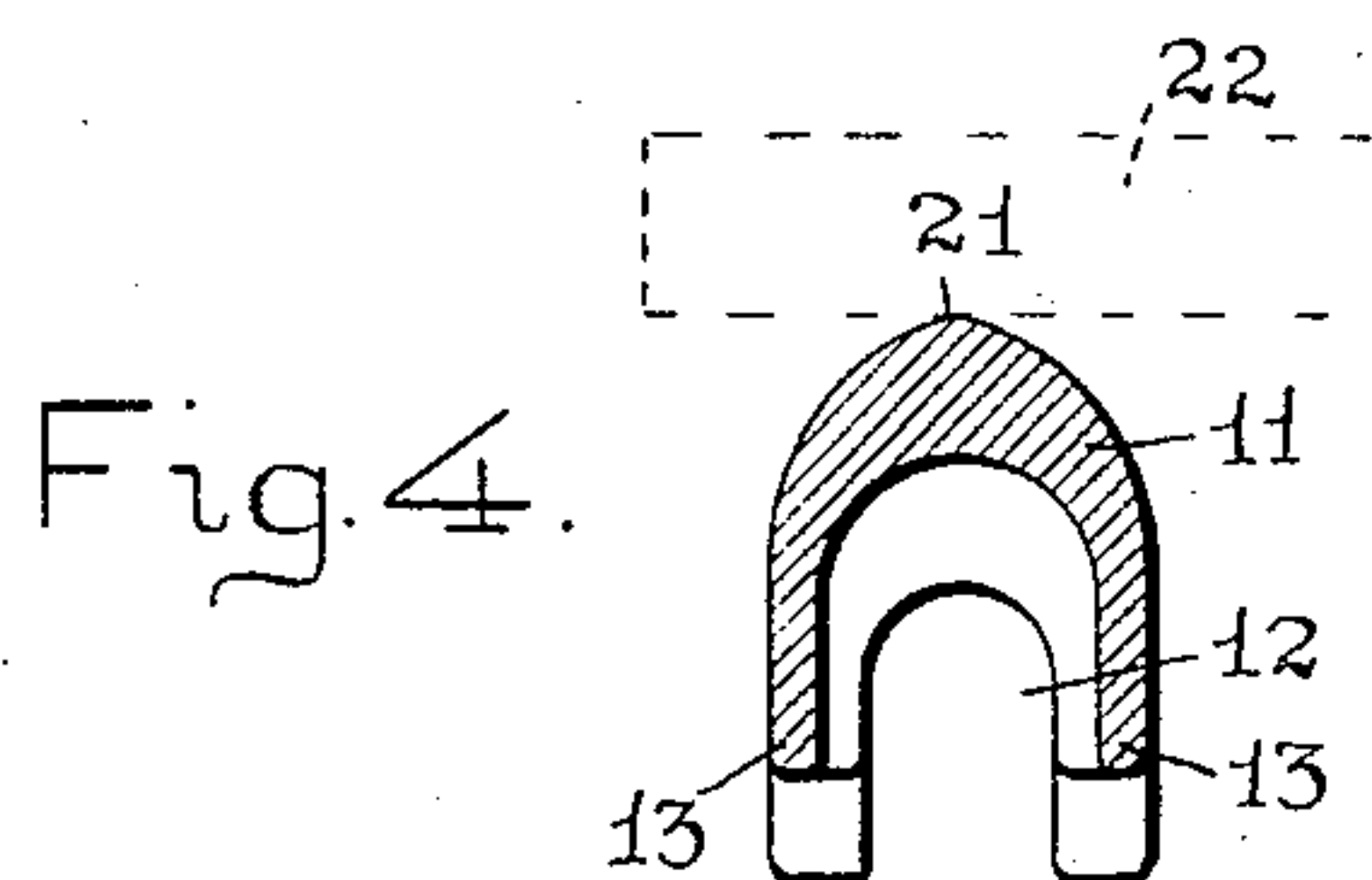
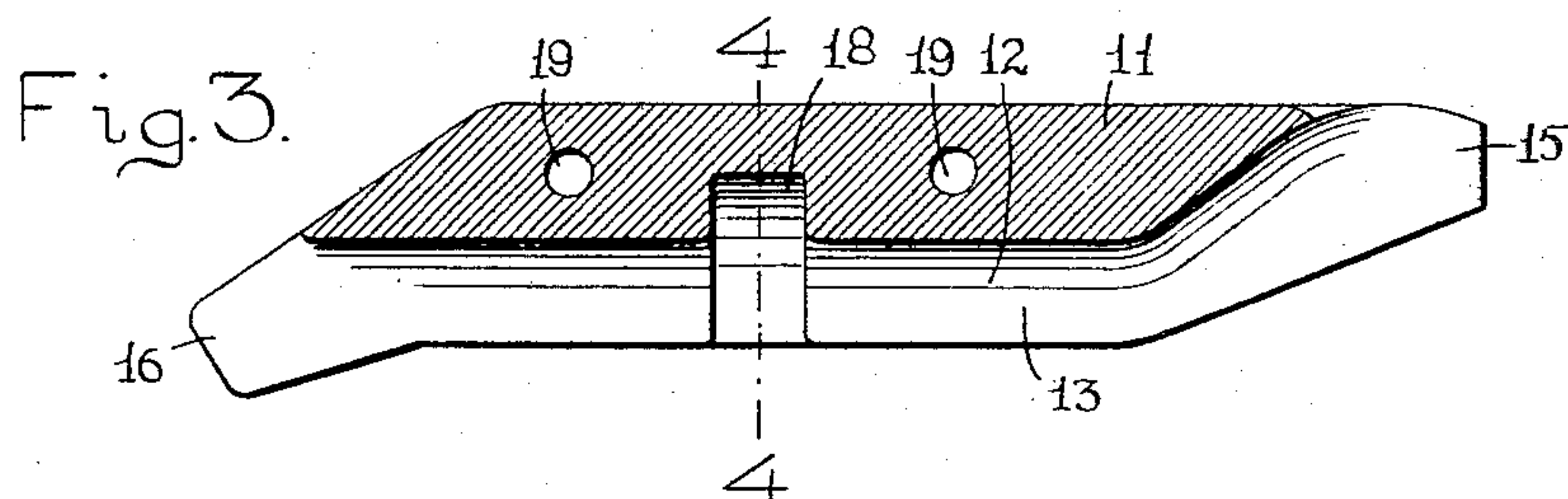
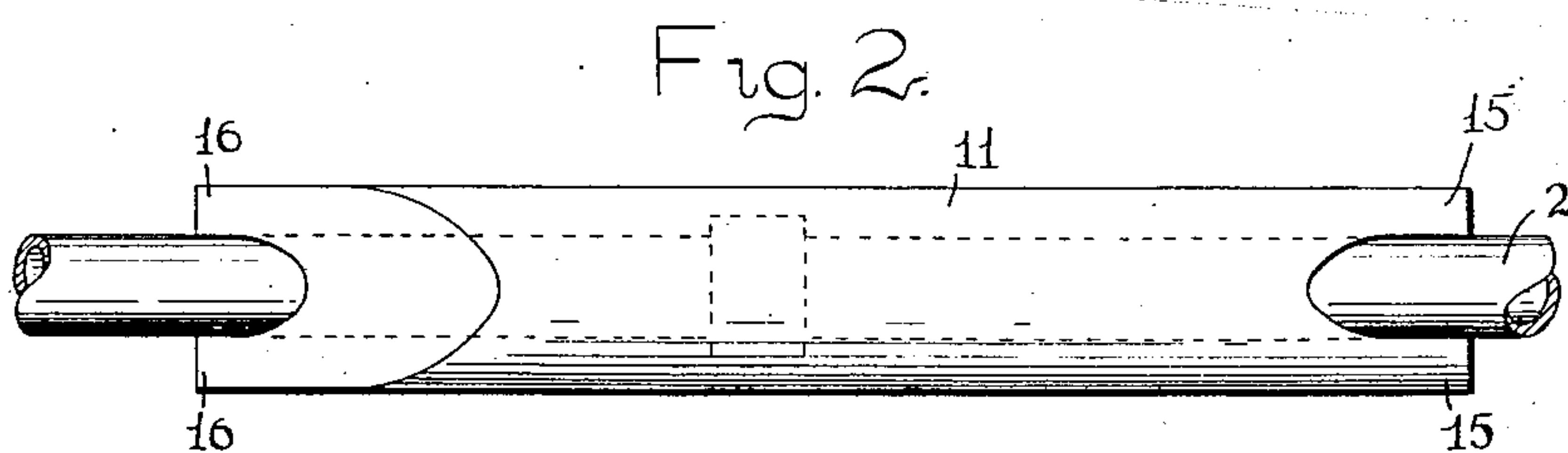
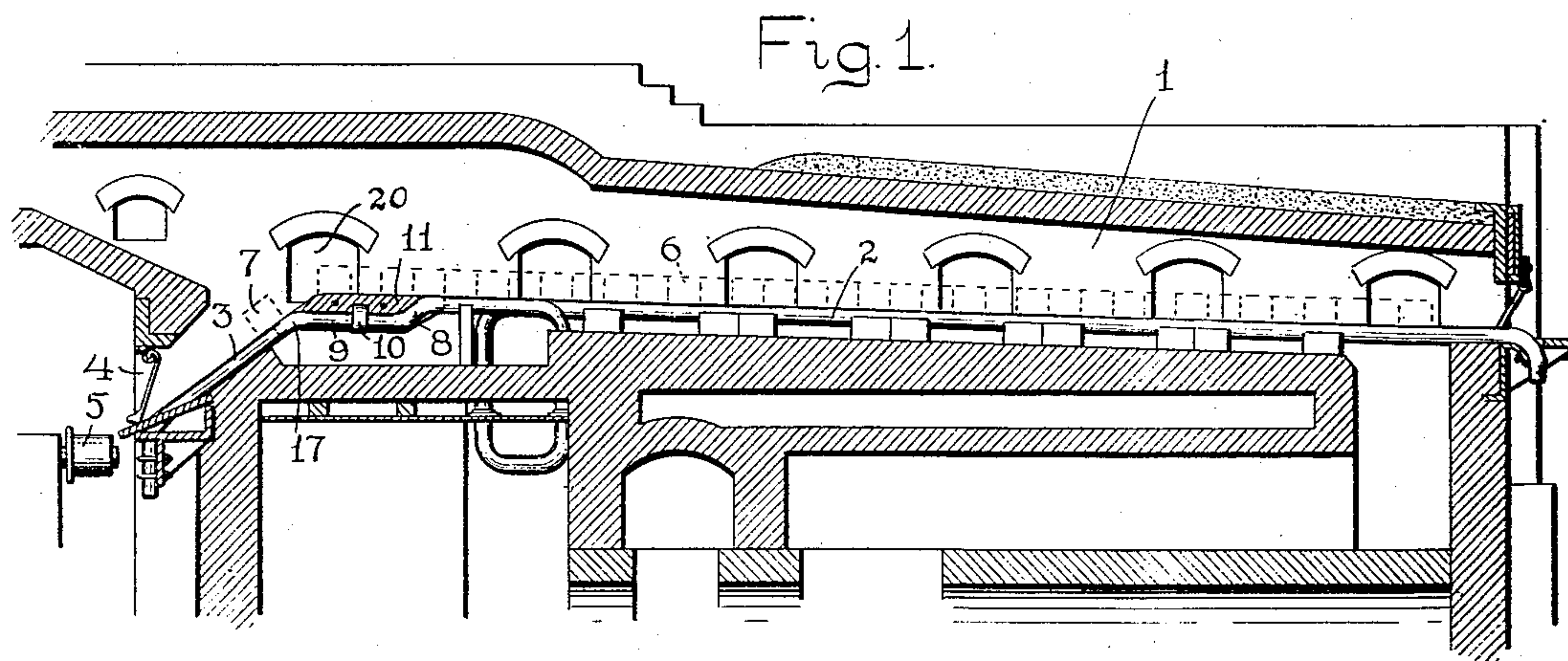


No. 886,492.

PATENTED MAY 5, 1908.

J. R. GEORGE.  
METAL HEATING FURNACE.  
APPLICATION FILED MAR. 6, 1905.



Witnesses

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# UNITED STATES PATENT OFFICE.

JEROME R. GEORGE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO MORGAN CONSTRUCTION COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## METAL-HEATING FURNACE.

No. 886,492.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed March 6, 1905. Serial No. 248,507.

*To all whom it may concern:*

Be it known that I, JEROME R. GEORGE, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Metal-Heating Furnaces, of which the following is a specification, accompanied by drawings, forming a part of the same, in which—

Figure 1 represents a vertical sectional view through the heating chamber of a metal heating furnace embodying my invention. Fig. 2 represents on a larger scale a top view of a portion of the track along which the metal bars are moved through the heating chamber. Fig. 3 is a central longitudinal sectional view of the metal shoe forming a portion of the track and detached therefrom, and Fig. 4 is a transverse sectional view of the same on line 4—4, Fig. 3.

Similar reference letters and figures refer to similar parts in the different views.

My present invention relates to an improvement in that class of metal heating furnaces which comprise a heating chamber provided with a track extending longitudinally through the chamber and composed of pipes through which a circulation of water is maintained in order to protect them from the intense heat of the furnace, and along which the metal bars are pushed from the admission to the delivery end of the heating chamber.

The object of my invention is to secure the uniform heating of a metal bar as it is delivered from the furnace, and it consists in providing means for removing the metal bar from contact with the cooling water pipes of the track just before its withdrawal from the furnace and for a sufficient period to enable the portion of the metal bar which has been in contact with the cooling water pipes to become heated uniformly with the remainder of the metal bar.

In the accompanying drawings I have shown my invention as applied to what is known as a gravity discharge furnace, the construction and operation of which will be well understood by those conversant with metal heating furnaces. It comprises a heating chamber 1 containing a track for the metal bars, consisting of water pipes 2 extending longitudinally through the heating chamber, one of said pipes being shown in

Fig. 1. The metal bars are admitted upon the water pipes 2 at one end of the chamber and are pushed along by a step-by-step motion to the opposite or delivery end of the chamber, where the water pipes are given a sharp bend downward forming an inclined section 3 of the track, over which the metal bars are delivered by gravity through a delivery opening 4 upon conveyer rolls 5.

The broken lines 6, Fig. 1 indicate the position of the metal bars on the water pipes between the admission end of the furnace and the inclined section 3 of the track, and the broken lines 7 indicate a metal bar passing down the inclined section 3 of the track. The water pipes are raised above the bed of the heating chamber to permit the application of heat to the under side of the metal bars, but those portions of the metal bars which come in contact with the water pipes are subjected to the cooling influence of the water circulating through the track, so that they become less heated than the remainder of the bars, and when delivered from the furnace these less heated spots are harder and less ductile than the remainder of the bar, resulting in unequal sections when rolled.

It is the object of my present invention to obviate this difficulty encountered in heating metal bars in contact with a water cooled track and to render the entire mass of the metal bar uniformly heated as it is delivered from the furnace, and I accomplish this result by making a short downward bend at 8 in the pipe forming the track and a short distance in front of the inclined section 3 forming a depressed section 9 of the track to which I attach by welding or otherwise a collar 10. Upon the depressed section 9 of the track I mount a metal shoe 11, preferably of cast steel, having its under surface longitudinally grooved at 12 to receive the depressed section of the pipe and form longitudinal flanges 13, 13, extending downward upon each side of the pipe. The flanges 13 are extended at one end of the shoe at 15 to inclose the bent section 8 of the pipe, and at the opposite end of the shoe the flanges are extended at 16 to inclose the bend 17 at the beginning of the inclined section 3. The shoe is also provided with a central recess 18 to receive the collar 10 attached to the pipe in order to prevent the longitudinal movement of the shoe on the pipe and the extended ends 15 and 16 of the flanges as they



inclose bent sections of the pipe tend to prevent the rocking of the shoe on the pipe. The shoe is further provided with holes 19 to receive the ends of iron bars or rods by which the shoe may be inserted through an opening or door 20 in the side walls of the furnace and placed in position upon the water pipe, also enabling shoes which have become eaten by the intense heat of the furnace to be replaced by new shoes. The upper portion of the shoe is preferably reduced in thickness to form a limited supporting surface 21, Fig. 4, for the metal bars, the position of which on the shoe is indicated by the broken lines 22, Fig. 4. The forward movement of the metal bars along the track causes the bars to be successively moved out of contact with the water pipes and into contact with the shoes 11, in which position the under surface of the bars is considerably removed from the water pipes and is in limited contact with the apex or upper surface of the shoes. During the movement of the metal bars across the shoes 11 the application of heat to the under surface of the bars previously in contact with the water pipes and the retained heat from the bars themselves causes a diffusion of heat through the partially heated spots previously in contact with the water pipes until the entire mass of the bar becomes heated uniformly by the time it reaches the inclined section 3 of the track, when it is rapidly delivered by gravity through the delivery opening 4 of the furnace.

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

1. The combination with a water cooled pipe forming the track of a metal heating furnace and having a depressed section, of a detachable shoe supported by the top of said depressed section and having its upper surface at one end in the plane of said track and at its opposite end higher than the depressed section of the track, whereby a metal bar supported on said shoe is removed from contact with the water cooled pipe.

2. The combination with the water cooled pipe forming the track of a metal heating furnace, of a detachable shoe loosely held on said pipe, whereby a metal bar supported on said shoe is removed from contact with said pipe, and means for holding said shoe from longitudinal movement on said pipe.

3. The combination with a water cooled pipe forming the track of a metal heating furnace, and having a depressed section provided with a collar, of a shoe applied to said depressed section and having a recess fitting said collar whereby said shoe is held from longitudinal movement.

4. The combination with a water cooled pipe forming the track of a metal heating furnace, and having a depressed section produced by a bend in the pipe, of a shoe mount-

ed upon said depressed section and having flanges inclosing the bend in the pipe, whereby said shoe is held from rocking on the pipe.

5. The combination with a water cooled pipe forming the track of a metal heating furnace, and having a depressed section, of a detachable shoe mounted upon said depressed section of the pipe, and having its upper surface reduced in thickness and having downward depending flanges inclosing the sides of the pipe, with the upper surface of said shoe lying in the normal plane of said track, and means for holding said shoe from longitudinal movement.

6. The combination with a water cooled pipe forming the track of a metal heating furnace, and having an inclined section at the delivery end of the furnace over which the heated metal bars are delivered by gravity, and a depressed section adjacent to said inclined section, of a shoe adapted to be supported on said depressed section of the pipe, and means for moving a metal bar from said track across said shoe upon said inclined section, said shoe having the upper surface of its receiving end in the normal plane of said track and having its delivery end at the inclined section of the track.

7. In a metal heating furnace, in combination, a heating chamber, a longitudinal water cooled track for billets, and means for removing the billets from said water cooled track near its discharging end and comprising a removable shoe of refractory material having its upper surface in a plane above the corresponding section of said water cooled track, said track forming a water cooled support for said shoe, and means for holding said shoe from longitudinal movement.

8. In a metal heating furnace, in combination, a heating chamber, a longitudinal water cooled track for billets having an inclined discharging section, a removable shoe of refractory material supported on said water cooled track for supporting the billets adjacent to said inclined section, means for holding the shoe from longitudinal movement on said track, and means for pushing the billet over said shoe and from said shoe to the inclined section of the track, whereby the billets are removed from said track immediately before entering upon said inclined section.

9. In a metal heating furnace, in combination, a heating chamber, a longitudinal water cooled track for billets having an inclined discharging section, with a clear space between said track and the floor of the heating chamber adjacent to said inclined section, and means for removing the billets from said water cooled track adjacent to its inclined section, consisting of a removable metal shoe and a water cooled support for said shoe.

10. In a metal heating furnace, in combination, a heating chamber, a longitudinal



water cooled track for billets, means for removing a billet from said track near its discharge end and consisting of a removable shoe of refractory material having its supporting surface in a different plane than the corresponding section of the water cooled track, supported by said water cooled track.

11. In a metal heating furnace, in combination, a heating chamber, a longitudinal water cooled track for billets, a removable support for the billets supported upon said track near the discharge end, having its supporting surface in a different plane than the corresponding section of the water cooled track, whereby the billets are removed from contact with said track, and means for holding said removable billet support from longitudinal movement.

12. In a metal heating furnace, a heating chamber, a longitudinal track for billets, a removable support for the billets near the

discharge end of and supported upon said track, having its supporting surface in a different plane from the corresponding section of said longitudinal track, whereby the billets are removed from contact with said track, and means for holding said removable billet support from longitudinal movement.

13. In a metal heating furnace, a heating chamber, a longitudinal track for billets, a removable support for the billets resting upon said track having its supporting surface in a different plane from the corresponding section of said longitudinal track, whereby the billets are removed from contact with said track.

Dated this 15th day of February 1905.

JEROME R. GEORGE.

Witnesses:

PENELOPE COMBERBACH,  
RUFUS B. FOWLER.