

C. A. BESSER.
 COLLAPSIBLE FORM FOR BUILDING CULVERTS.
 APPLICATION FILED AUG. 17, 1911.

1,055,862.

Patented Mar. 11, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

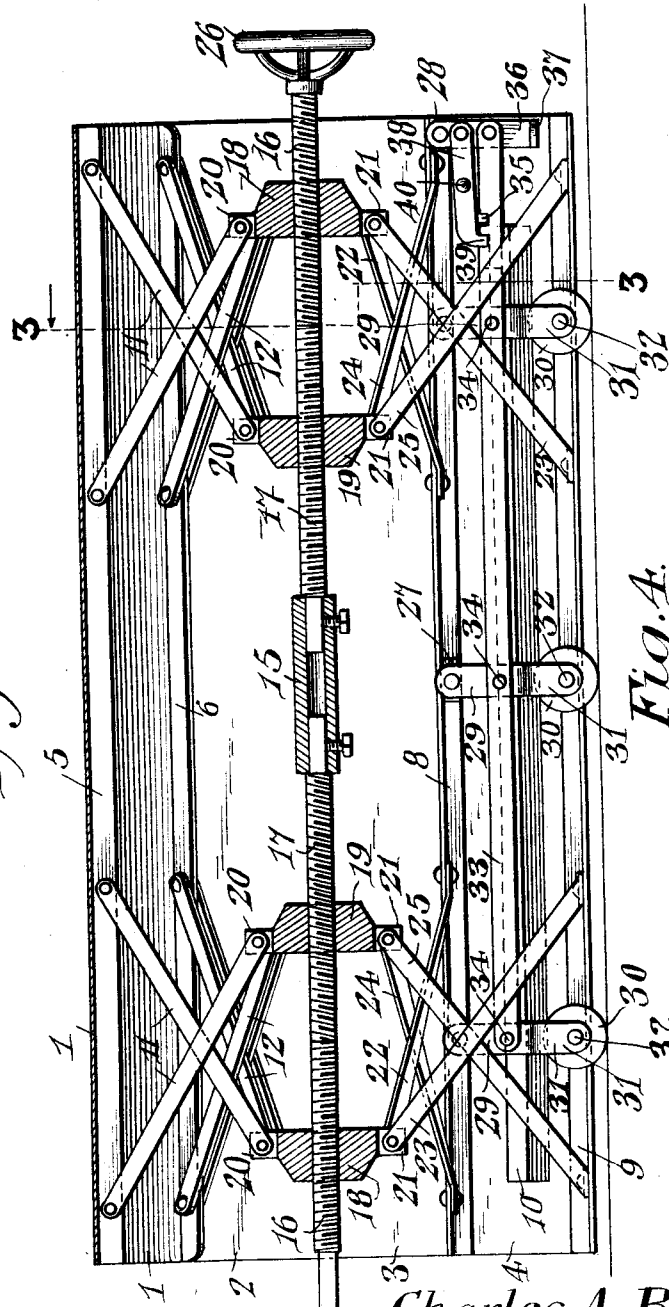
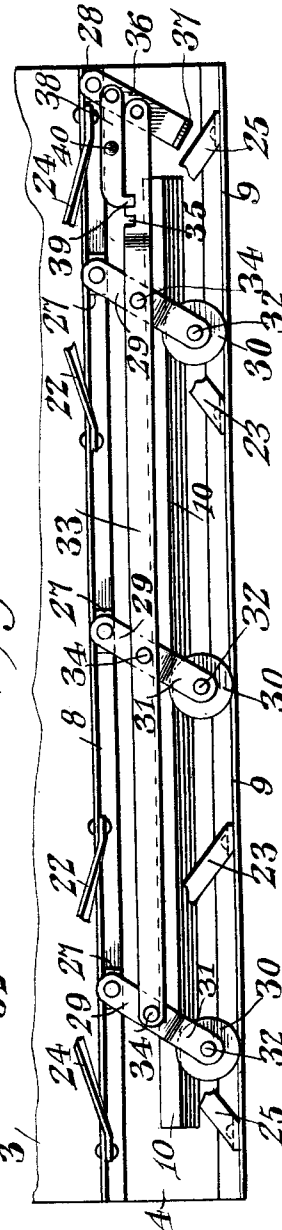


Fig. 4.



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Fig. 3.

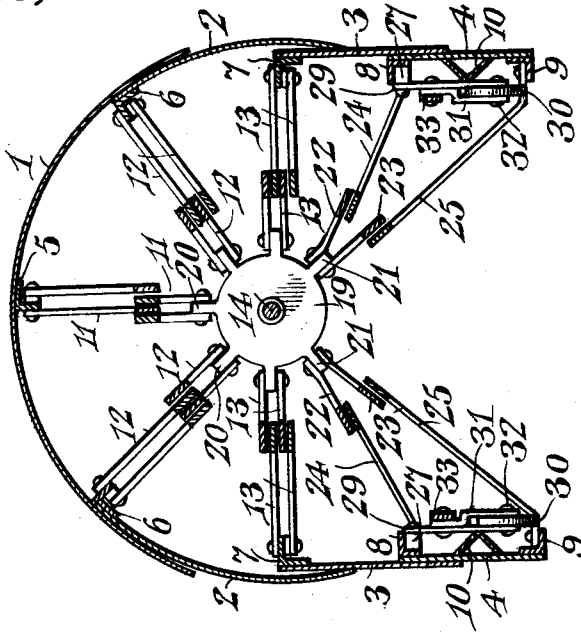


Fig. 2.

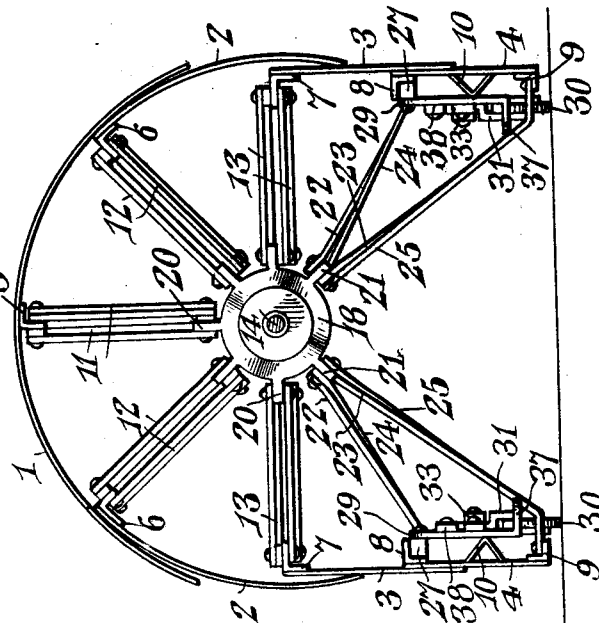
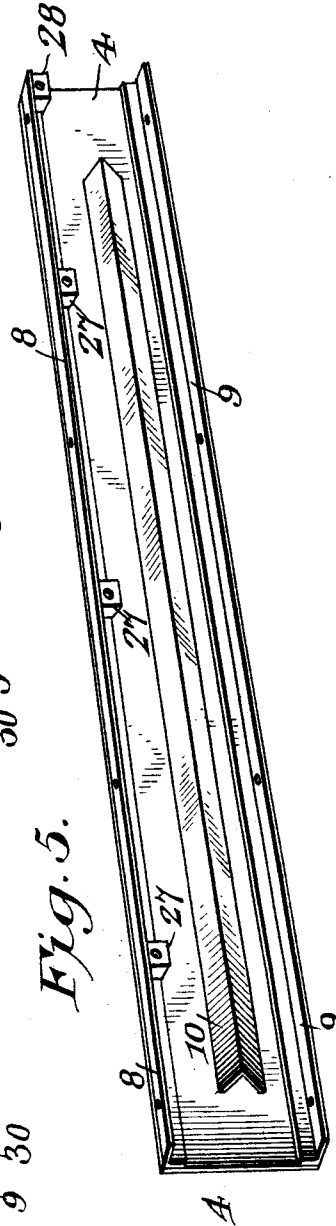


Fig. 5.



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CHARLES A. BESSER, OF MOUNT PLEASANT, IOWA.

COLLAPSIBLE FORM FOR BUILDING CULVERTS.

1,055,862.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed August 17, 1911. Serial No. 644,617.

To all whom it may concern:

Be it known, that I, CHARLES A. BESSER, a citizen of the United States, residing at Mount Pleasant, in the county of Henry and State of Iowa, have invented a new and useful Collapsible Form for Building Culverts, of which the following is a specification.

This invention has reference to improvements in collapsible forms or cores for use in constructing concrete or other culverts for sewers, drains, and the like, and its object is to provide a form for such purpose which may be expanded or collapsed to vary its size and to release it from the walls of the culvert after the concrete has set, the movement of the parts of the mold being all controllable simultaneously by a single operating means. Moreover, the structure of the present invention is such that the form may be readily transported from place to place or withdrawn from the finished culvert, for which purpose the form is provided with roller supports which may be moved into and out of active position irrespective of the movement of the walls of the form under the action of the adjusting means.

The present invention is an improvement upon Patent No. 952,869, granted to me on March 22, 1910, for a collapsible form for building culverts, but the construction shown in the said patent was such as to limit its use to the building of cylindrical culverts or the like, while the present invention is designed for the building of culverts having parallel basic walls and an arched crown.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that while the drawings illustrate a practical embodiment of the invention it is susceptible of other practical embodiments and, therefore, the invention is not confined to any exact conformity with the showing of the drawings, but the structure may be changed and modified so long as the salient features of the invention are retained.

In the drawings:—Figure 1 is a central vertical longitudinal section of the form with some parts in elevation, with the structure in position for transportation from place to place. Fig. 2 is an end elevation of the culvert as shown in Fig. 1 and as viewed from the right hand end of the structure as shown in Fig. 1 with the manipulating shaft

in cross section. Fig. 3 is a section on the line 3—3 of Fig. 1 with the supporting rollers raised. Fig. 4 is a view, similar to Fig. 1, of the lower end of the form as shown in Fig. 1, but with the roller supports in the inactive position. Fig. 5 is a perspective view of one of the plane form sections designed to carry the roller supports.

Referring to the drawings, there is shown a form made up of a sheet metal plate 1 and pairs of plates 2, 3, 4, respectively, but the particular number of plates employed will vary in accordance with the size of the form and the conditions to be met, the number of plates shown in the drawings answering for some purposes.

The plate 1 constitutes the crown plate, and like the similar plate in the aforesaid patent has a normal tendency to assume a curvature described on a comparatively small radius. This plate is provided with a central longitudinal angular flanged strip 5, one flange of which is approximately radial to the axis of generation of the plate and the plate will yield to a properly applied force to cause it to define the segment of a cylinder of greater diameter than the normal position of the plate. The plates 2 are, also, curved plates having a normal tendency to assume a curvature of comparatively short radius, and these plates may likewise be bent by a properly applied force to define segments of a circle or of a cylinder of larger diameter than their normal position. Each plate 2 has secured thereto along one edge an angular strip 6 with one flange of the strip substantially flush with the edge of the plate and directed toward the axis of curvature of the plate. The plates 2 are of less circumferential extent than the plate 1 in the particular arrangement shown.

The plates 3 are plane and of appropriate width, being of the same length as plates 1 and 2 and all the plates as well as the plates 4 which are also plane, are equal in length to the length of the form and the plates 4 in the particular structure shown are indicated as of less width than the plates 3, although this particular arrangement is not mandatory. The plates 3 have each along one edge an angular strip 7 having one flange at substantially right angles to the plane of the plate 3.

The plate 4 has along the long edges angular strips 8, 9, respectively, and each strip 8 and 9 has one flange projecting from the corresponding face of the plate at substan-

tially right angles thereto. The plate 4 has intermediate of the strips 8 and 9 a longitudinal angular strip 10 with the free edge of the flanges against the face of the plate 4 carrying the strips 8 and 9 and with the angle of the strip outset from the plate to a point about flush with the outer edges of the outstanding flanges of the strips 8 and 9.

Secured to the flanged strips 5, 6 and 7 are pairs of links 11, 12 and 13, respectively, there being coactive pairs of links in spaced relation one to the other and located near the respective ends of the angular strips carrying them, and these pairs of links at each end of the form are arranged in crossing relation, one link of each pair being intermediate of the two links of the mating pair.

At approximately the axis of the curved portion of the form or core there is a shaft 14 made up of parts connected together by a coupling 15, and each part of the shaft has oppositely directed or right and left hand screw threads 16, 17, respectively. Mounted on the threaded portion 16 of each member of the shaft is a block 18 appropriately threaded for the passage of the shaft and on the threaded portion 17 of each member of the shaft there is another block 19 like the block 18, and each block is provided with radially disposed outstanding ears 20 appropriately spaced to receive each a pair of links 11, 12 or 13, respectively, the ears 20 being disposed about the respective blocks 18 and 19 in substantially equi-distant relation one to the other.

Each block 18 and 19 is provided with other ears 21 like the ears 20 and to each ear 21 of the block 18 there are pivoted two links 22, 23, respectively, while similar links 24, 25, respectively, are pivoted each at one end to the corresponding ears 21 of the block 19. The links 22 and 24 are shorter than the links 23 and 25 and are pivotally connected to the strips 8 of the plate 4 at the ends remote from the blocks 18 and 19. The links 23 and 25 are pivotally connected to the strips 9 of the plate 4 at the ends remote from the blocks 18 and 19, the ends of the links 22 to 25 where connected to the strips 8 and 9 being appropriately bent for the purpose. The links 22 and 24 extend oppositely with relation one to the other and the same is true of the links 23 and 25, so that these links cross at an intermediate point. One end of the shaft 14 carries a manipulating hand wheel 26 or any other suitable manipulating means, whereby the shaft may be rotated, and such rotation of the shaft will cause the blocks 18 and 19 at each end of the shaft to approach or recede one with relation to the other in accordance with the direction of turning of the shaft. When the blocks are caused to approach one toward the other, the corre-

sponding ends of the links connected to the blocks are brought closely together, and as the other ends of the corresponding links have a fixed distance with relation one to the other, the distance of the outer ends of the links from the shaft is thus varied and the plates 1, 2, 3, and 4 participate in such movement, wherefore the distance of these plates from the shaft is also varied.

In the structure shown the pair of plates 2 is interior to the crown plate 1, the pair of plates 3 is interior to the pair of plates 2, and the pair of plates 4 is interior to the pair of plates 3, so that each inner pair of plates tends to force the next outer pair of plates outwardly with relation to the shaft. The edges of the plate 1 overlap those edges of the plate 2 which are connected to the links 12, the edges of the plates 2 overlap those portions of the plates 3 connected to the links 13, and the plates 3 overlap those portions of the plates 4 carrying the flanged strips 8. The arrangement is such that during the movements of the plates 4 their outer faces remain substantially parallel one with the other, this being due to the different lengths of the links connecting them with the blocks 18 and 19. The links 13 are so proportioned to the links carrying the plates 4 that the plates 3 moved by the links 13 at one edge have the edge engaged by the plates 4 moving to substantially the same extent as the plates are moved by the links 13, so that the plates 3 have their outer faces maintained in substantially parallelism at all times. The links 12 move in a different radial plane from the links 13, and while the edges of the plates 2 actuated by the links 12 move in one radial direction the other edges of the plates 2 are moved in accordance with the movement of the plates 3 with the result that the plates 2 during the expanding movement of the form have their curvature lessened or flattened against the normal tendency of these plates. The links 11 move the plate 1 in a radial plane bodily, but do not affect the long edges of the plate 1, which edges are controlled solely by the plates 2 in opposition to the normal tendency of the plate 1, so that during the expanding movement of the core or form the plate 1 is flattened to a commensurate extent.

During the collapsing movement of the structure the plates 1 and 2 curl under their normal tendency toward the initial curvature and the plates 2 by their elasticity tend to move the plates 3 and through them the plates 4 toward a diametric longitudinal plane substantially coincident with the links 11 and the axis of the shaft 14. Because of this construction the form or core retains a substantially inverted U-shape within the range of its movement from the collapsed position to the fully extended posi-

tion with the legs of the U approximately parallel one with the other at all times.

Each angular strip 8 has fast thereto at appropriate points blocks 27, and at one end a block 28 like the blocks 27. The blocks 27 and 28 are substantially flush with the outer edge of the respective angular strip 8. Each block 27 has pivoted thereto one end of a link 29 in such manner that the link 29 in the ordinary position of the structure is pendent with relation to the block 28. In the particular construction shown in the drawings there are three such links, one about midway of the length of the form and one near each end thereof, but it will be understood that long forms will require more links and short forms may require but two links. Each link carries at the end remote from its pivot support a roller 30, the link being provided with a bracket 31 co-acting with the body of the link to support the pivot pin 32 for the roller, which latter is introduced in the space between the bracket 31 and the corresponding face of the link, the bracket being sufficiently offset from the link for the purpose.

The several links are connected together by a bar 33 joined to the links by pivot pins 34, so that the links may be rocked on their pivot supports on the blocks 27 in either direction simultaneously. One end of the bar 33 is extended close to the corresponding end of the form and is provided with notches 35. The end of the link 33 carrying the notches 35 is pivotally connected to a manipulating lever 36 in turn pivotally supported by the block 28 in substantially pendent relation thereto, and the lever 36 is formed with a manipulating end 37 whereby the lever may be rocked about its pivot support in the block 28 to cause a longitudinal movement of the bar 33 and the movement of the lever 36 is the same as the movement of the links 29, so that there is no binding of the parts. The lever 36 between the point of connection thereto of the bar 33 and the pivot support of the lever, carries a latch member 38 having a tooth 39 adapted to the notches 35, there being two such notches properly spaced for a purpose which will presently appear. The latch 38 is provided with a manipulating hand piece 40 whereby the latch may be moved at the will of an operator.

By a suitable manipulation of the lever 36 the links 29 may be simultaneously rocked in a direction to carry the rollers 30 above the plane of the bottom of the form, so that the lower edges of the plates 4 and the corresponding flanges of the strips 9 may rest upon the ground or other support on which the culvert is to be formed, the concrete or other material being applied to the exterior of the form in the usual manner, and the form is allowed to remain in place

until the concrete has become sufficiently hardened.

When it is desirable to remove the form from the culvert the hand wheel 26 is manipulated to turn the screw shaft in the proper direction, so collapse the form sufficiently to move its walls out of engagement with the wall of the culvert. Now the latch 38 which while the culvert was being formed engaged in one of the notches 35 to hold the rollers 36 in their upper position, is released from engagement with the bar 33 and the lever 36 is then manipulated in a direction to move the links 29 to a substantially upright position in which case the rollers 30 project a short distance below the plane of the lower edge of the form and the latter is lifted to a commensurate extent, so that its lower edge is free from the ground or other support, and when the parts are in this position the latch lever 38 will be engaged by the tooth or nose 39 in the other one of the notches 35, thereby holding the rollers in the new or active position, as indicated in Fig. 1, when the form may be readily pulled out of the culvert to a new position or transported to some other position of use, or to a position of storage as may be desired.

The roller supports are provided on each section 4 and in order to prevent the rollers 30 from coming in contact with the flanged strips 9, the flanged member 10 is provided, and this flanged strip 10 not only serves as a bearing for the links 29 but serves also to stiffen the plates 4 as it extends throughout the greater portion of the length of the respective plate 4.

What is claimed is:—

1. A molding form provided with an arch portion composed of curved plates and a base section composed of plane plates in coactive relation to the plates of the arch section, and actuating means connected to the several plates for simultaneously moving them to expand or contract the form, said actuating means being connected to the plane plates to move them rectilinearly during the expansive and contractile movements of the form with respect to a plane intermediate of and parallel with the plane plates and radial to the longitudinal axis of the arch portion.

2. A mold form comprising curved plates and plane plates associated to form a substantially U-shaped mold or core, and means for expanding or contracting the mold form comprising link members connected to respective plates of the form, and means for moving all the link members simultaneously in a direction to expand or contract the form, the link members connected to the plane plates being positioned with reference thereto to impart rectilinear movement to said plane plates in a direction substantially

perpendicular to a plane radial to the longitudinal axis of the curved portion of the mold.

3. A mold form having an arch section comprising curved plates each having a normal tendency toward increased curvature and each plate being interior to the next plate toward the crown of the arch, plane plates interior to the margins of the curved plates of the arch section and constituting the basic portion of the mold form, and a common actuating means for all the plates connected thereto for moving them simultaneously to increase or decrease the size of the arch section diametrically and to impart rectilinear movement to the plane plates of the basic section toward and from a median plane radial to the longitudinal axis of the arch section.

4. A form or core for molding comprising an arch section composed of curved plates and a basic section composed of plane plates, each plate overlapping the next succeeding plate in order from the crown of the arch toward the base, and means for sustaining and moving the plates to expand and contract the form comprising a screw shaft having oppositely directed threads thereon, blocks on the shaft actuated by the threaded portions thereof to move in opposite directions, links extending from each block to the several plates, the links from a block movable in one direction crossing those from the block movable in the opposite direction, and links extending from the blocks to opposite edges of the terminal plate of the basic portion of the form.

5. A mold or form having an arch portion and a basic portion together constituting a mold of substantially U shape in cross section, rollers carried by the basic portion of the form interior thereto with pivoted links connecting the rollers to the basic portion of the form, and a manipulating means for the rollers common to all the rollers on a respective side of the basic portion of the mold form for moving the rollers into and out of projecting position with relation to the plane of the bottom of the basic portion of the form.

6. In a mold form, a basic portion provided with mold plates on opposite sides of the median line of the form, each plate having a series of spaced links each pivoted at one end to the plate near the upper edge thereof when the mold is in position, a roller at the lower end of each link, a bar connecting the several links, and means for locking the bar and the links with the rollers thereon in position where the rollers project beyond the plane of the bottom of the mold and where the rollers are above said plane.

7. In a mold form, a basic member having

oppositely disposed terminal mold plates each having along each long edge an angle strip secured thereto and at an intermediate point an angle strip extending longitudinally of the plate with the angle directed away from the plate in the same direction as the angle strips, a series of links in spaced relation one to the other and each pivoted at one end to the edge of the plate which is uppermost in operation and provided with a roller at the end remote from the pivoted end, a bar connecting the several rollers carried by a respective plate, a manipulating lever to which one end of the bar is connected, and a latch member carried by the manipulating lever and provided with a tooth, the connecting bar being provided with spaced notches for the reception of the tooth of the latch lever.

8. A mold form provided with an arch portion composed of curved plates movable in radial paths with respect to a common center, a base portion composed of plates movable in rectilinear paths, with respect to an intermediate plane radial to the longitudinal axis of the arch portion, actuating means connected to the several plates for simultaneously moving them to expand or contract the form by radial movements of the curved plates and said rectilinear movements of the base plates, and supporting means for the form comprising rollers carried by links mounted on the base plates and provided with common operating means for each side of the form.

9. A molding form provided with an arch portion composed of curved plates, and a base portion composed of plane plates in coactive relation to the plates of the arch portion, actuating means connected to the several plates for simultaneously moving them to expand and contract the form, the actuating means being connected to the plane plates to move them rectilinearly with respect to a plane intermediate of and parallel with the plane plates and radial to the longitudinal axis of the arch portion and to the curved plates to move them radially with respect to a common center, supporting rollers carried by the plane plates and movable into and out of supporting position with respect to the plane plates, and actuating means for the rollers, the actuating means for the plates and the actuating means for the rollers being extended to and both accessible at one end of the form.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES A. BESSER.

Witnesses:

GEO. T. KULER,
J. W. BURNOP.