Jan. 6, 1931. O. MOLIN ET AL 1,788,200

CONDUIT FORMING MECHANISM

Filed Feb. 27, 1926 4 Sheets-Sheet 1

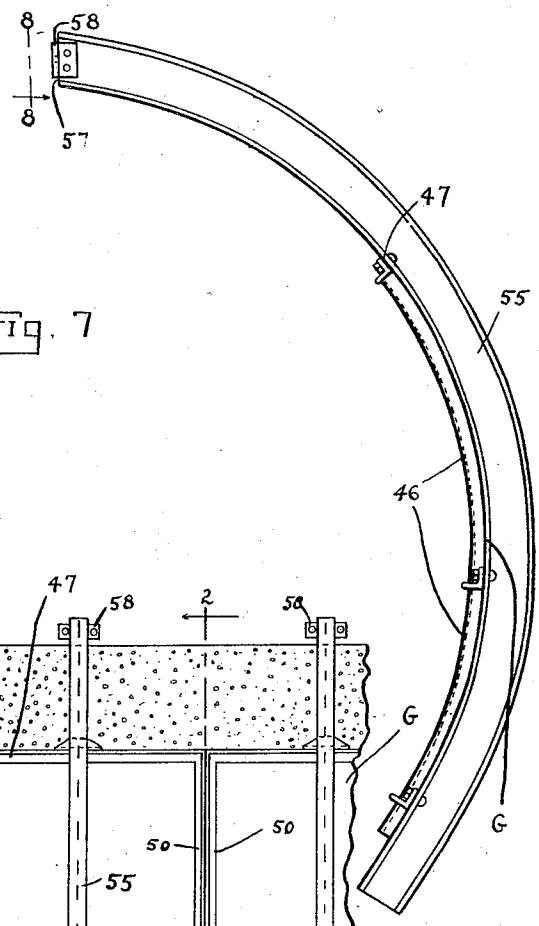


Fig. 7

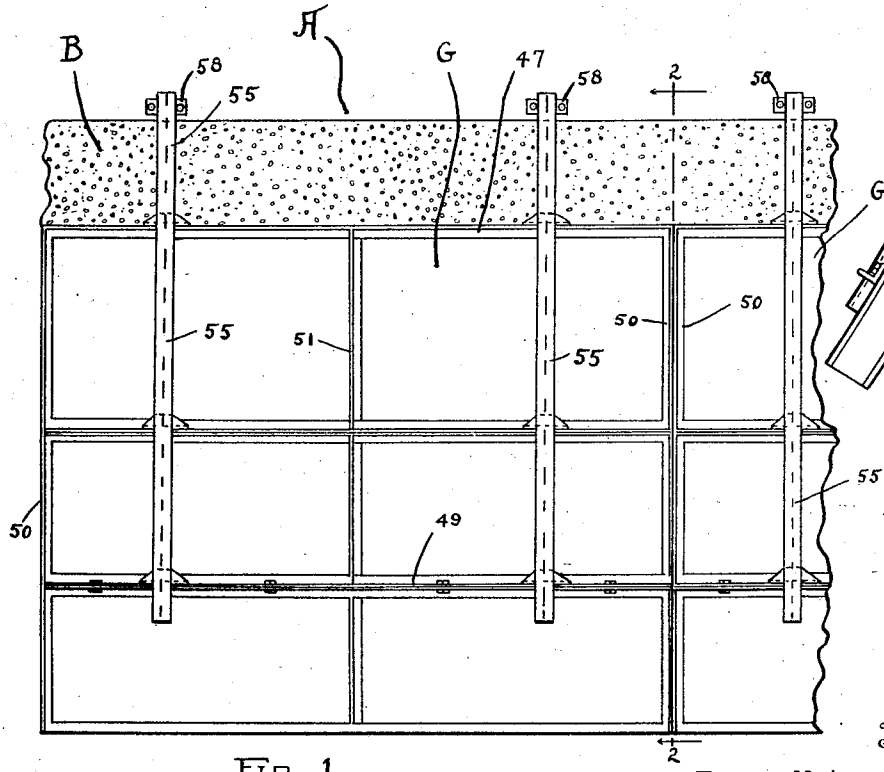


Fig. 1

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CONDUIT FORMING MECHANISM

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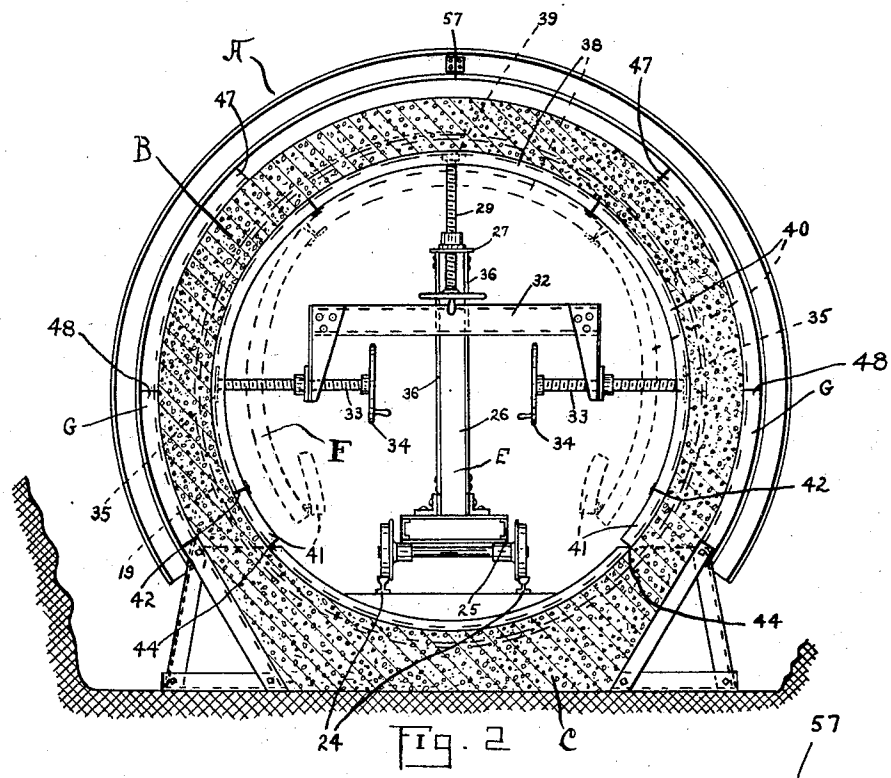


Fig. 2

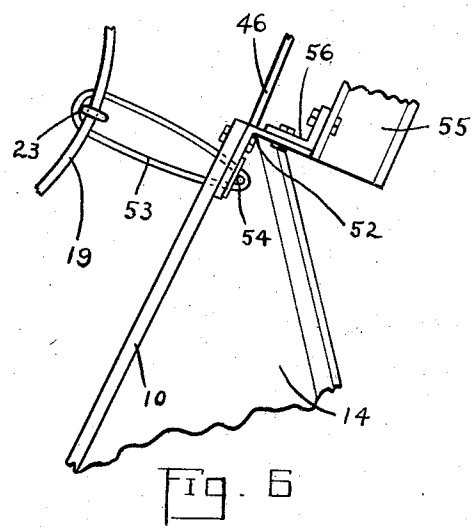


Fig. 6

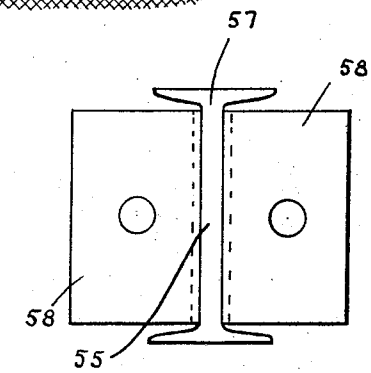


Fig. 8

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CONDUIT FORMING MECHANISM

Filed Feb. 27, 1926 4 Sheets-Sheet 3

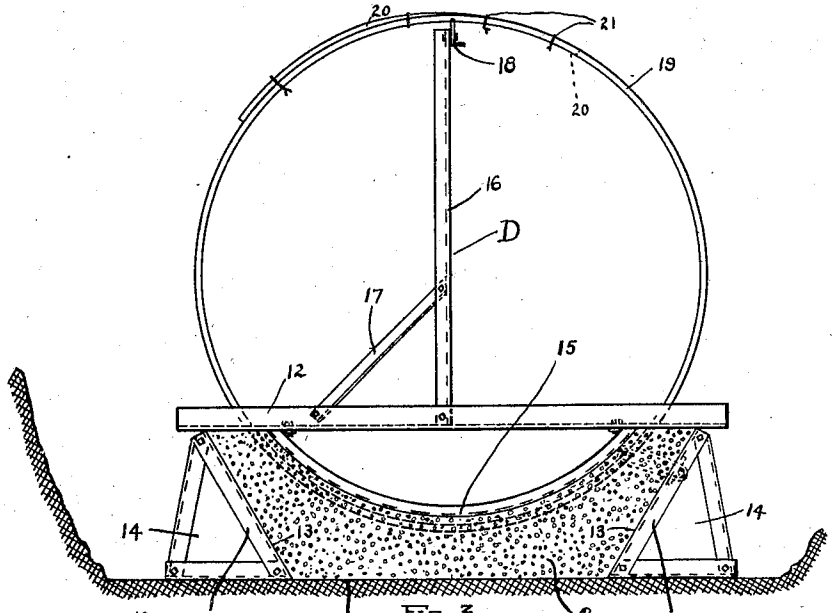


Fig. 3

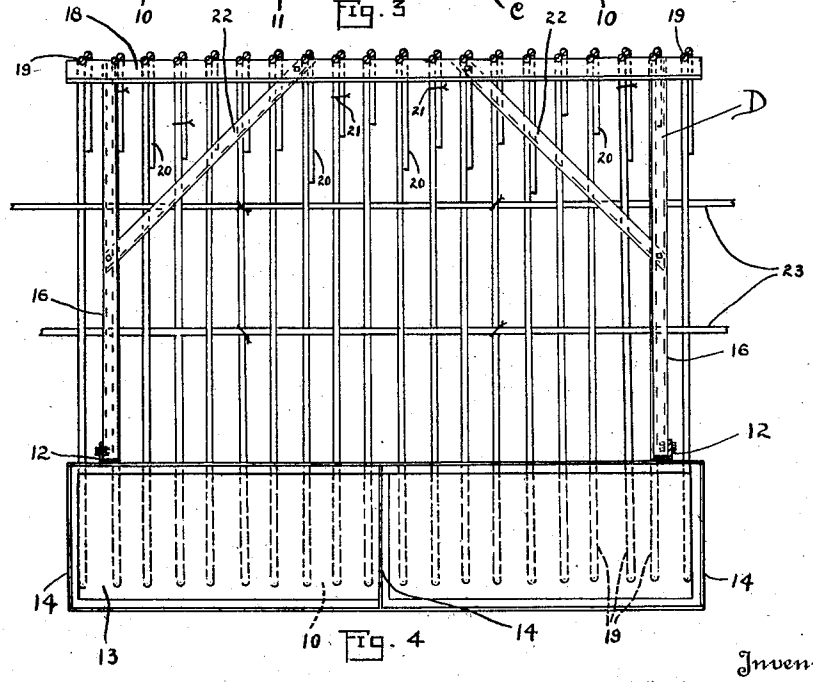


Fig. 4

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CONDUIT FORMING MECHANISM

Filed Feb. 27, 1926 4 Sheets-Sheet 4

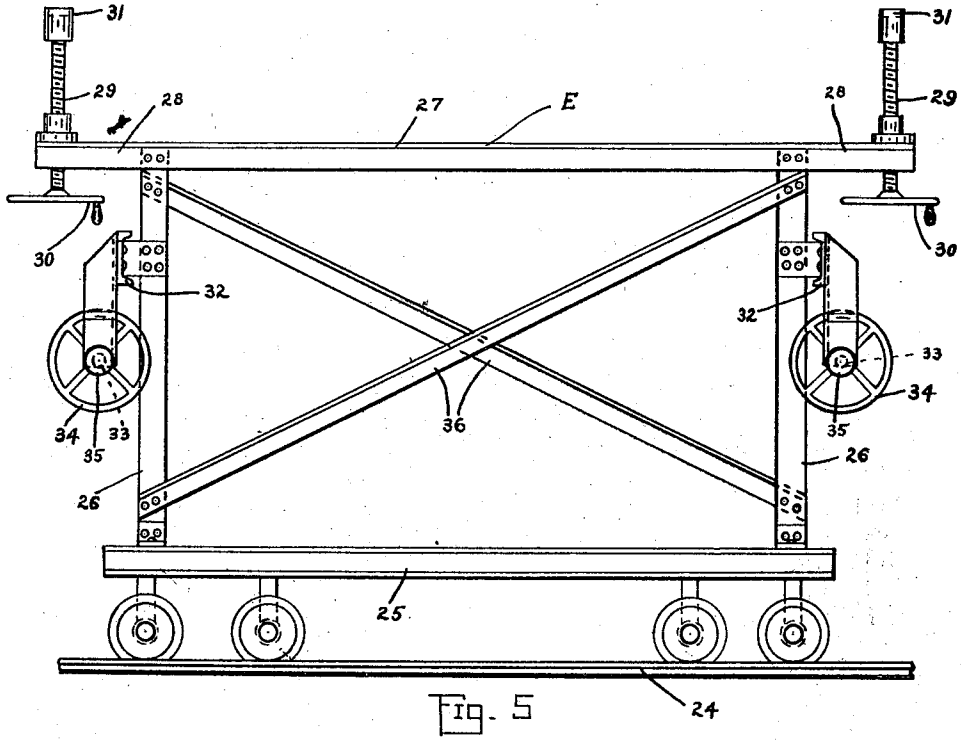


Fig. 5

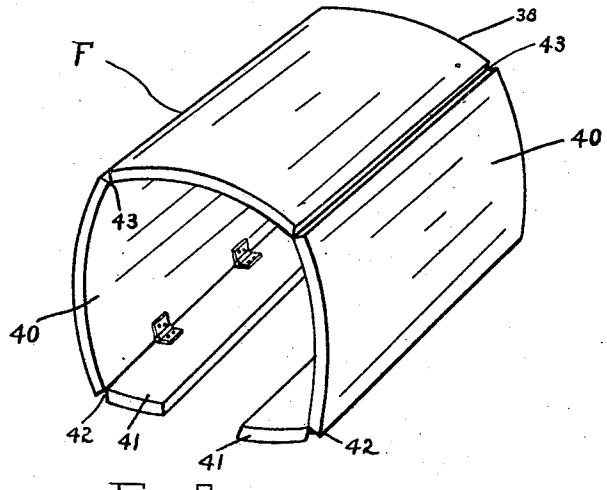


Fig. 9

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UNITED STATES PATENT OFFICE

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CONDUIT-FORMING MECHANISM

Application filed February 27, 1926. Serial No. 91,091.

Our invention relates to conduit forming mechanism including collapsible forms which may be connected together to form a continuous conduit of concrete or other material and to permit portions to be connected together and moved along from time to time to make up the continuous conduit.

A feature of the invention resides in a simple design of inner form which is adapted to be supported in a manner so as to hold the same in place to form the inside form and to be expanded into operating position or collapsed so as to be carried along through the conduit.

Further, the invention includes means for holding the reinforcing rings so as to equally space the same apart and to hold the same while these reinforcing rings are embedded in the base of the conduit in a manner so as to provide a uniformity of spacing of these rings and permitting the longitudinal reinforcing members to be tied thereto so as to hold the rings in place over the top until the concrete is poured about the same.

The invention includes a hoisting frame which is adjustable in a manner so as to hoist the inside form into operative position or to engage the same and withdraw and reduce the size of the same so as to permit the form to be passed on through the conduit clearing the forms which are in place to hold the concrete until it sets. The simplicity of this hoisting frame is a feature of the invention as it is made up of a series of angle and channel iron members which are secured together in a manner to form a T-shaped end frame with a projecting upper portion which extends longitudinally of the frame in a manner to carry the center hoisting members on either end of the same projecting above and from the ends of the main frame to provide the necessary clearance for operation. The detail of construction of this hoisting frame is an important feature of our invention.

Our invention includes the supporting frame for the reinforcing rings which is adapted to hold the rings spaced apart and this frame is collapsible so that after the reinforcing rings are wired into place with the longitudinally extending reinforcing rods and the concrete base is poured the reinforcing supporting frame can be taken down. These supporting frames for the reinforcing rings are interconnected with similar frames which extend adjacent each other so that several supports can be set up at one time interconnected together extending along centrally of the proposed formation of the conduit.

It is an object of our invention to provide a base form which is adapted to form means for supporting the concrete to make up the base and which may be interconnected with similar base forms to form a continuous base for the conduit. Each of the forms of our device is made up in sections or units so that they can be moved from place to place and continued along to be used over and over to form the continuous conduit.

It is a feature of the invention to provide cheek plate forms which are provided with preferred form "circumferential" reinforcing means adapted to arcuate above the top of the cheek plate in a manner so as to connect with a similar reinforcing arcuated arm of the cheek plate on the other side of the conduit form, these arcuated members being adapted to be connected centrally and providing means for spacing the cheek plate apart provided over the space through which the concrete is poured into the form. The lower portion of the cheek plate is adapted to be attached to the base form so as to hold the same firmly in place to permit the concrete to be formed without distorting the form. The arcuated preferred form "circumferential" arms of the cheek plate form transverse braces while suitable longitudinal reinforcing means extend along each plate, thereby making the cheek plate perfectly rigid and with an arcuated nature so that with our forms a circular or approximately circular conduit is formed.

The simplicity of our form and method of making a continuous circular conduit is of primary importance in our invention. All of the forms are easily taken apart so as to completely collapse the same. Each form is interconnected with similar forms so that these unit forms can be set up and are

adapted to support the concrete until it is thoroughly set, after which the unit forms are removed so that each section can be moved from place to place and interconnected until the desired lengths of continuous conduit is formed. As far as we know no form has ever been used before for supporting the circular reinforcing rings which extend transversely of the conduit and are adapted to be embedded in the walls of the same. This is an important feature in our invention.

These features together with other objects and particular forms and the method of making continuous conduit will be more clearly and specifically set forth in the specification and claims.

In the drawings forming part of this specification:

Figure 1 is a side view of a portion of our conduit forming device and form, a part of which is broken away showing a side elevation of the same in use.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 illustrates a transverse view partly in section of the base of the conduit, showing the base forms in place and showing the frame for the holding ring reinforcing means used in the conduit.

Figure 4 is a side view of the base frame, showing the ring supporting frame for the reinforcing, in position supporting the rings of reinforcing material, each of which are spaced apart and held in this position by our frame.

Figure 5 is a side elevation of the hoisting frame as it would appear mounted upon the carrying truck with the forms removed from the same.

Figure 6 is a detail illustrating the reinforcing and tying means for supporting the base, together with the connection for attaching the cheek plates to the base form.

Figure 7 is an end view of one of the cheek plates illustrating the radial arcuated I beams reinforcing and supporting arm, with a connecting portion which extends above the top of the cheek plate.

Figure 8 is an enlarged end view along the line 8—8 of Figure 7, illustrating the connecting plate of the end of the arcuated arm which is adapted to connect with the similar arm on the other side of the conduit.

Figure 9 is a perspective view of one of the collapsible forms.

In the drawings our conduit making device and collapsible form A is adapted to be set up as illustrated in Figures 1 and 2 to permit the concrete to be poured into the form at the top when the forms are set up, which permits the rapid formation of the conduit B made up of a suitable mixture of concrete and adapted to be provided with reinforcing means in the same.

In making up the conduit B of concrete the base portion C is formed first by setting up the base sections 10 spaced apart from each other and positioned on the ground line 11. Suitable cross angles 12 are connected at the top of the base portions in a manner so as to space the same apart and hold the same firmly in place.

The base members 10 are formed with side plates 13 which are held to extend annularly from the ground line 11 by the triangular bracket plate 14. Each section of the base 10 is formed with end triangular angle plates 14 and a centrally positioned angular plate 14 positioned between the ends of the base plate 10. To provide a guide for the bottom of the conduit, that is, the inside or diameter in the base portion of the conduit C, we provide channel iron members 15 which extend across below the angle plate 12. These channel members 15 provide a guide so the concrete forming the base C can be troweled to form the trough-like bottom conforming with the curvature of the channel member 15.

Before the base portion C has been poured and properly formed into the cross sectional shape illustrated in Figure 3, the ring reinforcing supporting frame D is attached to the angle member 12. This frame D is made up of the end members 16 which form the upright support, projecting upward from the angle member 12 connected thereto by the brace 17.

The upright standard 16 of the reinforcing supporting means D are adapted to support the angle member 18 extending horizontally from one of the members 16 to the other, and the members 16 are connected at the bottom to the angle members 12 approximately centrally between the ends of the same, so that the upright or standards 16 are adapted to extend in the center or radius of the reinforcing rings 19. The rings 19 are formed with overlapping ends 20 at the top which are connected by the loops 21 leaving the ends 20 free to expand when the inner form for the conduit is placed in position, as will be hereinafter described.

Suitable brace members 22 extend from the standard 16 toward the center of the ring supporting angle 18 so as to form the frame rigidly and of a substantial nature so as to hold the reinforcing rings 19 in place. The reinforcing supporting frame D is important as it provides a means for supporting the rings in place to hold the same firmly, as illustrated in Figures 3 and 4 until the concrete base C of the conduit is formed and set sufficiently to hold the rings 19. The longitudinal reinforcing rods such as 23 are tied and attached to the rings 19 before the base C is poured and formed, and thus the net work of reinforcing is properly spaced and held in position so that the forms can be set up about the same to properly place the forms

about the upper portion of the rings and other longitudinally extending reinforcing rods 23.

Our frame D permits the easy setting up of the reinforcing rings and makes it more easy to operate the forms in the formation of a concrete conduit such as B. Our frame D is entirely collapsible as it can be taken apart and moved from place to place, being adaptable to be set up along the line of the conduit when the base sections 10 are set up.

After the base portion C of the conduit B has been formed and properly set, the frame D is taken down and moved along to a point where it is desired to be set up again for use, leaving the inside of the net work of reinforcing rods and rings free to receive the track 24 which is adapted to carry the truck 25 which supports the hoisting means E.

The hoisting means E is of a very simple construction and is made up of the supporting end standards 26 which support the longitudinally extending angle members 27 along each side of the standards 26 and formed with a projecting portion 28 on either end of the same which is adapted to support the hoisting screw 29. The screw 29 is operated by a suitable handle 30 to raise and lower the heads 31 on the screws 29.

The standards 26 are adapted to support cross channels 32 which are spaced below the longitudinal angles 27 and are adapted to form approximately a T-shaped frame with the standards 26. Depending from either end of the channels 32 we provide adjusting screws 33 which are operated by handles 34. The adjusting screws 34 are each provided with a form engaging head 35.

Brace angles 36 are connected to the standards 26 and extend from the bottom of one member to the top of the other member so as to form cross braces, as illustrated in Figure 5 to rigidly support the frame of the hoisting device E.

The hoisting means E is carried on the truck 25 which is provided with suitable wheels on either end adapted to run on the track 24. This track is set up along the center of the base C, as illustrated in Figure 2, and is just long enough so as to permit the truck to operate along the inside of the conduit B, a distance sufficient to take the forms after the concrete has set and move them on to a new portion which is being set up so that the form can be set up there and be made ready for the pouring of the concrete.

The hoisting means E is thus provided with two screw members 29 which are adapted to hoist and engage the center plate member 38 centrally at 39, as illustrated in Figure 2, while the screw members with the heads 35 are adapted to engage the side plates 40 of the inside form 10 which is illustrated diagrammatically in Figure 9 of the drawings. Figure 2 shows the engagement of the plates 35 with the sides 40 of the inside form F. In this figure the form F is illustrated in dotted outline collapsed and contracted so as to clear the form F which is set up and illustrated in full lines, in Figure 2.

The form F is provided with key plate portions 41 which are hingedly secured to the lower ends of the members 40 at 42. The plates 40 are hingedly connected at 43 to the center top plate form 38. The key plate members 41 are adapted to be folded in as illustrated in dotted outline in Figure 2, when the form F is desired to be withdrawn after the concrete of the conduit B has set and the form F is desired to be removed and carried along to a new point to be set up to form a continuation of the conduit B.

The screw members 33 allow the side plate members 40 to fold inwardly after the key members 41 have been released from the points 44 on either side of the base portion and channel members 15. When the form F is set up the key plates 41 engage the base plates 15 and lock and hold the form F practically circular, or forming that portion of a circle about the base C to hold the form F rigidly in place, so as to form the inside form against which the concrete of the conduit is poured and formed. This simple construction of the inside form F is very desirable, making the same, formed with the center portion 38, the side members 40, and the key plates 41. The screw members 33 operate to allow the plates 40 to fold inwardly and it is to be noted that the screw members 29, together with the screw members 33 are positioned outwardly from the end of the hoisting mechanism E. This is an important and practical detail of our invention as it permits the operation of two workmen within the conduit, to rapidly set up and take down the inside forms F, thus permitting conduit to be formed very rapidly by our method using our particular mechanism, together with the collapsible forms.

Another feature which is important in our hoisting mechanism E is, that the same is formed of the two standards 26 on the end of the same. These standards are directly in the center of the holding truck 25 and permit the workmen to pass from end to end of the hoisting mechanism if it is desired, owing to the comparatively flat and narrow center portion with the cross braces 36 and the end members 26. The longitudinal members 25 form a handrail for engagement by the workmen when passing from end to end. These details are of importance in our invention.

After the inside form F has been set into position it is desirable to place the cheek plate forms G in position on the outside to form the outside form of the sides of the conduit so that the concrete for the conduit B can be poured between the cheek plates G and the inside form F.

The cheek plates G are made up of the plate

members 46 which are reinforced by transverse and longitudinal members 47, 48 and 49 extending in a manner to brace the plates longitudinally, while the end members 50 reinforce the ends of the cheek plates G. Suitable central reinforcing plates or angles 51 extend across the plates 46, approximately centrally between the ends 50 of the same. All of these reinforcing members are of angle iron or other suitable reinforcing means for the longitudinal reinforcing, the end and edge portions so as to permit the cheek sections G to be connected one to the other as illustrated in Figure 1.

The lower portion or edge 49 of the cheek plates G are adapted to be secured to the base sections 10 along the upper edge of the base plates 10 which are also reinforced with angle members along and about the edge of the same which members fit together with the angle members 49 so that they can be bolted together, as is illustrated in Figure 6. Along the upper edge 52 of the base plates 10, as illustrated in Figure 6, reinforcing tie wires 53 are extended from the reinforcing rings 19 and over some of the longitudinal reinforcing rods 23 and extended out through the plate 10 with a wedge rod 54 through the outwardly projecting loop of the wire 53. After the concrete is poured and the conduit is complete, and when the side plates 10 are taken away, the wedge 54 is driven out permitting the plates 10 to be removed therefrom.

Arcuated base members formed of I beams, such as 55 are secured to the outside surface of the cheek plates G and spaced a short distance from the ends 50 of the same. The lower ends of these arcuated braces 55 are secured, as illustrated at 56 in Figure 6, to the base plates 10. The upper ends of these reinforcing members 55 project above the top 47 and curve in a manner so that the cheek plates on either side of the conduit B can be connected together centrally at 57.

Connecting plates 58 of an angle nature are secured to the ends of each of the members 55. The ends of the members 55 are connected together at 57, the upper edges 47 of the cheek plates G are spaced apart, leaving an opening between the same through which the concrete is poured into the forms to permit the same to run down to the base portion C between the plates of the cheek plates G and the inside forms F. Thus the plates 38, 40 and key plates 41 form the inside plates against which the concrete is formed, while the cheek plates 46 form the outside against which the concrete moulds.

The portion above the edges 47 of the cheek plates is troweled by hand and smoothed over so as to form and shape the same to conform with the circular formation of the projecting portions of the braces 55 and the continuation of the plates 46. This opening at the top of the conduit permits ready troweling and tamping of the concrete mixture into the side walls of the conduit and then the forming of the top easily by the workmen in making the conduit with these forms.

In fact, the operating is so simple with our forms that the conduit is made up very rapidly and of a very smooth and desirable contour, not having the irregularities which are so often apparent in making conduit of this nature. We have adapted and used our forms to a considerable extent in forming conduits and have found the same most desirable for practical use.

The forms for our mechanism for making conduit and other similar concrete forms are of a simple practical nature, being effective in use, collapsible so as to be stored away in a small space, or shipped from place to place; all of the parts being separable from each other so that the same can be taken down very readily, or so that the sections of the same can be easily moved from place to place. By having a series of these sections, including the base portions 10, the reinforcing frame holding means or supporting means D, the inside forms F, the outer cheeks G, these sections and forms can be set up rapidly and moved along as fast as the poured concrete has set sufficiently so that the form can be contracted and moved along to form a support for the pouring of additional concrete to continue the conduit for the distance that may be desired.

The reinforcing frame D is very important as it permits the reinforcing to be readily and quickly set up in a very accurate manner with the parts properly spaced apart, and the reinforcing rings 19 held in the notches, formed along the top of the member 18 of the frame D until the longitudinal reinforcing rods are secured and tied thereto, then permitting the reinforcing frame D to be taken down and the inside forms to be set up, such as F, after which all that is necessary is to set the cheek plates at the concrete base, and pour the concrete for the top of the conduit; permitting us with our method and means of forming a conduit to work very rapidly and save considerable time over other methods which have been used heretofore in so far as we know.

In accordance with the patent statutes we have described the principles of operation of our method of forming concrete conduits, together with our form of collapsible forms and reinforcing or holding means and while we have illustrated a particular formation and construction in the drawings we desire to have it understood that this is only illustrative, and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

We claim:

1. The method of forming a continuous conduit of an approximately circular nature inside, consisting in first forming the base with an inner circular bottom surface and holding reinforcing members of a circular nature suspended while said base is formed to project and be embedded therein, then tying longitudinally extending reinforcing members to the circular reinforcing members held by the base and then forming the concrete conduit in a circular nature about the reinforcing members and shaping the same across the top to form a substantially circular conduit to extend continuously.

2. A collapsible form for forming conduits including base sections adapted to support side plates to project inwardly with the arcuated center braces extending between the side plates, horizontal transverse angular members adapted to space the side plates apart and hold the arcuated center brace members, contractible inside form members including a series of plates hingedly connected together with a top central plate, side plates on either side thereof and key plates on the ends of the side plates and outside cheek plate, the bottom edge of which is adapted to be secured to the base at the outer side thereof, arcuated transverse brace members extending over said cheek plates and adapted to be connected at the top in a manner to hold the cheek plates concentric with the center form and to provide an open pouring space between the upper edges of the cheek plates.

3. Reinforcing supporting means for conduits including, a collapsible frame having upright standards on the ends thereof, a longitudinally extending central member between the standards at the top thereof, a base means for supporting said standards including cross angle members, brace means extending from said cross members to said standards, and brace means extending from said standards to said longitudinal member, and a series of notches equally spaced apart along the upper edge of said longitudinal member adapted to receive a series of reinforcing rings to support the same.

4. A reinforcing supporting means for conduits including, a frame having a central, longitudinal member, a series of recesses formed in the upper edge of said member adapted to receive and support the reinforcing rings to hold the same practically equally spaced apart until the longitudinal reinforcing rods are tied thereto, and standard and base means for supporting said frame.

5. Reinforcing supporting means for use in the formation of conduits including, collapsible frame means adapted to support the transverse rings to hold the same until the base portion of the conduit is formed and set about the reinforcing rings, collapsible standards for supporting said reinforcing supporting means, and brace members detachably secured thereto.

6. Reinforcing supporting means for the transverse rings of a conduit including, a series of angle iron members adapted to be detachably connected together in a manner to be collapsed into a compact state and having a series of brace members adapted to hold a longitudinal central member rigid with standards for supporting the same until the reinforcing rings of the conduit are set in the base portion.

7. Collapsible forms for making a continuous conduit including, base sections, brace members extending horizontally to space said base sections apart, arcuated channel members adapted to form brace engaging members for the inside lower surface of the conduit, an inside form comprising a series of plate members hingedly connected together with one member centrally at the top, having a side plate on either side thereof and key members connected to the free edge of the side plates, whereby the inside form can be supported wholly and entirely on the base section, forming a continuation of the arcuated channel braces for the purposes set forth.

8. Conduit forming mechanism including, a series of base sections, angle members for spacing said base sections apart, arcuated channel members adapted to be connected to said angle members to form the inside formation to provide a gauge for the troweling of the inside of the bottom of the conduit, contractible inside sections, a carriage for supporting said inside sections individually, having means to expand the same or engage and contract the same sufficiently to clear a set up inside form, and outside cheek plates having I beam arcuated brace members extending transversely over the same and adapted to hold the cheek plates concentric with the set up center form, the cheek plates and the center forms being adapted to be supported on the said base sections.

9. Concrete forming mechanism including, a series of sectional forms adapted to provide the form plates for receiving the poured concrete, base sections including triangular shaped brace members at the ends and center thereof, center channel guide members adapted to be equally spaced between the base sections to form the guide for the inside formation of the conduit, horizontal brace means adapted to support the guide channels and side plates spaced apart, contractible inside form sections having key plates on the ends thereof adapted to fold inwardly to permit the contracting and expanding of the inside form plates, carriage and expanding means for said inside form sections, cheek plates adapted to form the

side walls for the outside form of the conduit, an arcuated transversely extending brace member adapted to space the cheek members apart in a manner to hold the cheek members in the same arcuated formation as the inside form sections for the purposes specified.

10. Sectional forms for conduit formation to be made up of concrete including, a cheek plate having an outer brace member adapted to extend beyond one end of the same to form connecting means to space the edges of the cheek members apart, an inside form member adapted to provide a collapsible and expandible inside unit form, a spaced section including side plates, projecting brackets on said side plates to support the said plates, means for spacing and connecting said side plates together in a manner so that said cheek plates and inside form unit may be supported on said base plate section after the base of the conduit is formed of concrete with a large open space between the cheek plates adapted to receive the poured concrete between the cheek plates and the inside form unit.

11. A collapsible conduit form unit including, in side forms hingedly connected together with key plates on the free ends of the inside unit whereby said inside unit is self supporting and of an arcuated nature when the key plates are in operative position, a portable base section having inner arcuated brace members adapted to engage with said key plates to hold the same in operative position, reinforcing loops extending through a portion of the base of the conduit to connect the inside and the outside of the base sections together with the arcuated inside members, and outer cheek plate forms having means for spacing the same apart at the top to form an opening for receiving the concrete adapted to form the conduit, said cheek plate member forms being supported on said base plate section.

12. The method of forming continuous conduit of concrete consisting in supporting circular reinforcing members, forming a base portion having an inner curved nature along the bottom portion with said reinforcing members embedded therein and projecting from the same to form a reinforcing for the top of the conduit, then forming the conduit about the reinforcing members, leaving the form until the concrete has set and then moving the same on to a previously formed base portion to continuously form the conduit, collapsing the form within the conduit and passing the same inside of forms holding a plastic conduit that has not yet been set.

13. A collapsible conduit forming section comprising, a base forming section including two side plates, triangular shaped base braces extending out from said side plates, horizontally extending angle iron members adapted to space said side plates apart, inside conduit guide members adapted to be supported to said horizontal angle member, an inside form unit consisting of an upper arcuated central plate, arcuated side plates hingedly secured to said central plate, arcuated key plates hingedly connected to the free ends of said side plates, and a cheek plate unit being formed to simulate the arcuations of the inside form plate and having transversely extending brace members with a portion extending beyond one edge of the same, said extending portion of said brace members being adapted to connect with similar brace members so the cheek plate on the other side is equally spaced apart from the inside form unit in a manner so that said inside form unit and outside cheek plate are adapted to be supported to said base plate unit, to provide a form for receiving concrete to make up a conduit.

14. Conduit making form sections including, an inside form section having a series of plates hingedly connected together with key plates on the free ends of either side thereof, outside cheek plate sections, brace members secured to and projecting from said outside cheek plate sections to space the same apart on either side of the conduit to form the outside form walls of the conduit, with an opening for receiving the concrete at the top thereof, and a base forming section including plate members adapted to be spaced apart with inside gauge members adapted to coact with the base plate member in a manner to support the inside form section and the outside cheek plate section to provide a collapsible concrete form for conduit.

15. A collapsible conduit forming form including, unit sections having base plate members adapted to be spaced apart to permit the base of the conduit to be first formed, inside form members connected together in a manner to be contracted or expanded, said inside form members being self-supporting with the base of the conduit when set up, outside cheek form members providing the side plate of the form for the unit for forming conduit, said outside members including reinforcing beams adapted to space the outside cheek plates concentric from the inside members and open at the top to receive the concrete, said base plate members supporting said cheek members at the bottom thereof.

16. The method of constructing and holding reinforcing for conduits consisting in setting up a frame adapted to hold annular reinforcing means equally spaced apart, then securing to the annular reinforcing means longitudinally extending reinforcing means, then pouring the base of the conduit after which said supporting means is removed and the forms for the conduit are placed thereabout.

17. A collapsible supporting device for holding reinforcing means in making con-

crete conduit including, a base portion and means extending from said base portion in a manner to support reinforcing members extending transversely of the conduit, said supporting means being collapsible after longitudinal tie members have been secured to said transversely extending reinforcing members.

18. The method of constructing conduit and reinforcing adapted to be embedded therein consisting in setting reinforcing supporting means supporting reinforcing rings therefrom, and tying longitudinally extending reinforcing members to said reinforcing rings, then pouring the base of the conduit, then collapsing said reinforcing supporting means within the net work of reinforcing, and molding concrete in a manner to entirely embed said reinforcing means.

19. The method of constructing concrete conduit consisting in setting up base forms for the concrete, then setting up reinforcing supporting means adapted to support reinforcing rings to extend approximately equally spaced apart, then attaching longitudinally extending reinforcing rods to the reinforcing rings, then pouring the base after which said reinforcing supporting means is collapsed and removed from within the net work of reinforcing and then molding concrete to complete the conduit.

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