

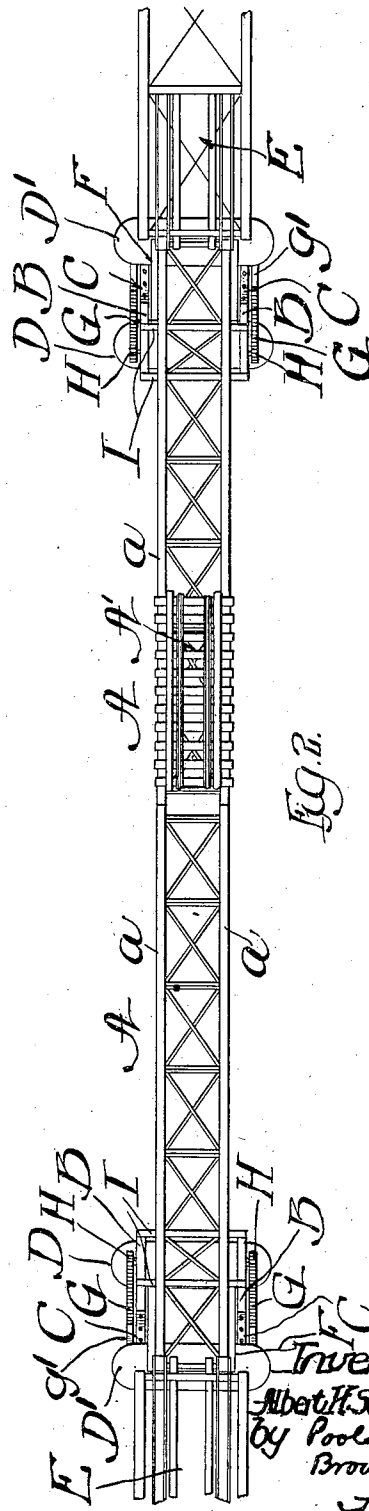
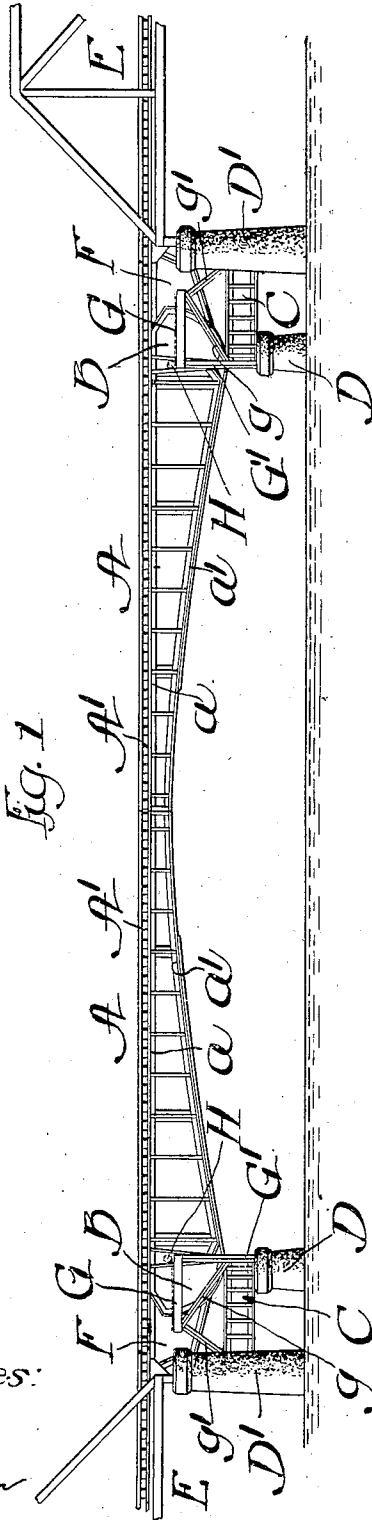
A. H. SCHERZER.
BASCULE BRIDGE.

APPLICATION FILED JULY 30, 1907.

Patented Oct. 22, 1912.

3 SHEETS—SHEET 1.

1,041,885.



Witnesses:
J. H. Alfred
A. M. Brown

Inventor
Albert H. Scherzer
by Pool &
Brown
Attys.

A. H. SCHERZER.

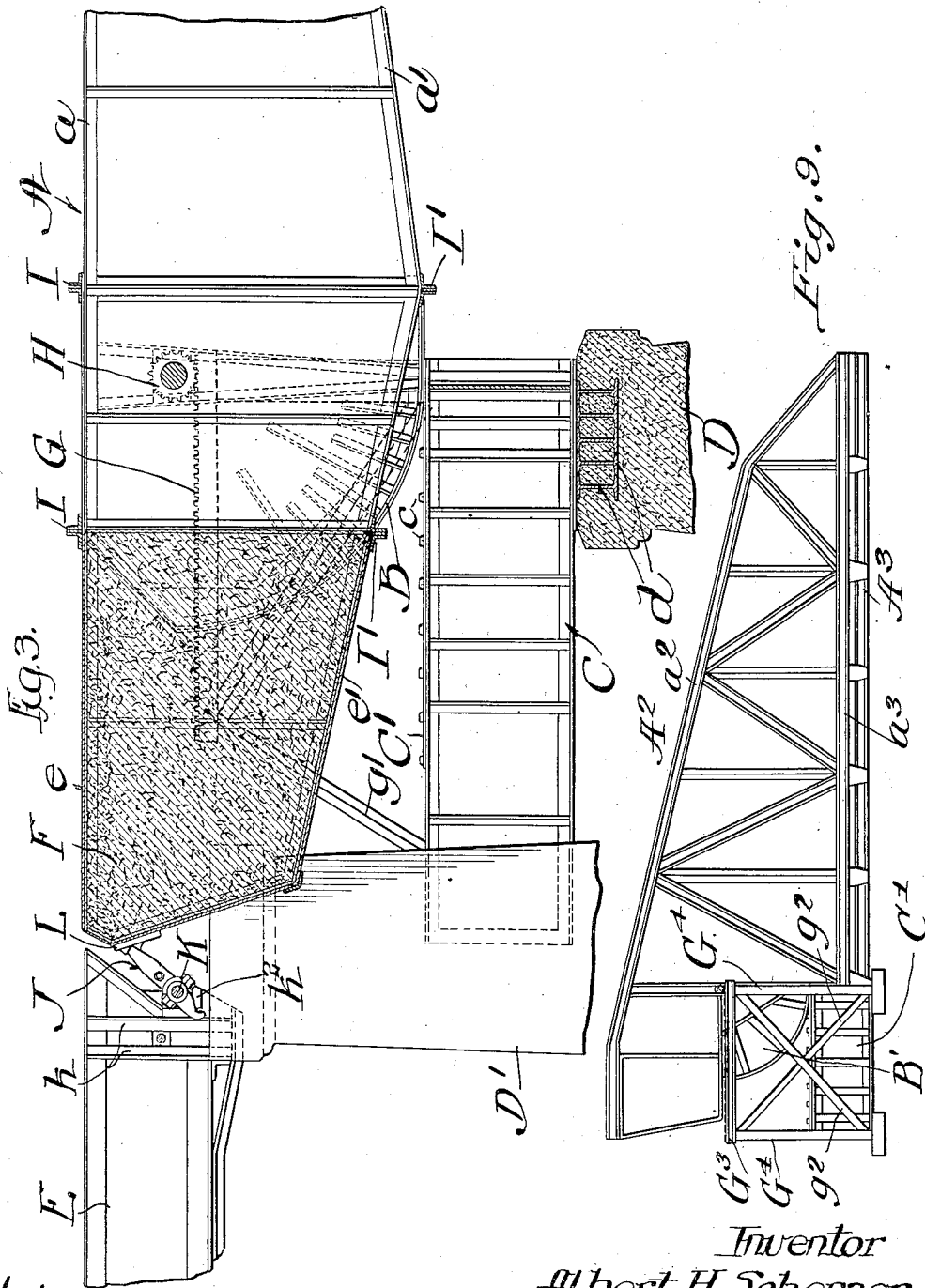
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3 SHEETS—SHEET 2.

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Witnesses
F. H. Phelps
A. M. Bunn

Inventor
Albert H. Scherzer
 by *Boole & Brown*
Attys

A. H. SCHERZER.

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3 SHEETS—SHEET 3.

1,041,885.

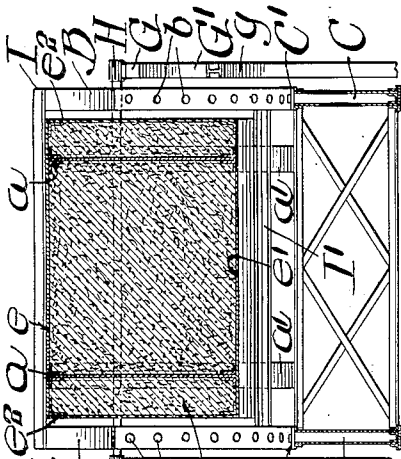


Fig. 5.

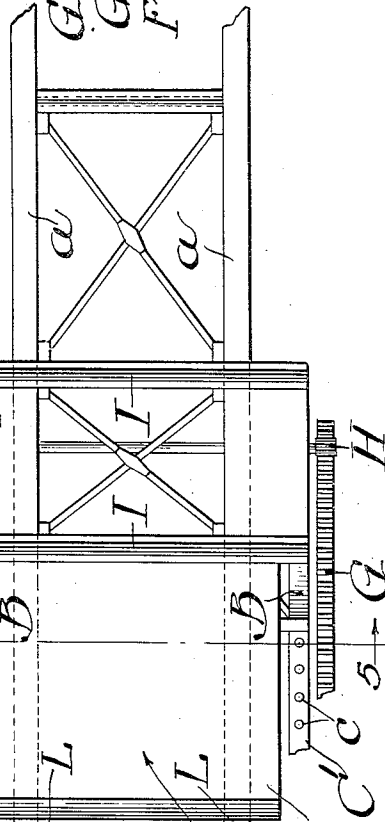


Fig. 4.

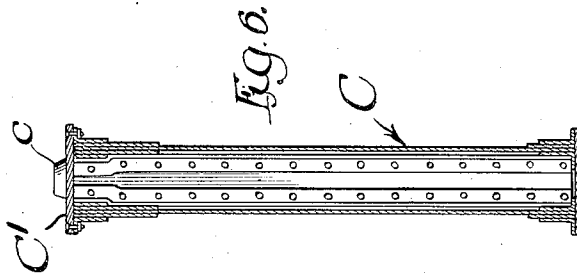


Fig. 6.

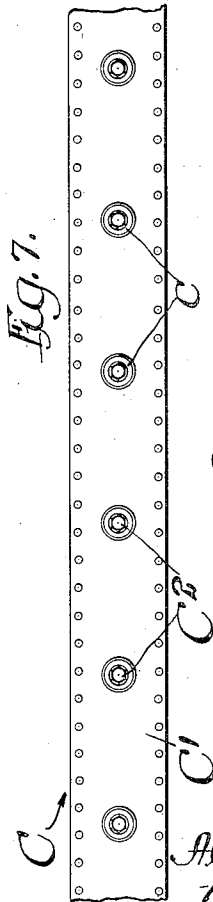


Fig. 7.

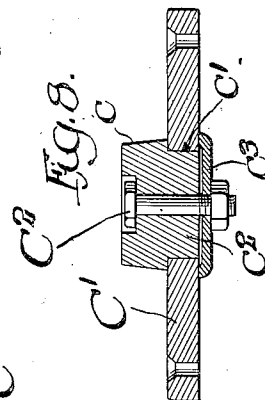


Fig. 8.

Witnesses:

F. H. K. H. K.
A. M. Bunn

Inventor
Albert H. Scherzer
by *Roche & Brown*

Atty's

UNITED STATES PATENT OFFICE.

ALBERT H. SCHERZER, OF CHICAGO, ILLINOIS.

BASCULE-BRIDGE.

1,041,885.

Specification of Letters Patent.

Patented Oct. 22, 1912.

Application filed July 30, 1907. Serial No. 386,256.

To all whom it may concern:

Be it known that I, ALBERT H. SCHERZER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bascule-Bridges; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in bascule or lift bridges of that kind known as a rolling lift bridge, or one in which the bridge is provided with a movable span or leaf, which swings in a vertical plane and in which the said span or leaf is provided with rolling segments resting on stationary tracks or supports.

The invention relates more specifically to features of construction by which the rolling segments and their supporting tracks are located in planes outside of the planes of the trusses which constitute the frame of the leaf and to the location or arrangement of the supports for the track-girders on which the rolling segments rest.

The invention consists in the matters hereinafter described and pointed out in the appended claims.

My improvements are illustrated in the accompanying drawings as applied to a deck bridge consisting of two spans or leaves, the front ends of which meet each other at the center of the water way or bridged space, and while certain of my improvements are adapted particularly to this type of bridge others may be as well applied to a single leaf bridge or to a through bridge.

As shown in the said drawings,—Figure 1 is a view in side elevation of a bascule bridge embodying my invention. Fig. 2 is a plan view of same. Fig. 3 is an enlarged, detail, longitudinal, vertical section, taken centrally through the bridge structure, and showing the parts thereof at the rear end of the span or leaf, including the track girders, the counterweight and a rear lock. Fig. 4 is an enlarged detail plan view of parts of the rear end of the bridge, shown in Fig. 3. Fig. 5 is a detail cross section taken on line 5—5 of Fig. 4. Fig. 6 is a detail cross section taken through one of the track girders. Fig. 7 is a plan view of a portion of one of said track girders. Fig. 8 is an enlarged

cross section of the top plate of the track girder which constitutes the supporting track for the rolling segment. Fig. 9 is a view in side elevation of one leaf of a through bridge, provided with rolling segments located outside of the planes of the trusses, in accordance with one feature of my invention.

As shown in said drawings A A designate the leaves of the bridge, each of which comprises side trusses having upper and lower chords a a^1 and a floor structure A^1 , located substantially at the level of the upper chords. The bridge illustrated is a railway bridge, the track rails being supported on cross ties that rest upon the said upper chords. The upper chords are horizontal and the lower chords of curved form; said lower chords of the two leaves having together the form of an arch and the bridge as a whole having the appearance of an arched bridge of deck form.

B B designate rolling segments which are attached to the side trusses of the leaves, exterior to the planes of the trusses at the rear end of each leaf. Said rolling segments rest and roll on horizontal supporting tracks, formed by the top surfaces of girders C C which are hereinafter termed track girders. The said track girders are shown as supported at their outer or forward ends on piers D D, and at their rear ends on other piers D^1 D^1 . Said piers D^1 D^1 , in the bridge shown in the drawings, constitute supporting piers for approach spans E E. The leaf trusses extend rearwardly beyond the rolling segments B B toward the bridge approaches, so that each leaf has a rearward extension which meets the stationary approach structure at a point over or adjacent to the pier D^1 , and said rear extension of the leaf falls or descends as the front end of the span rises. A space is provided for the descent of the said rear extension of the leaf, at the central part of said pier D^1 , as plainly seen in Fig. 3. F F indicate counterweights, which are attached to the rearward extensions of the bridge trusses rearward of the rolling segments. Said counterweights occupy the spaces between the upper and lower truss chords or beneath the floor structures of the leaves, and extend transversely of the leaves, or from side to side thereof. Said counterweights F F serve to counterbalance the leaves, in the usual manner, so as to permit of the raising

and lowering of the bridge leaves with minimum power.

The operating devices for the bridge leaves are not herein illustrated in detail.

5 The parts thereof shown in the drawings correspond with those of an operating device of the general type shown in the United States Letters Patent to Kellar, No. 752,563, and embrace fixed, horizontal operating
10 struts G G, located outside of the rolling segments B B, and provided on their upper surfaces with toothed racks which are engaged by gear pinions H, mounted on the movable leaf and operated by driving connections, which it is unnecessary to illustrate or herein describe. The said struts G
15 G are attached at their forward ends to columns G¹ G¹, which are anchored in the piers D, and at their rear ends by means of oblique struts or braces g g¹ extending upwardly from the lower ends of the columns G¹ and from the forward parts of the piers D¹.

One important feature of my invention
25 relates to the location of the rolling segments B B and track girders C C in planes outside of the planes of the trusses. This construction is of especial value when used in connection with bridges having considerable length of span, inasmuch as it gives a wide bearing support on the track girders when the leaf is in its upright or open position, it being manifest that inasmuch as a long leaf extends a considerable distance
30 upwardly when the bridge is open and is therefore subject to considerable wind pressure, the increase in the width of the supporting base, or distance between the track girders, is of advantage in giving stability to the span when raised. Another advantage of this construction, which is of especial consequence in connection with bridges of considerable length of leaf and which therefore require a large counterbalance
35 weight, is that ample room or space is thereby provided for the counterweight. The laterally extending space in which the counterweight may be located, in such a construction is not confined to that between the outer
40 faces of the trusses, because the said counterweight may extend laterally beyond the trusses, as is the case with the counterweight F illustrated.

The rolling segments B B arranged as
55 described may be attached to or connected with the bridge trusses in any desired manner. As shown in the drawings said rolling segments are rigidly secured to the trusses by means of transverse beams or
60 girders I I connected with the upper chords of the trusses and like beams or girders I¹ I¹ attached to the lower chords of the trusses. The said beams in both instances extend at their ends outwardly beyond the planes of
65 the trusses. The rolling segments, which

consist of separate, rigid metal structures, are rigidly attached at their upper and lower parts to the said outwardly extending ends of said beams.

In Fig. 9 is illustrated through bridge
70 leaf A² having inclined upper chords a² and horizontal lower chords a³, and having its floor structure A³ located substantially at the level of the lower chords. In this instance the rolling segments, one of which is
75 indicated by B¹, are attached rigidly to the trusses exterior to the outer side faces thereof. In said Fig. 9, C¹ indicates a track girder, the top surface of which is located above the level of the bridge floor, and G³ an
80 operating strut, attached at its ends to columns G⁴ G⁴, and braced by oblique struts g² g². An advantage of locating said rolling segments outside of the trusses in a through bridge leaf, in addition to those
85 hereinbefore stated, is that the segments when so located may be conveniently made much smaller in size than when located in the planes of the trusses and constituting part of the truss structures, and also may be
90 located at any convenient point between the upper and lower chords. Fig. 9 illustrates the upper surfaces of the track girders as located at a considerable distance above the
95 bridge floor, and the lower edges thereof above or near the level of the lower chords of the trusses. The construction by which the upper or supporting surfaces of the track-girders are above the level of the
100 lower chords of the trusses, enables both the said lower chords and the track girders to be located only a short distance above the level of the water in a waterway, this being highly desirable in cases where the entire
105 bridge structure is required to be close to the water level. The construction shown in said Fig. 9 in which the rolling segments are relatively small and of less vertical height than the distance between the upper and lower
110 chords of the trusses, has the advantage of enabling such rolling segments to be conveniently attached to the trusses at any desired position or location relatively to the upper and lower chords thereof.

Another feature of my invention relates
115 to the construction and arrangement of the counterbalance weight F. Said counterbalance weight consists generally of metal members attached to the trusses, and a mass or body of cement or concrete applied to
120 said members. As illustrated in the drawings the counterbalance weight embraces a box-like inclosure of metal, in which cement or concrete is inserted as a filling, the top and bottom walls of which are indicated by
125 e e¹ and the end walls by e² e². Said box-like inclosure is, as a whole, wider than the distance between the outer faces of the trusses, its said end walls e² e² being located at a considerable distance exterior to the
130

outer faces of the rear extensions of the trusses, which carry the counterweight, while the truss members extend through or are inclosed within the walls of the inclosure. (See Fig. 5.)

By so extending the counterweight inclosure outside of the trusses, the same is given a much larger capacity than would otherwise be the case. Moreover, this construction is rendered possible when the rolling segments are located outside of the trusses because a counterweight located as illustrated must necessarily pass downwardly between the track girders, which latter are, of course, located in the same vertical planes with the rolling segments.

The truss members which extend within or through the counterweight inclosure or box may be of any desired construction and if they include continuous vertical webs or plates such as are shown in the sectional view, Fig. 5, the cement or concrete filling will be inserted or applied to fill the spaces in the box-inclosure between and at the sides of the same.

Another important feature of my invention relates to the location of the rolling segments relatively to the supports for the track girders C C. As will be clearly seen from Fig. 3, the outer ends of said track girders rest upon the top of the pier D which is shown as provided with transverse metal I-beams *d d* adapted to receive the downward pressure coming on the outer ends of said track girders. The point of greatest resistance to downward pressure or stress coming upon the outer end of the track girder is manifestly at the center line of the pier D. As these parts have heretofore been arranged the points of contact between the rolling segments and the track girders have been located at or rearward of such point of greatest resistance to downward stress, namely, the center of the supporting pier. In the improved construction illustrated, the parts are so arranged that the points of contact of the rolling segments with said track girders, when the bridge is closed, are located at or near the forward extremities of the track girders and therefore outside of the center line of the pier, and the inner ends of the track girders are anchored in such manner that they are held from rising; said track girders in the construction shown, being for this purpose inserted and secured in the pier D¹. When the parts are thus arranged the track girders operate in a sense as cantalivers, the same being supported at their forward ends at the center line of the supporting pier D, and held from rising at their inner ends, so that the vertical stress due to the weight of the bridge leaf, while taken directly by the outer end of the track girders, is not in fact brought upon the outer part of the pier (so as to

have a possible tendency to tip or tilt the same on its foundation) but such stress comes vertically on the center of the pier. It will, of course, be understood that when the leaf is being lifted and when in its open position, its weight will come on the girders at points between the points of support of their forward and rear ends, so that at such times the load will exert downward vertical stresses on both supports or piers. It will also be understood that the track girders will be made sufficiently stiff or rigid to prevent any substantial flexure thereof under the weight of the bridge leaf. It is to be also observed that the parts may be so arranged that the points at which the downward stress of the bridge leaf acts on the track girders may be located even farther toward the front end of the span than illustrated, by extending the forward ends of the track girders outwardly to or beyond the forward face of the pier D, so that said points of vertical stress may in fact be located entirely forward of the supporting pier.

A general advantage arising from the cantaliver construction in the track girders referred to, is that the actual length of the span may be decreased without decreasing its effective length, which latter is measured by the width of the clear space or opening between the piers D D. The advantages of the construction referred to will be more apparent from consideration of the fact that the length of the bridge leaf is decreased to the extent that the points of support are moved forwardly from the center of the pier, and when this distance is as much as two feet, as is the case in some bridges constructed substantially in accordance with the drawings, the length of the span will be correspondingly decreased and the cost of construction proportionately lessened.

In Figs. 6, 7 and 8, is shown the construction of the track girders and the retaining devices thereon by which the rolling segments are held from shifting or moving laterally or endwise thereon. Such holding devices consist generally of upwardly projecting teeth *c* on the track girder which enter holes or sockets *b* formed in the curved bearing surface or tread of the rolling segment. Heretofore such teeth have been formed integrally on cast metal track plates, which form the bearing surfaces of the tracks but which, by reason of the short length of such cast plates, have possessed little load carrying value. According to the construction shown in the drawings the track plates are made of a rolled plate which constitutes an upper member of the track girder, such as indicated by C¹ (see Figs. 6, 7 and 8). Said plate C¹ may extend the entire length of the track girder,

but in a large bridge, in which said track girders are of considerable length, two or more of such track plates may be used. In any instance each plate C^1 serves as the top member of the girder, adapted to give lateral rigidity thereto and combining the functions of an ordinary track plate with that of a stiffening or reinforcing plate or bar. Inasmuch as such rolled track plates cannot be conveniently formed with integral teeth thereon, said teeth c are made of separate pieces of metal secured in holes or apertures c^1 formed in the plates. Convenient means of securing the teeth in said holes or apertures is shown in the drawing, Fig. 8, wherein each tooth c consists of a block of metal of circular form having a lower reduced part or shank c^2 which is fitted in the hole c^1 formed in said plate. To the lower end of the tooth is attached a fastening or clamping plate c^3 which is larger in diameter than the shank c^2 of the tooth and overlaps and bears against the under surface of the plate C^1 . Said fastening plate c^3 is secured to the tooth by means of a clamping bolt C^2 , which is inserted vertically through the tooth and clamping plate, in the manner illustrated. Said teeth c are shown as of circular form, but they may be of other shape, although they will be upwardly tapered in a manner permitting their proper engagement with the sockets in the rolling segments without binding therein.

I have shown in the drawings a suitable form of locking mechanism for holding the bridge leaf in its closed position, which constitutes the subject-matter of Letters Patent Number 978,893, issued to me and bearing date of December 13th, 1910; the same being a division of this present application. As the locking device shown in the drawings herein forms no part of the present invention it need not be described herein, except in so far as shown. Said lock embraces two oscillatory arms or locking detents J , J , mounted on each end of a horizontal rotative shaft K extending transversely of the approach structure and below the level of the same. Each of said locking arms or detents J , J , has its free or swinging end adapted to engage with a downwardly facing stop or shoulder formed on the projection L , on the end of the leaf structure. Said free end of each locking detent, J , J , is adapted to be swung rearwardly out of engagement with the shoulder on the stop L , by a suitable means such as described in my said patent above referred to.

I have herein shown and described one specific embodiment of my invention, but do not wish that my invention be confined to the details set forth, except so far as such details may be specified in the annexed claims.

I claim as my invention:

1. A rolling lift bascule bridge, comprising a bridge leaf provided with rolling segments and supporting tracks for said segments; said segments and the supporting tracks being located in planes laterally exterior to the sides of the leaf.
2. A rolling lift bascule bridge, comprising a bridge leaf having longitudinal trusses and provided with rolling segments attached to said trusses, and supporting tracks for said segments, said segments and supporting tracks being located laterally exterior to the said trusses.
3. In a rolling lift bascule bridge, a bridge leaf having longitudinal trusses and provided with rolling segments which are located exterior to the planes of the trusses and with transverse frame members rigidly connecting said rolling segments with the trusses.
4. A rolling lift bascule bridge, comprising a bridge leaf having longitudinal trusses, rolling segments located laterally exterior to the planes of said trusses, supporting tracks for said segments, and a counterweight attached to the leaf and extending laterally outside of the trusses.
5. In a rolling lift bascule bridge of the deck type, comprising a bridge leaf provided with rolling segments and having longitudinal trusses and a floor located substantially at the level of the upper chords of said trusses, said trusses extending at the rear end of the leaf beyond the rolling segments toward the bridge approach, and a counterweight extending transversely between the said trusses at the rear of said rolling segments and below the level of the top chords of the said trusses.
6. In a bascule bridge, the combination with a swinging bridge leaf having longitudinal trusses, said leaf being provided with rolling segments and with longitudinal trusses which at the rear end of the leaf extend beyond said rolling segments toward the bridge approach, of a counterweight which extends transversely between and extends laterally outside of said trusses, said counterweight consisting of metal members attached to the truss members and a mass or body of concrete applied to said metal members.
7. In a bascule bridge, the combination with a swinging bridge leaf having longitudinal trusses, of a transversely extending counterweight consisting of a metal inclosure attached to and extending laterally outside of said trusses, and provided with a filling of cement or concrete.
8. In a bascule bridge, the combination with a swinging bridge leaf, provided with longitudinal trusses, of a counterweight consisting of a metal inclosure attached to and

inclosing portions of the trusses, and a filling of cement or concrete in said inclosure.

9. In a rolling lift bascule bridge, the combination with a bridge leaf provided with rolling segments, of track girders on which said segments rest and roll, and supports for the forward ends of said track girders; said rolling segments being adapted to rest, when the leaf is closed, on said track girders so that the centers of said segments are in a vertical plane passing through points forward of the points at which said forward ends of the girders are sustained by said supports and the rear ends of said track girders being anchored to prevent the same from rising.

10. In a rolling lift bascule bridge, the combination with a bridge leaf provided with rolling segments, of track girders on which said segments rest and roll, and supporting piers for the forward and rear ends of said girders, said rolling segments being adapted to rest, when the leaf is closed, on the said track girders so that the centers of said segments are in a vertical plane passing through points forward of the center line of the forward supporting pier, and the said track girders being anchored at their rear ends to the rear supporting pier.

11. The combination with a swinging

bridge leaf having longitudinal trusses; of rolling segments rigidly attached to said trusses outside of the planes of the same and track girders the top surfaces of which are located above the level of the lower chords of said trusses.

12. The combination, with a swinging bridge leaf having longitudinal trusses, of rolling segments rigidly attached to the said trusses outside of the planes of the same, and between the upper and lower chords of said trusses, and supporting tracks for said rolling segments.

13. The combination with a swinging bridge leaf having longitudinal trusses, of rolling segments rigidly attached to said trusses outside of the planes of the same, said rolling segments being of less vertical height than the distance between the upper and lower chords of said trusses, and supporting tracks for said rolling segments.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 2nd day of July, A. D. 1907.

ALBERT H. SCHERZER.

Witnesses:

G. R. WILKINS,

D. E. MARMON.