H. B. LOXTERMAN.

TUNNEL MOLD FORM.

APPLICATION FILED FEB. 5, 1916.

1,273,244.

Patented July 23, 1918.

2 SHEETS—SHEET 1.

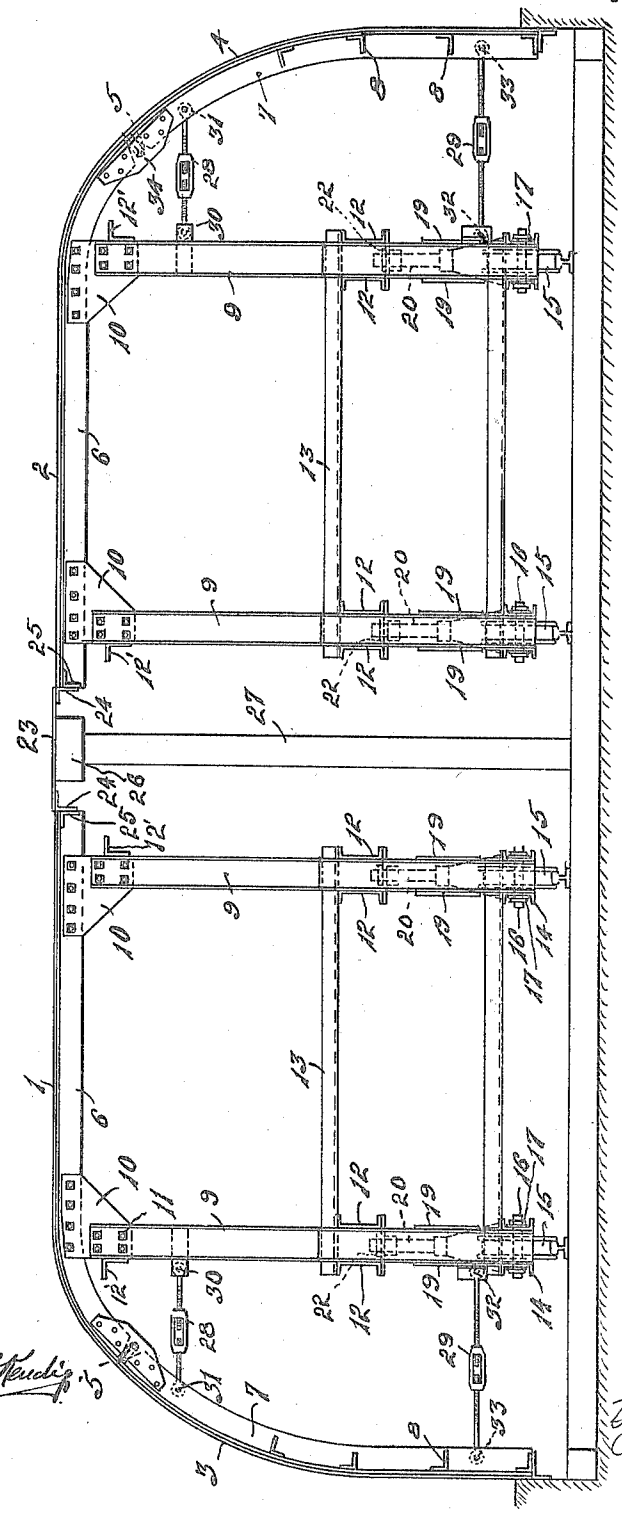


Fig. 1

WITNESS:

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

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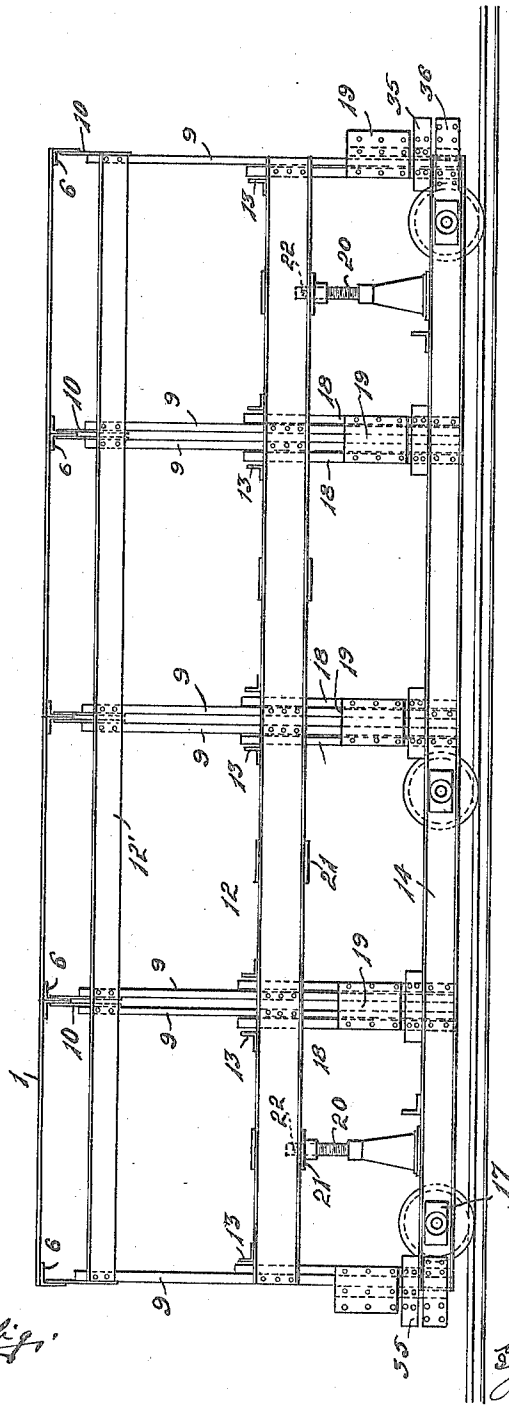


Fig. 2

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UNITED STATES PATENT OFFICE.

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TUNNEL MOLD-FORM.

1,273,244. Specification of Letters Patent. Patented July 23, 1918.

Application filed February 5, 1916. Serial No. 76,345.

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 certain new and useful Improvements in Tunnel Mold-Forms, of which the following is a specification.

This invention relates to forms for molding concrete structures and more particularly to that class of forms used in the construction of concrete lined tunnels, sewers, etc., and has for its principal objects, the provision of a form which may readily be collapsed and moved into new positions, the provision of a mold form of large proportions that can be manipulated with little difficulty, the provision of a mold form having a plurality of mold sections independently supported so that separate sections can be shifted from one place to another without disturbing the remaining sections, the provision of a mold form wherein a telescoping traveler or mold support carries the forms upon adjusting screws which serve to positively raise or lower the forms as required, the provision of a form wherein the central portion thereof is supported independently of the traveler, and which is adapted to support the central portion of the ceiling so that the remainder of the forms may be shifted into a new position before the concrete has become hard enough to support the whole width of the tunnel thereby saving time in the operation of the molds, and such other objects as may hereinafter appear. One embodiment of the invention is illustrated in the accompanying drawings, wherein—

Figure 1 is an end elevation showing the forms set up to form a tunnel mold, and Fig. 2 is a side elevation of one set of mold sections and traveler looking from the center of the tunnel toward one of the walls thereof.

Referring to the drawings, the mold form and traveler support comprises a series of ceiling form sections 1 and 2, each being provided with a side section 3 and 4, respectively, which is hinged to the outer edges of the ceiling sections at 5. The ceiling sections are built up of plates mounted upon angle irons 6 while the plates of the side sections are mounted upon curved angle irons 7. The side sections extend from a point adjacent the top of the mold nearly to the bottom of the tunnel and are braced longitudinally by angle irons 8 which extend from one vertically disposed angle iron 7 to another.

The ceiling sections are attached to a supporting frame which consists of downwardly disposed vertical channels 9, the channels being secured to the angle irons 6 of the form sections by means of the gusset plates 10 which are fastened by means of the detachable bolts 11. All of the downwardly disposed channels 9 are connected longitudinally of the form by means of the longitudinal channels 12, which are securely bolted to the said vertical channels 9, and the longitudinal channels 12′ which are bolted adjacent the upper ends of the channels 9 and which extend the full length of the mold, these channels serving to form the vertical channels 9 into a rigid frame whic his tied transversely at the top by means of the angle irons 6 and adjacent the longitudinal channels 12 by means of the transverse angles 13.

The frame structure is supported upon a traveling truck consisting of a series of longitudinal channels 14 extending the full length of the mold section and which carry the wheels 15 which are disposed between the separate pairs of longitudinal channels, as shown in Fig. 1. The wheels are pivoted on pins 16 extending through the channels and are mounted in bearings 17 which are secured to the longitudinal channels 14. Referring more particularly to Fig. 2, a series of vertical columns are secured to the longitudinal channels 14 and consist of vertically disposed channels 18 arranged in pairs with a space between them to receive the downwardly extending channels 9 of the frame construction in which such channels telescope with the vertical columns. The channels 18 are securely bolted to the longitudinal channels 14 and are further held in position by means of the plates 19 which serve to tie the channels together and form a box construction which serves to prevent lateral displacement of the channels 9.

It will be seen that the traveler consists, therefore, of a truck portion which is adapted to travel along the track arranged

longitudinally of the tunnel, and a frame portion which is adapted to support the mold sections and which is in telescopic engagement with the truck so that the frame portion may be moved vertically with respect to the truck. Upon the longitudinal channels 14 of the truck is securely bolted the jack screws 20 spaced at convenient intervals, and which support at their upper ends the longitudinal channels 12 of the frame construction. Plates 21 which are secured to the under side of the channels 12, are provided with holes through which the upper ends of the jack screws pass and serve as a bearing sheet for the upper end of the jack 20. Pins 22 (Fig. 2) are inserted through holes in the jack 20 above the plate 21 and serve to contact with the plate 21 when the screw is turned to lower the frame, thereby positively drawing the frame downward as the screw is turned. It will be seen that manipulation of the screw jacks 20 will cause the frame to be raised or lowered with respect to the truck depending upon the direction in which the screw is turned.

Referring to Fig. 1 it will be seen that the form comprises two separate trucks each carrying a separate frame construction mounted as hereinbefore described, and that the space between the ceiling sections 1 and 2 is bridged by a space plate 23 which is provided at its edges with stiffening angles 24. These angles are adapted to abut the stiffening angles 25 on the under side of the frame sections 1 forming a continuous ceiling mold when the parts are in proper position. The space plate 23 may be of varying widths depending upon the width of the tunnel, thus making it possible to use the same size of traveler and mold sections in producing tunnels of different widths. The space plate 23 is supported independently of the traveler members by means of a wooden beam 26 which extends longitudinally of the tunnel and which is supported by the wooden vertical columns 27 spaced at proper intervals longitudinally of the tunnel. Aside from other advantages in supporting the space plate 23 independently of the travelers, the principal object is to support the center of the tunnel ceiling while the concrete is hardening. When the center of the ceiling is supported the remaining forms may be removed much earlier than if there were no support provided. Therefore the forms carried by the travelers may be removed and set up in a new position in considerably shorter intervals than heretofore possible. The result is an economy in the number of forms required and a saving of time.

The principal object in making the forms with sections supported upon separate trucks is to facilitate the movement of the forms in smaller units where the proportions of the tunnel are large. It will be seen that the mold sections for one side of the tunnel may be set up and the operation of pouring the concrete may be carried on while the form sections for the other side of the tunnel are arranged in position, thus saving considerable time in the construction work. Another advantage is that a set of sections on one side of the tunnel may be moved into a new position before the concrete on the other side has become set sufficient to permit of movement of the section on that side. Also it may be seen that it will be much easier to manipulate the small section of the mold form than if it were necessary to shift the whole tunnel form as a unit.

The side sections 3 and 4 which are hinged to the ceiling sections 1 and 2 respectively, at 5, are held in extended position as shown in Fig. 1, by means of turnbuckles 28 and 29. The turnbuckles 28 are attached at one end to the frame construction at 30 and to the side form 3 at 31, while the turnbuckles 29 are attached at one end to the truck construction at 32 and to the lower end of the side form at 33. When the forms are set in position the ceiling forms and the side forms are reinforced at the point of connection by means of splice plates 34 which are bolted to the angles 6 and 7 of the ceiling forms and side forms, respectively.

When it is desired to collapse the forms the splice plates 34 are removed and the turnbuckles 28 and 29 are then simultaneously turned to draw the side form toward the traveler. After this is done the jack screws 20 are turned so that the frame construction will be drawn down, thus pulling the ceiling sections away from the finished concrete. The traveler carrying the form sections with it may be advanced into a position for forming a new portion of the tunnel.

While the mold section herein shown is approximately twenty feet in length and composed of four panels of section forms, it is sometimes desirable to connect the forms in units of greater length, possibly four mold sections, as shown, being coupled together forming a long tunnel mold. When it is desired to attach a series of mold forms a set of the plates 19 of one section is removed permitting the extending plates 19 at the end of the adjoining section to occupy the position of the previously removed plates. This applies also to the stiffening angles 35 which serve to tie the vertical channels 18 to the longitudinal channels 14. By referring to Fig. 2, it will be seen that these angles 35 project beyond the ends of the mold section in a manner similar to the plates 19, and additional splice plates 36, which are bolted to the ends of the longitudinal channels 14, serve to connect the channels 14. Therefore, the separate sections are securely

connected at the adjoining ends by means of three splice members 19, 35 and 36, which serve to bind the sections into a solid unit.

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

What I claim is:

1. A tunnel mold form comprising a pair of independently movable trucks each independently supporting a top mold section and a side mold section arranged with the free ends of the top sections facing one another, and a connecting plate supported between the free ends of the top sections whereby the sections are joined to form a complete tunnel mold.

2. A tunnel mold form comprising a pair of independently movable trucks each supporting a top mold section and a side mold section arranged with the free ends of the top sections facing one another, and means for withdrawing from the tunnel wall the forms carried upon one truck independently of the forms carried upon the other truck.

3. A tunnel mold form comprising a pair of independently movable trucks each supporting a top mold section and a side mold section arranged with the free ends of the top sections facing one another, a connecting plate supported between the free ends of the top sections whereby the sections are joined to form a complete tunnel mold, and means whereby the connecting plate is supported independently of the trucks.

HOWARD B. LOXTERMAN.

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