

R. M. AGNEW.  
LOCKING DEVICE FOR DRAWBRIDGES.  
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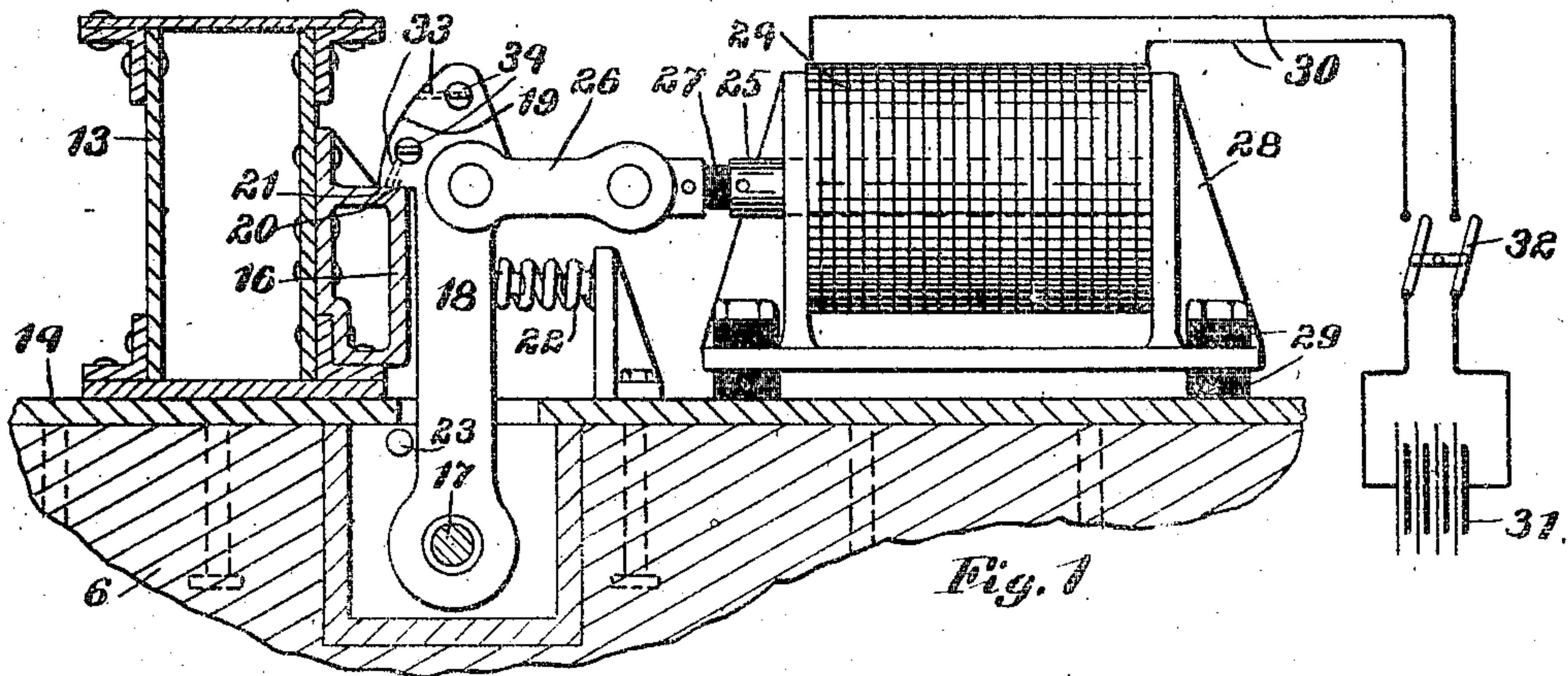


Fig. 1

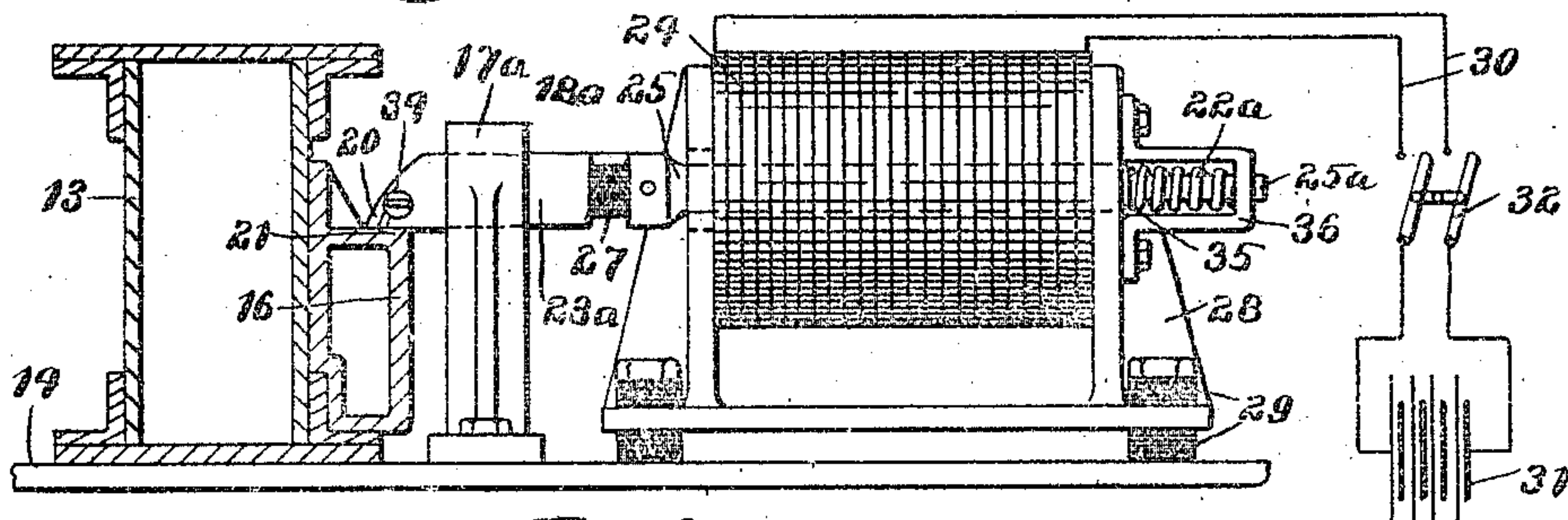


Fig. 2

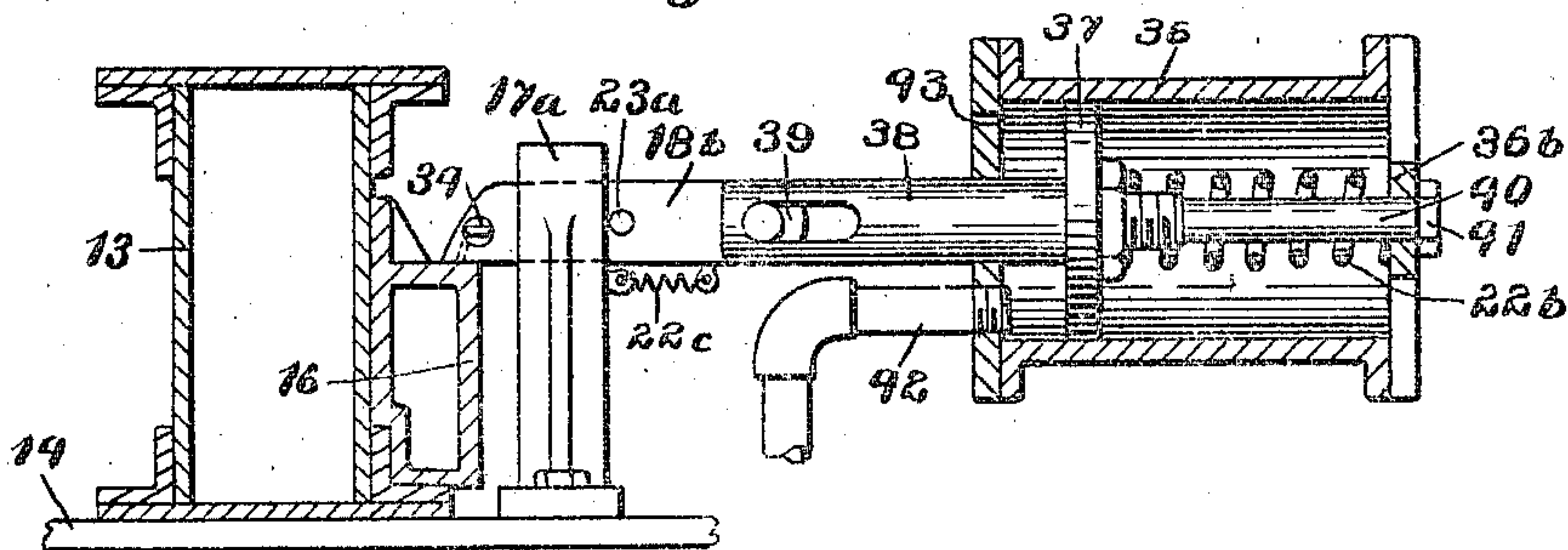


Fig. 3

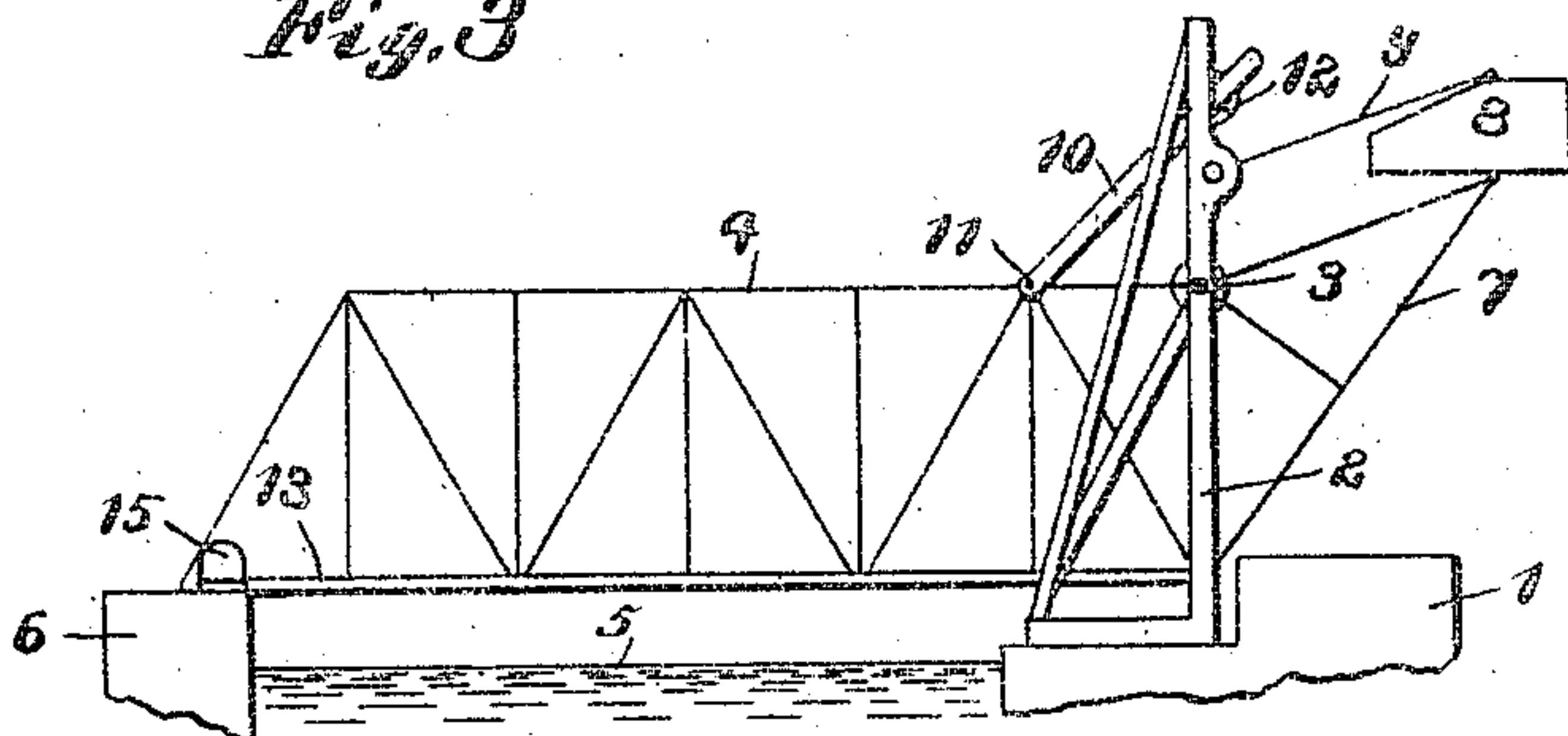


Fig. 4

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# UNITED STATES PATENT OFFICE.

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## LOCKING DEVICE FOR DRAWBRIDGES.

983,194.

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*To all whom it may concern:*

Be it known that I, ROE MANNING AGNEW, a citizen of the United States, residing at Chesaning, in the county of Saginaw and State of Michigan, have invented certain new and useful Improvements in Locking Devices for Drawbridges, of which the following is a specification.

This invention relates to draw bridges, and particularly to automatic locking devices designed primarily for application to bridges of the bascule or lift type.

The invention further relates to power actuated means for operating and controlling such locking devices.

The objects and advantages of the invention will appear from the detail description following, taken with the drawings, in which:

Figure 1 is a transverse section through a bridge pier and one of the chords of a bascule bridge resting thereon, with the locking mechanism shown in elevation resting on the pier; Figs. 2 and 3 are similar views showing two other forms of the locking mechanism; and Fig. 4 is a general view of a section of a bascule bridge showing the location of the locking device thereon.

Referring first to the general view shown in Fig. 4, 1 represents an abutment or pier of masonry or concrete, upon which is built a steel tower 2, to which is pivoted at 3 the steel structure 4 forming the lift bridge proper, which spans the waterway 5 and has its farther end resting on the concrete pier 6. The shore end of the bridge structure extends somewhat inwardly and upwardly as at 7 and has pivoted thereto a counterweight 8 which is also pivotally connected to the tower 2 by a parallel link 9 to maintain it in horizontal position during the lifting operation, as will be readily understood. An operating link 10 is pivoted to the structure at 11 and operating means 12 of any known kind is suitably connected with said link. These parts are of well known design and form no part of the present invention.

In Fig. 4 the bridge is shown in closed or normal position, and it will be understood that when it is desired to clear the waterway 5 for navigation, the bridge may be swung on its pivot 3 to a substantially vertical position, the structure being in nearly a perfect balance by reason of the counterweight 8. When the bridge is returned to its horizontal position, it is found in practice that as the

outer end strikes the pier 6 there is always more or less rebound or vibration which causes some delay in locking the bridge for the resumption of traffic thereon. It is for the purpose of avoiding this delay and for instantaneously locking a bridge of this character in closed position that the present invention was devised, and the details thereof will now be described.

The base of the bridge structure 4 is made up of a series of chords 13, the outer ends of which rest upon the plate 14 forming the upper surface of the pier 6 when the bridge is in closed position. One or a series (depending upon the size of the bridge) of automatic locking devices 15 are used for instantaneously securing the chords to the pier, and one of such devices is illustrated.

Referring to Fig. 1, it will be seen that a steel block 16 is securely bolted to one of the sides of the chord, projecting slightly beyond the edge thereof, and that there is pivoted on a suitable trunnion bar 17 mounted firmly in the pier 6, a catch or dog 18 having a beveled head 19 and a nose 20. This dog is so mounted on the pier that its beveled head is normally in the vertical path of the block 16 and it is adapted to be moved from this path either by the block itself acting, in descending, on the beveled head or by a manually controlled power actuated means hereinafter described. The dog is held in its normal or locking position in which it is shown in the figure with the nose 20 engaging over the shoulder 21 of said block, by a spring 22, and a stop 23 limits its movement toward the block.

It will be understood that in a mechanism of this character which must of necessity be made very heavy to withstand the severe strains to which it is subjected, it would be impracticable to depend upon manual power for withdrawing the locking dog 18, as some form of reduction gearing or a complicated system of levers and connecting rods would be required, particularly if the device was to be operated at a distance from the locking dog, which would render the operation slow and uncertain, and thus cause delay in opening the bridge. To avoid this delay and uncertainty and render the unlocking of the mechanism practically instantaneous a power actuated mechanism is connected directly to the locking dog. In the form illustrated in Fig. 1 this mechanism is in the form of a solenoid 24 having its core 25 connected



through link 26 with the dog 18 at or near its head. It will be understood that the link connection is for the purpose of permitting the core to move straight through the center of the solenoid while the dog swings on its pivot 17. The core 25 is suitably insulated from the link 26 by block 27, and the frame 28 of the solenoid may be insulated from its support by suitable blocks 29. Conductors 30 convey current to the solenoid windings from a source of electricity 31, and the operation of the solenoid may be manually controlled from a distance by a switch 32 placed in the circuit.

The operation of the device will be readily understood from the above description. The bridge chord 13 is shown in locked position in Fig. 1 and if it is desired to open the bridge the switch 32 is closed thus energizing the solenoid 24 which acts to quickly draw the core 25 within it thus moving the dog 18 through the link 26 toward the right in Fig. 1, thus disengaging the nose 20 from the shoulder 21, which leaves the chord 13 free to swing upwardly on its pivot 3. Upon the return of the chord 13, as it nears the pier 14 the lower right hand edge of the block 16 slides down the beveled face of the head 19 moving the dog out of its path against the tension of the spring 22, and the moment the chord strikes the pier the nose 20 of the dog snaps over the shoulder 21 of the block and the chord is safely held against rebound or vibration and securely locked to the pier.

Since the beveled face of the head 19 and the nose 20 are subject to sliding contact with the block 16, it is desirable that lubricant be supplied to them, and this is accomplished in the present invention by drilled holes 33 extending from these parts to suitable points on the side of the head 19 and grease cups 34 to force lubricant through these holes to the surfaces to be lubricated.

Referring to Fig. 2, it will be seen that a sliding dog 18<sup>a</sup> is employed. This dog is supported in a bracket 17<sup>a</sup> in which it has a sliding fit and is rigidly connected through the insulating block 27 with the core 25 of the solenoid 24. The spring 22<sup>a</sup> in this instance surrounds the extended end 25<sup>a</sup> of the core and abuts against a shoulder 35 thereon and a bracket 36 mounted on the solenoid frame 28. A stop 23<sup>a</sup> limits the forward movement of the dog. The remaining parts of this form of the invention are the same as in Fig. 1, and the operation is obvious.

It will be observed that Fig. 3 is similar to Fig. 2 except in the means shown for withdrawing the locking dog. In cases where electricity is not available, the dog may be operated by pneumatic or hydraulic power, using a cylinder 36 having a piston 37 and a piston rod 38 connected by a pin and slot

connection 39 with the sliding dog 18<sup>b</sup>. A spring 22<sup>b</sup> extends between the piston and a bracket 36<sup>b</sup> on the cylinder, guided by a rod 40 forming an extension of the piston rod, said rod 40 also having a stop 41 to limit the forward movement of the piston. The rear end of the cylinder is open to the atmosphere and the forward end is supplied with compressed air or other fluid through a pipe 42, a leak 43 being provided to permit the piston to return slowly to the normal position shown after the dog has been withdrawn and the chord released. It will be understood that the pin and slot connection is to permit the dog to move rearwardly when moved by the descending chord 13 without also moving the piston 36, which is of course more or less sluggish, and a spring 22<sup>c</sup> connects the dog with the bracket 17<sup>a</sup> to return it to normal position.

Having thus described my invention, what I claim is:

1. The combination with a pier and a movable bridge structure mounted independently of said pier and adapted to strike thereon as the bridge closes, of an automatic locking device mounted on said pier and adapted to engage and hold said structure to the pier, and a solenoid connected with said locking device to withdraw the same from such engagement.

2. The combination with two separated bridge piers, and a bridge structure pivoted on one of said piers and adapted to span the space between the piers, a chord of said structure being adapted to strike on said other pier as the bridge closes, of an automatic locking device mounted on said latter pier and adapted to engage and hold said chord, and a solenoid connected with said locking device to withdraw the same from such engagement.

3. The combination with a pier and a movable bridge structure adapted to strike against said pier as the bridge closes, of a spring pressed locking device mounted on said pier, a block on said bridge structure adapted to travel in the path of said locking device and cause the latter to first be moved against the tension of its spring and then snap over a shoulder on said block as the bridge strikes said pier, and power actuated means for withdrawing said device from said block.

4. The combination with a pier and a movable bridge chord adapted to strike thereon as the bridge closes, of a catch mounted on said pier and movable to engage and hold said chord, a spring tending to press said catch toward said chord, a solenoid for withdrawing said catch, and a source of electricity for energizing said solenoid.

5. The combination with a pier and a movable bridge chord adapted to strike



thereon as the bridge closes, of a bracket secured to said pier adjacent the path of said chord, a sliding bolt arranged to slide in an opening in said bracket and provided with a beveled head normally in the path of said chord, a spring to yieldingly maintain said bolt in the path of said chord, a stop to limit the action of said spring, and power operated means for withdrawing said bolt from the path of said chord.

6. The combination with a movable bridge chord and a block thereon provided with a shoulder, a pier upon which said chord is adapted to strike as the bridge closes, and a spring-pressed dog on said pier adjacent the point where said chord strikes and adapted to be moved by said block and to catch over said shoulder to secure the chord to the pier as the bridge closes, of a solenoid connected to said dog, and a source of electricity for energizing said solenoid to withdraw said dog from said shoulder to thereby release the chord.

7. The combination with a movable bridge chord and a block thereon provided with a shoulder, a pier upon which said chord is adapted to strike as the bridge closes, and a spring-pressed dog on said pier adjacent the point where said chord strikes and adapted to be moved by said block and to catch over said shoulder to secure the chord to the pier as the bridge closes, of a solenoid connected to said dog, a source of electricity including said solenoid in its circuit for energizing said solenoid to withdraw said dog from said shoulder to thereby release the chord, and a switch in said circuit whereby the mechanism may be controlled from a distance.

8. The combination with a pier and a movable bridge chord adapted to strike thereon as the bridge closes, of an automatic locking device for said chord comprising a dog having a beveled head arranged in the path of travel of said chord and a nose to snap over a shoulder on said chord, a spring tending to hold said dog in said path, and a solenoid for withdrawing said dog from said path.

9. The combination with a pier and a movable bridge chord adapted to strike

thereon as the bridge closes, of an automatic locking device for said chord comprising a dog having a beveled head arranged in the path of travel of said chord and a nose to snap over a shoulder on said chord, a spring tending to hold said dog in said path, a solenoid, a link connecting the core of said solenoid with the head of said dog, and a source of electricity for energizing said solenoid at will.

10. The combination with a pier and a movable bridge chord adapted to strike thereon as the bridge closes, of an automatic locking device for said chord comprising a sliding dog, a bracket for supporting said dog, a solenoid having its core connected to said dog at one end and projected through and beyond the other end of said solenoid, a bracket at said latter end of the solenoid, a spring surrounding the projecting end of said core and under tension between a shoulder on said core and said bracket, and a source of electricity for energizing said solenoid at will.

11. The combination with a pier and a movable bridge adapted to strike thereon as the bridge closes, of a catch or dog adapted to automatically lock said bridge to said pier and having a sliding engagement with a block on said bridge, and means for lubricating the engaging surfaces of said catch comprising grease cups mounted on said dogs adjacent the engaging surface.

12. The combination with a pier and a movable bridge adapted to strike thereon as the bridge closes, of a catch or dog adapted to automatically lock said bridge to said pier and having a sliding engagement with a block on said bridge, said dog having drilled holes extending from its engaging surfaces to suitable points on its side, and grease cups arranged in said holes, whereby lubricant may be supplied to said engaging surfaces.

In testimony whereof I affix my signature in presence of two witnesses.

ROE MANNING AGNEW.

Witnesses:

FRANK E. CAVE,  
PHILIP VITOLO.