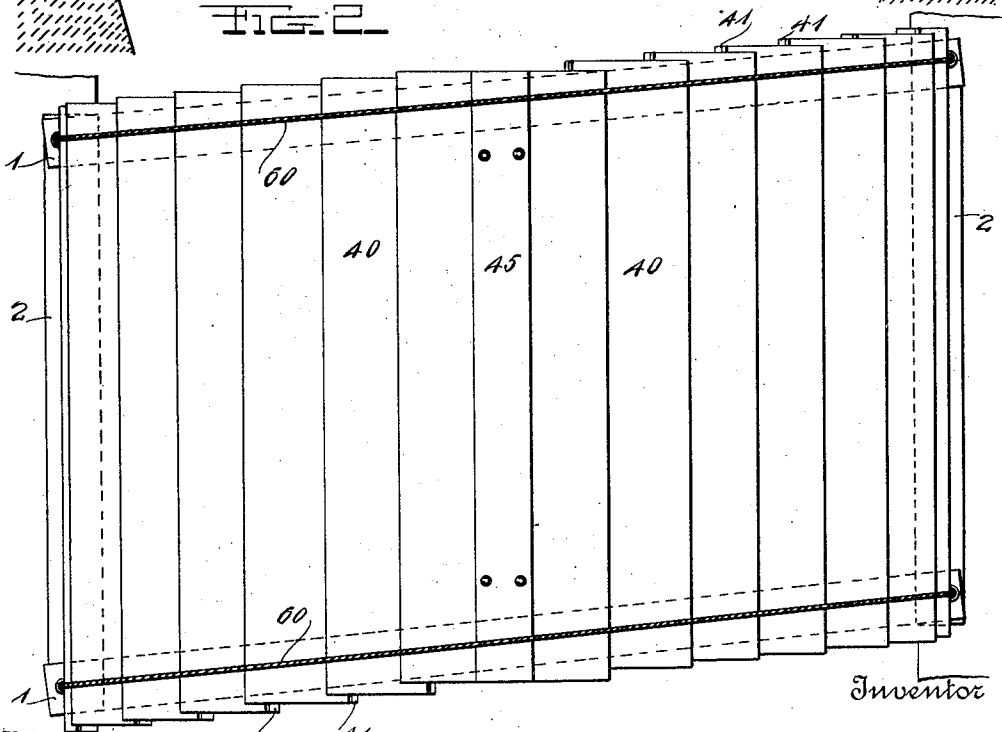
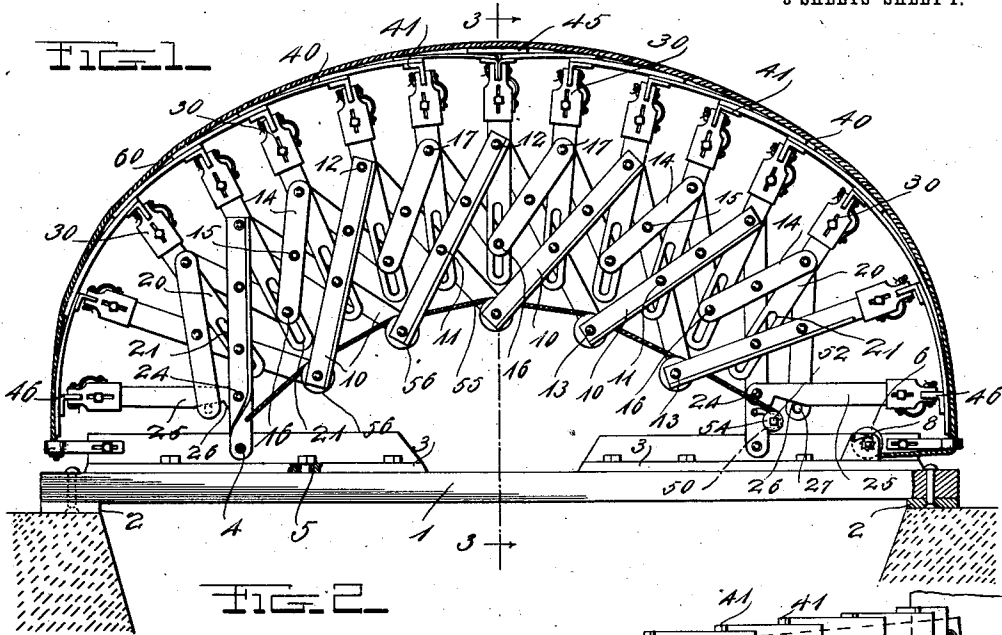


P. C. MERILLAT.
 ADJUSTABLE MOLD FOR CULVERTS AND BRIDGES.
 APPLICATION FILED NOV. 16, 1911.

1,022,960.

Patented Apr. 9, 1912.

3 SHEETS—SHEET 1.



Witnesses
 J. P. Pierce
 M. Kollamer

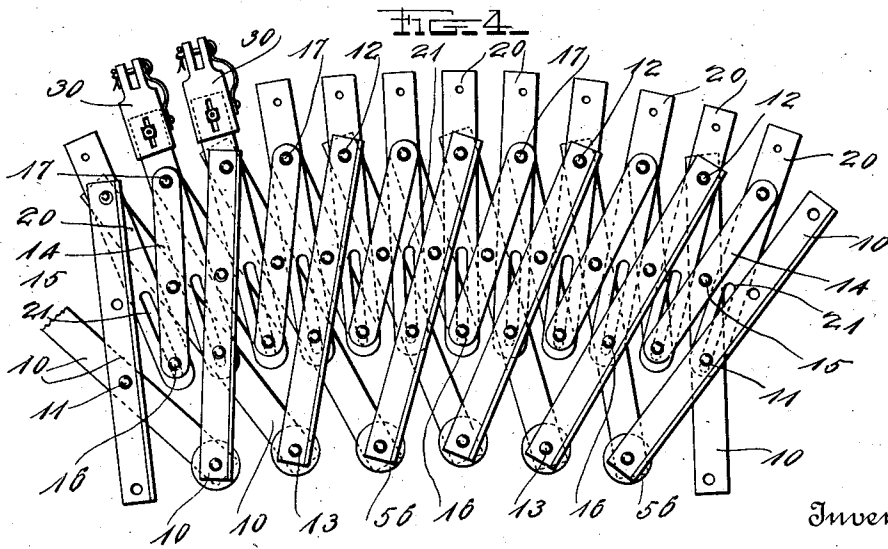
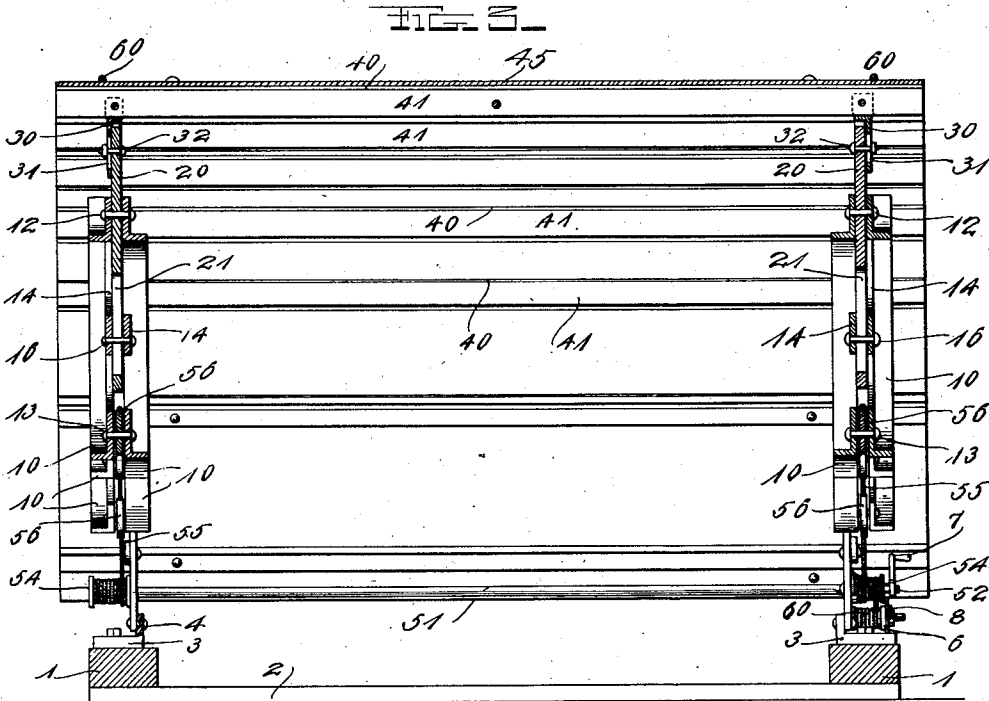
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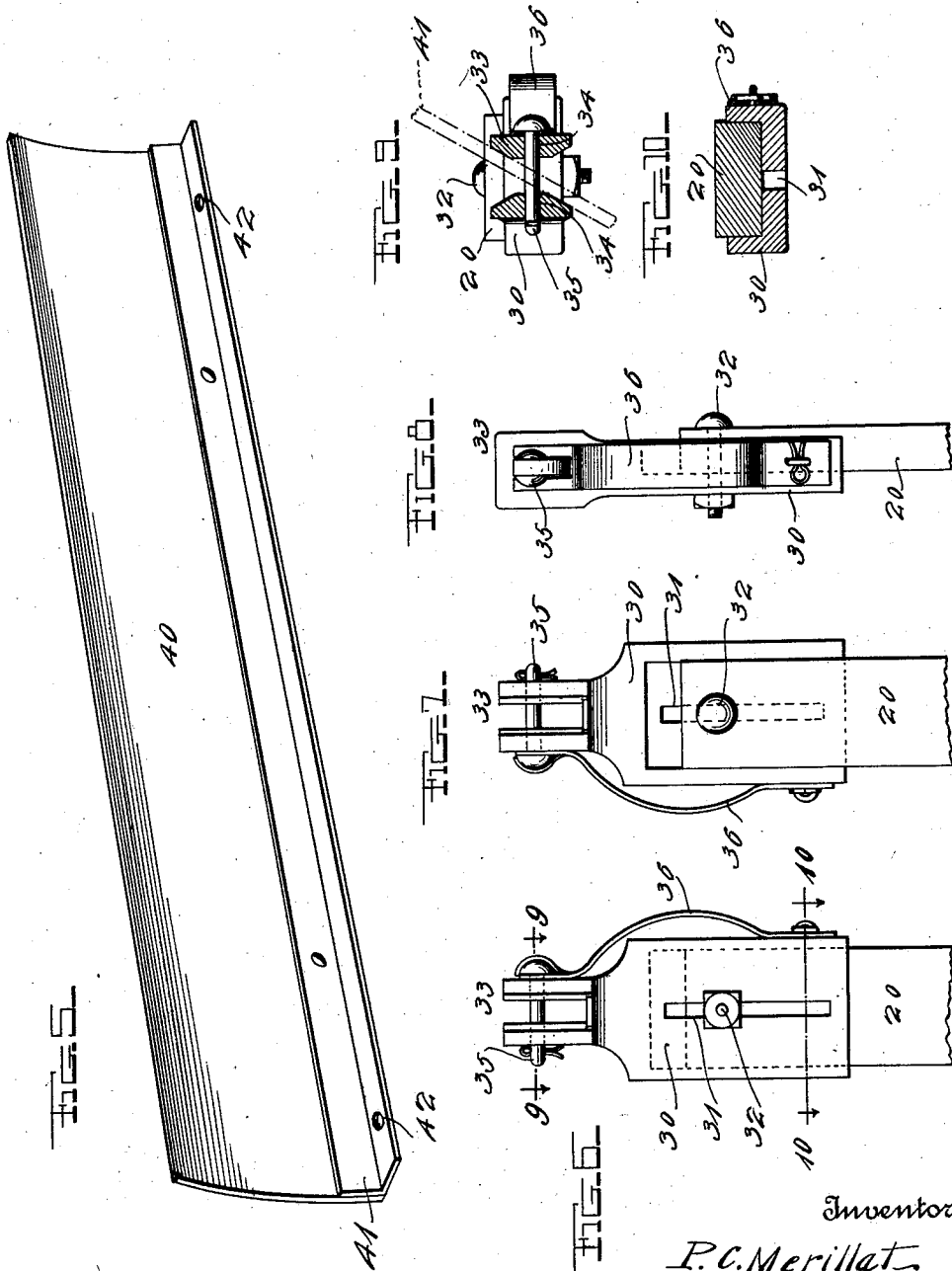
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UNITED STATES PATENT OFFICE.

PETER C. MERILLAT, OF WINFIELD, IOWA.

ADJUSTABLE MOLD FOR CULVERTS AND BRIDGES.

1,022,960.

Specification of Letters Patent.

Patented Apr. 9, 1912.

Application filed November 16, 1911. Serial No. 660,641.

To all whom it may concern:

Be it known that I, PETER C. MERILLAT, a citizen of the United States, residing at Winfield, in the county of Henry and State of Iowa, have invented certain new and useful Improvements in Adjustable Molds for Culverts and Bridges; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to molds and more especially to the centers thereof, and the object of the same is to produce an adjustable and collapsible metallic arch over which can be built a culvert or similar structure of concrete and the like.

Another object of the invention is to construct an adjustable and collapsible mold of this character with extension members whereby its field of usefulness may be enlarged.

Still another object is to construct the device in such a way that it may be placed obliquely across a valley or stream which is to be bridged, and the crown of the arch will remain parallel with said valley or stream.

These and other objects are carried out in the manner hereinafter more fully described and claimed, and as shown in the drawings wherein—

Figure 1 is a side elevation; Fig. 2 is a plan view showing the mold as arranged for the formation of an arch obliquely across a valley; Fig. 3 is a section on the line 3—3 of Fig. 1; Fig. 4 is an elevation of the lazy-tong structure with its parts or links nearly housed or collapsed; Fig. 5 is a perspective detail of one of the plates; Figs. 6, 7 and 8 are outside, inside and edge elevations of the extension element and its latch, and Figs. 9 and 10 are cross sections thereof on the lines 9—9 and 10—10 of Fig. 6.

Broadly speaking this device is made up of like side members, each mounted on a sill of its own, which sills will stand as far apart as necessary according to the width of the bridge or culvert desired; extension elements sometimes used when the capacity of the device is to be enlarged; and a series of plates running parallel with the stream and overlapping each other slightly, and upon which the concrete structure is to be built. Ordinarily, and in fact almost invariably, a culvert or bridge is only a little

wider than a single or double roadway, and two of my improved side members will be sufficient; but it is not impossible that a number of them could be employed with plates of greater length than contemplated for the average culvert or bridge, and the device could then be used for building a long arch such as a sewer. This, however, is only one of the possibilities of which the invention is capable and I will describe it in its simpler form.

The foundation for this improved mold consists of two sills 1 extending across the stream to be bridged, and stringers 2 connecting the sills at intervals. These foundation elements may be roughly constructed of wood and of dimensions and dispositions corresponding with the necessities of each case, or they might be more nicely constructed for repeated use. The superstructure is by preference entirely of metal, galvanized strap iron being employed throughout where possible and bent into angle-iron or L-shape when stiffness is required, and galvanized sheet iron being used for the plates. As the sides of this mold are of like construction, I will describe but one.

The numerals 3 designate two base members which are by preference of angle iron with one leaf sliding on the sill 1 and the other leaf upstanding therefrom and pierced with eyes 4 for pivotally supporting the arch hereinafter described, and near their outer ends one base member has an eye 5 while the other has a windlass 6 adapted to be rotated by a removable handle 7 and held latched by a pawl-and-ratchet mechanism 8. It is intended that one of these base members, as for instance that carrying the eye 5, shall be spiked upon the sill 1, whereas the other or windlass-carrying member will simply rest upon the sill and be movable thereon until it assumes its final position as described below. Connecting these two base members is what I will call the "arch" which is of the lazy-tong construction somewhat amplified to fit the conditions present. That is to say, it is made up of a number of main links 10 crossing each other at points about three-fifths the distance from their upper to their lower ends and there connected by the main pivots 11, while their upper and lower ends are positively connected with each other by the end pivots 12 and 13 as usual in lazy tong construction. All said links are by preference of angle iron, the inner leaves of the links in the outer series stand-

ing parallel with the adjacent leaves of all those in the inner series, and the other leaves of all links projecting outward so as to form supporting ribs to stiffen said links. The placing of the main pivots 11 at other points than midway between the end pivots 12 and 13 will cause the lazy-tong structure to open out on a curve or arc rather than on a straight line, and in order to strengthen its use as an arch I employ additional or expanding links 14 interposed between the main links and having their bodies pivoted, centrally at 15 to the main links 10 above the main pivots 11. Their lower ends are connected with each other by pivots 16 standing just above or radially outward beyond the inner pivots 13 of the main links, and their outer ends are connected with each other by pivots 17 standing just above or radially outward beyond the main pivots 11. As these expanding links are shorter than the main links, it follows that when this lazy-tong structure is collapsed the former will be as it were nested between the latter and the curvature of the entire structure will be maintained. Pivotaly mounted on the outer pivots 12 and 17 are bars 20 standing ever radial to the arch, and these bars have slots 21 at their inner ends which slide over the main pivots 11 and over the intermediate inner pivots 16 of the expanding links; and it is obvious that as the lazy-tong structure is drawn outward or expanded and arches upward these bars, mounted on its upper pivots 12 and 17, will rise with its crown while ever maintaining positions truly radial to the arc on which the arch is struck. The endmost of the main links are pivoted in the eyes 4 of the base members 3, above which points of pivotal support they have eyes 24 in which are pivoted the inner ends of loose links or bars 25 each having a notch 26 in its lower edge; and the endmost link of the smaller series carries near its inner extremity a pin 27 adapted to engage this notch at times as will be explained below.

An extension element (see Figs. 6 to 9) is by preference attached to the outer end of each bar 20 and 25, and the same includes a channeled member 30 having a longitudinal slot 31 at the center of its channel in which moves a bolt 32 which connects the outer end of the bar with the member in such way that the latter may be adjusted longitudinally thereon. At the outer extremity of the channeled member is a fork 33 whose arms have eyes 34 through which moves a pin 35 held normally in place across the crotch of the fork by means of a spring 36. When the head of the pin where it connects with the spring is grasped by the hand, the pin can be withdrawn wholly from one eye 34 so that its tip clears the crotch of the fork to release the plate yet to be described. In a simpler construction of my invention it

is quite possible to omit these extension elements and connect the plates directly with the outer ends of the bars, but in that event the capacity of the entire structure could not be amplified beyond the possibilities to which it may be extended or opened up by means of the lazy-tong arches. When these extension elements are employed the nut on the bolt 32 can be loosened and the member 30 slid outward on the bar to a degree limited only by the length of the slot 31, after which the nut is again tightened up and the bar and element become in effect one piece.

A series of plates extending longitudinally of the stream being spanned and transversely of the road being crossed are employed in connection with the device as above described, whether the extension elements are used or not. Each plate 40 has a sheet-iron body slightly curved transversely of its length, and an angle-iron 41 secured along one edge (or the edge of the sheet might be turned in to angular position), its inner leaf being pierced with eyes 42 through which the pins of the latches will pass when these plates are attached to the extension elements carried by the bars of the arches. All the plates at one side of the structure extend in one direction away from their angle-irons, and all those at the other side of the structure extend in the opposite direction, so that the angle-irons of the two innermost plates meet at the apex or keystone of the arch, and over the slot thus formed is disposed a lapping plate 45. The bodies 40 of the plates are omitted from the endmost angle irons 46, whose inner leaves are latched like the others to the extension elements which are carried at the outer ends of the loose links or bars 25. The plates are by preference of light galvanized sheet metal, possibly somewhat lighter than the sheet iron of which the angle-iron members are constructed, and their degree of curvature will correspond with the requirements of the case according to the size of the entire structure while their length will be slightly greater than the width of the bridge or arch being formed.

An important feature of my invention consists in the fact that all the pivots and connections above described are made rather loosely, as is possible in connecting strap-iron members, and the result is that when the structure is placed in position the entire foundation and with it the superstructure can be deflected from a rectangular contour as is often desirable where a culvert is to be built obliquely beneath a roadway instead of at right angles thereto. In such deflection the two base members 1 retain their parallelism as also do the two stringers 2 connecting said base members, but the four members assume the shape of a parallelogram which in this case is a rhomboid; and,

as the superstructure is mounted upon this foundation or base, it also must assume that shape when seen from above. Thereafter the two arches, standing over and in longitudinal alinement with the two sills, will lie in planes which are slightly oblique to those occupied by the inner flanges of the plates, and therefore the connections between said flanges and the pins in the forks 33 must be somewhat loose. The bodies 40 of said plates will slide a little over each other longitudinally, but the contour of the arch which they form will be preserved and the desired end attained.

After the structure has been distended to its desired capacity it is put in place across the stream to be bridged. The structure includes mechanical means for collapsing it so as to take it out of place after it has been used, as next to be explained.

Mounted in eyes 50 in the endmost of a pair of the main links 10 adjacent their eyes 24 is a cross rod 51 having a squared extremity 52 for the reception of a handle which may also be employed on the windlass shaft above mentioned, and this rod carries drums 54 over which are wound chains or wire ropes 55, one at each side of the device and for each arch. It is obvious that by rotating this shaft by means of the handle the two ropes will be drawn upon. Each rope passes from its drum over pulleys 56 which are located on the lower pivots 13 connecting the main links 10 and between the two links connected thereby, and leads over to the opposite endmost link to which it is attached in any desired manner; and obviously the rotation of the shaft will cause the drums to draw in on these ropes whereby the ends of the lazy-tong structure will be caused to approach each other, and as one base member 3 is spiked to the sill the other base member will move toward it. Thereby the arches may be said to be folded up or collapsed as the links in both series of lazy-tongs are nested into each other. When the structure is reduced to an extremely small size, the loose links or bars 25 with the angle-irons carried by their outer extremities are useful for holding up the ends of the crown or the bodies of the outermost plates 40; whereas when the device is distended these loose links fall outward and rest on the pins 27 in the endmost links of the smaller series. After expanding the device to the size of the culvert to be built, the movable base members 3 are spiked to the sills 1. Then wires or wire ropes 60 are connected with one pair of the base members, led over the top of the plates directly above the arches, and attached to the windlasses above described; and by applying thereto the handle 7 and turning these windlasses, the ropes may be tightened. When both these ropes are drawn taut and the

windlasses locked by the pawl-and-ratchet mechanisms, the plates forming the crown of this device will have been drawn downward as far as the curved shape of the lazy-tong arches permit, and all parts of this structure are thus held firmly against vibration and looseness; and if the wire ropes are small they will leave scarcely a crease in the under side of the concrete arch to be formed. The latter is built over this mold in a manner not necessary to amplify in the present specification, and allowed to set. Later the spikes of at least one pair of the base members are removed and the handle 7 used to rotate the shaft so that these members are drawn inward toward the other pair, and all parts of the mold approach its axis as the structure is collapsed. When it has been thus reduced in size it may be withdrawn out of the culvert or bridge and used in the formation of some similar structure at another time and place.

What is claimed as new is:

1. An adjustable collapsible mold for culverts or bridges including a plurality of individual arches of lazy-tong links standing in parallel upright planes and pivoted to each other at their ends and where they cross, the intermediate pivots being disposed below the center of the length of said links, and plates slidable on each other and each loosely connecting the upper end of a member in one arch with the corresponding member in the arch adjacent.

2. An adjustable collapsible mold for culverts or bridges including a plurality of individual arches of lazy-tong links standing in upright planes and pivoted to each other at their ends and where they cross, the intermediate pivots connecting the links of each arch being disposed below the center of the length of said links, extension elements adjustably connected with the upper ends of the various members of the arches, and plates sliding over each other and each loosely connecting an element in one arch with the corresponding element in the arch adjacent.

3. An adjustable mold for culverts including two arches of lazy tong links pivoted to each other at their ends and where they cross, the latter pivots being disposed below the center of the length of said links, means for supporting said arches, and flexible crowns connecting them.

4. An adjustable mold for culverts including two arches of lazy tong links pivoted to each other at their ends and where they cross, the latter pivots being disposed below the center of the length of said links, base members pivoted to the endmost links at the inner ends of the latter, a sill under each arch supporting said base members, and a flexible crown connected with the outer ends of the links in both arches.

5. An adjustable mold for culverts or bridges comprising parallel sills; an arch for each sill including two base members whereof one is fixedly secured upon the sill and the other adjustably secured thereon, and a body of lazy-tong links whose main pivots stand below the center of their length; and a crown consisting of plates sliding upon each other and each connecting a member in one arch with the corresponding member in the other.

6. An adjustable mold for culverts comprising parallel sills, and transverse stringers pivotally connecting the sills whereby the latter may be disposed across and at right angles to the valley being spanned or obliquely to the same; an arch for each sill including two base members whereof one is fixedly secured upon the sill and the other adjustably secured thereon, and a body of lazy-tong links whose main pivots stand below the center of their length; and a crown consisting of plates loosely sliding upon each other and each loosely connecting a member in one arch with the corresponding member in the other.

7. An adjustable mold for culverts comprising two sills, and transverse stringers pivotally connecting them; an arch for each sill consisting of two base members connected by a body of lazy-tong structure whose links have their intermediate pivots disposed below the center of length of said links, a wire cable connected with the one base member and leading past the various links, and a winding mechanism connected with the other base member for tightening up said cable and causing the approximation of the base members; and a crown consisting of plates loosely sliding upon each other and each loosely connecting a member in one arch with the corresponding member in the other.

8. An adjustable collapsible mold for culverts or bridges comprising parallel sills, and transverse stringers connecting the sills; an arch for each sill including two base members mounted upon the sill and connected by a body of lazy-tong structure whose links have their main pivots disposed below the center of the length of said links, and means for causing the approximation of the two base members upon the sill; a crown consisting of plates loosely sliding upon each other and each loosely connecting a member in one arch with the corresponding member in the other; and compressing means for said plates consisting of a wire cable connected with one base member and passing over the plates, and a windlass carried by the other base member for tightening said cable.

9. In an adjustable collapsible mold for culverts or bridges, the combination with the crown composed of a series of parallel plates, and the support; of a plurality of like arches supporting said crown and each including base members mounted on said support, and a lazy-tong body structure connecting said members and consisting of a series of main links pivotally connected with each other at their extremities and the endmost links pivotally connected with said base members, main pivots connecting said links where they cross at points below their centers, and a second series of expansion links pivotally connected at their extremities with each other and at their mid-length with the upper portions of the main links.

10. In an adjustable mold for culverts the combination with a flexible crown, and a support beneath said crown and each comprising a lazy-tong body structure consisting of a series of main links pivotally connected at their extremities with each other, main pivots connecting them where they cross at points below their centers, a second series of links pivotally connected at their extremities with each other and between their extremities with the upper portions of said main links, and radial bars pivoted on the outer pivots of both series and having slots near their inner ends slidably engaging the main pivots of the main series and the inner pivots of the other series.

11. In an adjustable mold for culverts, the combination with a flexible crown, and a support beneath said crown and each comprising a lazy-tong body structure consisting of a series of main links pivotally connected with each other, main pivots connecting said links where they cross at points below their centers, a second series of links pivotally connected at their extremities with each other and between their extremities with the upper portions of said main links, pins on the inner ends of the endmost links of the second series, loose bars pivoted at their inner ends to the endmost links of the main series and having notches in their lower edges adapted to engage said pins, and angle irons connecting the outer ends of said bars in pairs and extending from one arch to the other within said crown.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PETER C. MERRILLAT.

Witnesses:

C. C. MERRILLAT,
H. E. REECE.