S. J. HARRY & W. E. KELLY.

FORM FOR CONCRETE STRUCTURES.

APPLICATION FILED JULY 29, 1918.

1,298,941.

Patented Apr. 1, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

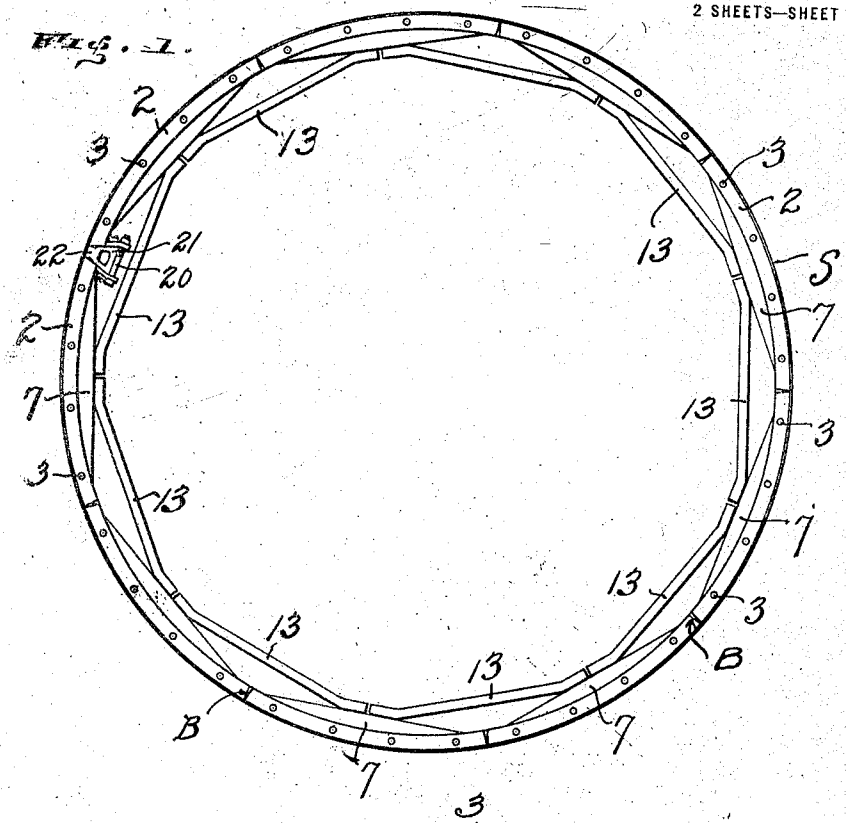
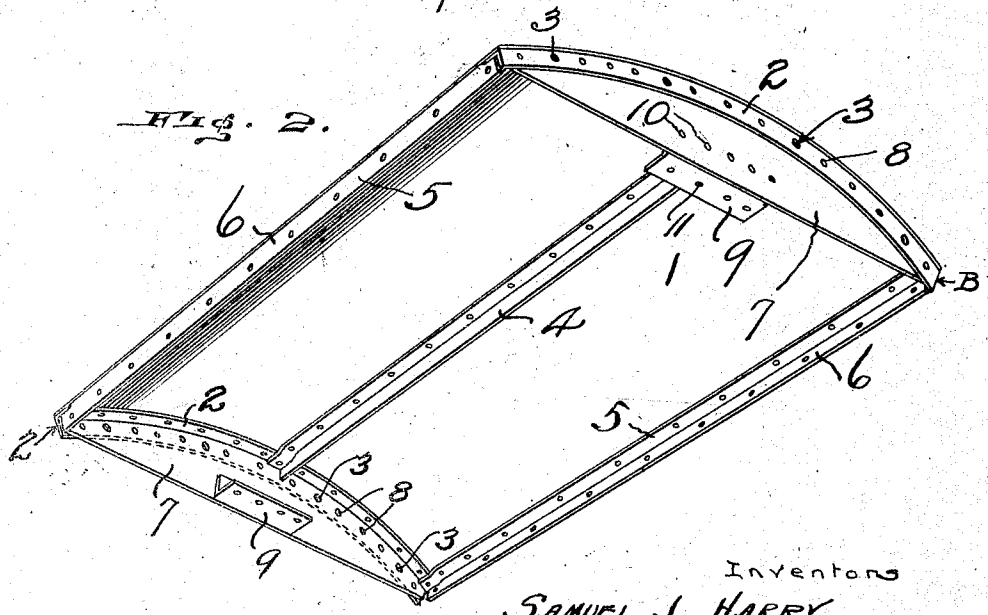


Fig. 2.



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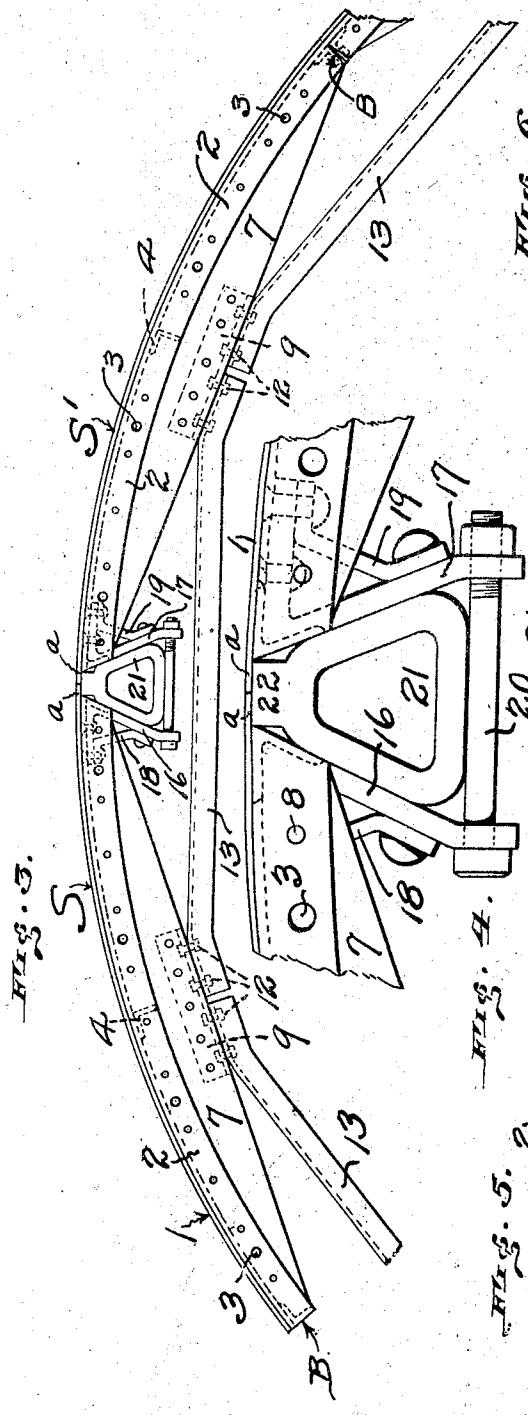


Fig. 3.

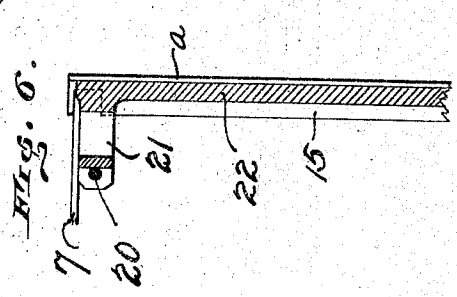


Fig. 6.

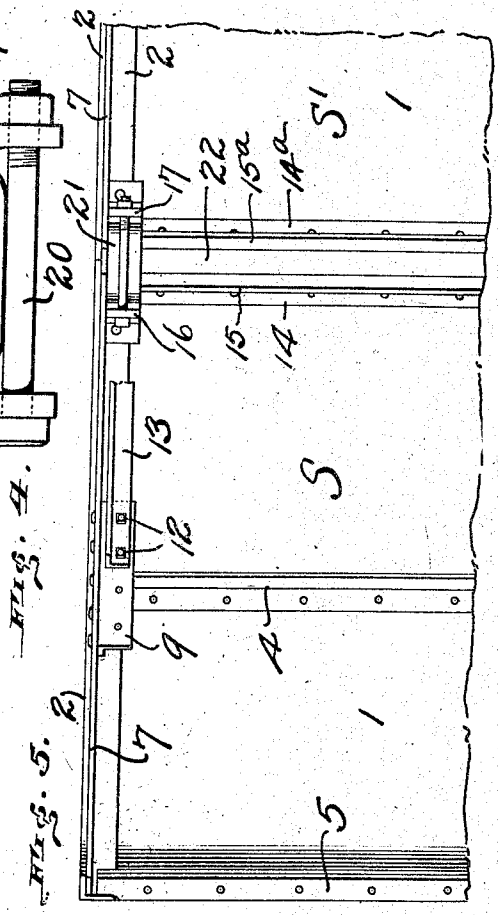


Fig. 4.

Fig. 5.

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FORM FOR CONCRETE STRUCTURES.

1,298,941. Specification of Letters Patent. Patented Apr. 1, 1919.

Application filed July 29, 1918. Serial No. 247,197.

To all whom it may concern:

Be it known that we, SAMUEL J. HARRY and WILLIAM E. KELLY, citizens of the United States, residing at Connellsville, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Forms for Concrete Structures, of which the following is a specification.

This invention relates to molds and has special reference to a novel collapsible concrete form particularly adapted for use in the formation of tunnels, shafts, sewers, and the like.

A primary object of the invention is to provide a mold wherein the several sections may be readily secured together to form a complete circular unit, while certain of said sections are formed to coöperate with a special locking key to provide a single joint which enables the same to be readily reduced in diameter or collapsed to permit it to be easily withdrawn from the completed concrete structure. That is to say, it is proposed to provide a construction wherein the adjoining edges of the several matching sections of the mold are constructed to be more or less permanently connected as compared with the adjacent edge portions of one pair of sections, whereby one point is provided in the circumference of the mold which may be readily and quickly released or "broken" to cause the entire unit to collapse or be reduced in diameter sufficiently to enable the entire unit to be shifted as a whole to a new position without taking the individual sections apart.

Another object of the invention is to provide a construction which involves improvements in the several parts or sections that are not only susceptible of embodiment in a manner to form a complete circular structure, but also structures of other desired shapes. In other words, while the features of improvement embodied in the present invention are particularly adaptable to a mold of circular formation, these features are nevertheless susceptible of application to mold sections which when assembled will provide an elliptical, square or other shaped mold.

A further object of the invention is to provide a structure of the character set forth which is relatively simple in its construction and capable of facile assembly, and whose interior braces and reinforcing elements are of such a character that they offer practically no obstruction or interference to apparatus for hauling concrete, or to workmen employed therein for effecting the removal of the forms to a new position.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is an end elevation of a complete form-unit assembled in accordance with the present invention.

Fig. 2 is a detail perspective view of one of the sections of the form.

Fig. 3 is an enlarged detail plan view of the joint sections of the mold, clearly showing the locking-key which is used to lock the connected sections in assembled form.

Fig. 4 is an enlarged detail plan view of the key joint.

Fig. 5 is a detail elevation of the structure shown in Fig. 3.

Fig. 6 is a longitudinal section on the center line of the key bar of the lock-joint.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

As previously indicated, the present invention contemplates a concrete form of the circular collapsible type which consists of a number of similar matching and readily interchangeable sections which may be readily connected in such a manner as to provide the complete form. Thus, by reference to Figs. 1 and 2 of the drawings it will be observed that the said several sections are designated generally as S, and each preferably consists of an outer sheet steel wall or shell plate 1 having secured to each end thereof a suitable segmental angle bar 9, which not only serves to reinforce and strengthen the end of the section, but also provides convenient means for coupling the end of one section to an adjacent section through the medium of suitable coupling bolts which may be inserted in the openings 3 especially provided for that purpose. As shown, the ends of the angle bars 2 are mitered or cut away as at B to give sufficient clearance to provide a relative hinging action between the coupled sections when collapsing the form and to also facilitate the complete dismemberment thereof. In addition to the angle bar reinforcement at each

end of the section 1, the same is provided with an intermediate reinforcing angle bar 4 while the opposite side edges also have secured thereto the angle bar strips 5—5 whose offset flanges 6 are adapted to abut with similar flanges of an adjacent section to provide the necessary lateral connection therebetween to make the complete mold unit.

Additional reinforcement is provided for the ends of each section S by a segmental gusset or chord plate which is riveted or otherwise secured to the offset flange of the curved angle bars 2 by means of the fastenings 8. Therefore, it will be apparent that there is a chord plate 7 at each end of the section, and as will be observed from Fig. 2, said plates carry on their inner faces the intermediate anchor plates 9, which are preferably of angular cross-section having one of their flanges riveted or otherwise secured to the chord plate as indicated at 10, while the other flange thereof is provided with suitable openings 11 for receiving the fastening bolts 12 of a suitable interior cross-tie or brace 13 clearly shown in Figs. 1 and 3 of the drawings. These ties 13 effectively brace the interior of the form by connecting the intermediate portion of adjacent sections, and by reason of the convenient means of attaching the ends thereof to the anchor plates 9, the said tie bars or braces may be readily put in place after the several sections are connected at their lateral edges, and also readily taken down prior to collapsing the entire mold structure.

From the foregoing it will be apparent that the structural features and characteristics of the curved sections S which form a complete mold unit are such as to provide a strong and rigid structure which is not only capable of withstanding all the strains and pressures imposed thereon but is also easily handled by workmen. And, with the construction shown and described it will be apparent that the several sections have a uniform type of connection. That is to say, the lateral edges of each section are capable of being coupled to an adjoining section by means of suitable bolts or equivalent fastenings, so that they will have a more or less fixed relation. However, owing to the desirability of providing a suitable place in the mold which may be readily "broken" or released, so that the entire mold may be collapsed or reduced in diameter substantially in the manner of a spiral, the adjoining side edges of one pair of sections are especially formed to coöperate with a novel type of locking bar to provide a readily releasable joint.

Therefore, a primary novel and distinctive feature of the present invention resides in the provision of a special quick detachable joint between certain of the sections which greatly facilitates the handling of the mold as a unit since it does away with the time consuming practice of disconnecting the individual sections thereof, and then again setting them up and reëstablishing the connections therebetween in a new location. That is to say, by leaving all of the sections connected except at one point, it becomes very easy to break the special lock joint provided by the present invention so as to permit the disconnected ends of the joint to overlap owing to the clearance B between the sections S and the slight inherent flexibility of the entire metallic unit to permit the entire form to assume a substantially spiral formation and thus reduce its diameter so that it may be easily withdrawn from the completed concrete structure.

According to the present invention, it is proposed as previously set forth to provide the individual sections with reinforcing angles, and notwithstanding the fact that certain of the sections are provided with means for forming a special joint, this feature is carried out even in the joint sections. Therefore, it will be observed from Fig. 4 of the drawings that the adjacent sections S and S′ are provided with reinforcing strips or bars at each side edge thereof, but one of these bars on the sections referred to slightly differs from the others to provide the special joint. That is to say, it will be observed that while the section S is provided adjacent one edge with an angle strip or bar 5 of the type previously described, its opposite edge is provided with an angle bar 14 whose offset flange 15 is bent backwardly toward the other flange so that when the opposite section S′ having a similar bar or strip 14^a thereon is in juxtaposition thereto a substantially trough shaped cavity or keeper recess will be provided by the divergently related flanges 15—15^a. At each end of the members 14 and 14^a the sections S and S′ are provided with suitable clamping members 16 and 17 in the form of angle brackets which are arranged in opposite relation, and are riveted respectively to the adjacent side edges of the adjoining sections S and S′ of the form. These clamping members 16 and 17 are reinforced and strengthened by suitable bracing angles 18 and 19, and the outer ends thereof are provided with openings to receive a suitable transverse clamping bolt 20 for the purpose of holding the head 21 of a special locking key in position. This key essentially consists of the clamping head portion 21 of open triangular shape and a filler bar portion 22 which is adapted to extend the full length of the sections in the valley between the divergent flanges 15 and 15^a of the angles 14 and 14^a, and support the projecting edge portions *a* of the sections S and S′ throughout the length of the unit, thus completely closing or sealing the joint there-

between. The novel shape of the head portion 21 of the key permits of a wedging fit between the clamping members 16 and 17, which like the flanges 15 and 15ª are divergently related, whereby, when the bolt 21 is in position behind the flat side of the head, the entire bar is held rigidly in position.

From the foregoing it will be apparent that the present invention aims to provide a form for concrete structures which consists of a plurality of duplicate sections, the majority of which are readily interchangeable and are held together at their meeting edges by suitable detachable fastenings throughout the greater part of the circumference of the mold, but at one point in said circumference there is provided a special joint which permits of releasing the meeting edges of one pair of sections in a manner which is much quicker than removing all of the bolts or like fastenings between the other connected sections, namely by means of the novel locking key above described. That is to say, the invention aims to provide a plurality of individual sections having novel reinforcements which are capable of being secured together to form a complete circular or like unit, and are also provided with suitable means for interiorly bracing the unit, such for instance as the cross ties 13 which offer little or no obstruction to the passage of workmen or apparatus through the interior of the form. Obviously the general open formation of the structure and its simple and effective system of reinforcement and bracing renders the handling of the individual sections in putting up, taking down or shifting a comparatively easy task, and while this is greatly facilitated by the provision of the novel joint and locking key between one pair of sections, it is also facilitated as between the remaining sections because of the fact that the same are sheared or cut away as indicated at B to provide necessary clearance for the purpose indicated.

We claim:—

1. A collapsible form unit for concrete structures consisting of a plurality of matching and interchangeable sections each section having means at both ends and sides for abutting with similar sections, fastenings for connecting the lateral edges of the sections to form the unit, and a single readily releasable lock joint formed between the lateral edges of one pair of said sections to facilitate the collapse of the unit.

2. A form for concrete structures consisting of a unit comprising a plurality of sections having means at their edges for connecting with adjacent sections, and a readily releasable lock joint between the lateral edges of a pair of said sections, said joint consisting of spaced abutments carried by the adjacent edge portions of said section and a key bar adapted to be wedged thereagainst.

3. A collapsible form for molds comprising a plurality of similar form sections having a jointed connection at their edges permitting inward contraction of the entire series of sections, and a releasable lock joint constituting the sole connection between a pair of sections, and including a single key bar and means for holding the key bar in engagement with the edges of the sections.

4. A form for concrete structures consisting of a unit comprising a plurality of sections having means at their side edges for connecting with similar portions of adjacent sections, and a readily releasable lock joint between the lateral edges of a pair of said sections, said joint consisting of spaced parallel keeper bars extending the full length of each section adjacent the edge thereof, and a key bar adapted to be clamped between said keeper bars.

5. A form for concrete structures consisting of a unit comprising a plurality of sections having means at their side edges for connecting with similar portions of adjacent sections, and a readily releasable lock joint between a pair of said sections, said joint consisting of keeper bars carried by the edge portions of said adjacent sections, clamping arms at each end of said keeper bars, and a locking key consisting of a filler body adapted to occupy the space between the keeper bars and a clamping head at each end thereof adapted to fit between the said clamping arms, and a clamping bolt arranged in the free ends of the clamping arms and adapted to cause the same to rigidly grip the head of the key bar to hold the same against the adjacent intermediate edges of the adjoining sections.

6. A collapsible tubular form for molds consisting of a plurality of sections connected at their lateral edges, and a single separable joint connecting the meeting edges of one pair of sections, whereby when the joint is broken the said meeting edges may overlap to permit the collapsing of the structure.

7. A collapsible concrete form unit consisting of a plurality of metallic sections, means carried by the side of each section for connecting with the side of an adjacent section, a releasable joint formed between the lateral edges of certain of said sections, means at the end of each section for connecting the entire form unit with an adjacent form unit, and means for connecting the central portion of the end of one section with an adjacent section consisting of a chord plate carried by each end of the section, an anchor plate carried by said chord plate, and braces connected with the anchor plate of one section and also with the anchor plate of an adjoining section to thereby brace the joint therebetween.

8. A collapsible form unit for concrete structures consisting of a plurality of matching and interchangeable sections, each section having a segmental angle bar reinforcement at each end thereof, angle bars carried by each side thereof for reinforcing the section and provided with openings for receiving fastenings for coupling with an adjacent section, an intermediate longitudinally disposed reinforcing angle member, and a chord plate secured to the segmental angle members at each end of the section.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

SAMUEL JAMES HARRY.
WILLIAM EDWARD KELLY.

Witnesses:
G. B. FREED,
J. B. KURTZ.