C. L. KELLER.

MEANS FOR OPERATING BASCULE BRIDGES.

APPLICATION FILED APR. 4, 1910.

**1,047,950.**

Patented Dec. 24, 1912.

2 SHEETS—SHEET 1.

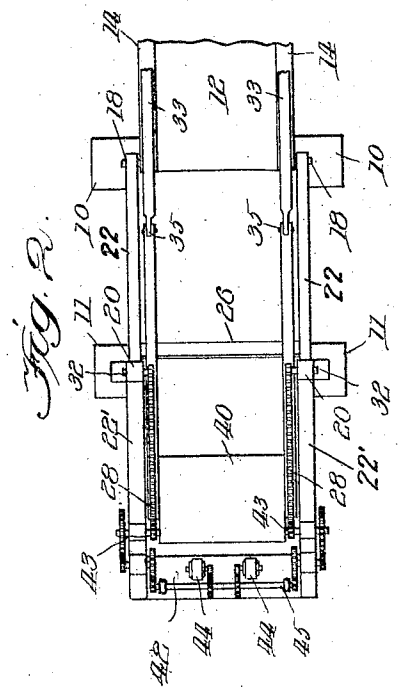

Fig. 2.



Fig. 1.

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Fig. 4.

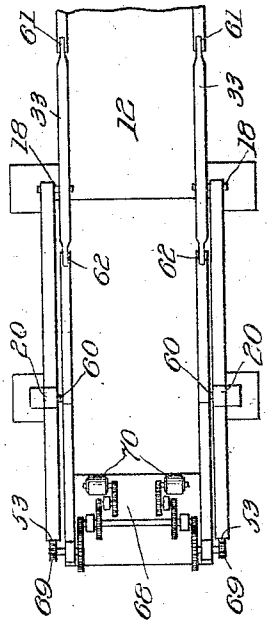


Fig. 3.




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# UNITED STATES PATENT OFFICE.

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## MEANS FOR OPERATING BASCULE-BRIDGES.

1,047,950. Specification of Letters Patent. Patented Dec. 24, 1912.

Application filed April 4, 1910. Serial No. 553,400.

*To all whom it may concern:*

Be it known that I, CHARLES L. KELLER, 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 Means for Operating 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 characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in bascule bridges, and more specifically to the operating mechanism for giving movement to the bridge leaf to open and close the bridge.

The object of the invention is to improve the operating mechanism for bridges of this type, and the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

I have herein shown my improvements as applied to a bascule bridge of the trunnion type in which the leaf or span swings upwardly about a trunnion or trunnions suitably supported on the bridge pier, but said improvements may be applied to other types of bascule bridges, as a rolling lift bridge.

In the drawings, Figure 1 is a side elevation of a single leaf bridge embodying my invention. Fig. 2 is a plan view of the shoreward end of the leaf. Fig. 3 is a side elevation of the bridge, showing a modified form of the operating mechanism. Fig. 4 is a plan view of the shoreward end of the bridge shown in Fig. 3.

As shown in the drawings, 10, 11 designate the inner and outer shore piers and 12 the leaf or span of the bridge supported on said piers and a pier 13 located at the inner or lifting end of the leaf. The leaf consists principally of two trusses, one on each side of the roadway, each embracing upper and lower truss members 14, 15 respectively, joined by transverse struts and diagonal braces 16 and 17 respectively. I have not herein shown the approaches or approach structures at the ends of the bridge, but it will be understood that they may be arranged in any suitable or preferred manner, depending upon the location and the particular construction of the bridge. The said leaf is pivoted at its shoreward end or trunnions 18, 18 which are suitably carried by trunnion supporting pieces 19 suitably fixed to and supported on the inner shore pier 10, and about which the rising end of the leaf swings when the bridge is opened and closed. While I have herein illustrated a single-leaf span it will be understood that my improvements may be embodied in and adapted to a two-leaf span wherein the leaves meet each other at their inner ends, as is common in this class of bridges.

Referring now to the operating mechanism by which the bridge is opened and closed, and to the counterweight devices for counterbalancing the bridge, and more especially to the construction shown in Figs. 1 and 2, the same are made as follows: Located in rear of the leaf at the shoreward end thereof, and supported on the piers 10 and 11 are counterweight and operating machinery supporting frames consisting of uprights or posts 20, 20 supported on the pier 11, one at each side of the roadway, diagonal members 21, 21 extending from the tops of the uprights or posts 20 to the pivoted end or heel of the leaf, and horizontal tying beams 22, 22 extending between the lower ends of said posts 20 and said diagonal members 21 and through the inner ends of which the bearing trunnions 18 extend. The said frames embrace also horizontal members 22′, 22′ extending rearwardly from the upper ends of said uprights or posts, and diagonal brace members 23, 23 extending from the outer ends of said horizontal members to the lower ends of said posts. Said frames are further braced by two diagonal brace members 24, 25. The said supporting frames may be tied together by horizontal members 26, 27, the former extending between and attached to the upper ends of the members 21 and the latter extending between and attached to the rear ends of the machinery supporting beams or members 22′. The frames thus constructed carry movable or swinging counterweight supporting frames, to which, in the construction shown in Figs. 1 and 2, are rigidly fixed curved segmental racks that coöperate with pinions of the operating machinery supported on the stationary frames, and through the medium of which the leaf is given movement to open and close the same. Said swinging rack and counterweight carrying

frames are made as follows: The movable or swinging rack and counterweight carrying frames may be pivoted on the upper ends of the posts 20 to swing toward and from the leaf. They comprise rack sectors 28, 28 which are arranged in the planes of the trusses of the leaf, as best shown in Fig. 2, vertical strut members 29, 29 attached at their upper ends to the upper ends of the rack sectors, horizontal members 30, 30 attached to the lower ends of the rack sectors and diagonal members 31, 31. Said frame members are fixed rigidly together at their inner ends, and are arranged radial to and are pivoted at their connected ends on pivot pins 32, 32 mounted on the upper ends of said posts 20, 20. The teeth of said racks are concentric with the pivot pins 32. The rack sectors, embracing parts of the operating mechanism, thus constitute parts of the swinging frame of the bridge structure. The said rack sector frames are connected with the leaf by means of diagonal links 33, 33 arranged in the planes of the trusses and pivoted at their lower or inner ends to the upper members of the trusses by means of pivot pins 34, and at their upper, outer ends by means of other pivot pins 35 to the inner ends of extension members 36 and 37 which constitute part of the rack sector frames and meet at their inner ends for pivotal connection with the links 33, 33.

40 designates a counterweight which may extend between and be supported in any suitable manner from the rack sector frames, the said counterweight being herein shown as supported by means of suitable hangers 41, 41 fixed to said sector frames. The counterweight when thus attached to the rack carrying frames affords means for rigidly connecting said frames to brace them against lateral stresses. Other supplemental bracing means may be employed as required or found convenient.

The operating machinery for giving motion to the leaf to raise and lower the same, and the operating motor or motors are supported in any suitable manner on the horizontal members 22′ of the machinery supporting frames, as by the platform 42 extending between said members 22′. Said operating mechanism embraces pinions 43, 43 which mesh with the teeth of the rack sectors 28, and said pinions are connected by suitable intermediary speed reducing gears with the driving motors 44 which may be mounted on said platform 42 between the frame members 22′. As herein shown two of the driving motors are employed, and are geared to the main driving shaft 45, which latter is in turn geared to said pinions 43 in the manner shown most clearly in Fig. 2. A single operating motor may be used if desired. When the leaf is in its closed position, it is supported on inner shore pier 10 and the pier 13, and the counterweight and its supporting frames are supported on the outer shore pier 11; through the posts 20 of the stationary or fixed frames of the bridge structure. In this position of the parts the members 21, 33, 37 and the oblique end of the upper truss member of the leaf constitute a parallelogram, the links or members 33 of which constitute tension members and the braces 21 compression members. Upon movement of the operating machinery to open the bridge, the engagement of the pinions 43, 43 with the racks of the rack sector carrying frames swings said frames downwardly and outwardly, and the connection of said frames with the leaf, through the medium of the links 33, raises the outer or lifting end of the leaf about its trunnions 18 at the inner end or heel of the leaf. The open position of the bridge is indicated in dotted lines in Fig. 1, in which position the rack sectors 28 have traveled throughout the limit of their movement and the counterweight holds the leaf in its open position. A reverse rotation of the pinions operates to lift or swing upwardly the rack sector and counterweight carrying frames, thereby permitting the bridge to close under the control of its operating machinery.

It will be observed that a part of the mechanism for giving movement to the leaf is carried by the swinging counterweight frame and is applied to the frame in a simple manner which insures that the operating mechanism will be maintained in proper alinement with the bridge parts to effect a direct application of power on the swinging leaf in a manner to avoid lateral binding strains or stresses being brought upon the relatively movable parts of the bridge structure. Moreover the arrangement avoids the necessity of employing operating struts carried by the movable part of the bridge, the use of which adds to the weight to be lifted and avoids the unstable conditions of the structure involved in the use of such operating struts in bridges of the kind illustrated.

In the construction shown in Figs. 3 and 4 the operating mechanism, including the operating machinery and racks, is reversed with respect to the construction heretofore described, in that the racks are mounted on the stationary frames and the operating machinery is carried by the swinging frames. As shown in said figures, the stationary frames, comprising the uprights or posts 20, the diagonal members 21, and the tying members 22, are provided with rearwardly extending radial members 50, 51, 52 which are rigidly connected at their inner ends to the upper ends of said posts and are connected at their outer ends with stationary rack sectors 53, 53 constituting fixed parts of the stationary bridge structure frames

and arranged outside of the planes of the leaf trusses and provided at their lower ends with extension braces 54 that are rigidly attached to the uprights or posts 20 at the lower ends of the latter. In the construction shown in said Figs. 3 and 4 the frames which, in the first described construction, carry the counterweight and gear sectors, are arranged to carry a counterweight and the operating machinery, the machinery being shown as supported on the counterweight. These swinging frames comprise radial members 55, 56, 57 which are rigidly connected together at their meeting ends, at the upper ends of the posts 20, and an outer deflected member 58 to which the outer ends of said radial members are fixedly attached. The said frames are arranged in the planes of the trusses of the leaf and are pivoted at their inner connected ends to pivot pins 60 supported in any suitable manner on the uprights or posts 20. The forward ends of said frames are connected by the links 33 with the upper members of the leaf trusses, as in the construction before described, said links being pivotally connected to the upper trusses by pivot pins 61 and to the swinging frames by other pivot pins 62. The said frames are strengthened or reinforced by brace members 64, 65. The counterweight 67 may extend between the swinging frames and may constitute a connecting member by which said swinging frames are rigidly connected together.

The operating machinery which coöperates with the rack teeth of the rack sectors is shown as mounted on a platform 68 fixed to the upper side of the counterweight. Said operating machinery embraces pinions 69, 69 which mesh with the teeth of said rack sectors and are connected by intermediary reducing gears to operating motors 70, 70 supported on said platform 68. In this construction the said pinions move downwardly along the rack-teeth, while rotating, whereby the counterweight and its swinging frames are carried downwardly and operate through the medium of the links 33 to raise the lifting end of the leaf. The dotted lines in Fig. 3 indicate the full open position of the bridge leaf. The bridge is closed under the control of the operating machinery in the same general manner as heretofore described in connection with Figs. 1 and 2, the said pinions moving upwardly along said rack teeth during the closing movement of the leaf.

The counterweight, when arranged as herein shown, may comprise a box which is filled with suitable material to give the proper weight thereto, or may comprise metal members reinforced by concrete or like material. The counterweight is located wholly above the clearance line of the bridge, and its arrangement is such that it is wholly above the floor of the approach structure when the leaf is in its open position, as indicated in dotted lines in Figs. 1 and 3.

The details of the bridge, aside from the parts thereof immediately associated with my invention, have been omitted for the sake of clearness of illustrating the essential features of the invention. It will be understood, however, that the details illustrated are capable of variation within the scope of the invention, and the invention is not limited to such details except as hereinafter made the subject of specific claims.

I claim as my invention.

1. A bascule bridge comprising a swinging leaf and operating mechanism for raising and lowering said leaf, the bridge structure embracing also at its shore end a stationary part and a swinging part, the latter pivotally connected to the stationary part and to the swinging leaf, said operating mechanism being principally located on the side of the stationary bridge structure part remote from said swinging leaf and embracing a curved rack that is fixed rigidly to one of said structure parts and a pinion that is rotatively mounted on the other of said structure parts and meshing with said rack.

2. A bascule bridge comprising a swinging leaf and its pivot, rack and pinion operating mechanism for the leaf, a bridge structure exterior to the leaf embracing a movable part that is pivotally connected to the leaf, a stationary part upon which the movable part is pivoted, and a counter weight carried by said movable part, the rack and pinion mechanism being principally located exterior to the stationary part of the bridge structure and the rack being curved and fixed rigidly to one of said structure parts and the pinion being rotatively mounted in the other of said structure parts.

3. A bascule bridge comprising a swinging leaf, a stationary frame exterior to the leaf, a swinging frame pivotally mounted on the stationary frame and connected to the leaf, mechanism exterior to the stationary frame for raising and lowering the leaf, comprising a curved rack fixed rigidly to one of said frames, a pinion rotatively mounted on the other of said frames and meshing with said rack, and a counter weight acting on said swinging frame.

4. A bascule bridge comprising a swinging leaf, fixed trunnions about which the leaf swings, a stationary frame exterior to the shoreward end of the bridge, a swinging frame pivoted thereto and connected to said leaf, and operating mechanism for raising and lowering the leaf, located exterior to the stationary frame and mounted in part on the stationary frame and in part on the swinging frame.

5. A bascule bridge comprising a swinging leaf, fixed trunnions at the heel of the

leaf about which the leaf swings, a fixed frame exterior to the shoreward end of the leaf, a swinging frame pivoted thereto above the level of said trunnions and connected to said leaf at a point above and forward of its trunnions, and operating mechanism for raising and lowering the leaf comprising a curved rack fixed on said swinging frame exterior to the fixed frame and a pinion rotatively mounted on said fixed frame engaging said rack, and a counter weight carried by said swinging frame.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this first day of April A. D., 1910.

CHARLES L. KELLER.

Witnesses:

F. F. SOULE,

ROMAN ARZMAN.