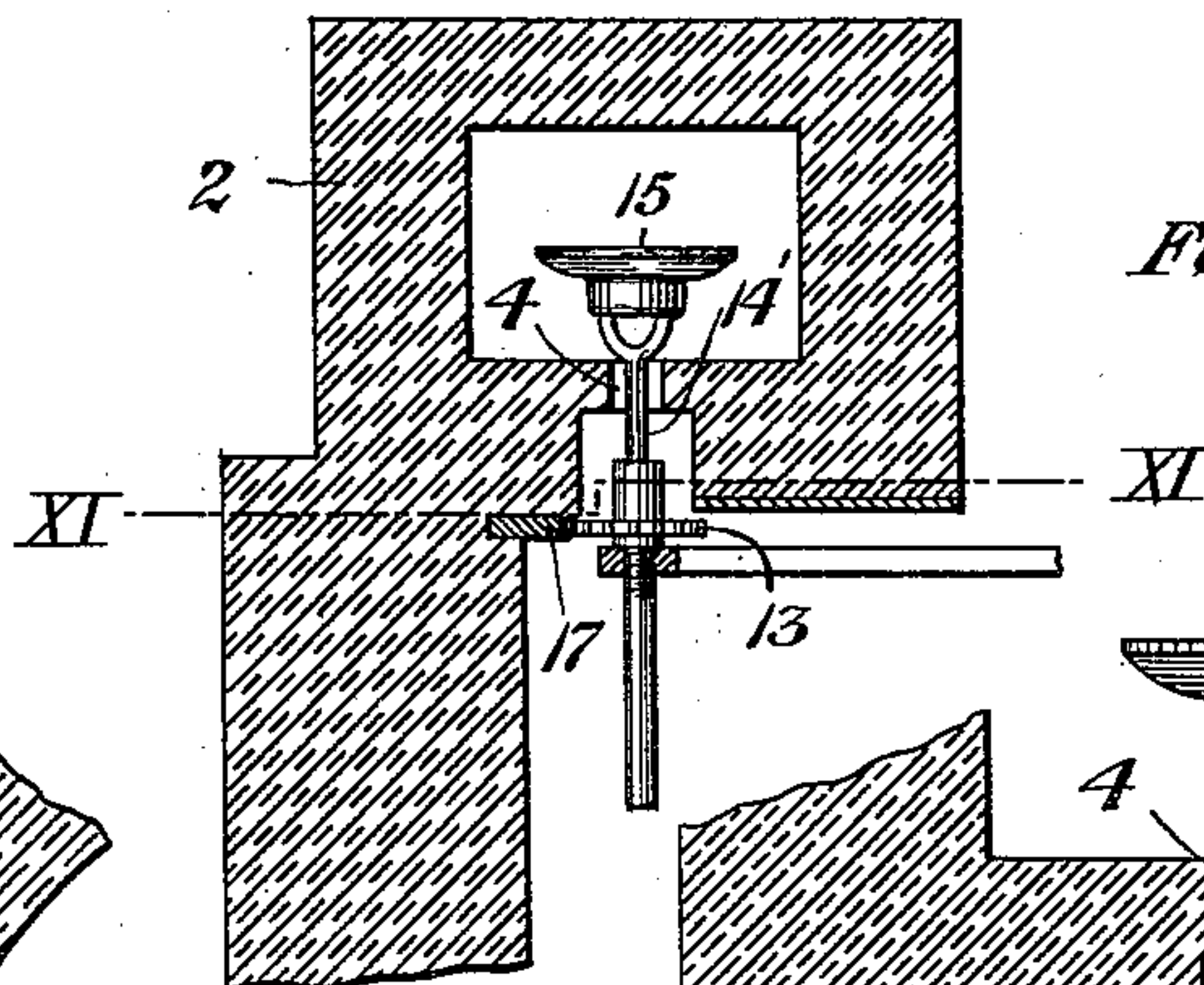


Fig. 10.

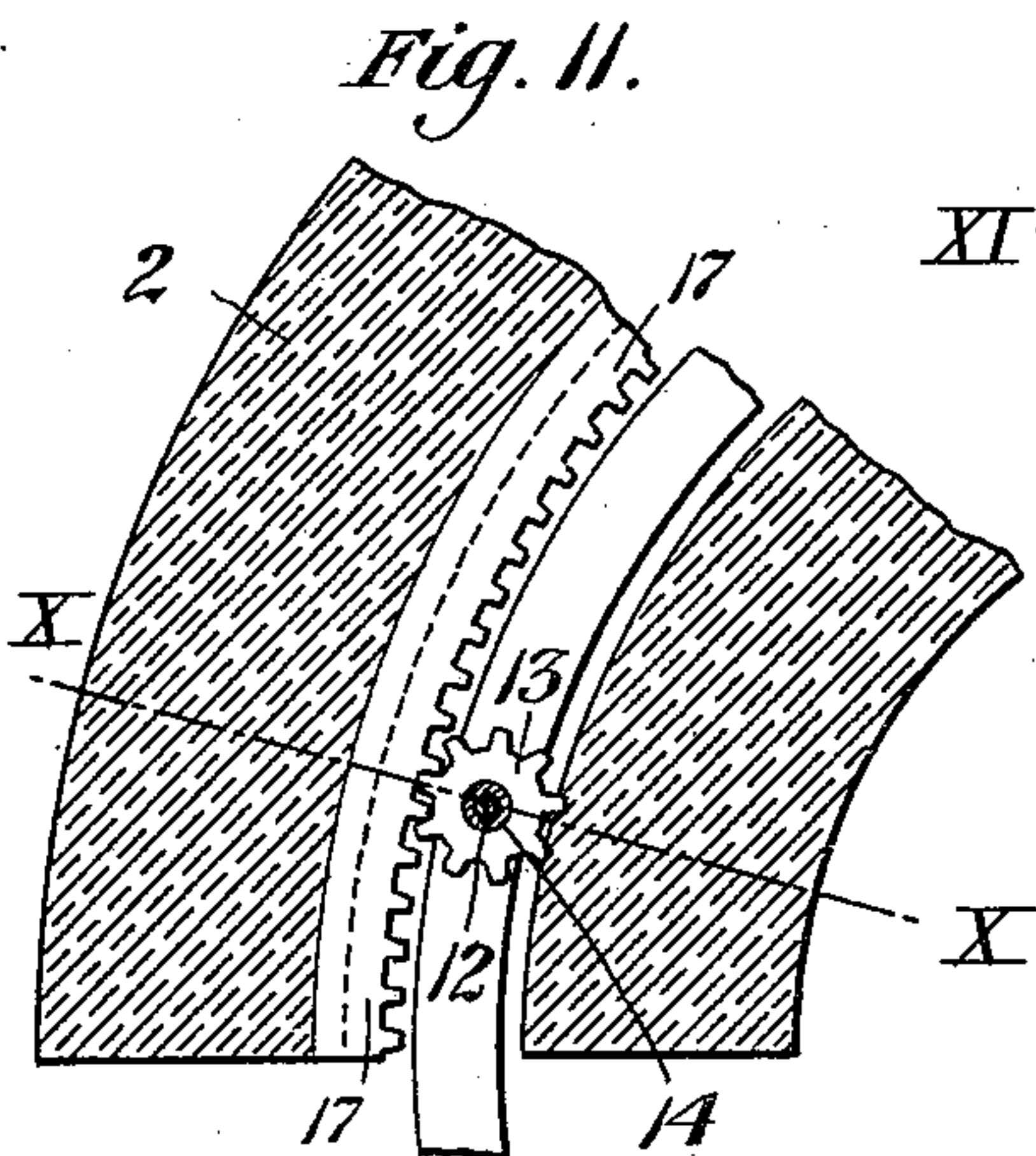


Fig. 11.

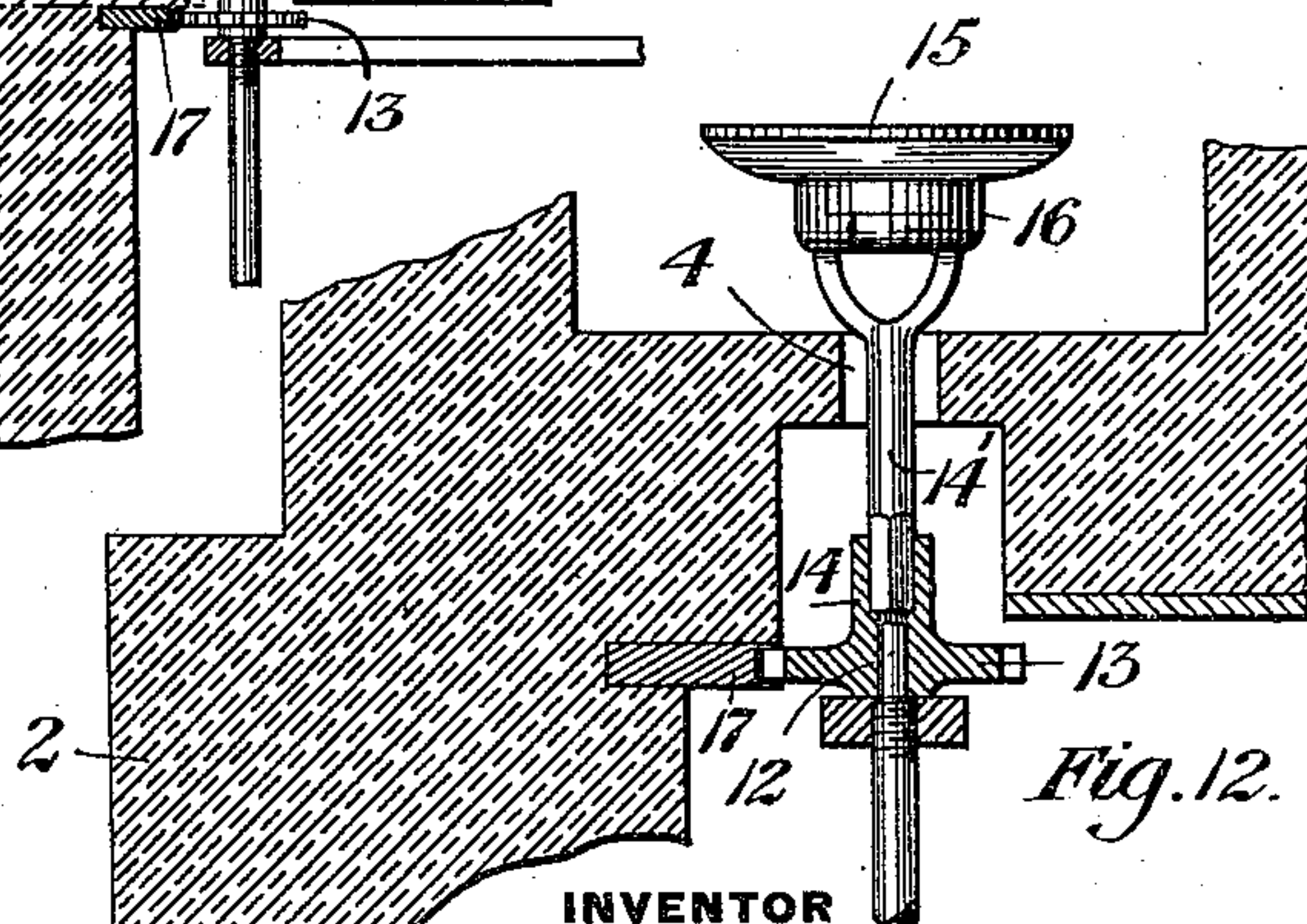


Fig. 12.

WITNESSES

C. M. Clarke  
J. M. Corwin

INVENTOR

George Cleis  
by his Attorneys  
W. Baxendale & Son



# UNITED STATES PATENT OFFICE.

GEORGE CLEIS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE ATTERBURY GLASS COMPANY, OF SAME PLACE.

## GLORY-HOLE FURNACE.

**SPECIFICATION** forming part of Letters Patent No. 542,990, dated July 23, 1895.

Application filed March 25, 1895. Serial No. 543,041. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE CLEIS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Glory-Hole Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of my improved apparatus. Fig. 2 is a similar elevation, the shield-plate and part of the circular ring being broken away. Fig. 3 is a plan view. Fig. 4 is an enlarged detail cross-section on the line IV IV of Fig. 3. Fig. 5 is a detail sectional view of the juncture of the gas and air pipes. Fig. 6 is a horizontal sectional view on the line VI VI of Fig. 1. Fig. 7 is a horizontal sectional view through the furnace on the line VII VII of Fig. 1. Fig. 8 is a vertical section on the line VIII VIII of Fig. 3. Fig. 9 is a similar section on the line IX IX of Fig. 3. Fig. 10 is a vertical cross-section on the line XX of Fig. 11. Fig. 11 is a partial sectional detail view similar to Fig. 7, and Fig. 12 is a cross-sectional view showing the rack in engagement with revolving mechanism.

Like symbols of reference indicate like parts in each figure.

When glass articles of many kinds are taken from the molds in which they are pressed, they require to be subjected to heat in a glory-hole for the purpose of fire-polishing them and of rendering them sufficiently plastic to enable them to be shaped into the finished form, to correct irregularities, &c. As ordinarily conducted this has been an operation requiring skill and labor, and has added considerably to the cost of the product.

The object of my invention is to provide means for performing the work in such way that skilled labor may be dispensed with and the manufacture of the glass articles improved, facilitated, and cheapened.

My improved method and apparatus may be employed for articles of many different shapes and styles, and though in the drawings I show the holders made of form proper to

receive and shape glass plates the invention is not limited thereto, since by varying the form of the holders they may be adapted for use with goblets and other articles.

In the drawings, 2 represents the glory-hole or furnace proper, which consists of a horizontal flue, preferably built on a semicircular arc, covered at the top, open at the ends, having near one end an outlet-flue 3 for the products of combustion, and in the bottom formed with a vertical slot 4, also made on a semicircular arc and coextensive with the flue. The flue is heated by a series of burner-pipes 5, discharging mixed air and gas vertically into it from above. As shown in Figs. 4 and 5, each burner-pipe has entering it an air-supply pipe 6 and a gas-supply pipe 7, arranged so that the air and gas shall mingle in proper proportions for combustion before their discharge into the flue, the burners being preferably arranged in pairs, as shown in Fig. 4, and the gas and air-pipes being provided with valves 8 and 9, enabling the proportions of the mixture to be easily regulable. There are also, preferably, burner-pipes 5', one or more of which discharge horizontally into the delivery end of the flue, as shown in Fig. 3.

Beneath the furnace-flue is a horizontal revoluble wheel or frame 10, journaled on a vertical axis 11, and carrying at its periphery a series of upright posts 12, on the upper ends of which, as shown in Figs. 10 and 12, are set pinions 13, which are rotary on the posts and have sockets 14 adapted to receive the standards 14', which carry the glass articles to be heated in the glory-hole. The upper portions of these standards consist of holders 15, which are of the shape desired for the glass articles and have shanks which, as shown in Fig. 4, adapt them to be set in and easily removed from sockets 16 at the upper ends of the standards. The pinions 13 mesh with a semicircular rack 17, which is parallel with and is formed on the same radius as the arc of the slot, and, as shown in the drawings, the arrangement is such that as the wheel is rotated the standards will travel in the slot, so as to carry the holders along the flue, and



that the pinions being in gear with the rack will rotate the standards and holders on their vertical axis.

In order to protect the workmen from the heat of the furnace I prefer to place at the front thereof a shield-plate 18, Figs. 1, 2, and 3, having openings 19 and 20 to permit passage of the holders into and out of the flue, and having opposite to one or both ends of the flue a swinging door or doors 20', which permit the holders to pass and then automatically swing back into place.

The operation is as follows: In order to heat the glass articles, for the purpose of fire-polishing and shaping them, they are placed by a workman upon the holders 15, which are set in their sockets outside of the furnace, as shown in Fig. 1, and the wheel is then turned so as to carry them through the flue in succession, the rate of their travel depending upon the speed at which the wheel is turned. As the articles thus progress through the flue they are rotated by the rack-and-pinion mechanism, and by the heat of the jets of flame from the burner-pipes, which play down upon them from above, they are heated, their surfaces are fire-polished, and the glass, being softened, sinks down upon and assumes exactly the shape of the holder, so that when they arrive at the delivery end the holders may be lifted from their sockets and the article removed from the holders and carried to the annealing-leer. The edges of the glass articles are heated and polished by the jets of flame from the horizontal burner-pipes 5' as the holders pass the same. In practice I prefer that the workman in charge shall turn the wheel a partial revolution when he wishes to introduce a glass article into the flue, and thus by the same operation he withdraws another article from the delivery end. The articles therefore progress through the flue in a series of steps and the heating will be more quickly effected if at the end of each short motion the wheel is stopped, so as to leave the articles directly beneath the respective gas-burners.

For the purpose of cooling the standards of the holders after they emerge from the glory hole or flue, so as to prevent them from becoming overheated, I provide pipes 21 at the exterior of the shield, which discharge a blast of cold air upon the holders. Said pipes and the burner-pipes within the flue are preferably so arranged relatively to each other that when the wheel is stopped at the end of each step motion the glass articles within the flue shall be opposite to the burners and the standards outside the flue shall be opposite to the cold-air pipes.

The function of the rack-and-pinion mechanism above described is to cause the rotation of the glass articles during their passage through the flue and thus to subject them evenly in all their parts to the heat of the

flame-jets; but within the scope of my invention, broadly defined, such rotating mechanism may be dispensed with and the standards fixed to the wheel, the glass articles being caused to traverse the flue without rotation, and many other modifications in the parts of the apparatus may be made within the principles of the invention as defined in the claims.

The advantages of the invention are that by its use glass articles may be fire-polished and shaped very rapidly and without employing skilled labor. The services of operatives heretofore employed in such work may be dispensed with, and the work is done not only more cheaply and more quickly than heretofore, but also with better results.

I claim as my invention—

1. In apparatus for finishing glass articles, a glory-hole flue, a holder having a recess of the shape to be given to the blank, means for moving the holder through the flue, and a vertically extending burner arranged to discharge the flame downwardly directly upon the blank and cause it to assume the shape of the recess or cavity; substantially as described.

2. In apparatus for finishing glass articles, a glory-hole flue, having therein burners discharging from above directly upon the glass articles, a burner or burners discharging horizontally into the flue, and means for carrying the glass articles through the glory-hole flue under the burners; said means having recesses of the shape to be given to the articles, substantially as described.

3. In apparatus for finishing glass articles, a glory-hole flue, having therein burners discharging from above directly upon the glass articles, said flue being formed on a circular arc and having a bottom slot, a wheel provided with standards which project through the slot into the flue and revoluble to carry the glass articles therethrough, said standards having recesses of the shape to be given to the articles, and cold-air pipes situated outside the flue and adapted to cool the glass articles; substantially as described.

4. In apparatus for finishing glass articles, a glory-hole flue, having therein burners discharging from above directly upon the glass articles, said flue being formed on a circular arc and having a bottom slot, and a wheel provided with standards which project through the slot into the flue and revoluble to carry the glass articles therethrough, said standards having recesses of the shape to be given to the articles, said burners and standards being so placed relatively to each other that the wheel may be moved step by step and at its intervals of rest stopped beneath the burners; substantially as described.

5. In apparatus for finishing glass articles, a glory-hole-flue, having therein burners discharging from above directly upon the glass articles, said flue being formed on a circular



arc and having a bottom slot, and a wheel provided with standards which project through the slot into the flue and revoluble to carry the glass articles therethrough, said standards  
5 having holders provided with recesses of the shape to be given to the blanks; substantially as described.

In testimony whereof I have hereunto set my hand.

GEORGE CLEIS.

Witnesses:

J. DRUM ATTERBURY,  
F. M. KING.