H. B. LOXTERMAN.

TUNNEL MOLD FORM.

APPLICATION FILED FEB. 5, 1916.

1,198,645.

Patented Sept. 19, 1916.

2 SHEETS—SHEET 1.

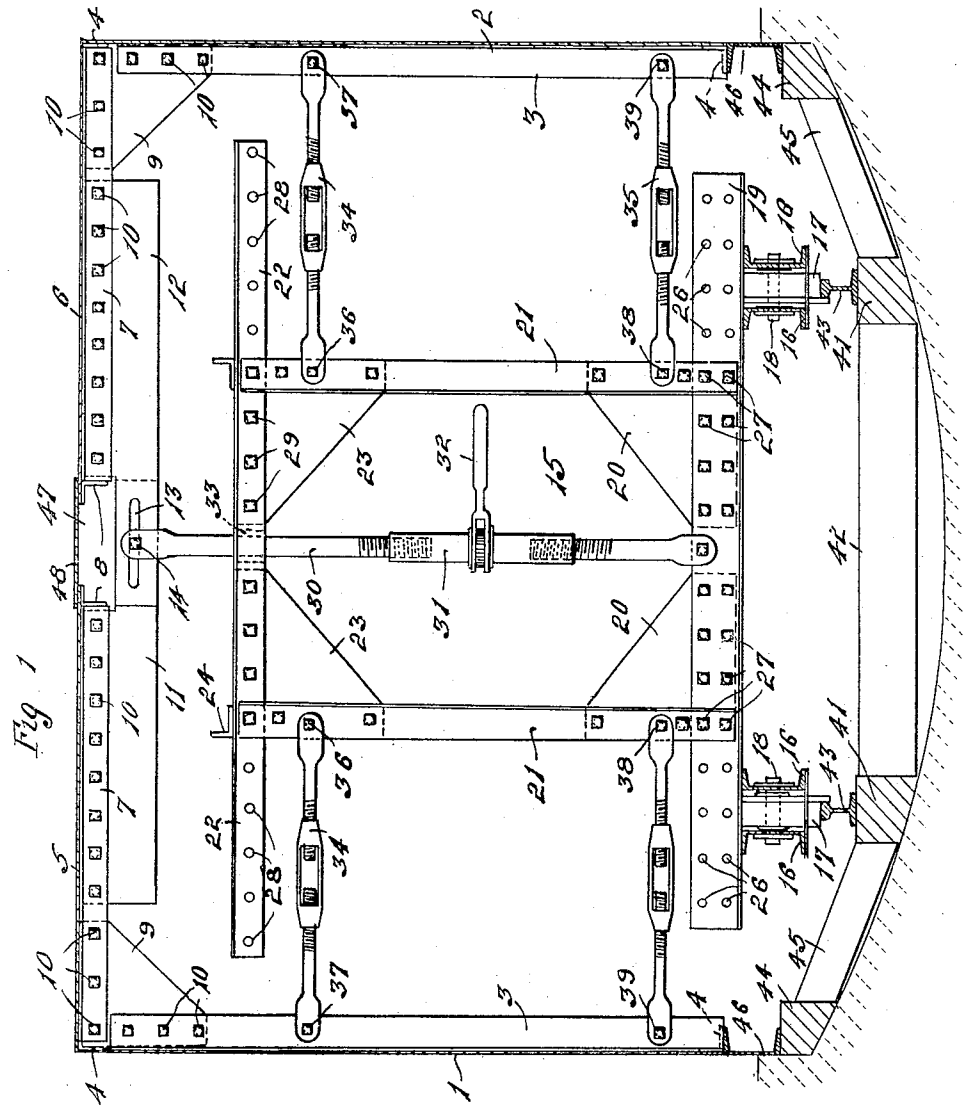


Fig. 1

WITNESS:

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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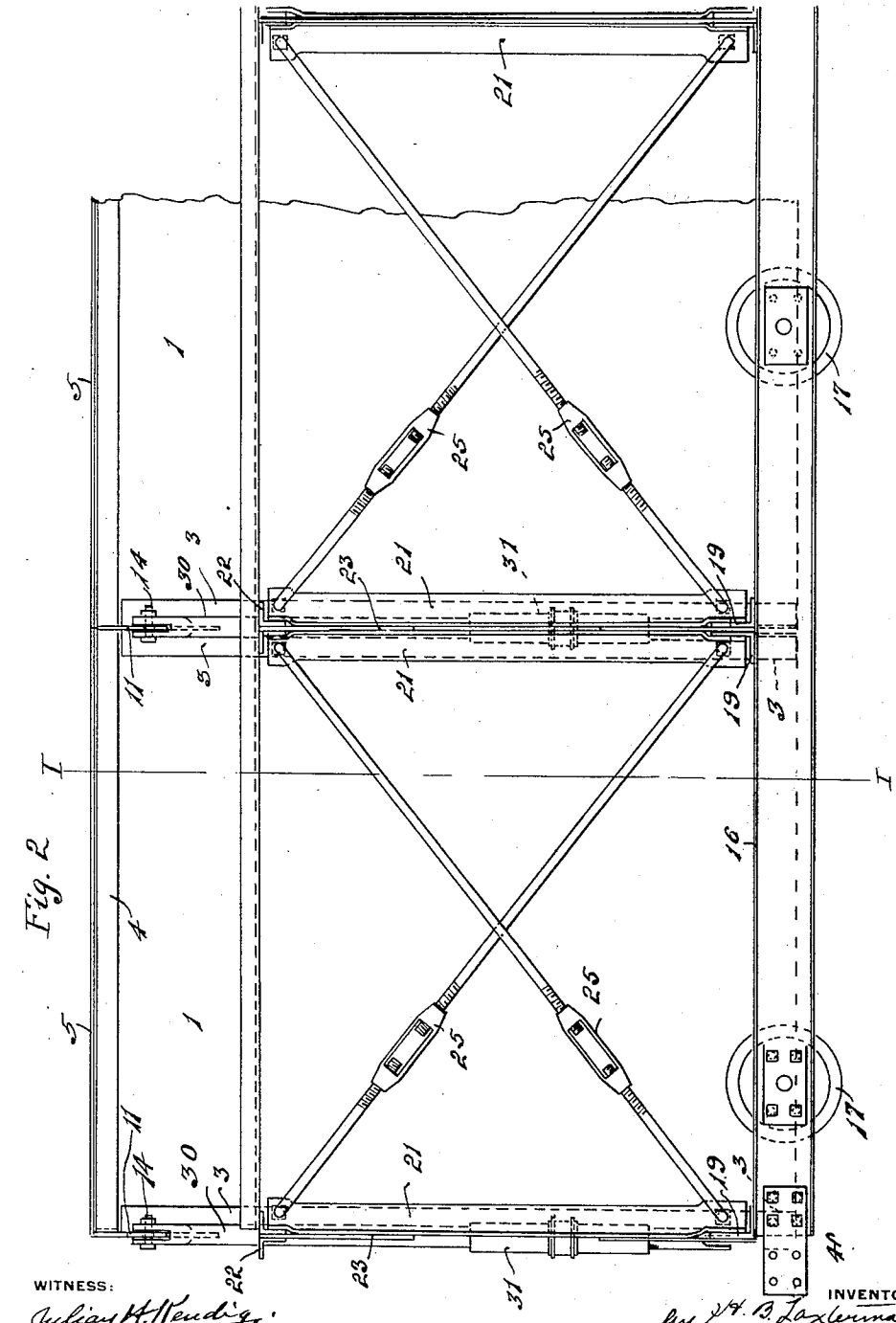


Fig. 2

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UNITED STATES PATENT OFFICE.

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TUNNEL MOLD-FORM.

1,198,645. Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed February 5, 1916. Serial No. 76,348.

To all whom it may concern:

Be it known that I, HOWARD B. LOXTERMAN, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Tunnel Mold-Forms, of which the following is a specification.

This invention relates to mold forms and more particularly to that class of forms used in the construction of concrete lined tunnels, conduits, sewers, etc., and has for its principal objects, the provision of a form and truck or traveler therefor, which may be used in the construction of tunnels, conduits or sewers having a wide range of varying dimensions; the provision of a mold form that may be readily assembled in operative position and easy to operate, 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 and traveler or truck, taken on the line I—I of Fig. 2, and Fig. 2 is a side elevation of the traveler showing the interior of the mold form illustrated at the left of Fig. 1.

Referring to the drawings, the apparatus comprises a pair of side mold forms 1 and 2 which are built up of sheet metal plates reinforced along their end edges by vertical angles 3 and longitudinally by angles 4. To each of the side mold forms 1 and 2 is secured ceiling mold forms 5 and 6 respectively, which are reinforced along their end edges by horizontal angles 7 and by the longitudinally disposed angles 8. The ceiling and wall forms are reinforced at their adjoining edges by means of gusset plate 9 which are securely bolted to the vertical angles 3 and to the horizontal angles 7 by means of bolts 10.

Between the downward depending flanges of the angles 7 on the ceiling form 5 is securely bolted a hinge plate 11 and on the other ceiling form 6 is secured a hinge plate 12 in a manner similar to that employed in securing the hinge plate 11. The inner ends of the hinge plates 11 and 12 are provided with slots 13 which are adapted to register so that a hinge pin 14 may serve as a pivot about which the mold forms may oscillate.

The mold forms are supported upon the traveler or truck 15 which consists of two pairs of longitudinal truck channels 16, between each pair of which are mounted the truck wheels 17, the wheels being pivoted on the shafts 18 which extend through each pair of channels. The pairs of longitudinal truck channels 16 are connected by transverse angles 19 at spaced intervals, the transverse angles 19 being arranged in pairs having their webs facing one another, between which gusset plates 20 are securely bolted in any desired position. Vertical angles 21 arranged in pairs are bolted to the gusset plates 20 and the transverse angles 19 and carry at their upper ends transverse angles 22 arranged in pairs, as shown in Fig. 2. Between the webs of the angles 22 are securely bolted gusset plates 23 which are bolted to the vertical angles 21 between the facing webs thereof. The transverse angles 22 are connected by longitudinal angles 24 which extend longitudinally of the traveler which is of such length, preferably, that it will support about four sections of mold forms, when arranged end to end.

By this arrangement of the transverse and longitudinal angles the framework is built up with great rigidity and the vertical angles 21 are braced by the turn buckles 25 (Fig. 2) which prevents any tendency of the vertical angles 21 being displaced longitudinally of the truck.

The transverse angles 19 are provided with a plurality of spaced holes 26 through which the bolts 27 which secure the vertical angles 21 to the transverse angles 19 may be inserted when it is desired to change the location of the gusset plates 20 with respect to the angles 19 for a purpose to be hereinafter described. The upper transverse angles 22 are provided with a plurality of spaced holes 28 through which the bolts 29 may be inserted when it is desired to adjust the position of the gusset plates 23 with respect to the transverse angles 22.

The ceiling forms 5 and 6 are supported upon the truck 15 by means of the ratchet jack screw 30 which is secured at its lower end to the center of the transverse angles 19 and which carries at its upper end the hinge pin 14, the ends of the jack screw being forked so as to straddle the angles 19 and the hinge plates 11 and 12. The jack screw is provided with a ratchet sleeve 31 which

is operated by a ratchet handle 32 when it is desired to shorten or lengthen the screw. The transverse angles 22 are bent at their center 33 to form a bearing for the upper end of the jack screw 30 which serves to hold the upper end of the jack screw 30 against lateral displacement.

The side forms 1 and 2 are supported by the truck 15 by means of turn buckles 34 and 35, the turn buckle 34 being located adjacent the transverse angles 22 and pivoted at one end to the vertical angles 21 at 36 and at the other end to the angles 3 at 37. The turn buckles 35 are located adjacent the transverse angles 19 and are pivoted at one end to the vertical angles 21 by means of bolts 38 and at the other end to the angles 3 of the side forms by means of bolts 39. It will be seen that when the turn buckles 34 and 35 are adjusted so as to shorten them the side forms 1 and 2 will be drawn toward the truck or traveler 15 and that the slots 13 in the hinge plates 11 and 12 will permit of the inward movement of the ceiling forms 5 and 6 at the same time. When the turn buckles 34 and 35 are adjusted while the jack screw 30 is stationary, the forms will oscillate about the hinge pin 14. On this account only a slight shortening of the jack screw 30 is necessary in collapsing the form so that it may be moved into a new position after the concrete has been molded.

The mold sections are built up in sections preferably five feet in length, and a plurality of them can be handled upon one traveler. In this case the inwardly projecting flanges of the angles 3 and 7 will be bolted together to form a rigid mold form of considerable length. The travelers are made so that they can be coupled together so as to support a large number of mold sections. In this case the connecting plate 40 is used to tie the longitudinal channels 16 together. The mold sections are secured together by liner channels 46 which are bolted to the angles 4 at the bottom edges of the side forms. These channels reinforce the bottom edges of the forms and serve to hold the forms in alined position.

In operation, the floor of the tunnel is formed by any preferred form of inverted mold and longitudinal timbers 41 are laid longitudinally of the tunnel and are held in spaced relation by means of the timbers 42. Upon the timbers 41 are mounted rails 43 upon which the truck is adapted to travel. At the lower corners of the tunnel longitudinal timbers 44 are inserted beneath the liner channels 46, and secured in position by filler blocks 45 which abut against the timbers 41 and serve to hold the timbers 44 against lateral displacement.

The space 47 between the ceiling forms 5 and 6 is covered by a loose plate 48 which extends longitudinally the full length of the form. The width of this plate may be varied according to the size of the space between the ceiling forms which varies with the width of the tunnel.

When it is desired to set the form up for operation the mold forms are assembled upon the truck and the turn buckles drawn in and the jack screw lowered so as to bring the mold forms into collapsed position. The traveler carrying the forms is then moved into the desired position and the jack screw and turn buckles are turned so as to elevate the ceiling forms and move the side forms out into the position shown in Fig. 1. The forms are then blocked up in the manner previously described, the forms being supported by the channels 46. The plate 48 is then laid across the gap 47 between the ceiling forms 5 and 6, after which concrete may be applied to mold the tunnel.

When it is desired to collapse the form after the concrete has become sufficiently set to permit of its removal the blocks 45 are first removed to permit of the removal of the timbers 44 and then the jack screw 30 is shortened by the manipulation of the ratchet handle 32. By reason of the horizontal position of the turn buckles 34 and 35 the wall forms will sag downward and inward oscillating about the hinge pin 14. The turn buckles may then be shortened, which will result in the inward movement of the wall forms and the ceiling forms, the movement of the ceiling forms being permitted by the slots 13 in the hinge plates 11 and 12. It will be seen that a very little manipulation is required in collapsing the form or adjusting it into operative position, and that the slots 13 which permit of the inward movement of the ceiling forms 5 and 6 are a distinct advantage over the previous practice of using a pin and hole.

Fig. 1 shows the mold forms in operative position to form a tunnel of substantially minimum dimensions that can be made with this form. When it is desired to use the form for a wider tunnel all that is necessary is to move the vertical angles 21 farther away from the center of the truck and readjust the hinge plates 11 and 12 with respect to the ceiling forms 5 and 6 so that the slots will overlap at the center of the truck. The vertical angles 21 can be readjusted by first removing the nuts from the bolts 27 and 29 and replacing them after the vertical angles 21 have been moved. The hinge plates 11 and 12 may be adjusted by first removing the nuts from the bolts 10 and replacing them after the hinge plates have been shifted to the desired position. After these adjustments have been made to adapt the form to a wider tunnel it will be found that the space between the ceiling forms 5 and 6 has been widened and it will

be necessary to use a wider plate 48 to cover this space.

It is obvious that many changes may be made in the details of the construction illustrated without departing from the spirit of the invention, and the invention is not limited to the specific structure herein described.

What I claim is:

1. A tunnel mold form comprising a pair of separable mold forms, a truck for supporting the forms disposed between the forms having spaced transverse frame members, vertical members connecting the transverse members, means for securing the vertical members in various positions on the transverse members, and pivoted links connecting the forms with the vertical members.

2. A tunnel mold form comprising a pair of mold forms, coacting hinge members on each mold form provided with slots adapted to register with one another, a support for the forms disposed between them provided with a hinge pin adapted to extend through the slots, and means for moving the forms toward or away from the support and oscillating them about the pin.

3. A tunnel mold form comprising a pair of separable mold forms, a truck for supporting the forms disposed between the forms having spaced transverse frame members, vertical members connecting the transverse members, means for securing the vertical members in various positions on the transverse members, pivoted links connecting the forms with the vertical members, and an extensible support for the forms secured at one end to the lowermost transverse frame member and at the other end to the mold forms, the said support having sliding engagement with the uppermost transverse frame member and adapted to be held thereby against lateral displacement.

HOWARD B. LOXTERMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."