

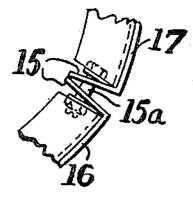
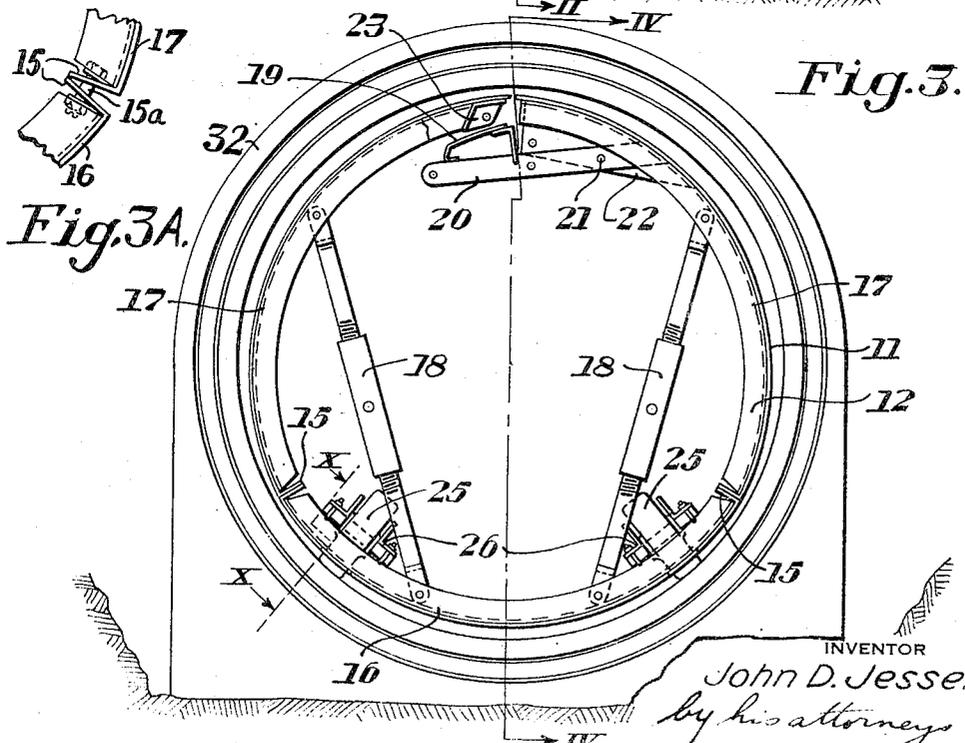
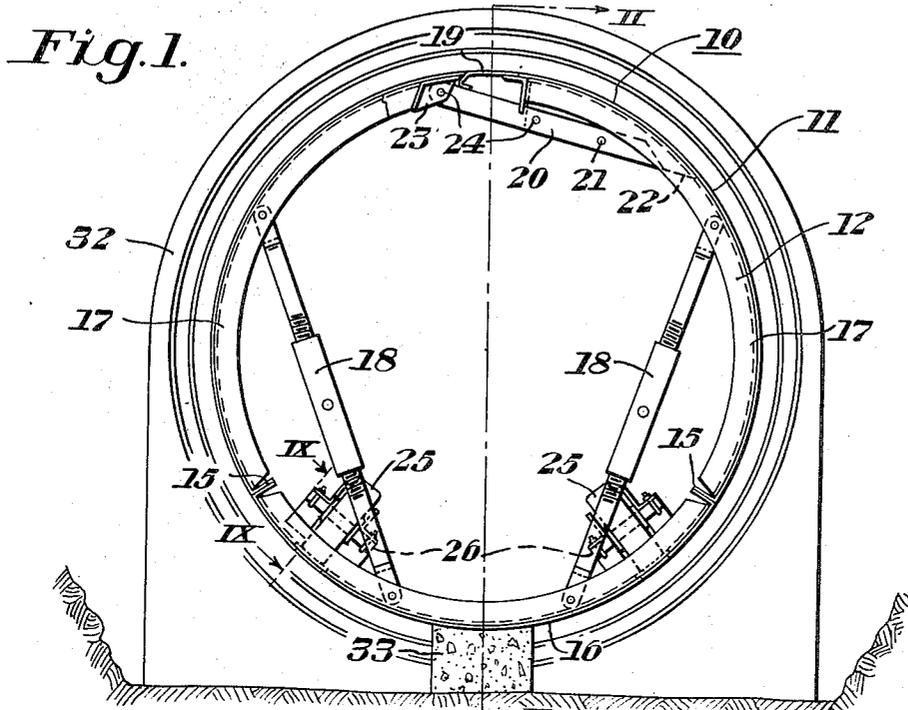
April 10, 1951

J. D. JESSEN
INSIDE FORM FOR CASTING ELONGATED
HOLLOW CONCRETE STRUCTURES

2,547,946

Filed Dec. 22, 1944

4 Sheets-Sheet 1



INVENTOR
John D. Jessen
by his attorneys
Stebbins, Blenko & Webb

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4 Sheets-Sheet 3

Fig. 5.

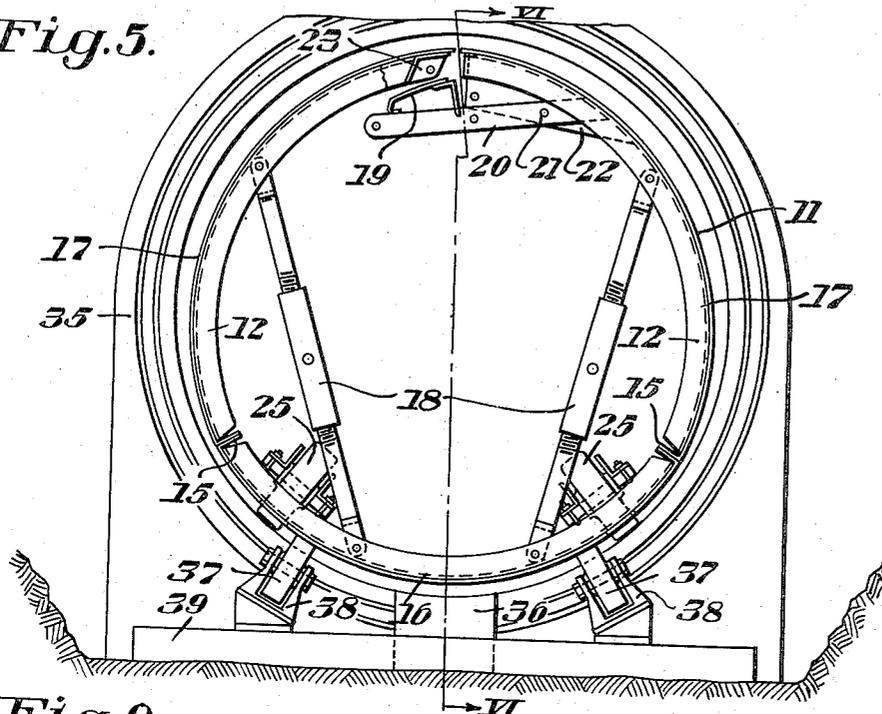


Fig. 9.

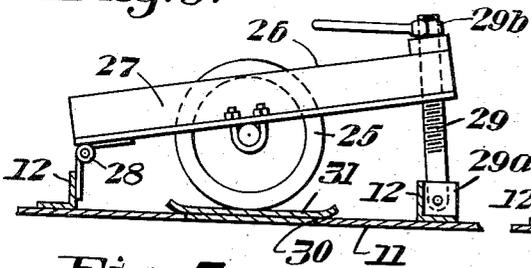


Fig. 10.

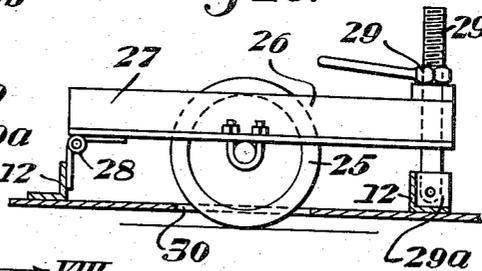
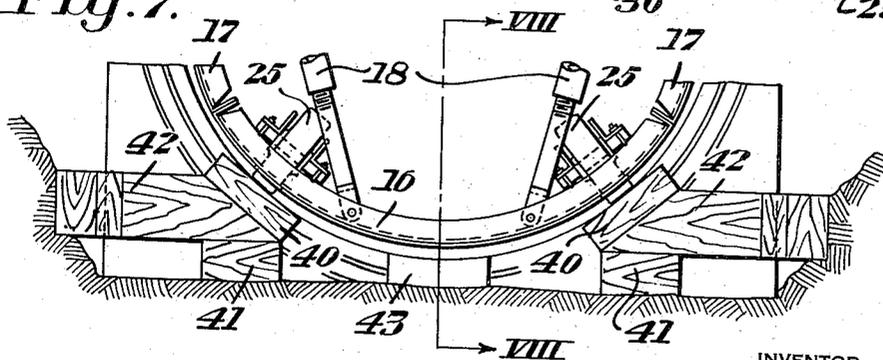


Fig. 7.



INVENTOR

John D. Jessen

by his attorneys

Stebbins, Blenko & Webb

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4 Sheets-Sheet 4

Fig. 6.

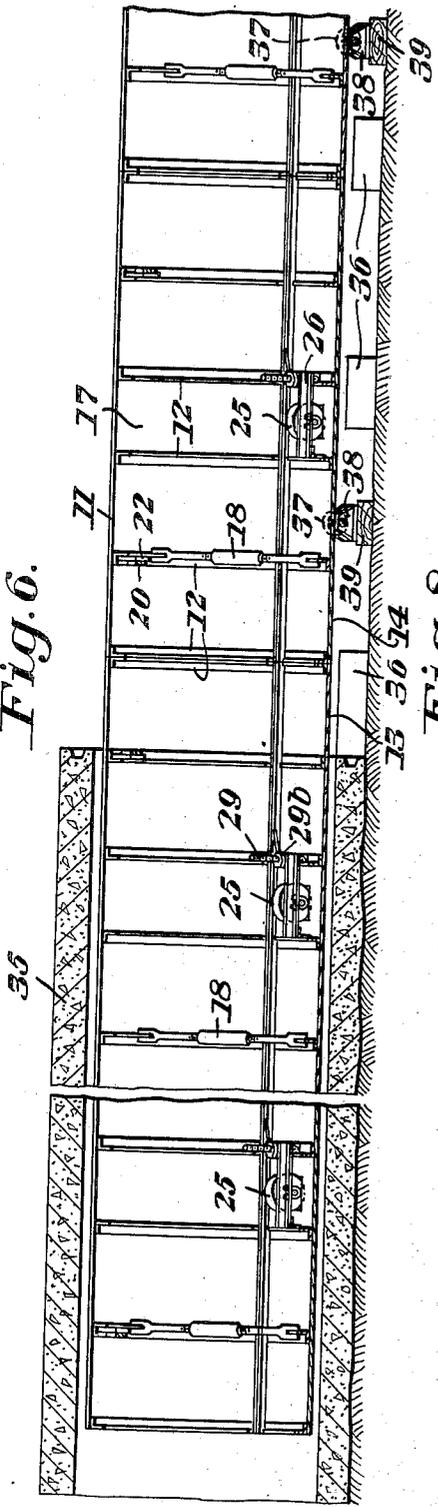
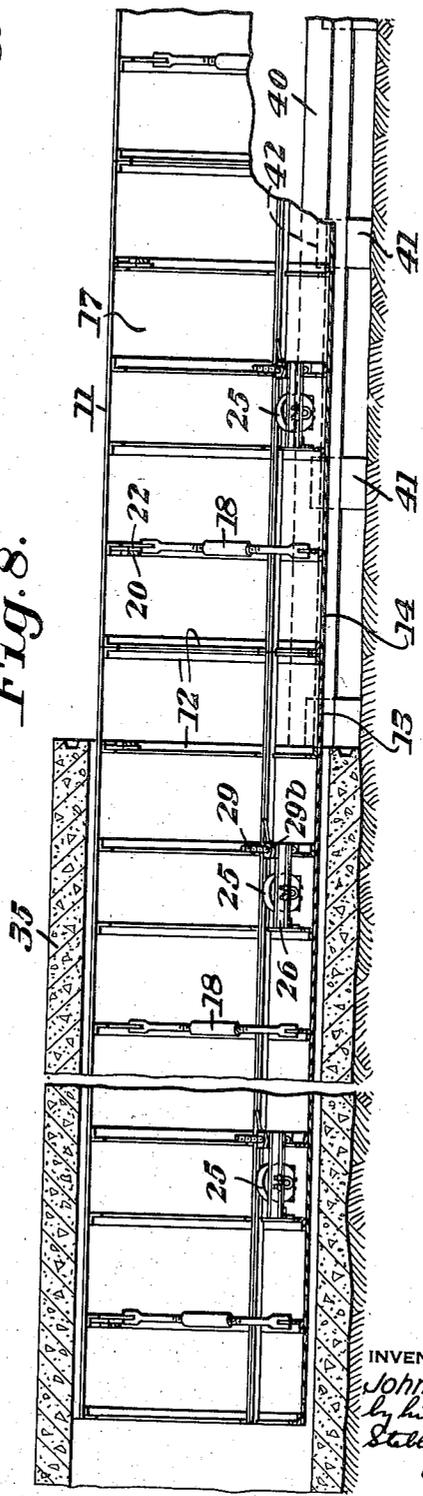


Fig. 8.



INVENTOR
John D. Jessen
by his attorneys
Stallins, Blenko
& Webb

UNITED STATES PATENT OFFICE

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INSIDE FORM FOR CASTING ELONGATED HOLLOW CONCRETE STRUCTURES

John D. Jessen, O'Hara Township, Allegheny
County, Pa., assignor to Blaw-Knox Company,
Pittsburgh, Pa., a corporation of New Jersey

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This invention relates to an inside form useful in the casting of hollow concrete structures of considerable length, such as tubular piles, caissons or sections of a continuous conduit, such as a tunnel lining, aqueduct, sewer or the like.

Structures such as those just enumerated are usually cast in lengths of from say 50 feet to 150 feet. The inside forms required are consequently large heavy structures. Expedients have been proposed heretofore to facilitate the removal of the inside form from the concrete structure cast therearound after the latter has set but all such proposals so far as I am aware have involved a relatively complex mechanism which is troublesome to operate, requiring considerable labor. I have invented a novel inside form for elongated concrete structures having means therein whereby it may be rolled along the inside of the cast concrete structure when collapsed, to permit its removal and setting up in a succeeding location for the casting of another concrete structure or the next section of a continuous conduit. A preferred embodiment of the invention comprises a hollow cylinder composed of a plurality of relatively movable segments so that it may be collapsed. The bottom segment has wheel mountings spaced therealong and circumferentially thereof with provision for moving them radially of the form. The form has holes therein so located as to permit wheels carried by the mountings to project at least partially therethrough into engagement with the interior of the concrete structure when the form has been collapsed, thereby raising it clear of the concrete for axial movement on the wheels. The holes have removable covers which are placed in position when the form is set up for the pouring of another hollow structure or conduit section. I also provide improved means for collapsing the form preparatory to movement and means mounting a closure segment so it can be easily moved into proper position when the form is expanded to full size and securing it therein.

Other novel features and advantages of the invention will become apparent during the following detailed description which refers to the accompanying drawings illustrating the present preferred embodiment. In the drawings,

Figure 1 is an end elevation of the form in position for the casting of a conduit section in alignment with a previously cast section, the end plate which is disposed against the leading end of the form before casting being omitted;

Figure 2 is a vertical longitudinal section taken along the plane of line II—II of Figure 1 showing the end plate in position;

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Figure 3 is a view corresponding to Figure 1 showing the form collapsed and lifted for traveling movement after the casting of a cylindrical concrete structure therearound;

Figure 3A is a partial enlarged view showing the hinge connection between the flanges 15 on the lower right-hand side of Figure 3.

Figure 4 is a vertical longitudinal section taken along the plane of line IV—IV of Figure 3;

Figure 5 is an end elevation showing one arrangement for supporting the form as it emerges from the cast conduit section on removal therefrom;

Figure 6 is a central vertical section taken along the plane of line VI—VI of Figure 5;

Figure 7 is a partial elevation similar to Figure 5 showing a modified arrangement for supporting the emerging end of the form;

Figure 8 is a central vertical section taken along the plane of line VIII—VIII of Figure 7;

Figure 9 is a partial section along the plane of line IX—IX of Figure 1, showing one of the wheel mountings in elevation; and

Figure 10 is a partial section taken along the plane of line X—X of Figure 3, showing one of the wheel mountings in alternate position.

Referring in detail to the drawings and, for the present to Figures 1 through 4, an inside form embodying my invention indicated generally at 10 comprises an elongated cylinder including an outer wall 11 and spaced circumferential ribs 12. The form may conveniently be made in sections such as 13 and 14 of any suitable length, which are preferably bolted together end-to-end. The wall 11 and ribs 12 are interrupted at circumferentially spaced joints by flanges 15 to form a bottom segment 16 and side segments 17 which may be bolted by bolts 15a or hinged together at the flanges. This construction permits partial collapsing or contraction of the form (by loosening the bolts or turning of the hinges) so that it may be stripped and removed axially from a hollow concrete structure cast therearound. Turnbuckles 18 are pivoted to the ribs of the bottom segment and side segments so that the latter may be contracted or expanded as desired. A closure segment 19 is adapted to fill the gap between the adjacent edges of the segments 17. The segment 19 is mounted on arms 20 pivoted at 21 to bearing plates 22 carried by certain of the ribs adjacent the upper edge of one of the side segments. Holes in the arms 20 are adapted to align with holes in brackets 23 and the bearing plates 22 to receive locking pins 24 which hold the closure segment in place and tie the form together circum-

ferentially when expanded to full size, as shown in Figure 1.

Wheels 25 preferably provided with rubber tires are journaled in mountings 26 spaced along the length of the form and circumferentially thereof. As shown in Figures 9 and 10, each of the wheel mountings 26 comprises a pair of angle bars 27 supported by a hinge 28 on one of the ribs 12 and provided with a screw jack 29. The jack is pivoted at its lower end to a block 29a secured to the rib 12 adjacent that to which the hinge 28 is secured. A nut 29b threaded on the jack screw has a handle extending therefrom whereby it may be turned down on the screw to swing the angle bars 27 outwardly on the hinge 28. Holes 30 are located in the wall 11 to permit the wheels 25 to extend partly therethrough into engagement with the interior of a hollow concrete structure cast around the form, as indicated in Figure 10. Each hole 30 is provided with a removable cover 31 which is held in place, as shown in Figure 9, by the adjacent wheel 25 when the form is in position for casting.

Figures 1 and 2 illustrate the positions of the parts when the form is in position for the casting of a hollow concrete structure, e. g., a section of a continuous conduit, the adjacent end of the previously cast section of which is indicated at 32. The form rests on precast pillow blocks 33 laid on the grade ahead of the section 32. A plate 34 is disposed over the leading end of the form and concrete is then poured around the form in the known manner along its entire length. Any suitable outside form may be employed in conjunction with the inside form of my invention which is adapted for the laying of continuous conduits in open cuts, on the surface of the ground or in subterranean bores. Various types of outside form suitable for the purpose are known and for that reason no detailed disclosure thereof is included herein. In case the inside form is used in the construction of a lining for a tunnel through rock, no outside form is necessary.

After the concrete has been poured to form the next section of the conduit indicated at 35, and sufficient time has elapsed to permit it to set, the inside form may be stripped and moved forward preparatory to setting it in place for the casting of the next section. To this end, the pins 24 are removed and the closure segment 19 is pulled inwardly by tilting the arms 20. The turnbuckles 18 are then operated to swing the side segments 17 inwardly on the bottom segment 16. The cover plates 31 are then removed from the holes 30 in the form wall and the jacks 29 are operated to force the wheels 25 against the interior of the section 35. After the wheels engage the concrete, further operation of the jacks raises the entire form partly collapsed, as shown in Figure 3, until it clears the interior of the conduit at all points. It will be understood that all the jacks 29 should be operated substantially simultaneously. The same is true of the turnbuckles 18. When the form has thus been partially collapsed or contracted and stripped clear of the conduit, it may be rolled forward on the wheels 25 which, of course, travel on the interior of the conduit. Any convenient means may be utilized for applying traction to the form.

Figures 5 and 6 show the form partially withdrawn from the conduit section 35 and the means for temporarily supporting it as it emerges therefrom. Conveniently, additional pillow blocks 36 are laid in advance of the section 35 before the form is moved. Supporting rollers 37 journaled

in brackets 38 are adapted to engage the exterior of the form as it emerges from the section 35. The brackets 38 are blocked up on sills 39 spaced along the course of the conduit. When the form has been wholly withdrawn from the section 35, the sills 39 and supporting rollers 37 are removed, the form being supported temporarily on portable jacks and then lowered onto the pillow blocks 36. The wheel mountings 27 are then raised to withdraw the wheels 25 from the holes 30 and the covers 31 are replaced. The side segments 17 are then swung outwardly by operation of the turnbuckles 18 and the closure segment 19 raised to its outermost position as shown in Figure 1. The form is thus placed in condition for the casting of the next conduit section.

Figures 7 and 8 illustrate a modified arrangement for supporting the form as it emerges from the previously cast section 35. According to this arrangement, tracks 40 which may simply be timbers of appropriate section are supported on blocks 41 and held in position by lateral bracing 42. The tracks 40 are located so that their upper surfaces are tangent to the interior of the conduit projected, whereby the wheels 25 may travel therealong in the same manner as on the interior of the previously cast section. As before, pillow blocks may conveniently be laid ahead of the last section as indicated at 43 before the form is rolled out. When the form has been wholly removed from the last section, it may be lowered by operating the jacks 29 until the bottom segment 16 rests on the blocks 43 after which the side segments may be opened out and the closure section raised as described above.

It will be apparent from the foregoing that my invention is characterized by numerous advantages over traveling inside forms as known heretofore. In the first place, the form is entirely self-contained, requiring no auxiliary apparatus (except the rollers 37, if used) to permit stripping thereof and advance movement into position for the casting of a succeeding conduit section. The task of stripping and moving the form is relatively simple and easy. The cost of auxiliary apparatus required for moving inside forms as known heretofore is avoided.

While I have disclosed the form of my invention with particular reference to the construction of successive sections of a continuous conduit, it may also be used with advantage for the construction of tubular concrete structures such as precast piles or caissons. In such case, the form is adapted to cooperate with an outside form of any suitable construction. It will be understood, furthermore, that while I have shown an inside form which is of circular section, the invention may also be embodied in a form of elliptical, oval or other desired section, all of which are comprehended within the generic term "cylindrical" as employed in the claims hereof.

Although I have illustrated and described but a preferred embodiment of the invention, changes in the arrangement and details of construction illustrated may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. An inside form for making elongated hollow concrete structures comprising a contractible hollow cylinder, wheel-mounting levers hinged on the interior of said cylinder and spaced therealong substantially parallel thereto, wheels journaled on said levers, holes in the wall of said cylinder adjacent said wheels adapted to admit

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the wheels therethrough, at least partially, for engagement with the interior of the surrounding concrete structure when the latter has been cast to support the cylinder thereon when contracted, for axial travel from a position within the structure, removable cover sections adapted to be disposed over said holes when said wheels are retracted, and means for actuating said levers to move said wheels from a position within the cylinder to a position in which they extend at least partly through said holes.

2. A form for concrete structures comprising a sectional wall including a bottom section having openings therethrough, a wheel rotatably mounted on the form adjacent each of said openings, a closure for each of said openings, the outer surface of said closures being substantially flush with the outer surface of said form when said closures are positioned in said openings and means for deflecting the axis of rotation of said wheels towards said bottom section to project a segment of said wheels through said openings when said closures have been removed, whereby said form may thereafter be rolled bodily over the surface of the concrete cast against the wall of the form.

3. An inside form for making elongated hollow concrete structures comprising a contractible hollow cylinder, wheel-mounting levers hinged on the interior of said cylinder and spaced therealong substantially parallel thereto, wheels journaled on said levers, holes in the wall of said cylinder adjacent said wheels adapted to admit the wheels therethrough partially for engagement with the interior of the surrounding concrete structure when the latter has been cast to support and to move the cylinder thereon when contracted, removal cover sections adapted to be disposed over said holes when said wheels are retracted, and means for actuating said levers to move said wheels from a position within said cylinder to a position in which they extend at least partly through said holes after said surrounding concrete structure has been poured and said cover sections have been removed, said cover sections overlying said holes on the inside of the form at their edges whereby they may be clamped in concrete forming position by the pressure of said wheels upon partial actuation of said levers by said means.

4. An inside form for making an elongated invert section of concrete or the like, comprising, a substantially rigid bottom segment having a continuous and smooth outer surface, wheels rotatably and swingably connected to the inside of said bottom segment for movement in a longitudinal plane substantially normal to the immediately adjacent surface of said invert section, said bottom segment having removable sections therein adjacent said wheels to permit said wheels to be moved into protruding position outside the outer surface of said bottom segment, said removable sections being substantially flush with said outer surface, and means for moving said wheels into protruding position when said removable sections are removed after said concrete or the like has been poured, whereby said bottom segment can be wheeled away over said concrete or the like which has been so poured.

5. An inside form for making an elongated invert section of concrete or the like, comprising, a substantially rigid bottom segment having a continuous and smooth outer surface, wheels rotatably and swingably connected to the inside of said bottom segment for movement in a longi-

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tudinal plane substantially normal to the immediately adjacent surface of said invert section, said bottom segment having inwardly removable sections therein adjacent said wheels to permit said wheels to be moved into protruding position outside the outer surface of said bottom segment, said removable sections being substantially flush with said outer surface, said removable sections being adapted to be held in closure position by having said wheels moved outwardly thereagainst, and means for moving said wheels into protruding position when said removable sections are removed after said concrete or the like has been poured, whereby said bottom segment can be wheeled away over said concrete or the like which has been so poured.

6. A form for concrete structures or the like, comprising, in combination, a form wall having a smooth outer surface, removable sections at spaced intervals in said form wall, said removable sections being removable from the inner surface of said wall, a wheel pivotally connected to the inner surface of said wall adjacent each of said removable sections, means for moving each of said wheels toward and away from said wall, said means being further adapted to cause said wheels to extend through the respective openings in said wall beyond the outer surface thereof when said removable sections are removed, said means being still further adapted to cause said wheels to hold said removable sections in closure position after said form has been placed and before concrete or the like has been cast against the outer surface thereof.

7. An elongated substantially rigid inside form for making hollow structures of concrete or the like, comprising, a radially collapsible tubular form, said form having a bottom segment, side segments hinged to said bottom segment and a closure segment hinged to at least one of said side segments, said segments having a continuous and unbroken outer surface when expanded, means adjacent the walls of said form connected to said bottom segment for collapsing and extending said other segments, means for holding said segments in expanded position, wheels in laterally and longitudinally spaced relation to the underside of said form, said wheels being movably connected to the inside of said form and adapted to protrude through the wall of said form when swung outwardly of the axis of said form to support it for placement and removal, said form having removable sections adjacent said wheels for opening said wall to permit said wheels to protrude, said sections being adapted to be disposed in closure position after said form is placed in position and before said concrete or the like is poured, and means for retracting said wheels after said tubular form is so placed and before said removable sections are positioned in said wall, all of said means being arranged around the internal periphery of said form to provide a clear axial passage through said form.

8. An elongated substantially rigid inside form for making hollow structures of concrete or the like, comprising, a radially collapsible tubular form, said form having a bottom segment, side segments hinged to said bottom segment and a closure segment hinged to at least one of said side segments, side segments having a continuous and unbroken outer surface when expanded, means adjacent the walls of said form connected to said bottom segment for collapsing and extending said other segments, means for holding said segments in expanded position, wheels in

laterally and longitudinally spaced relation to the underside of said form, said wheels being movably connected to the inside of said form and adapted to protrude through adjacent openings in the wall of said form when swung outwardly of the axis of said form to support it for placement and removal, said form having inwardly removable sections adjacent said wheels for opening said wall to permit said wheels to protrude, said sections being adapted to be disposed in closure position after said form is placed in position and before said concrete or the like is poured, said removable sections being adaptable to be held in said closure position by partial outward movement of said wheels respectively adjacent thereto, and means for retracting said wheels after said tubular form is so placed and before said removable sections are positioned in said wall, all of said means being arranged around

the internal periphery of said form to provide a clear axial passage through said form.

JOHN D. JESSEN.

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