

No. 879,674.

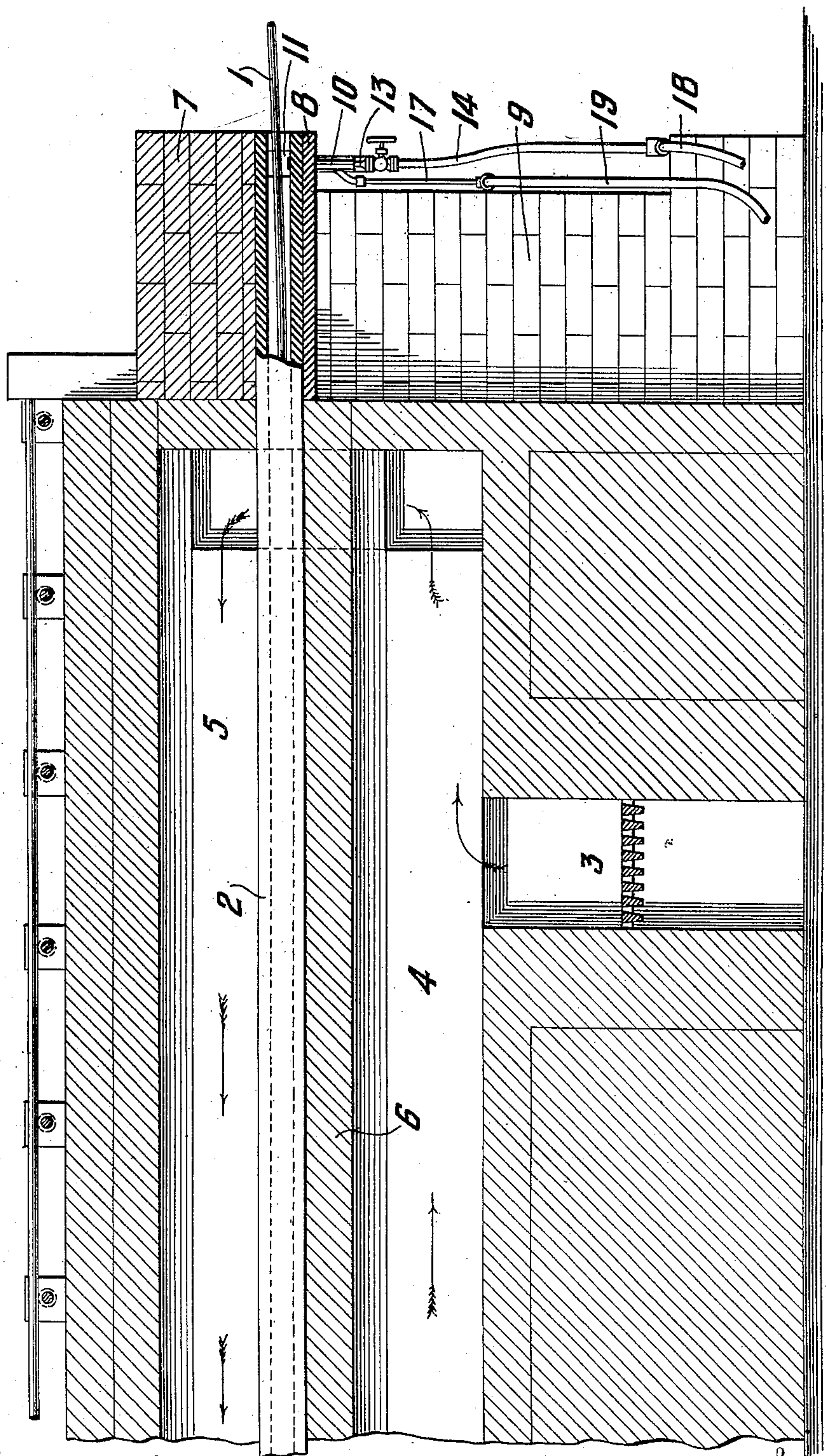
PATENTED FEB. 18, 1908.

J. H. ROBERTS.  
APPARATUS FOR ANNEALING WIRE.

APPLICATION FILED JUNE 27, 1907.

3 SHEETS—SHEET 1.

FIG. 1.



Witnesses  
Chas. H. Smith  
A. J. Berrell

Inventor  
John H. Roberts  
per A. J. Berrell his atty

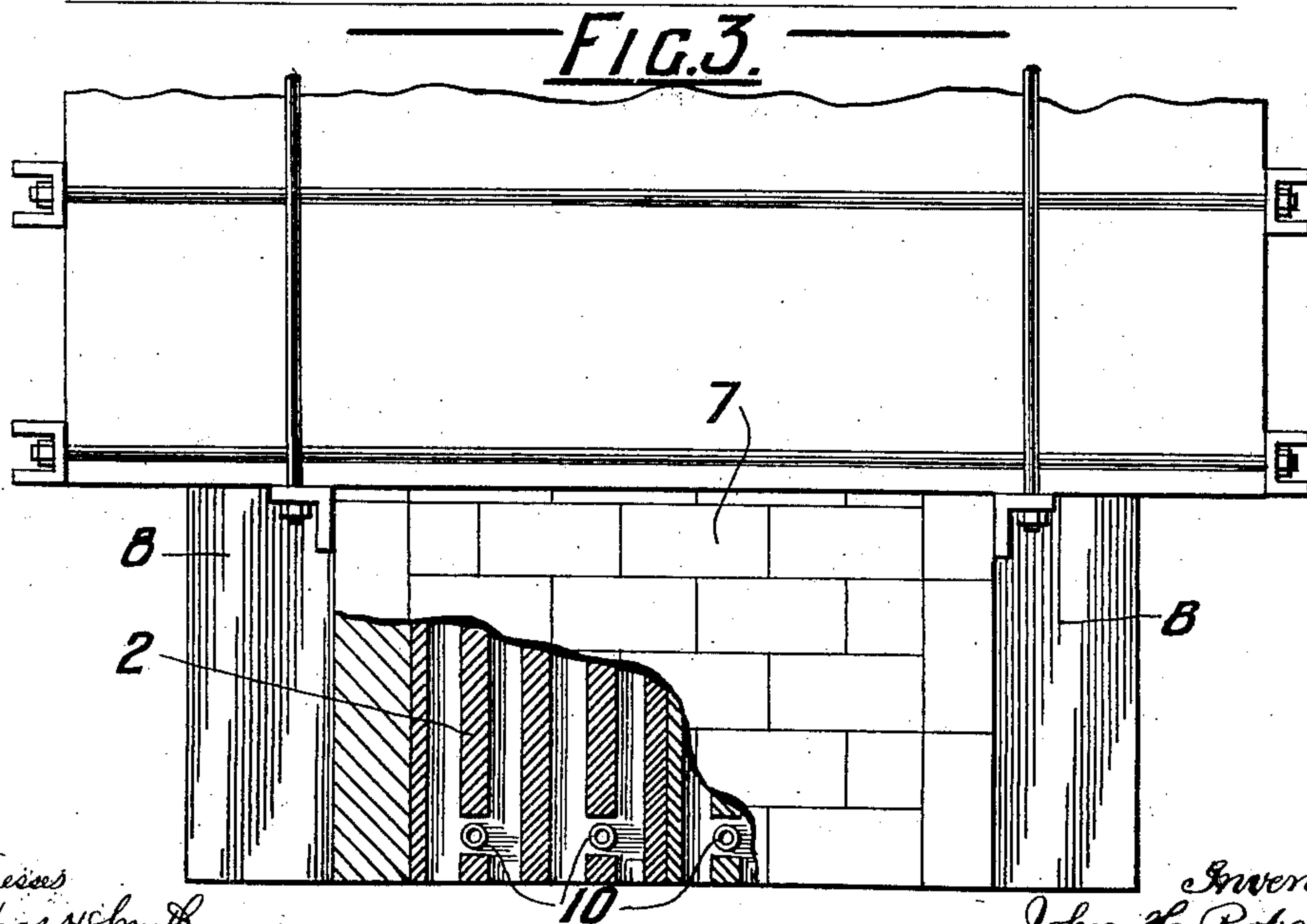
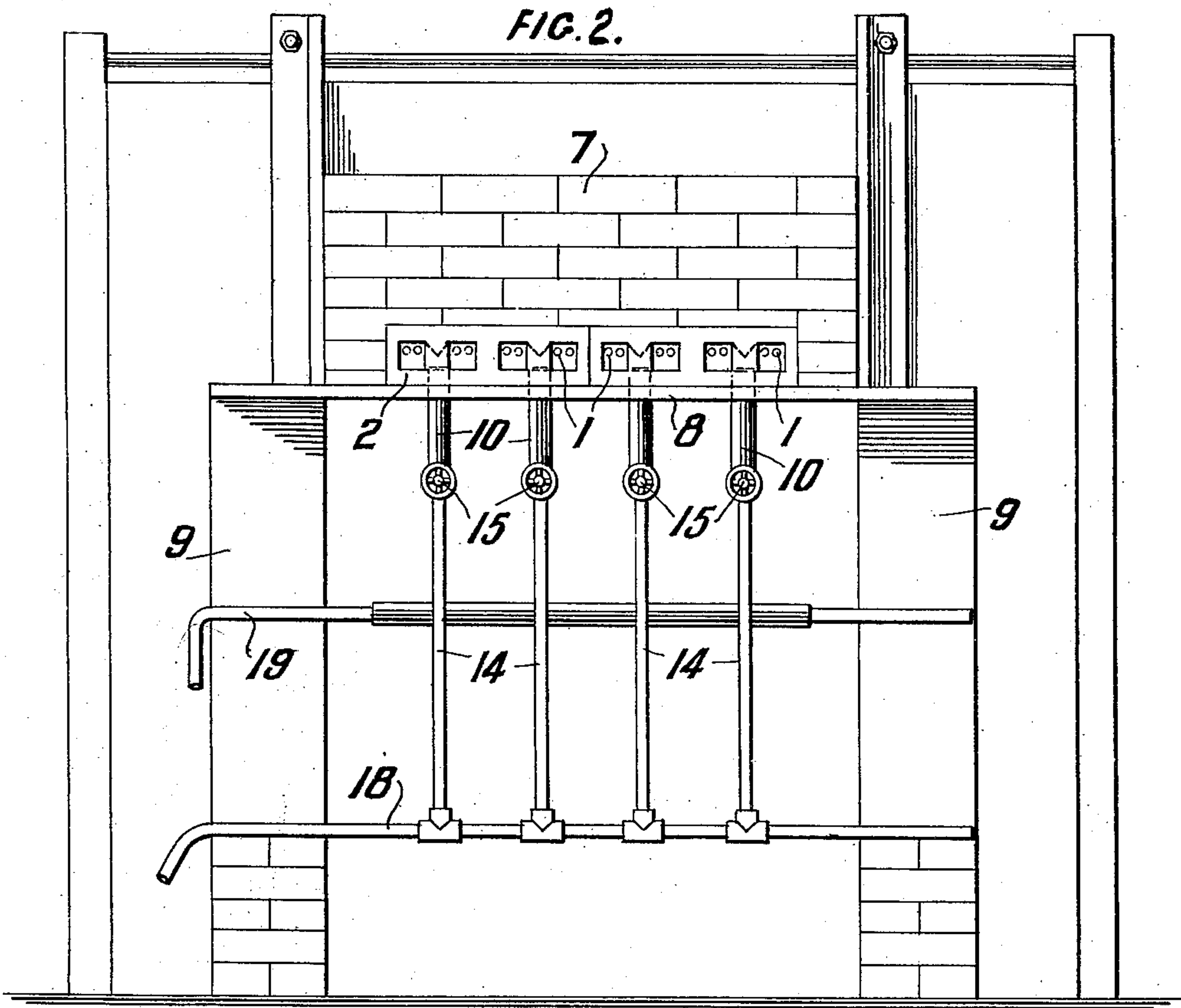
No. 879,674.

PATENTED FEB. 18, 1908.

J. H. ROBERTS.  
APPARATUS FOR ANNEALING WIRE.

APPLICATION FILED JUNE 27, 1907.

3 SHEETS—SHEET 2.



Witnesses  
Charles Smith  
A. J. S. S. S.

Inventor  
John H. Roberts  
per Charles S. S. S. his atty



No. 879,674.

PATENTED FEB. 18, 1908.

J. H. ROBERTS.

APPARATUS FOR ANNEALING WIRE.

APPLICATION FILED JUNE 27, 1907.

3 SHEETS—SHEET 3.

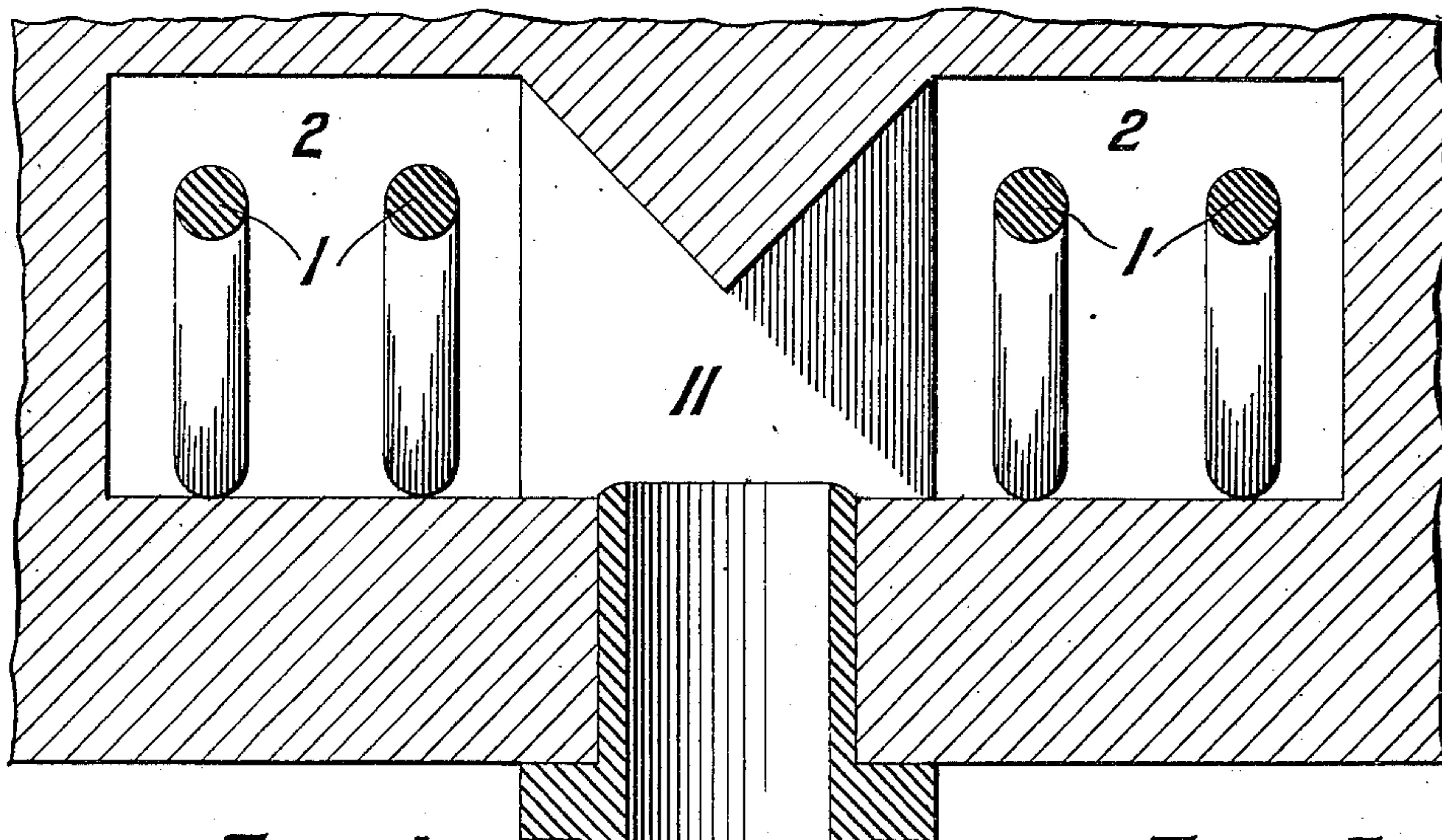
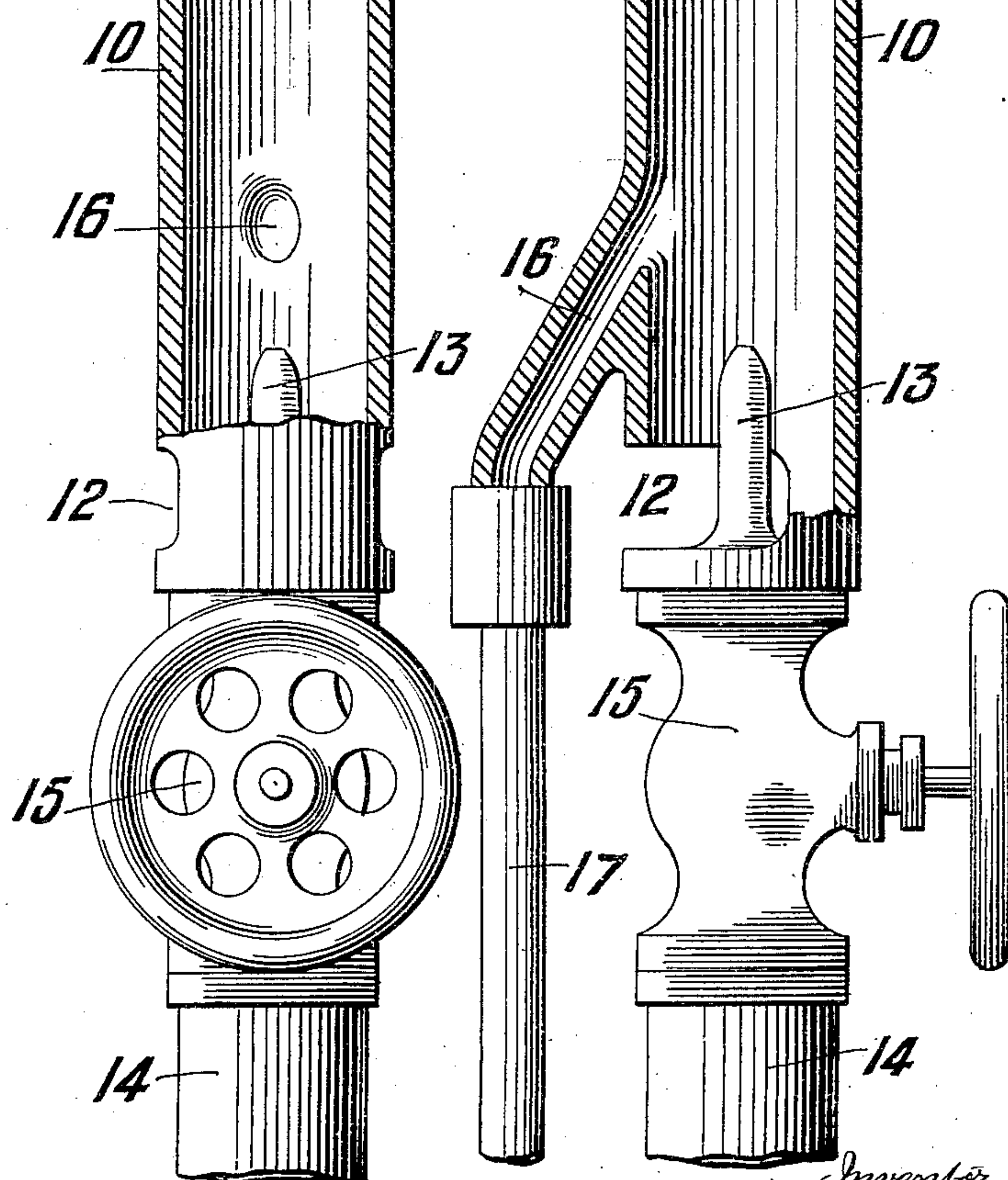


FIG. 4.

FIG. 5.



Witnesses  
Charles Smith  
A. J. Berrell

Inventor  
John H. Roberts  
for Harold Berrell  
his atty



# UNITED STATES PATENT OFFICE.

JOHN HENRY ROBERTS; OF DARLINGTON, ENGLAND.

## APPARATUS FOR ANNEALING WIRE.

No. 879,674.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed June 27, 1907. Serial No. 380,996.

*To all whom it may concern:*

Be it known that I, JOHN HENRY ROBERTS, a subject of the King of Great Britain, residing at Darlington, in the county of Durham, England, have invented certain new and useful Improvements in Apparatus for Annealing Wire, of which the following is a specification.

In annealing wire, the wire is passed slowly through a long fireclay passage or tube which is maintained at the desired temperature, and this fireclay tube is open at each end, and the wire which is being drawn through is thus subjected to a baking process from the time of its entry at one end of the annealing oven up to the time of its exit at the other end, and such tubes extend in a straight line, being open at both ends, and it is to the improvement of this ordinary and well known annealing furnace to which the present invention is directed, that is, to a furnace in which the fireclay tube or tubes through which the wire is drawn, is or are heated by the tubes being located in the combustion flue of a furnace. A disadvantage of this type of furnace is that as the wire emerges from the full open end of an annealing tube, the surface of the wire scales off and thereby causes not only a loss of weight of the finished product, but also diminution of its strength and a roughening of its surface.

Now I have found by experiment that the scaling of the wire can be prevented by, as it were, filling the exit ends of the aforesaid ordinary type of annealing tubes with a flame obtained from the combustion of inflammable gas and air, still employing that well known type of annealing furnace in which the fireclay tubes are considerably greater in sectional area than the wire passing through them, and in which the ends are not contracted and therefore permit a joint or connection between one length of wire and another to freely pass, which would not be the case if the ends were contracted or were fitted with covers having apertures only sufficient to pass the sectional area of a piece of wire.

To carry out this invention I therefore extend the fireclay annealing tubes beyond the wall of the furnace, and at a short distance from the exit end of the tube and outside or beyond the wall of the furnace, I insert a pipe at right angles to the axis of the tube and communicating with the interior of the said tube and through this pipe I force combusti-

ble gas and air, which, igniting within the mouth of the tube, completely fills the said mouth with flame, and thereby scaling of the wire is entirely prevented, and this without effecting any alteration whatever in this existing type of annealing furnace, excepting the extension of the annealing tubes beyond the wall of the furnace proper. Therefore it will be understood that my invention does not deal with that class of annealing apparatus in which the annealing tubes or chambers and the wire passing therethrough are heated solely by jets of inflammable gas entering the tubes at intervals in their length. Further I have found that it is essential to the success of the invention, that is to the prevention of scaling of the wire as it leaves the tube, that the flame should completely fill the interior of the tube at its exit end.

An annealing furnace of the known type before specified, with my invention applied thereto, is illustrated at Figure 1 by a longitudinal vertical section showing the exit end portion of the tubes, Fig. 2 being an end elevation of the same, and Fig. 3 a sectional plan of the parts shown at Fig. 2. Fig. 4 is a sectional end elevation on a larger scale than the previous figures, showing a pair of annealing tubes and a burner tube entering the same at right angles to the axes of the tubes, Fig. 5 being a sectional side elevation of the lower portion of such a burner tube.

The wire 1 in the ordinary annealing furnace here shown passes through fireclay tubes 2, which latter extend through the heating flues of an oven. This oven is provided with several furnaces 3 at distances apart throughout the length, only one of these furnaces near the exit end of the oven, being shown at Fig. 1, and the products of combustion from the furnaces 3 pass into a lower passage 4 and then into an upper passage 5, in which latter passage the annealing tubes are located and rest upon a floor 6. In these ordinary wire annealing ovens, the wire 1, after passing through the requisite length of annealing tube 2, is drawn out through the full open end of said tube into the atmosphere.

Now according to the present invention, I extend the structure beyond the end wall of the furnace, so that the annealing tubes 2 terminate coincident with the termination of the extending brickwork structure 7 which is supported upon a plate 8 and pillars 9. Atmospheric burners are then fitted, each



consisting of a tube 10 through which atmospheric air and combustible gas pass, the exit end of the burner tube 10 passing through the lower wall of the annealing tube at right angles to the length of the same and near the exit end so as to open into the interior of said annealing tube near said exit end, so that the flame from these atmospheric burner tubes closes, as it were, the mouths of the annealing tubes.

A suitable construction of the atmospheric burner is shown on a larger scale at Figs. 4 and 5, where it will be seen that the tube 10 enters the base of the annealing tubes 2 between two of the tubes, and a communication passage 11 is formed between the pair of tubes, the upper surface of the communication passage 11 being inclined in opposite directions as shown, so that the flame from the burner tube 10 is divided and directed into the exit ends of the adjacent annealing tubes, and since such tube 10 is located quite near the exit ends of the tubes, the said exit ends are, as it were, closed by the flame, and the wire proceeding from these tubes I have found by experience, does not scale, is not subjected to a loss in weight, and is not diminished in its strength, nor is its surface roughened.

As shown in the drawings, the oven is constructed, see Figs. 2 and 3, with a series of annealing tubes 2, through each of which two wires may pass, and the burner tubes 10 are fitted in any convenient or well known manner so that they can be easily removed for replacement by new tubes when required.

The tubes 10 are supplied with air through an opening 12,—Figs. 4 and 5,—communicating with the atmosphere and also air at greater than atmospheric pressure, can be admitted as required through a nozzle 13, Fig. 5, from a pipe 14 controlled by a valve 15; the combustible gas is supplied through a passage 16 from a pipe 17; 18 being the main air supply pipe communicating with all the pipes 14, and 19 the main gas supply pipe.

I claim as my invention:

1. In an apparatus for annealing wire, the combination with an oven, furnaces to heat said oven, and fireclay annealing tubes passing in a straight line through said oven through which tubes said wire is drawn, the exit ends of said annealing tubes extending beyond the end wall of the oven and having full open ends, of burner tubes for conveying combustible gas and air entering through the walls of said annealing tubes at right angles to the length of same near the full open exit ends thereof and beyond the end wall of the oven, and means for conveying combustible gas and air to said burner tubes whereby the interior of said annealing tubes near the exit ends thereof, can be filled with flame, substantially as set forth.

2. In an apparatus for annealing wire, the combination with an oven, furnaces to heat said oven, fireclay annealing tubes passing in a straight line through said oven having full open ends, the exit ends of said annealing tubes extending beyond the end wall of the oven and a brickwork structure extending beyond said end wall of the oven to support and cover the projecting ends of said annealing tubes, of burner tubes for conveying combustible gas and air passing through the lower walls of said annealing tubes and opening into the interior thereof near the open exit ends, and means for conveying combustible gas and air to said burner tubes, whereby the interior of said annealing tubes near the exit ends thereof can be filled with flame, substantially as set forth.

3. In an apparatus for annealing wire, the combination with an oven, furnaces to heat said oven, fireclay annealing tubes passing in a straight line through said oven having full open ends, the exit ends of said annealing tubes extending beyond the end wall of the oven and a brickwork structure extending beyond said end wall of the oven to support and cover the projecting ends of said annealing tubes, of burner tubes for conveying combustible gas and air passing through the lower walls of said annealing tubes and opening into the interior thereof near the open exit ends, a main gas supply pipe, branches from said gas supply pipe communicating respectively with the burner tubes to supply the latter with gas, a main air supply pipe to convey pressure air and branch pipes extending from said air main respectively to and opening into the lower ends of said burner tubes to convey pressure air, substantially as set forth.

4. In an apparatus for annealing wire, the combination with an oven, furnaces to heat said oven, fireclay annealing tubes passing adjacent to each other in a straight line through said oven through which tubes the wires to be annealed are drawn, the exit ends of said annealing tubes extending beyond the end wall of the oven, having full open ends and having a communication passage formed between the vertical dividing wall of each two adjacent annealing tubes near the exit ends of the same, of a burner tube for conveying combustible gas and air entering through the base between each pair of said annealing tubes, and opening into the communication passage aforesaid, and means for conveying combustible gas and air to said burner tubes, substantially as set forth.

5. In an apparatus for annealing wire, the combination with an oven, furnaces to heat said oven, fireclay annealing tubes passing adjacent to each other in a straight line through said oven through which tubes the wires to be annealed are drawn, the exit ends of said annealing tubes extending beyond



the end wall of the oven, having full open  
ends, having a communication passage  
formed between the vertical dividing wall of  
each two adjacent annealing tubes near the  
5 exit ends of same, the upper wall of said  
communication passage having oppositely  
inclined surfaces to divide and divert the  
flame into the adjacent annealing tubes, of  
a burner tube for conveying combustible gas  
10 and air entering through the base between  
each pair of said annealing tubes and opening

into the communication passage aforesaid,  
and means for conveying combustible gas  
and air to said burner tubes, substantially as  
set forth.

In witness whereof I have hereunto set my  
hand in the presence of two witnesses. 15

JOHN HENRY ROBERTS.

Witnesses:

GRIFFITH BREWER,  
THOMAS W. ROGERS.