(No Model.) 2 Sheets—Sheet 1.

# J. A. McNICOL.

## SWING BRIDGE.

No. 558,202. Patented Apr. 14, 1896.

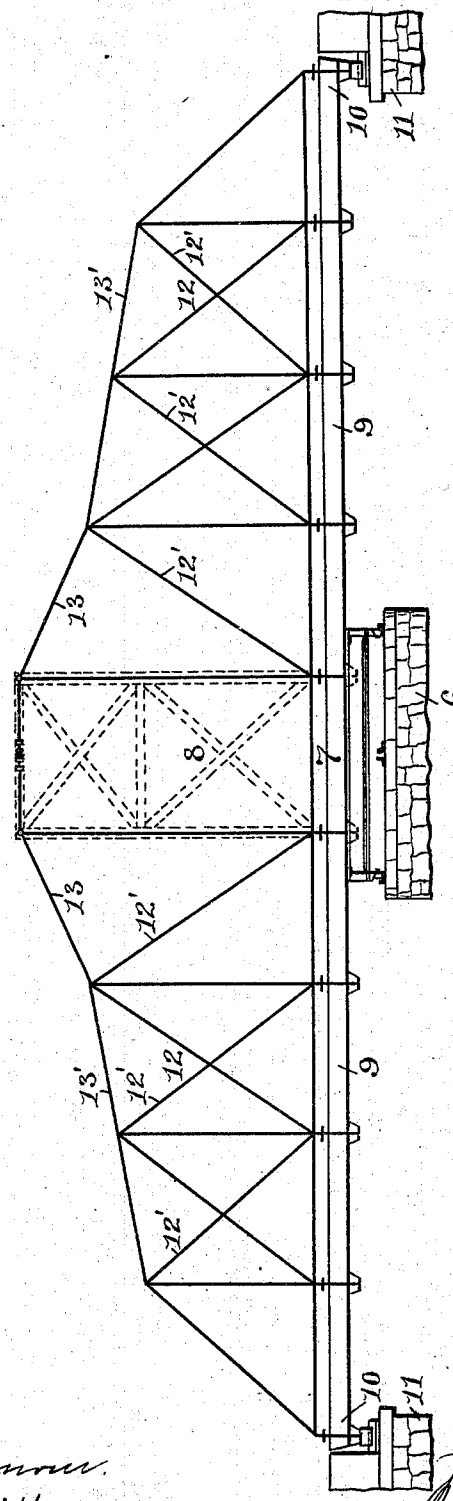


Fig. 1.

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Henry D. Miller

INVENTOR:

John A. McNicol
by Joseph A. Miller & Co
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(No Model.) 2 Sheets—Sheet 2.

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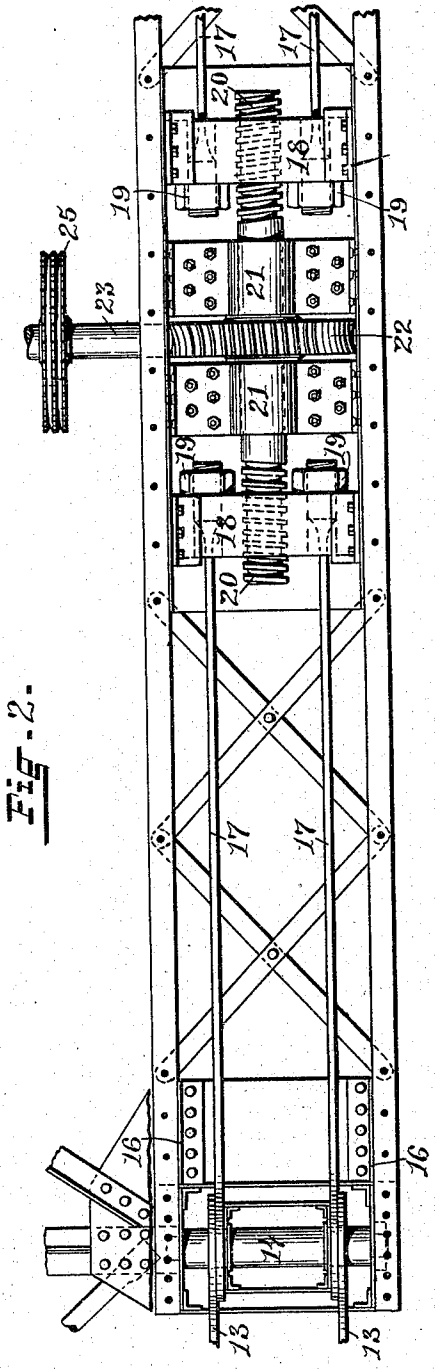


Fig. 2.

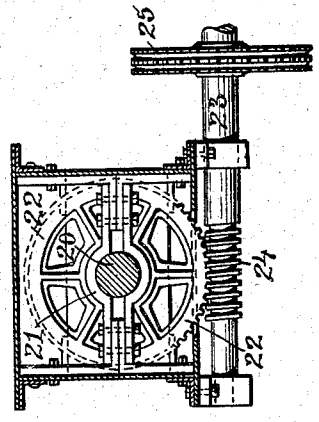


Fig. 4.

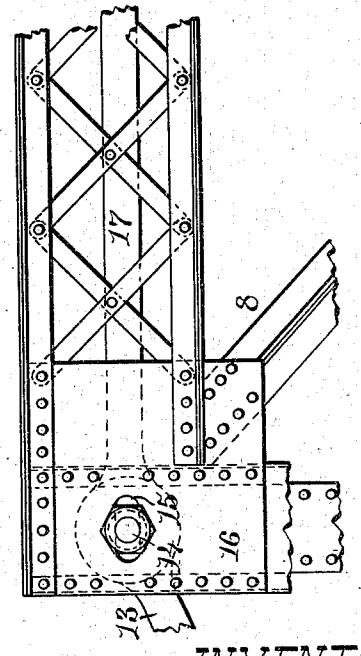


Fig. 3.

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# UNITED STATES PATENT OFFICE.

JOHN A. McNICOL, OF PROVIDENCE, RHODE ISLAND.

## SWING-BRIDGE.

SPECIFICATION forming part of Letters Patent No. 558,202, dated April 14, 1896.

Application filed August 29, 1891. Serial No. 404,089. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. McNICOL, of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Draw or Swing Bridges; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to an improvement in the draw-span of bridges; and it consists in the peculiar and novel construction and the mechanism by which, when the draw is to be swung open, the ends of the spans are slightly raised off from their bearings, and when the draw is closed the ends are lowered to their bearings, as will be more fully set forth hereinafter.

Drawbridges of modern construction have their braces, posts, and struts connected by pins, and the upper chain or tension members extend from the opposite ends to a central elevated support.

The object of this invention is to so construct such a draw that the ends may be raised off from their supports when the draw is to be swung open.

Another object of the invention is to raise both ends of the draw equally when the same is unequally loaded, and another object of the invention is to so construct the draw that any injury to the lifting mechanism will not impair the strength of the structure.

To these purposes I construct the draw with a central rigid frame in each one of the side trusses or frames and connect the upper tension members by pins with the upper tension member of the central rigid frame, which pins have capacity to be moved a limited space toward each other, and to these pins I connect the mechanism by which the pins are drawn toward each other and the ends of the draw are raised.

Figure 1 is a side view of a drawbridge. The central rigid frame is shown in broken lines. Fig. 2 is a top view of part of the upper horizontal member of the central rigid frame. Fig. 3 is a side view of one corner of the upper horizontal member of the central rigid frame. Fig. 4 is a cross-section of the upper horizontal member of the central rigid frame, showing one form of operating mechanism.

Similar numbers of reference indicate corresponding parts in all the figures.

In the drawings, the number 6 indicates the central pier of a drawbridge. On this pier the usual revolving platform 7 is supported, so that the draw may be turned or swung on this central support. On this central platform the central rigid frame or tower (shown in broken lines in Fig. 1) is erected. The two ends of the draw, forming the two spans 9, are formed each of two trussed girders placed in the usual manner, one on each side of the span, and having the roadway between them. These two spans 9 may be rigidly framed and connected with the central platform 7 by a somewhat flexible connection, so that the outer ends 10 of the draw may be slightly raised off from their supports on the abutments 11, or lowered so as to rest on them. The draw therefore consists, essentially, of the platform 7 and the two spans 9, forming, when in place, a discontinuous bridge having two entirely independent spans, the outer ends of which rest firmly and securely on the abutments and insure a road-surface on a plane with the approaches, firmly supported during the passage of the traffic.

The truss members 12 of the two spans 9 are indicated in Fig. 1 by heavy black lines, and they are connected by means of the cord, chain, or tension members 13 with the central rigid frame or tower 8. The upper horizontal member of the rigid central frame or tower may be of any desired construction by which the required strength and rigidity are secured. It is shown in Figs. 2, 3, and 4 as an open-frame girder. The cord or tension members 13 are secured to the upper corners of the central rigid structure or tower 8 by the pin 14, the ends of which extend through the slots 15 in the two side plates 16. The pin 14 may be moved horizontally in these slots 15 through a short distance, while the ends of the slots 15 form a stop by which the horizontal movement of the pin 14 is limited.

The draw-bars 17 are each provided at one end with an eye through which the bolt 14 passes in the same manner as are the tension members 13. The draw-bars 17 extend through the slide-blocks 18 and are provided with the nuts 19. The slide-blocks 18 are supported in ways formed on or secured to the upper member of the central rigid frame. The slide-blocks 18 have each a screw-threaded

hole. The shaft 20 is provided at opposite ends with screw-threads extending spirally in opposite directions, so as to form right and left handed screws. The screw-shaft is journaled in the bearings 21 and is secured in the worm-gear 22. The shaft 23 (shown in Figs. 2 and 4 as broken off) extends transversely across the draw and is supported in suitable bearings on both the upper members of the central rigid frame or tower 8. This shaft 23 is provided with the worms 24—one near each end—and these worms engage with the two worm-gears 22 in the two opposite upper members of the rigid central frame or tower 8. A chain-wheel 25 is secured on the shaft 23, over which an endless chain is passed, which, extending down to near the platform 7, may be operated by hand or power.

The operation of my improved drawbridge I will now describe more fully. When a drawbridge forms a rigid structure, the sole support of the same is on the central pier and the weight of the structure is carried on the central revoluble support, both when the draw is open and when it is closed. The ends of the draw do not bear firmly on the abutments of the approaches, as they require to be free to swing onto and away from these supports. When the traffic therefore passes over the draw, the structure rocks on this central support. By constructing a drawbridge of three independent parts—namely, a rigid central structure or tower and two end spans—greater rigidity and security are obtained, and the road-surface at the ends of the draw, when the traffic is passing over the same, is firmly supported on a line with the approaches. When the draw is to be swung open, the shaft 23 is rotated, and the worms 24 on the opposite ends of the shaft turn the worm-gears 22, and with them the right and left handed screw-threaded shaft 20, in the opposite central rigid frames or towers 8, in the direction by which the sliding blocks 18 are drawn toward the centers of the towers. The rods 17 transmit this movement to the pins 14, and these draw the chords or tension members 13 toward the center of the frames or towers 8. If the spans 9 are rigid structures the strains on the chords or tension members 13 will raise the outer ends 10 of the spans 9 off from the supports on abutments 11, and if, as is usual in modern bridges, the truss members are connected by pin connections, the chords or tension members 13 will draw the chords and tension members 13′ toward the center of the central rigid frame or tower, and the upper ends of the outwardly-inclined braces 12′ being drawn toward the center facilitate the raising of the outer ends of the spans 9. When the draw is again closed and is in alinement with the approaches, by reversing the motion of the shaft 23 the motion of the screw-shafts 20 permits the sliding blocks 18 to move outward from the center, the weight of the spans draws the pins 14 outward until the pins bear against the stop, when the ends 10 of the spans 9 have settled firmly on their bearings on the abutments, which abutments may be and in most cases are bridge-piers. As the central frame or tower 8 is a rigid structure, the movement of the ends of the spans 9 is not affected by any inequality of load or weight of the spans, and, therefore, the simultaneous raising of both ends is secured. With a firm support of the central platform on the turn-table, a very slight rise of the outer ends of the draw is sufficient to release the same.

It is evident that other mechanism than the mechanism shown and described may be used to operate the sliding blocks 18, and, while I prefer the worm, worm-gear, and right and left hand threaded screw-shaft, I do not wish to confine myself to the specific construction shown. By the use of the rigid central frame or tower and the stops by which the outward movements of the pins 14 are limited, the disarrangement or breaking of the operating mechanism does not endanger the structure of the draw, as the independent end spans do not depend for their support on the operating mechanism.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with the central rigid frame or tower 8, and platform 7 supported on a turn-table, the trussed spans 9 having the diagonal braces 12′ and chords or tension members 13′, of the chords or tension members 13 connected with the chords 13′ and with the pins 14 supported in the upper portion of the central frame 8 and having capacity to slide toward the center, and mechanism for drawing the pins 14 toward the center of the rigid frame or tower to raise the outer ends of the draw, as described.

2. In a drawbridge, the combination with the platform 7, the central rigid frame or tower 8 and the spans 9, of the chords or tension members 13, the pins 14, the rods 17, the sliding blocks 18, and mechanism adapted to draw the sliding blocks toward each other and raise the outer ends of the draw, as described.

3. In a drawbridge, the combination with the central pier and the abutments forming the supports for the ends of the draw, a central platform supported by the central pier, the central rigid frame or tower 8, the end spans 9, the chords or tension members 13 connected with the end spans and the central rigid frame or tower, of the shaft 23, the worms 24, the worm-gear 22, the screw-threaded shaft 20, the sliding blocks 18, and the rods 17 connecting the sliding blocks with the member 13, the whole adapted to raise the outer ends of the draw, as described.

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