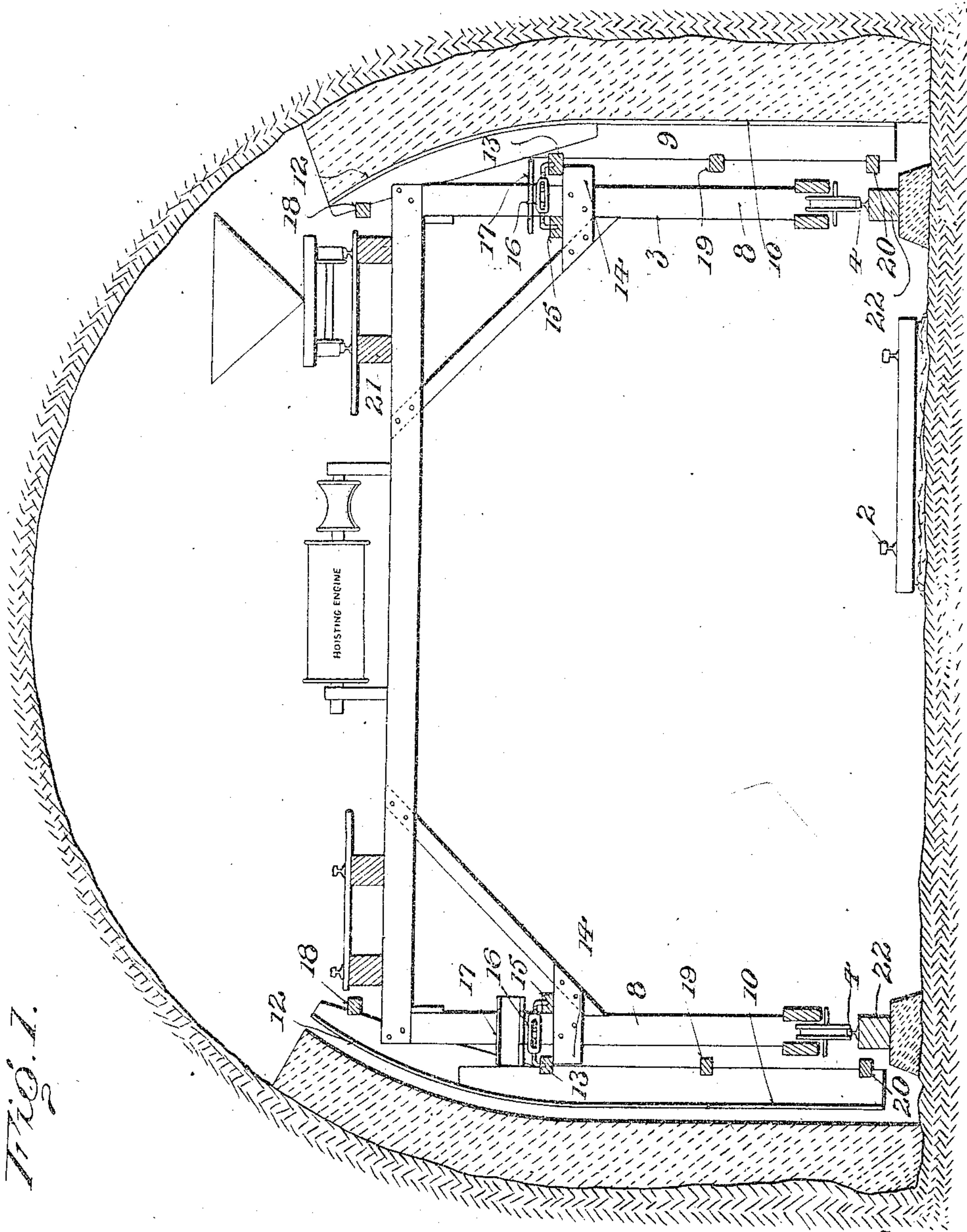


F. M. TALBOT.
 FORM FOR LINING TUNNELS.
 APPLICATION FILED OCT. 7, 1908.

934,768.

Patented Sept. 21, 1909.
 3 SHEETS—SHEET 1.



Witnesses

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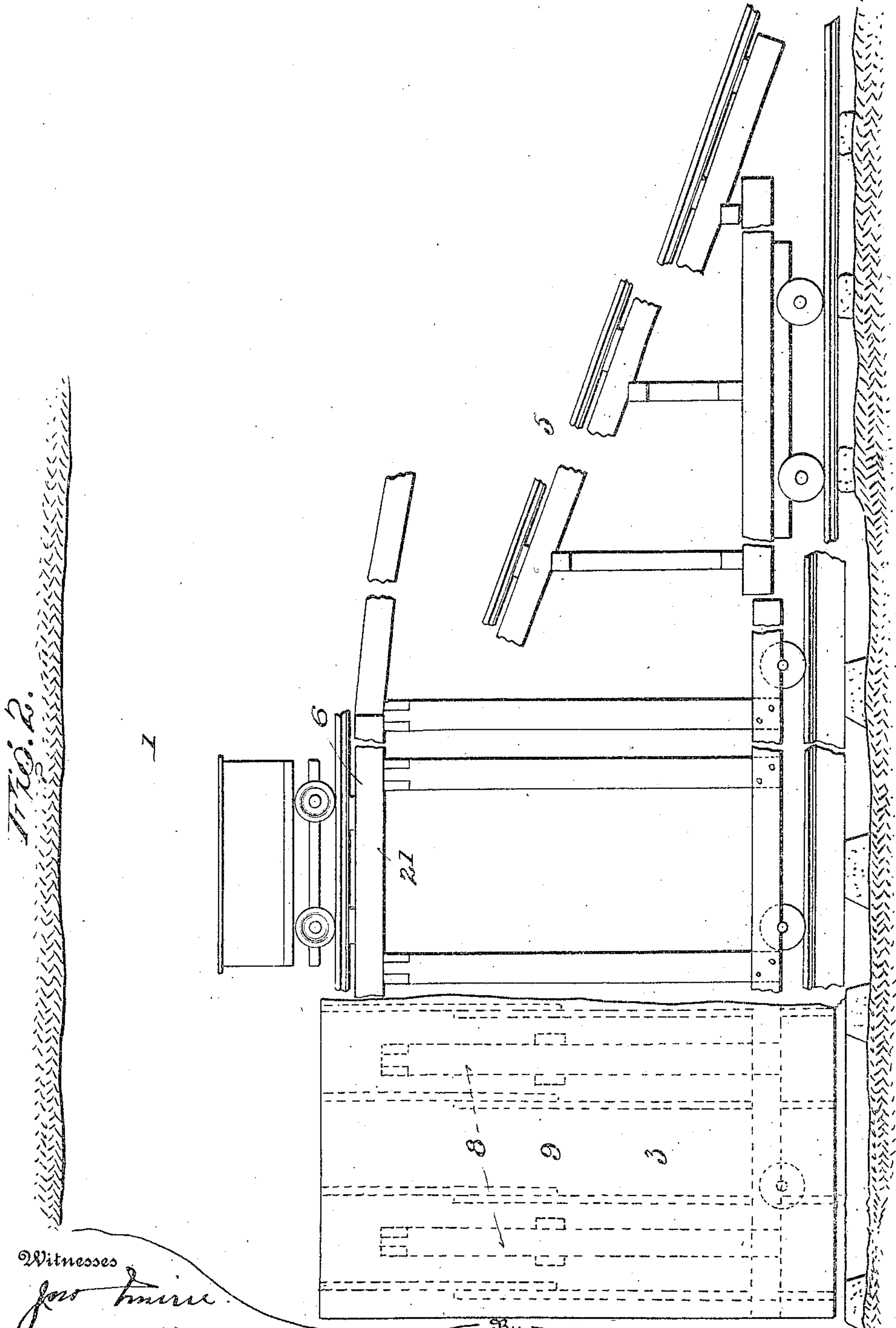
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Fig. 4.

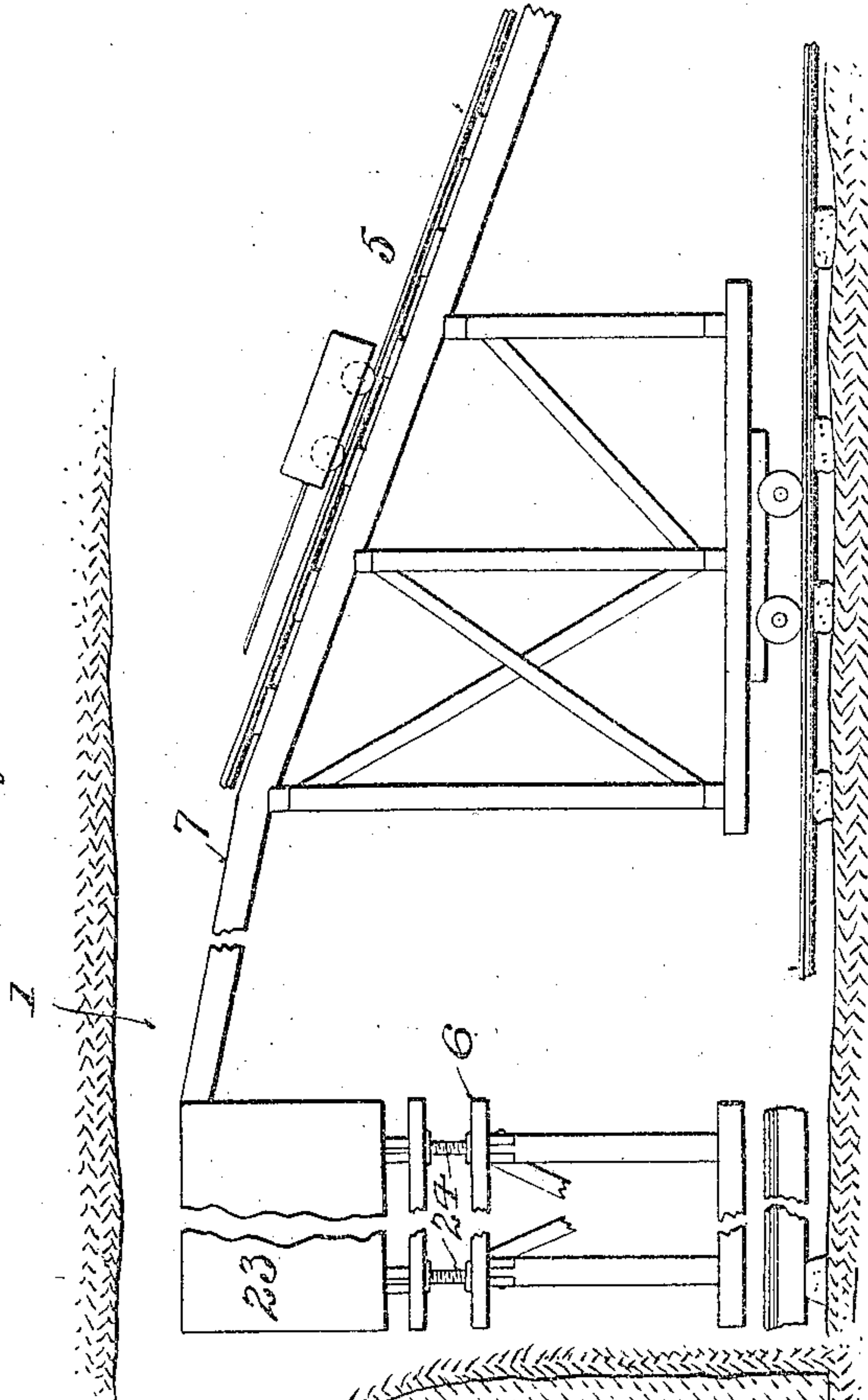
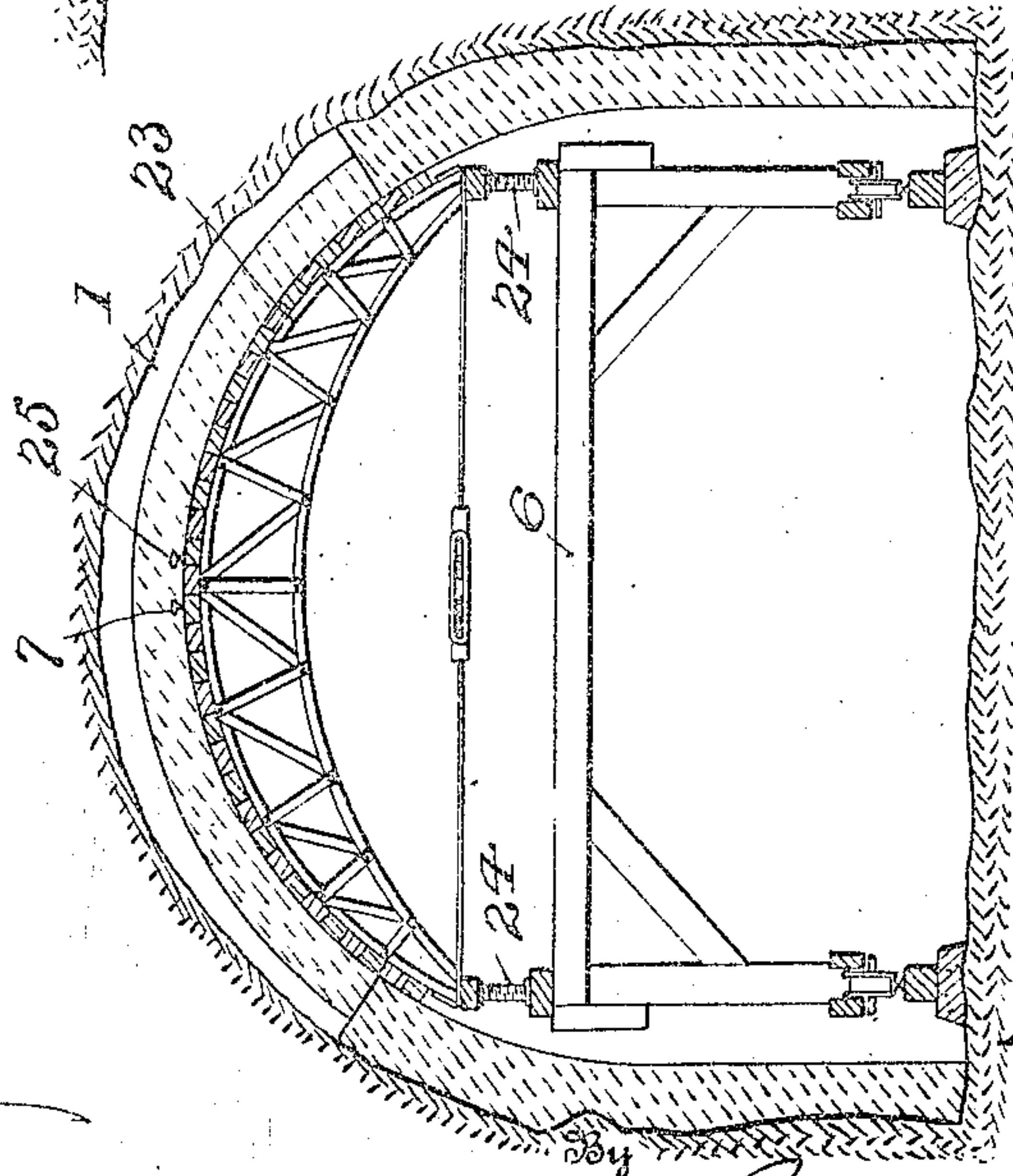


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANK M. TALBOT, OF GLEN RIDGE, NEW JERSEY.

FORM FOR LINING TUNNELS.

934,763.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed October 7, 1908. Serial No. 453,531.

To all whom it may concern:

Be it known that I, FRANK M. TALBOT, of Glen Ridge, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Forms for Lining Tunnels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

This invention contemplates providing an improved form for lining tunnels with concrete, having special reference to forms which bridge over a railway track and do
15 not interfere with the travel thereon, thus enabling a form to be used for lining a new tunnel while cars pass in and out from the head or for repairing or relining the tunnel through which railroad traffic is being main-
20 tained.

The primary object of my invention is to provide a simple construction having no exposed mechanism or other movable parts into which the concrete may gather and re-
25 tard operation.

Various attempts have been made to provide concrete forms for lining tunnels, but so far as I am aware they have failed of adoption, mainly because they require the
30 use of mechanical adjusting devices which would soon become inoperative when the concrete adhered to them.

A further object of my invention is to provide a form for lining both the sides and
35 the arch of a tunnel, such form having an inclined way over which the concrete may be transported, and both the form and the incline mounted upon a frame movable over tracks so as to enable the single structure
40 to be used for the entire length of a tunnel without requiring any dismantling of the parts.

In the accompanying drawing Figure 1 is a vertical transverse sectional view showing
45 a tunnel and the portion of my improved form used in lining the sides. Fig. 2 is a side elevation thereof. Fig. 3 is a transverse sectional view, showing the portion used for lining the arch. Fig. 4 is a side
50 elevation thereof.

Referring to the drawing, 1 designates a tunnel which I may call a surface tunnel to distinguish from what are commonly termed
55 "tubes". The tunnel illustrated is the kind commonly cut through a hill and in which the earth or grounds forms the flooring,

while "tubes" indicates the cylindrical structures employed in submarine passages.

2 designates the way or track passing through the tunnel. The frame structure 3
60 on which my forms are mounted is movable on tracks 4 arranged on either side of the railway 2. As shown in Figs. 2 and 4, the forward end of the frame is provided with an incline 5 over which cars containing the
65 concrete may pass either to platform 6, or to platform 7. The platform 6 is the one to which the materials are transported for lining the sides of the tunnel as shown in Fig. 1, while platform 7 constitutes the arch form
70 which is used after the sides have been lined. (See Figs. 3 and 4.)

The frame 3 comprises side uprights 8 and the flooring supported by these uprights, constituting the platform 6, the latter in
75 turn supporting the platform 7. I have shown the side forms at 9. These consist of a truly vertical portion 10 and a slightly curved part 12, rigidly secured together. Each of the forms 9 is provided with a
80 block or abutment 13, projecting inwardly and designed to rest upon an offset 14 on the vertical upright 8. A second block or abutment 15 is shown on the offset 14 on the inner side of the upright 8 and these two
85 blocks, 13 and 15, are connected by a turnbuckle 16. At 17 I have shown a hinged cover pivoted to the upright 8 and which may be turned down over the turnbuckle to protect it. I have so proportioned the
90 weights of the parts 10 and 12 of the form that when they are in the position shown in Fig. 1 and supported only by the block 13 resting upon the offset 14, they will be in the
95 correct position for acting as forms, that is, they will, by reason of gravity, be "trued". Hence it is only necessary to brace the forms 9 equally at various points in order to insure their lateral adjustment to the proper ex-
100 tent. For this purpose I have shown the vertical portions 10 of the form equipped with blocks 18, 19, and 20, in proximity to a rigid surface, such as the vertical upright 8 or the track supports 21, 22; so that between
105 these contiguous parts wedges may be inserted. In adjusting the forms it is only necessary to operate the turnbuckle 16 the desired extent and drive the wedges proportionately. When the concrete has set or
110 hardened, the wedges are released and by means of the turnbuckle the form is drawn away from the wall and the form again rests

upon the support 14 and requires only a repetition of the steps recited to again bring it into use after it has been moved with the frame along the tracks 4. It will be noted that there are no mechanical devices whatever which could become clogged or inoperative by reason of the concrete collecting upon them.

I cover the outer face of the forms 9 with a suitable metallic sheathing, such as galvanized iron. The forms 9 are usually about eighty feet in length and when this extent of wall has been lined, the forms are withdrawn and advanced for the next section. The integrity of both the forms and their covering is fully maintained. There are no parts unavailable for further use and the structure may be, and in practice has been, used continuously in lining tunnels without any parts becoming deranged.

The form 23 for the arch is shown supported by platform 6 and vertically adjustable by jack screws 24. On the top of the form 23 I have shown a way or track 25 to which the slope or incline 5 may lead after the sides have been lined. In both cases the material is poured into the space between the forms and the tunnel wall as indicated in Figs. 1 and 3. Form 23 is preferably about sixty feet in length, and, as will be readily understood, it is used and the material is conducted thereto after the forms 9 have completed their operation; the frame 3 being moved back to the point at which the lining was commenced and the filling and advancing continuing as described with relation to the forms 9.

I claim as my invention:—

1. In a form for lining walls with concrete, a frame having side uprights provided with seats, movable side forms having abutments designed to rest upon said seats, said side forms hanging freely from said seats, and means for bodily shifting said side forms laterally on said seats.

2. In a form for lining walls with concrete, a frame having side uprights provided with seats, movable side forms having abut-

ments designed to rest upon said seats, said forms hanging therefrom in vertical disposition, and turnbuckles connecting said forms to said uprights and designed to bodily shift said forms laterally while maintaining their disposition.

3. In a form for lining walls with concrete, a frame having side uprights provided with seats, movable side forms having each a vertical portion and an upper curved portion and having a series of abutments each contiguous to a rigid portion of said frame, one of the abutments of each of said forms being located at the center of gravity thereof and resting upon the adjacent seat of said uprights, means for moving said abutments on their seats to shift said forms laterally, and means, as wedges, for maintaining the other abutments rigidly with relation to said frame.

4. In a form for lining tunnel walls with concrete, a track, a frame bridging over the tunnel and having side uprights movable upon said track, and a slope or incline at one end, said frame having two platforms to which material for the lining may be conducted, one of said platforms being designed to receive the materials for the sides and the other the materials for the arch, side forms carried by said frame and normally hanging trued for concrete filling, means for bodily shifting said side forms laterally, an arch form carried by said frame, and means for moving said arch form vertically.

5. In a form for lining tunnel walls with concrete, a frame, a side form carried by said frame, said side form being bodily shiftable laterally through the medium of a single mechanical element, as a turnbuckle, and means for covering or protecting said turnbuckle.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

FRANK M. TALBOT.

Witnesses:

E. H. SNYDER,
J. H. GARDNER.