J. A. L. WADDELL & J. L. HARRINGTON.

BASCULE BRIDGE.

APPLICATION FILED JULY 24, 1908.

952,485.

Patented Mar. 22, 1910.

5 SHEETS—SHEET 1.

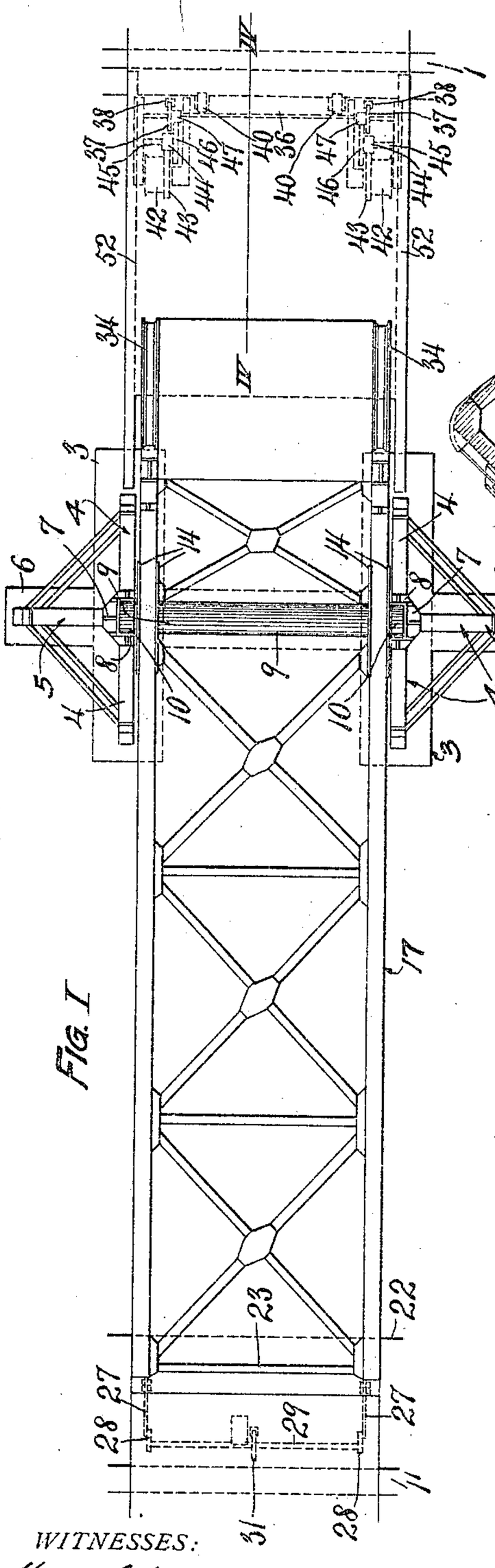

FIG. I

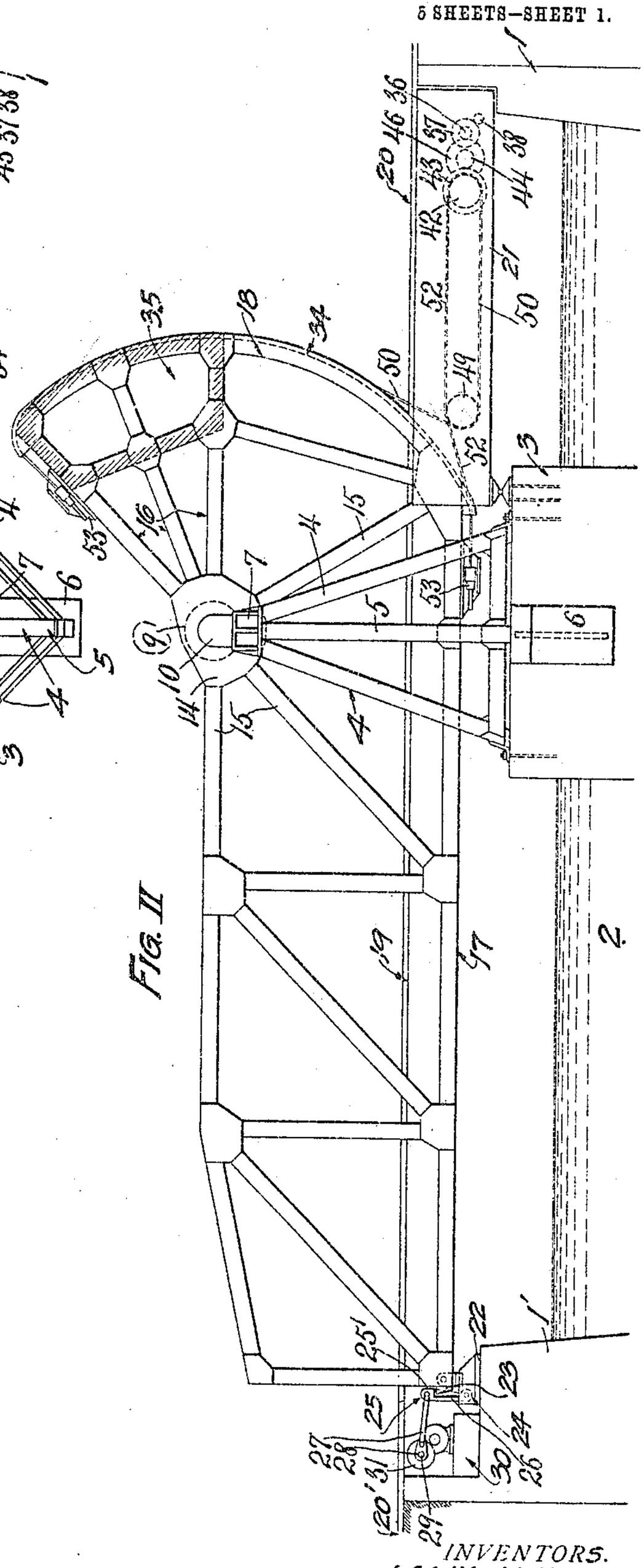

FIG. II

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FIG. II

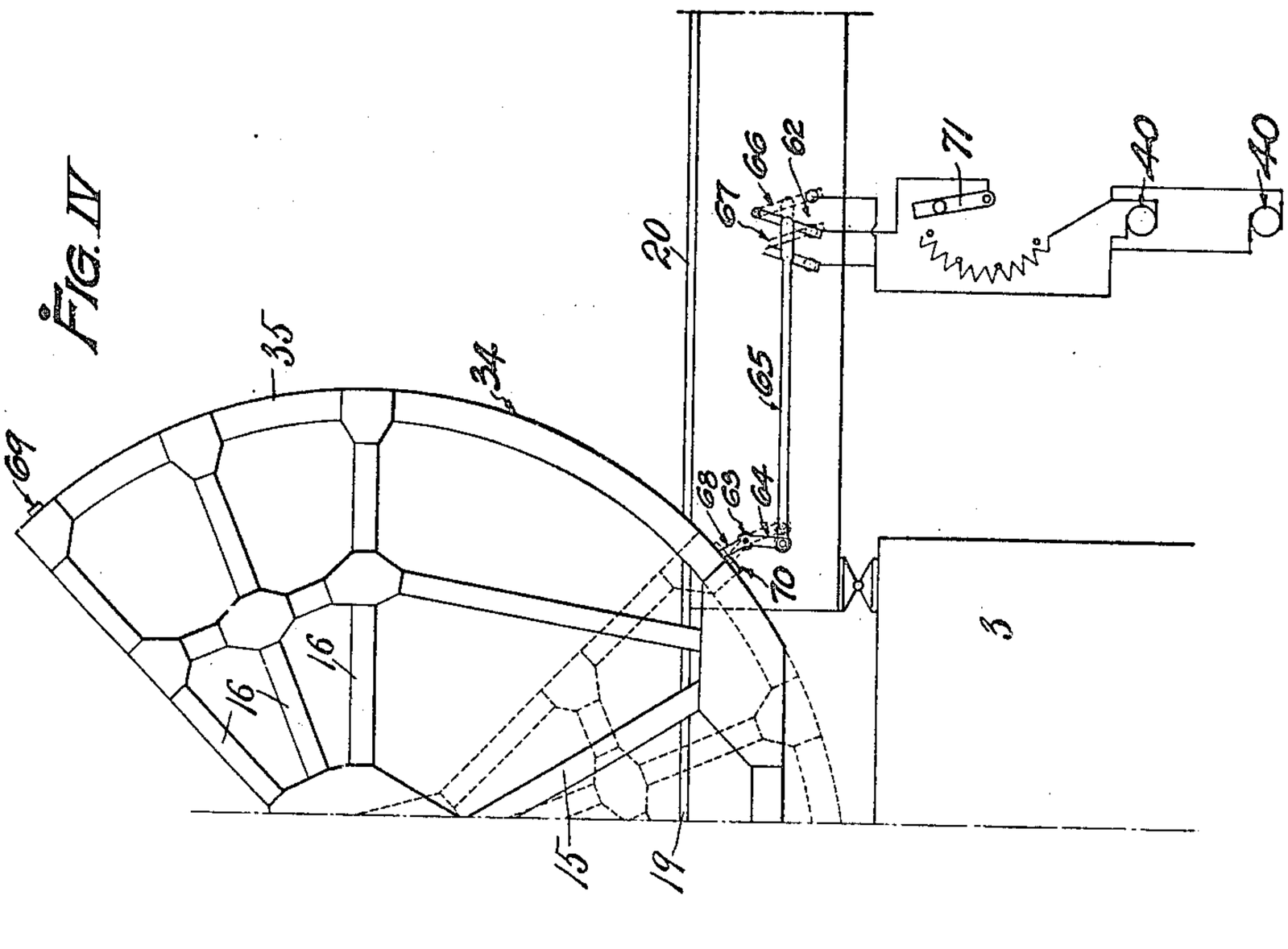
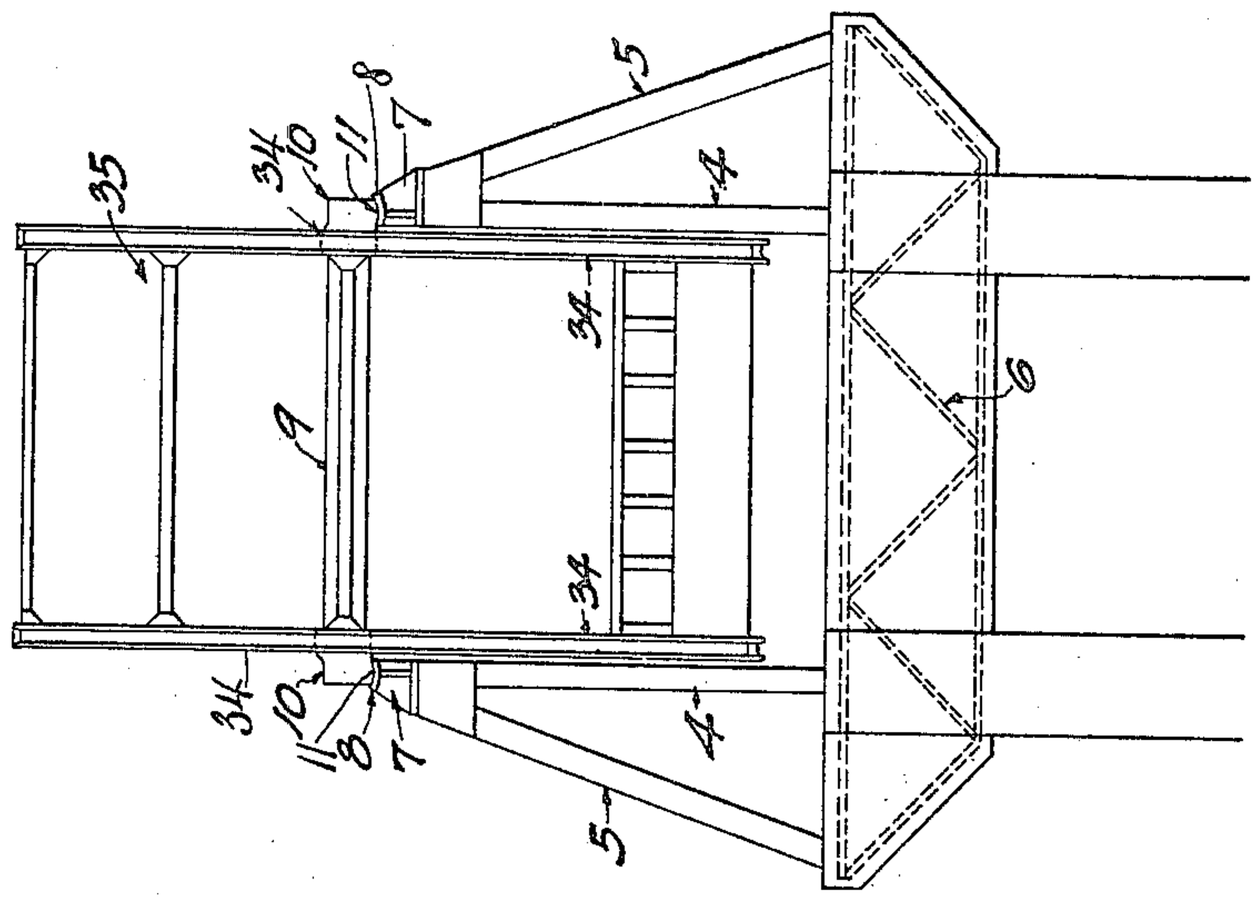


FIG. III



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5 SHEETS—SHEET 3.

FIG. VI

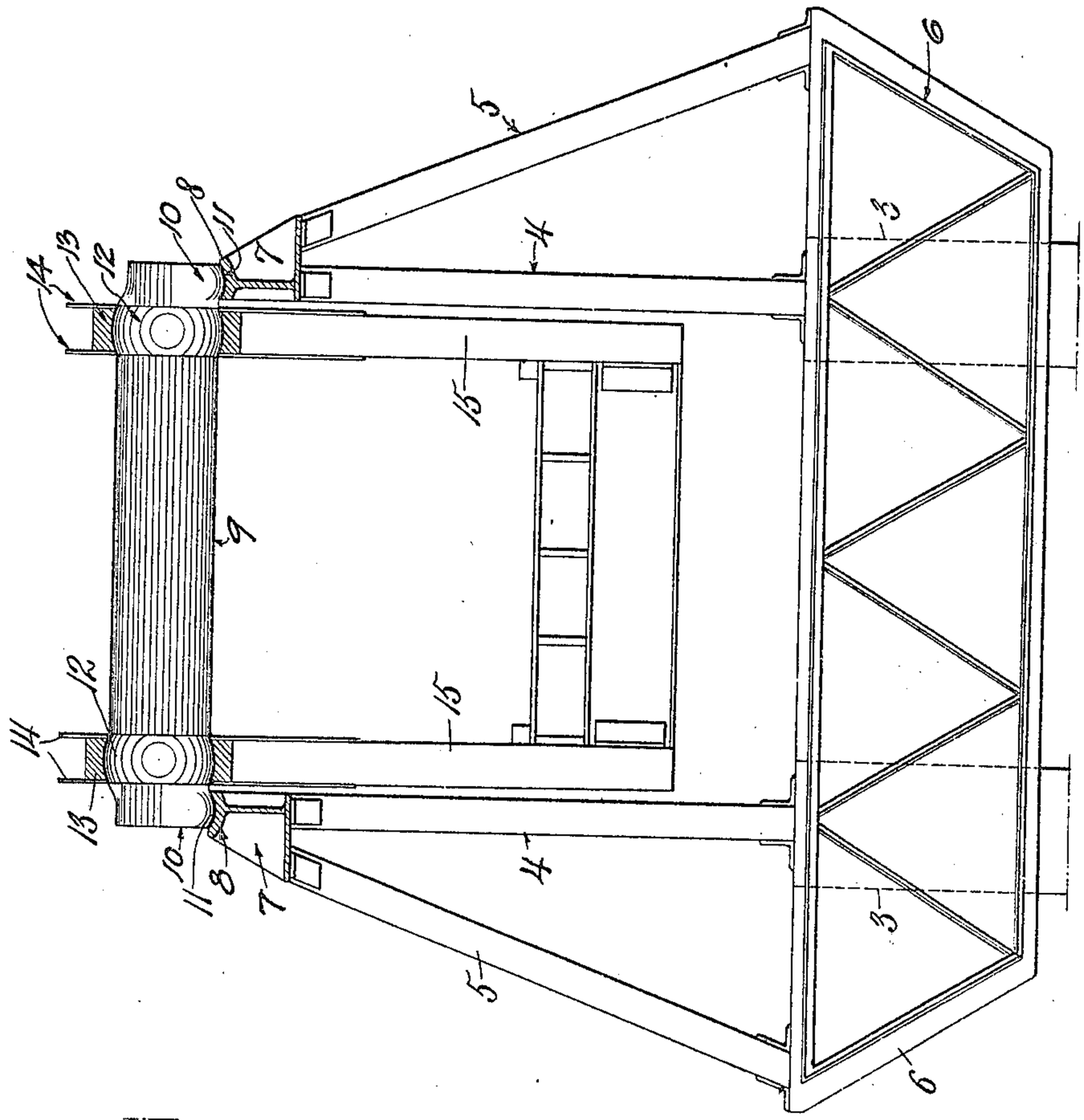
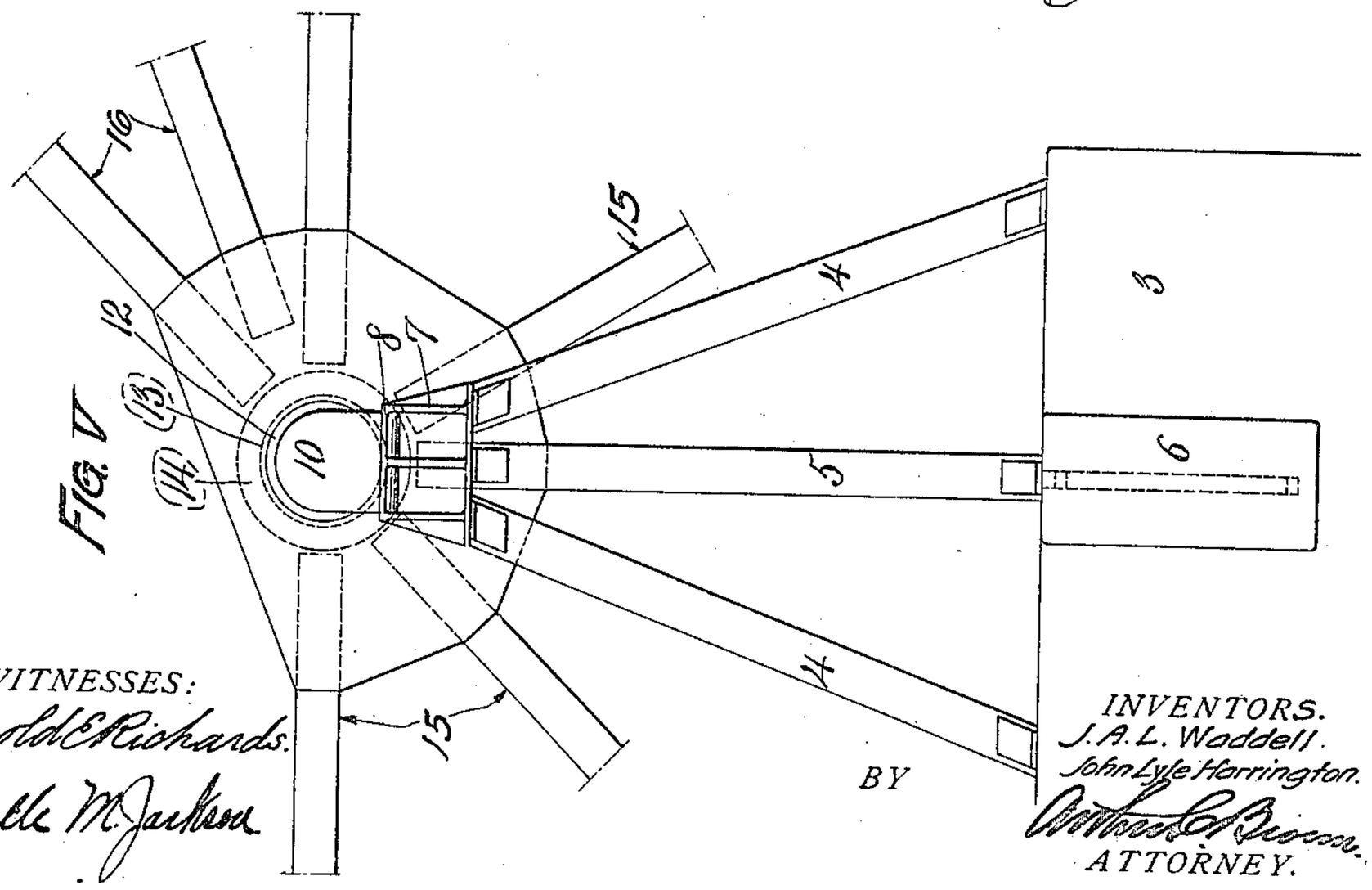


FIG. V



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5 SHEETS—SHEET 4.

FIG. IX

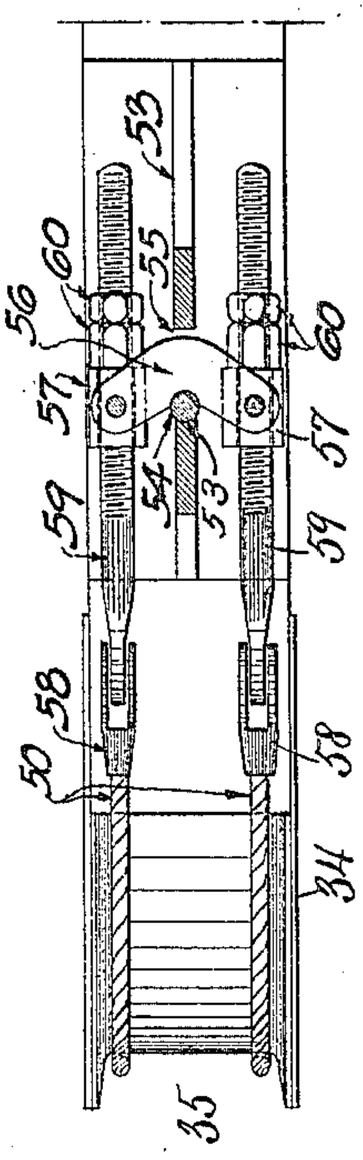


FIG. X

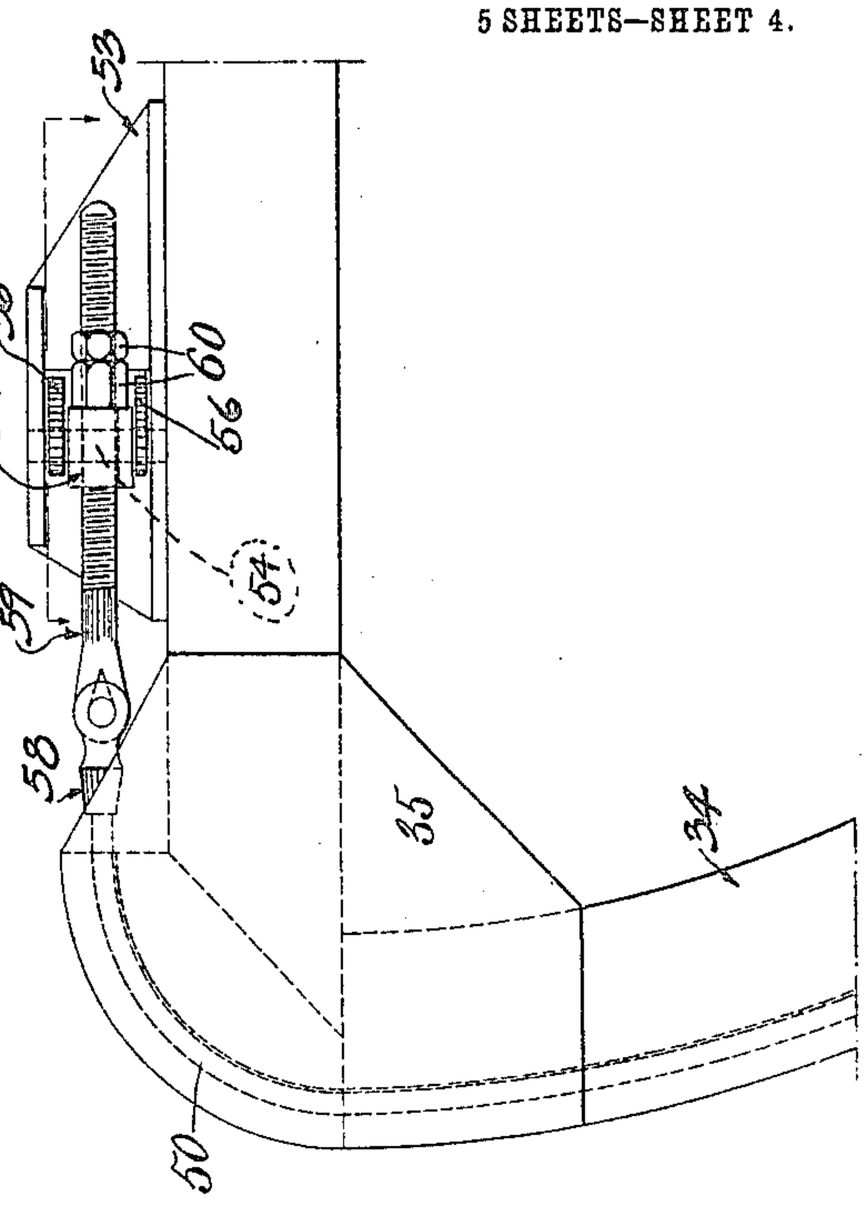


FIG. VII

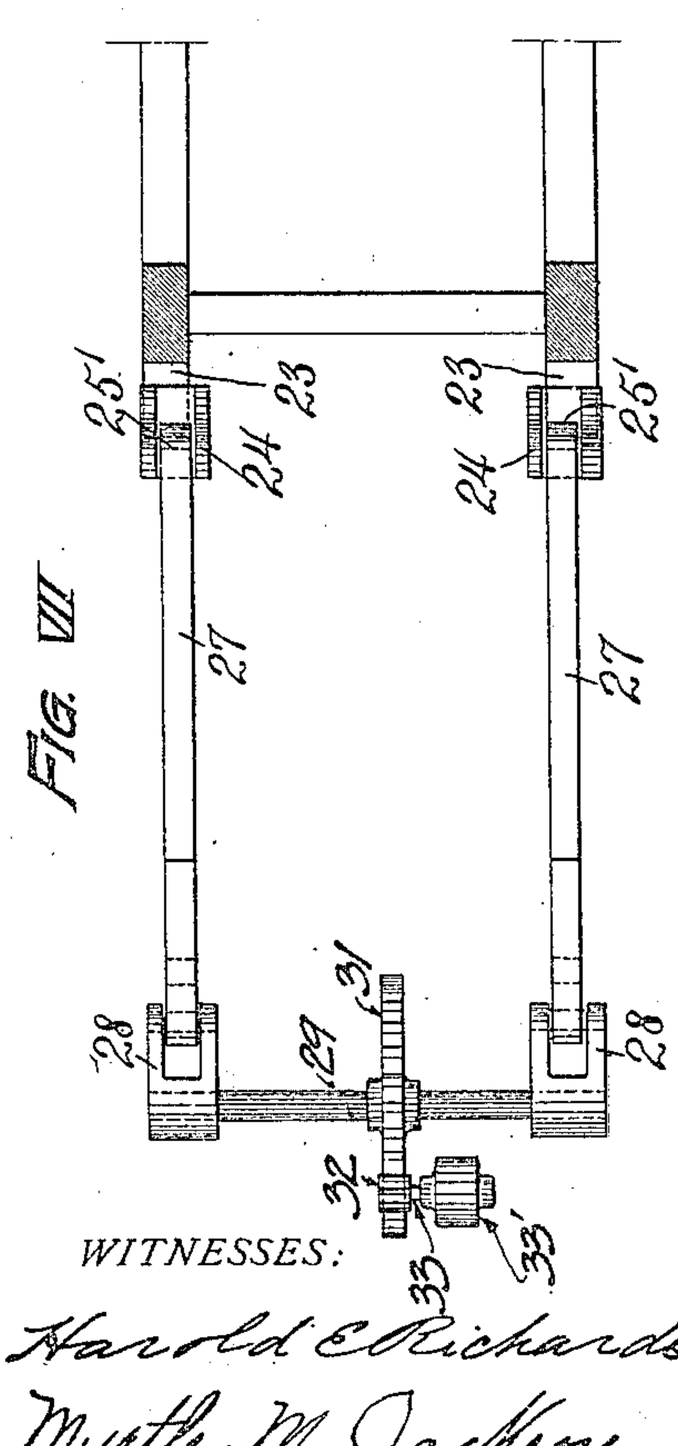
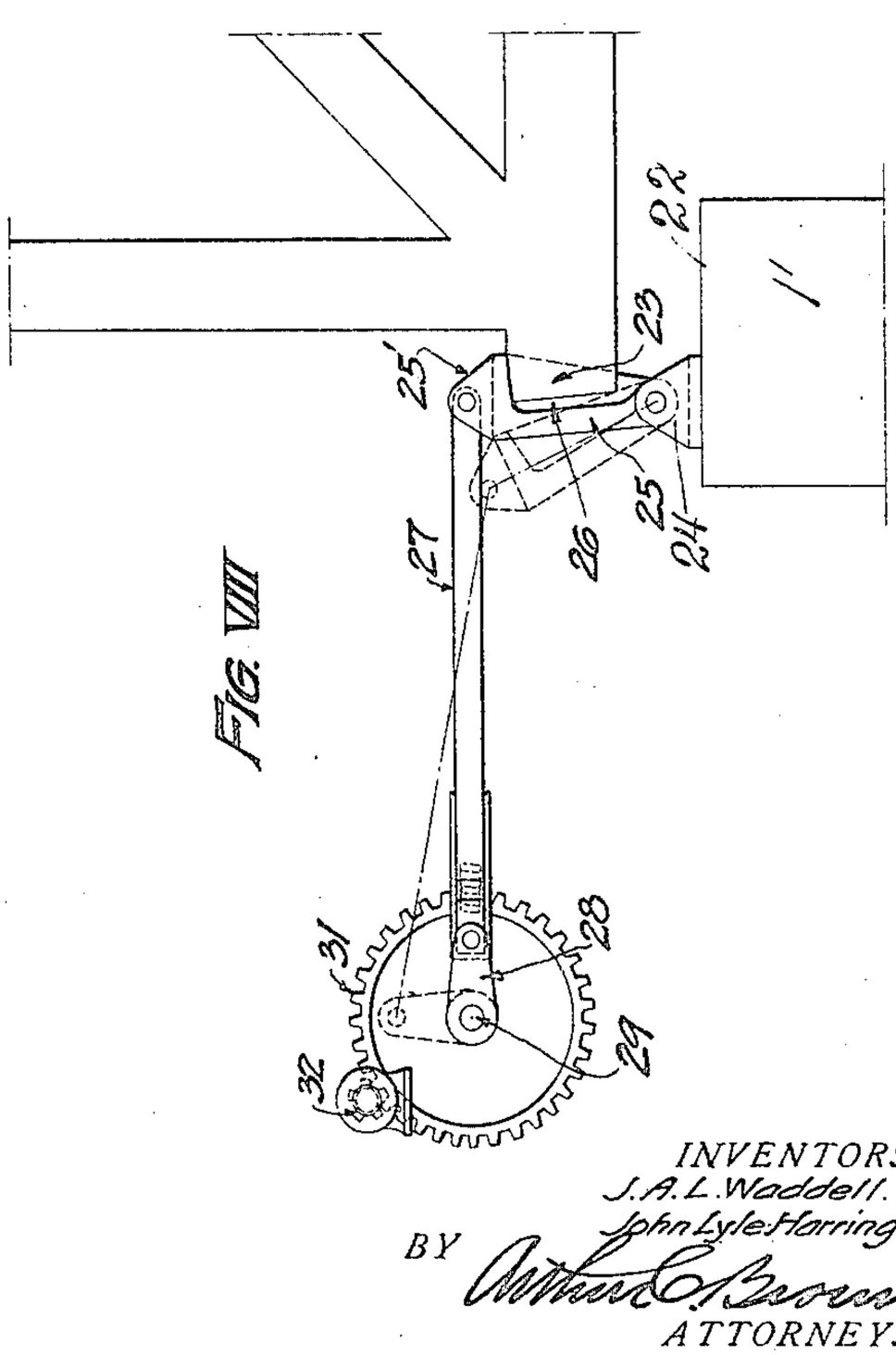


FIG. VIII



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5 SHEETS—SHEET 5.

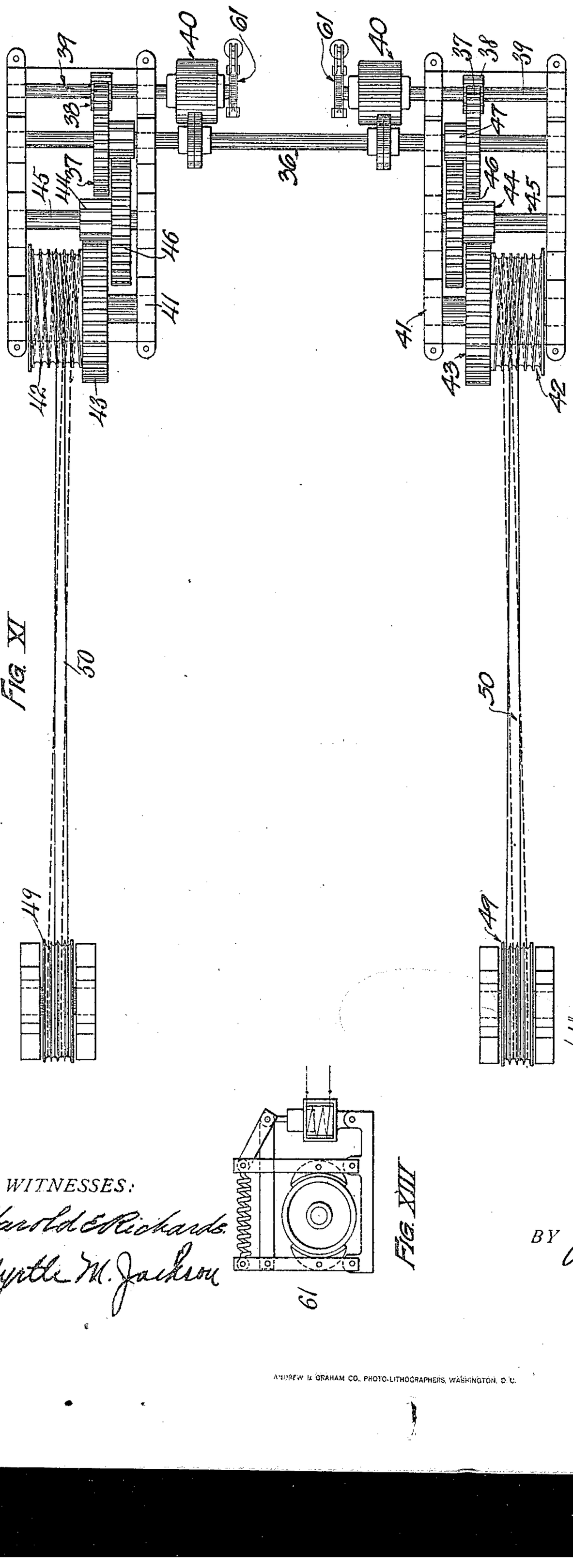

FIG. XI

FIG. XII

FIG. XIII

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UNITED STATES PATENT OFFICE.

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BASCULE-BRIDGE.

952,485. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed July 24, 1908. Serial No. 445,124.

To all whom it may concern:

Be it known that we, JOHN A. L. WADDELL and JOHN LYLE HARRINGTON, both citizens of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Bascule-Bridges; and we 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

Our invention relates to lift bridges and more particularly to a type commonly known as bascule, in which a bridge span is revolubly mounted, or trunnioned, at one side of a channel, and counterbalanced to enable the projecting span to swing vertically when clearing the channel for the passage of vessels.

It is the object of our invention to provide a bridge of this type in which the balancing weight is advantageously arranged; to provide an improved carrying axle and a mounting that will permit the axle to automatically adjust itself when deflected, in order to obviate disalinement of the parts and avoid serious secondary stress in the trusses; to provide a driving mechanism in which the motive parts may be permanently located on a stable foundation, and so connected with the movable span that the transmitting parts may not be affected by a possible uneven settlement of the motor and span piers, and to provide an improved locking mechanism for securely holding the span in its traffic carrying position.

A further object of our invention is to provide other improved details of structure which will presently be fully described and pointed out in the claims, reference being had to the accompanying drawings in which:—

Figure I is a top plan view of a bascule bridge constructed according to our invention. Fig. II is a side elevation of same. Fig. III is an end view of the movable span parts and the support for same. Fig. IV is a side elevation showing a diagram of the electrical controlling parts used in connection with the movable span. Fig. V is an enlarged view, in side elevation, of the span axle and its mounting. Fig. VI is an end view of same. Fig. VII is an enlarged plan view of the span locking mechanism. Fig. VIII is a side elevation of same. Fig. IX is an enlarged plan view of the cable attaching member on the counterbalance. Fig. X is a side elevation of same. Fig. XI is an enlarged plan view of the power mechanism and its connection with the counterbalance. Fig. XII is a side view of same. Fig. XIII is a detail view of the solenoid brake used with the motor parts.

Referring more in detail to the parts, 1—1′ designate the land abutments at each side of a channel 2, and 3 a pier that is located in the channel between the abutments 1—1′. Supported on and rising from pier 3 are the bridge supports 4, one of which is arranged at each side of the roadway and has a laterally projecting brace 5; the supports and braces being firmly mounted on the pier and the lower ends of the opposite braces connected by a bracing frame 6 that is embedded in the pier and extends transversely therethrough.

On the top of each of the supporting units 4—5 is a block 7 that is provided with an open, cylindrical bearing 8 in which one end of the bascule axle 9 is adapted to seat. The bearing portions 10 of axle 9 are offset downwardly from the axle body, and rounded longitudinally to fit the curved surface 11 of the bearing 7, in order to enable either end of the axle to automatically adjust itself in its bearing, when the axle is deflected under the load of the span. Near each end of the central body portion, axle 9 is provided with an integral convex enlargement 12 upon which the span hub 13 is adapted to revolve; the construction of the convex enlargement and hub being such that when the shaft 9 deflects, each hub may move laterally on its convex enlargement, to automatically adjust itself to the changed condition of the shaft without interfering with the proper working of the bridge, and avoid secondary stresses in the trusses.

Rigidly connected to and preferably integral with each of hubs 13 are the projecting side flanges 14, within which the inner ends of the span members 15 and counterpoise members 16 are anchored; the members 15 being extended to and connected with the span 17 and the members 16 to and with the counterpoise frame 18. Span 17 is provided with a suitable roadway 19, which, when the span is in its lowered position, is

adapted to form a substantially continuous path with the permanent roadway 20—20′ that ends at the edge of each abutment 1—1′, or at one side at the end of a permanent span 21, the free end of span 17 being adapted to seat on a step 22 on the abutment 1′ and provided with projecting end ledges 23.

Permanently mounted on step 22, in line with the span ledges 23, are the bearing frames 24. Axially mounted in the bearing frames 24 are the locking members 25, each of which is provided with a recess 26 that is adapted to receive the relative span ledge 23 when the locking member is rocked thereupon, so that the top of the ledge may be held against vertical movement by the free end 25′ of such locking member. Pivoted to each of the locking members is a pitman 27 that extends backwardly therefrom and is pivotally connected, at its opposite end, with a crank 28 on a shaft 29, which latter is revolubly mounted on a second step 30 on the abutment 1′. Rigidly mounted on shaft 29 is a gear wheel 31 which meshes with a similar wheel 32 on a motor shaft 33.

33′ designates a motor, of any suitable type, by which the parts just described are operated.

The segmental counterpoise frame 18, which is supported by the struts 16 at the balance end of the span, preferably comprises the sheave segments 34, which are arranged to rotate about the horizontal axis in front of the permanent span 21. Carried by the upper end of segments 34, and extending therebetween at a sufficient distance above the roadway to obviate interference with traffic, is the counterpoise weight 35, which may be composed of any suitable material, preferably concrete, and is adapted so to balance the lifting span that the center of gravity of the entire moving mass will be practically coincident with the axis of rotation.

36 designates a driving shaft that is revolubly mounted at the counterpoise end of the span 21 and extends transversely thereon.

37 designates gear wheels, one of which is rigidly mounted near each end of shaft 36 and meshes with a gear wheel 38 on a motor shaft 39 that is adapted for actuation by the motors 40. Motors 40 are preferably of an electrical type and adapted for simultaneous or independent action, being electrically connected, to secure united action, but otherwise independent of each other, except for their connection through the driving shaft 36. Rigidly mounted in bearings 41, are the drums 42, each of which has a geared flange 43 adapted for engagement with a gear wheel 44 on an intermediate shaft 45, that is connected with the driving shaft 36, by the gears 46—47 so that both drums may be revolved in unison upon the revolution of said driving shaft. Revolubly mounted in bearings at each side of span 21 in substantial alinement with the drums 42 and sheave segments 34, is a sheave 49.

50 designates a cable, or set of cables for each of drums 42, one end of which is wound on drum 42 and its opposite end beneath the sheave 49 and through the channel of the relative sheave segment 34 to the upper end of the counterpoise frame.

52 designates a second cable or set of cables, one end of which is secured to the drum 42 and its opposite end led over its relative sheave 49 and secured to the lower end of the segment 34, so that when the drums 42 are revolved in one direction the cables 50 will be drawn down to lower the counterpoise and elevate the span, and when they are revolved in the opposite direction the cables 52 are retracted to raise the counterpoise and lower the span; the opposite cables traveling in opposite directions during the drum movement, and always maintaining a taut connection between the drums and counterpoise frame. While a single cable or set of cables may be employed for each drum and segment and the cable ends secured to the segments in any suitable manner, we prefer to provide each drum with two cables or two sets of cables and the segments with equalizing devices whereby possible unequal contraction and expansion of the cables may be taken up; such equalizing devices preferably comprising the following mechanisms:—On each segment 34 is a bearing 53, having a pin 54 and slot 55. Loosely mounted in slot 55, and adapted for rocking movement on the pin 54, is a lever 56, comprising a pair of side plates that are rigidly connected at each end with the collars 57. On the ends of each of cables 50 is a socket 58, to which is pivoted a threaded pin 59, the shank of which is adapted to project through one of the collars 57 and carry nuts 60. With such an arrangement, the cables may be attached to the segments, and the separate cables in each set adjusted primarily, or at any time an adjustment is necessary, without removal of any of the parts.

To obviate damaging impact of the span and support, we provide a suitable brake mechanism and means for automatically actuating same as the span reaches the upper or lower limit of its travel; such mechanism preferably comprising an ordinary type of solenoid brake 61 that is energized upon the application of current to the motor, but which, as it may be of an ordinary and well known type, will not be described in detail.

62 designates a pole changer of any well known type.

63 designates a bell crank lever that is pivoted adjacent to the counterpoise frame 18, and has one of its arms 64, connected

by a pitman 65, with the switch arms 66—67 of the pole changer, the second arm 68, being extended into the path of the lugs 69—70 on one of the frame segments 34. With such device, the lug 69 will engage the crank arm 68 as the frame 18 moves downwardly, and move the pitmen 65 to shift the contact of the switches 66—67, to change the direction of the motors. When the motors are again put in operation, the counterpoise will be moved upwardly, and the switches 66—67 rocked by the lug 70 when it contacts with the bell crank, and the poles changed to their original condition.

71 designates a controller that is connected with the motors 40 and is adapted for automatic return to open position as the pole changer switch passes a neutral position when rocked by the bell crank 63.

Assuming the parts to be constructed and arranged in the manner described and the free end of the span locked to prevent accidental displacement, the span may be used as an ordinary traffic bridge. When it is desired to clear the channel to permit the passage of a vessel, the motor 33′ at the free end of the span is operated to revolve the shaft 29, the revolution of such shaft actuating the crank 28 so that the lock 26 is moved back away from the span ends. The motors 40 are then operated to revolve the drums 42 in the direction of the arrow, Fig. XII and the cables 50 wound over the drums, their upper ends being drawn downwardly as they are wound on the drums, and the cables 52 removed from the drums by the downwardly moving ends of the counterpoise frame; the sheaves 49 holding the cables in the proper relation to the counterpoise segments, and the frame moving downwardly in front of the permanent span until the movable span has reached its upper, channel clearing position. As the span reaches its upper position the bell crank 63 is engaged by the lug 69 on the counterpoise frame and acts to shut down the motors and apply the brakes, so that the span may assume its position and stop without damaging the supporting or actuating parts, and particularly without placing an undue strain on the motor cables. Simultaneously with the closing down of the motors, their polarity may be changed to cause them to operate in the opposite direction when current is again applied thereto.

When it is desired to lower the span the motors are operated in the opposite direction to produce a pull on the ropes 52 that will raise the counterpoise frame and lower the span, the ropes 50 paying out as the drum revolves, so that the ropes are always taut over the sheaves 49 and any unevenness of travel of the frame, due to slack in the ropes is obviated. As the span assumes the lowered position, the bell crank 63 is rocked by the lug 70, to again shut down the motors, apply the brakes, and change the polarity of the motors, so that a damaging impact of the span end with the abutment 1′ is obviated, and the motors are put in condition for operation in their original manner, upon a further application of current. The span being lowered, the motor 33′ is operated to move the locking yokes over the span ends, when the span will be permanently and securely locked in its traffic carrying position.

While a more satisfactory operation of the parts may be secured by simultaneous operation of both of motors 40, should one of the motors become inoperative the shaft 36 may be actuated by the other to secure an actuation of both of drums 42. By arranging the counterpoise weights at the top of the frame 18, a clear traffic way is provided therebeneath while the span is in its lowered position, while the weighted portion may provide a barrier across the roadway when the span is open.

While we have described the motors and brake mechanisms as of electrical types, it is readily apparent that suitable mechanical parts may be substituted therefor, such parts in themselves being of any ordinary type and claimed as our invention only in their combination with our improved bridge.

Having thus described our invention, what we claim as new therein and desire to secure by Letters Patent is:—

1. In a bascule bridge, a supporting frame, bearing members mounted on the frame and provided with curved bearing surfaces, an axle having its ends rounded longitudinally and seated upon the curved bearing surfaces, and a counterpoised bridge span revolubly mounted on said axle.

2. In a bascule bridge, a supporting frame, bearing members mounted on said frame and provided with curved bearing surfaces, an axle having longitudinally curved sections seated upon the curved bearing surfaces and provided with convex enlargements adjacent to said longitudinally curved sections, and a counterpoised bridge span having hubs fitting the convex enlargements of said axle, substantially as set forth.

3. A bascule bridge comprising abutments, a pier located between the abutments, supports located upon the pier, bearing blocks having curved surfaces, and mounted upon the supports, an axle having offset ends rounded longitudinally and seated upon the curved surfaces of the bearing blocks, and a bridge span having a segmental counterpoise frame and revolubly mounted upon the axle.

4. A bascule bridge comprising abutments, a pier located between the abutments, supports located upon the pier, bearing blocks having curved surfaces and mounted

upon the supports, an axle having offset ends rounded longitudinally, and seated upon the curved surfaces of the bearing blocks, and formed with convex enlargements adjacent to the offset ends, and a bridge span having a segmental counterpoise frame provided with a hub fitting the convex enlargements of the axle.

5. A bascule bridge comprising axle bearings, an axle having offset end portions adapted to seat in said bearings, and convex enlargements protruding therefrom adjacent to said offset end portions, and a counter-balanced span having hubs adapted for support by and automatic adjustment on said convex enlargements.

6. In a bascule bridge, a revoluble span, a counterpoise, a slotted bearing in said counterpoise, a bracket movably mounted in the slot in said bearing, collars carried by the opposite ends of said bracket, threaded pins adapted for sliding movement in said collars, cables connected with said pins and with an actuating device, and nuts on said pins adapted for engagement with said collars, substantially as and for the purpose set forth.

7. In a bascule bridge, an axially mounted span, a counterpoise, motors permanently mounted adjacent to said counterpoise, pliant means for connecting said motors with said counterpoise, whereby the latter may be raised or lowered according to the direction of travel of said motors, a pole changer mechanism connected with said motors and comprising suitable switches, lugs on the upper and lower ends of said counterpoise, a lever pivotally mounted with one arm projected into the path of said counterpoise lugs, and a pitman connecting the opposite arm of said lever and the pole changer switches, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN A. L. WADDELL.
JOHN LYLE HARRINGTON.

Witnesses:
ARTHUR C. BROWN,
HAROLD E. RICHARDS.