C. BRYNOLDT.

TUNNEL MOLD FORM.

APPLICATION FILED APR. 11, 1917.

1,277,186.

Patented Aug. 27, 1918.

2 SHEETS—SHEET 1.

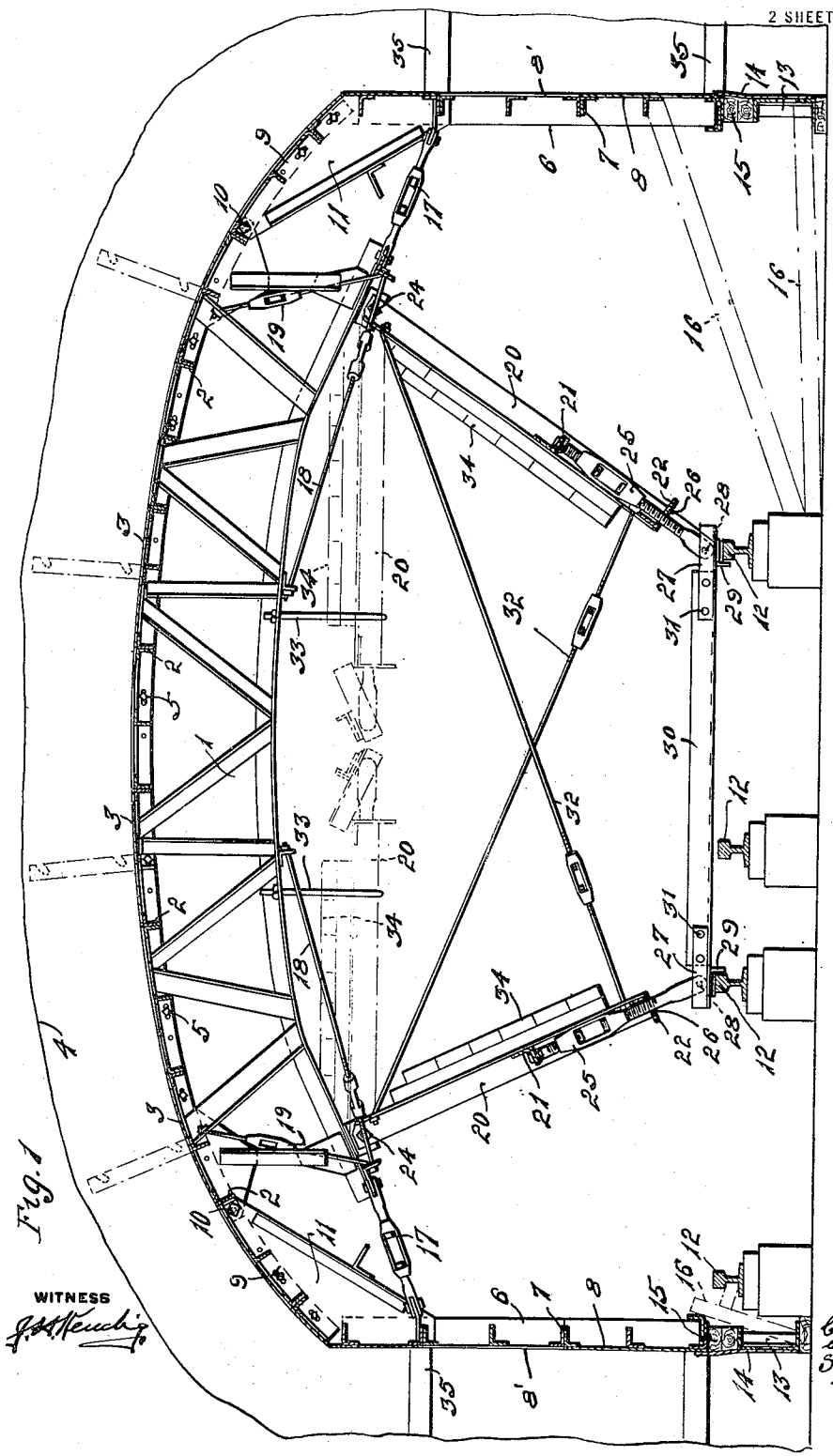


Fig. 1

WITNESS

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Fig. 3

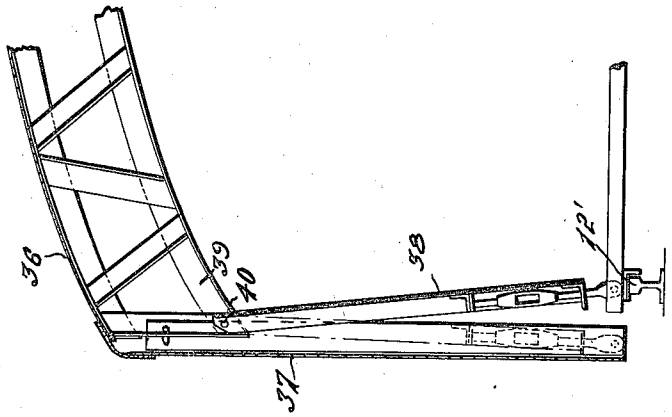
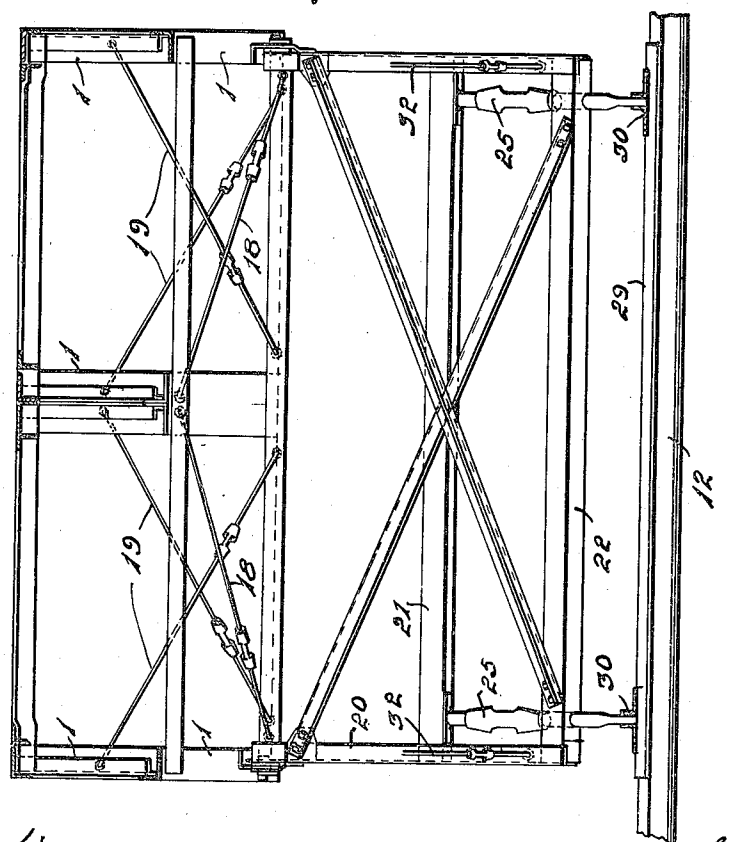


Fig. 2



WITNESS

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UNITED STATES PATENT OFFICE.

CHRISTIAN BRYNOLDT, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO BLAW STEEL CONSTRUCTION COMPANY, A CORPORATION OF NEW JERSEY.

TUNNEL-MOLD FORM.

1,277,186. Specification of Letters Patent. Patented Aug. 27, 1918.

Application filed April 11, 1917. Serial No. 161,131.

To all whom it may concern:

Be it known that I, CHRISTIAN BRYNOLDT, a subject of the King of Denmark, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Tunnel-Mold Forms, of which the following is a specification.

The invention relates to mold forms, and particularly to that class of mold forms used in the erection of concrete lined tunnels and mine shafts, and has for its principal objects the provision of a mold form wherein the traveler upon which the form is used may be moved clear of the traffic through the tunnel or shaft; the provision of a mold form that may be easily collapsed and assembled in operative position; the provision of a mold form wherein the traveler may be folded upward clear of the traffic and serve as a working platform for the operators while the concrete is being applied to the ceiling; the provision of a mold form having alternate panels of the side walls and ceiling detachable so that concrete may be applied through spaced openings in the form; and such other objects as may hereinafter appear. One embodiment of the invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a transverse section through a mold form in operative position with the traveler in position ready to support the form for moving; Fig. 2 is a longitudinal section of the upper portion of the form showing a portion of the traveler in side elevation; and Fig. 3 is a transverse sectional view of a portion of a form showing a modified application of the traveler.

Referring to the drawings, the ceiling of the mold form comprises a plurality of spaced truss members 1 connected longitudinally of the tunnel by angles 2 which provide supports for the form shells or plates 3. As illustrated, every alternate plate is detachable, such plates being removed to permit the concrete to be filled between the earth 4 and the form. When concrete has been applied until it is level with the opening the detachable plates are secured to the form by bolts or any suitable means. The trusses are adapted to be bolted together end to end by bolts 5 which pass through slots in the top angles of the trusses. Thus two or more forms may be secured together and used as a unit in operation. Preferably two forms are used with each traveler.

The side walls of the form consist of spaced vertical angles 6 connected longitudinally of the form by horizontal angles 7 which support the shells or plates 8. The alternate plates of the side walls are made detachable so that they may be removed for filling concrete through the openings 8′. The upper ends of the side walls carry a portion 9 of the ceiling form which forms the upper corners of the tunnel. The side forms are pivoted to the ceiling form by means of bolts 10 and the portion 9 of the ceiling form is supported rigid with the side forms by triangular shaped web plates 11. The side walls are adapted to collapse inward and swing on the bolts 10 when it is desired to move the form.

In tunnels where the traffic rails 12 are already in place and are close to the walls thereof and elevated from the bottom of the tunnel, the main side wall forms must terminate at a point above the rails so that they will clear the rails when swung inwardly. The side wall is completed, in such cases by a narrow panel 13 made of angle iron, provided with a form plate 14 which extends upward and is adapted to overlap the lower end of the wall form on the outside. The panel 13 and the lower end of the wall form are retained in operative position by wooden braces 16, indicated in dotted lines and the wall forms are supported upon the panels 13 with a pair of coöperating wedges 15, inserted between the panel and the form. When it is desired to collapse the form the wedges are removed permitting the form to lower.

The wall forms are held adjacent the top in operative position by the turn buckles 17 and the whole structure is stiffened against distortion by means of diagonally disposed tie rods provided with turn buckles for adjustment of their tension.

Where concrete is being applied in operating tunnels it is necessary to support the forms while in operation so that they will clear all normal traffic through the tunnel and it is the object of this invention to provide a form that is self supporting while in operative position, and a traveler for conveying the form into operative position that may be secured to the form and swung clear of all traffic through the tunnel or mine

shaft while the form is in operative position. It is also the object to provide a traveler that may be utilized while not conveying the form, as a working platform for supporting the operators while they are filling the concrete through the openings in the mold.

The traveler consists of a pair of rectangular frames built of angle iron 20 which are connected longitudinally by angle irons 21 and 22. The upper ends of the angles 20 are pivoted to the lower truss member 23 by the bolts 24, and the lower ends of the traveler are provided with turn buckle jacks 25, the upper ends of which are secured to the angles 21, while the lower ends project through holes 26, in the angles 22, and are pivoted to clips 27 by bolts 28. The clips are connected longitudinally of the form by rail shoes 29 firmly secured thereto and the travelers are secured to each other adjacent their lower ends by connecting angles 30 which are bolted to the clips 27 by bolts 31. As this form is particularly designed for use in a mine shaft having a considerable downward angle, wheels or rollers are not necessary where the form will slide into a new position when the anchors have been released.

The travelers are retained against distortion or lateral displacement by the diagonal tie rods 32 which are removed when the traveler is not in operative position for moving the form.

When the form has been moved, the angles 30 are removed and the travelers swing upward until they have reached the horizontal position indicated by dotted line, and are held in such position by means of hook bolts 33 suspended from the ceiling trusses 1. In this position they provide a platform 34 for the operators which consists of a series of wooden planks secured longitudinally upon the traveler frame.

Assuming that the mold is in collapsed position upon the traveler, the operation is as follows. The turn buckle jacks 25 upon the traveler are screwed so as to elevate the ceiling mold to proper height. The panels 13 are inserted in position. The side forms are then swung outward by the turn buckles 17, the wedges then inserted between the forms and the panels, and the braces 16 wedged in the position indicated in dotted lines. Wooden braces 35 are then inserted between the tunnel walls and the form to prevent it from spreading laterally when the travelers are swung into folded or collapsed position.

After the form has been adjusted into proper position the angles 30 connecting the lower ends of the forms are removed and the tie rods 32 are disconnected. The travelers are then swung into folded position and secured in place by the hook bolts 33. Traffic may pass freely beneath the travelers and it will be seen that traffic will only be obstructed while the form is being moved, which is a very short interval compared with the filling operation.

Fig. 3 illustrates a form having a ceiling mold 36 and a wall mold 37 which may be moved inward with respect to the ceiling mold. A traveler 38 similar to the one previously described is pivoted to the ceiling truss 39 by bolts 40. This traveler may be swung toward the side form so as to clear traffic upon the rail 12'.

It is obvious that many changes may be made in the details of the construction and the invention is not limited to the specific means herein illustrated and described.

What I claim is:

1. A tunnel mold for forming concrete tunnels comprising a form for supporting the concrete and a collapsible traveler for supporting the form while the form is being moved to operative position, the said traveler being carried by the form and adapted to be moved into substantially horizontal position beneath the upper portion of the form so as to permit free passage of objects through the tunnel, the said traveler also being provided with a platform for supporting operatives when the form is in operative position.

2. A tunnel mold for forming concrete tunnels comprising a form for supporting the concrete, a traveler for supporting the form while the form is being moved to operative position, the said traveler being pivoted to the form and adapted to be swung upward beneath the upper portion of the form clear of the tunnel traffic, and an operating platform supported by the traveler when in elevated position adapted to support the operators while filling the form.

3. A traveler for supporting a concrete tunnel mold form comprising a plurality of columns extending from the ground upward into engagement with the form, means for extending the traveler so as to lift the form into operative position, means for securing the traveler to the form whereby the end thereof engaging the ground may be swung clear of the tunnel traffic, and means for securing the traveler in such position.

4. A tunnel mold form comprising a ceiling form, a side form secured to the ceiling form and extending within a short distance from the bottom of the tunnel, a form panel adapted to fit between the ground and the side form with a space between the side form and the panel, a plate adapted to bridge the space between the panel and the side form and wedges resting upon the panel adapted to support the side form and hold it in operative position.

5. A tunnel mold for forming concrete tunnels comprising a collapsible form for supporting the concrete, and a traveler carried by the form for supporting the form

when the form is in collapsed position, adapted when in operative position to support the entire form, the said traveler being carried by the form and adapted to be moved adjacent the shell thereof so as to permit of free passage of objects through the tunnel when the form is in operative position.

6. A tunnel mold for forming concrete tunnels comprising a collapsible form for supporting the concrete, a traveler carried by the form for supporting the form when the form is in collapsed position, adapted when in operative position to support the entire form, the said traveler being carried by the form and adapted to be moved adjacent the shell thereof so as to permit of free passage of objects through the tunnel when the form is in operative position and means for adjusting the form into operative position while supported upon the traveler.

7. A tunnel mold for forming concrete tunnels comprising a collapsible form for supporting the concrete, a traveler for supporting the form while the form is being moved to operative position, the said traveler being carried by the form and adapted to be elevated into substantially horizontal position so as to permit free passage of objects through the tunnel beneath the traveler when the form is in operative position.

CHR. BRYNOLDT.