EXAMINER.

No. 824,627. PATENTED JUNE 26, 1906.

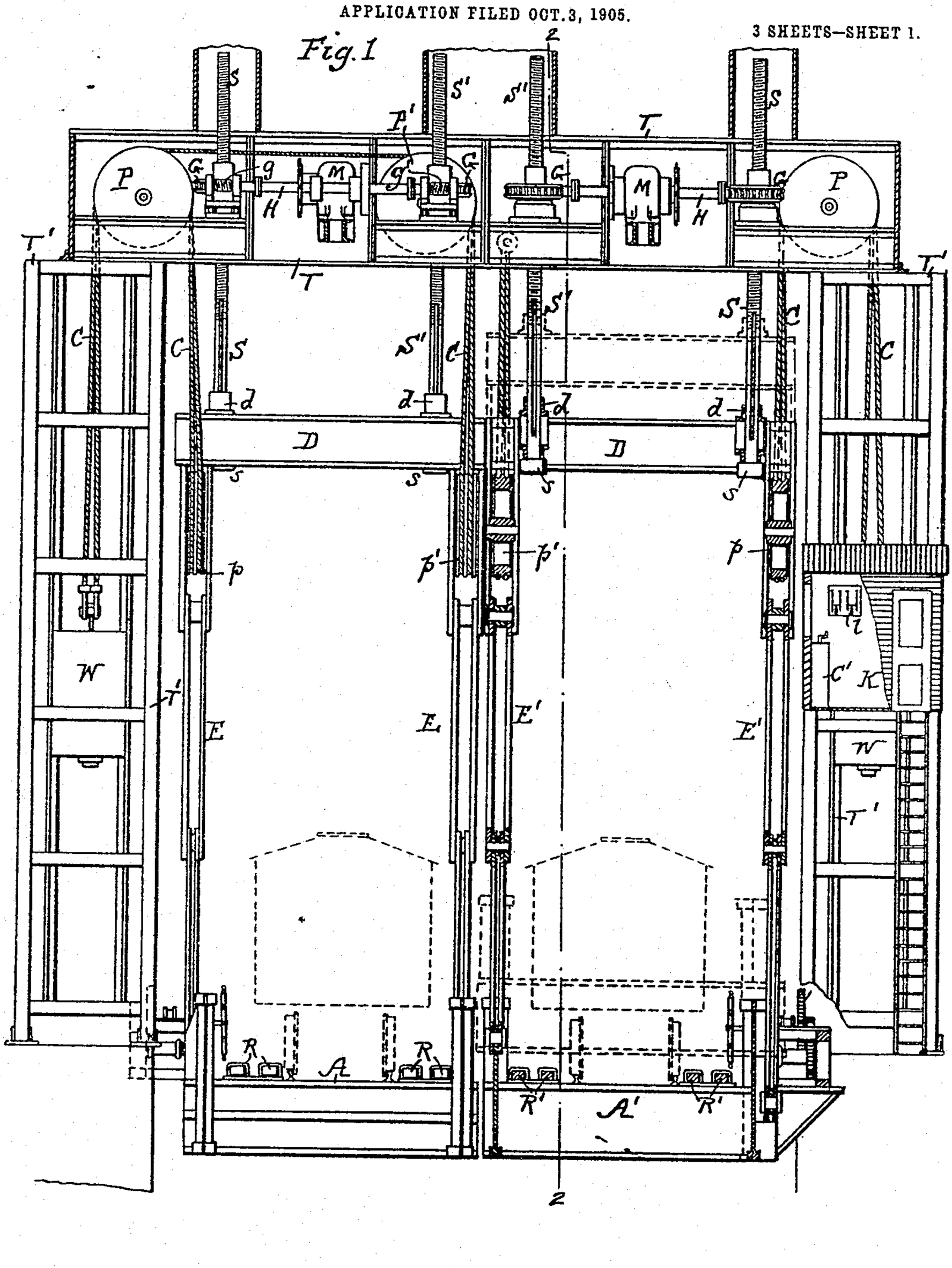
N. W. CONDICT & J. B. FRENCH.

FERRY BRIDGE.

APPLICATION FILED OCT. 3, 1905.

3 SHEETS—SHEET 1.

Fig. 1



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3 SHEETS—SHEET 2.

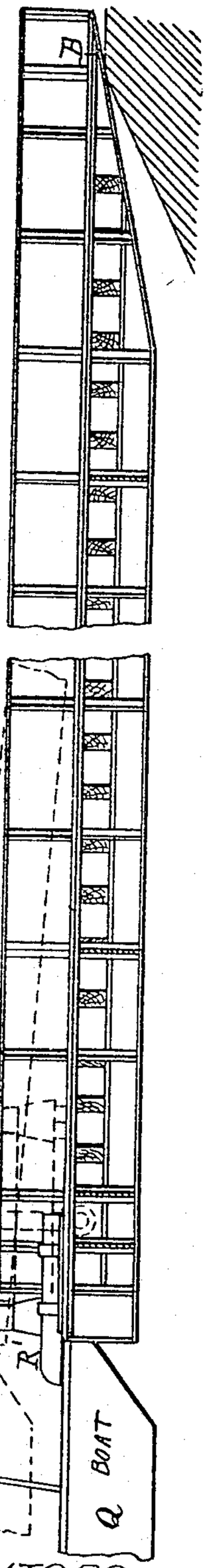

Fig. 2

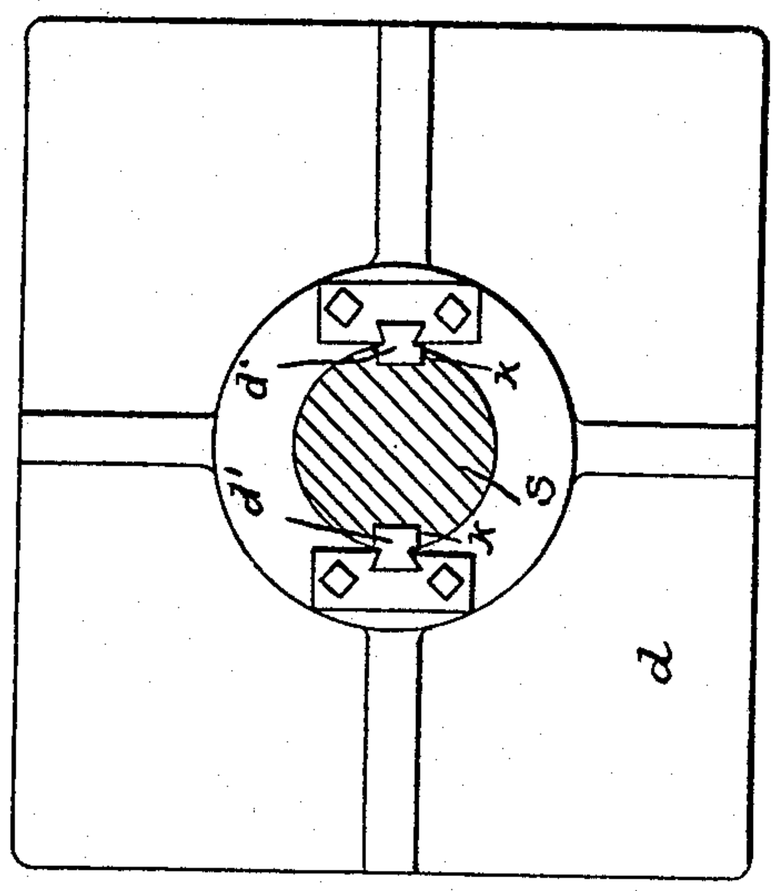

Fig. 5.

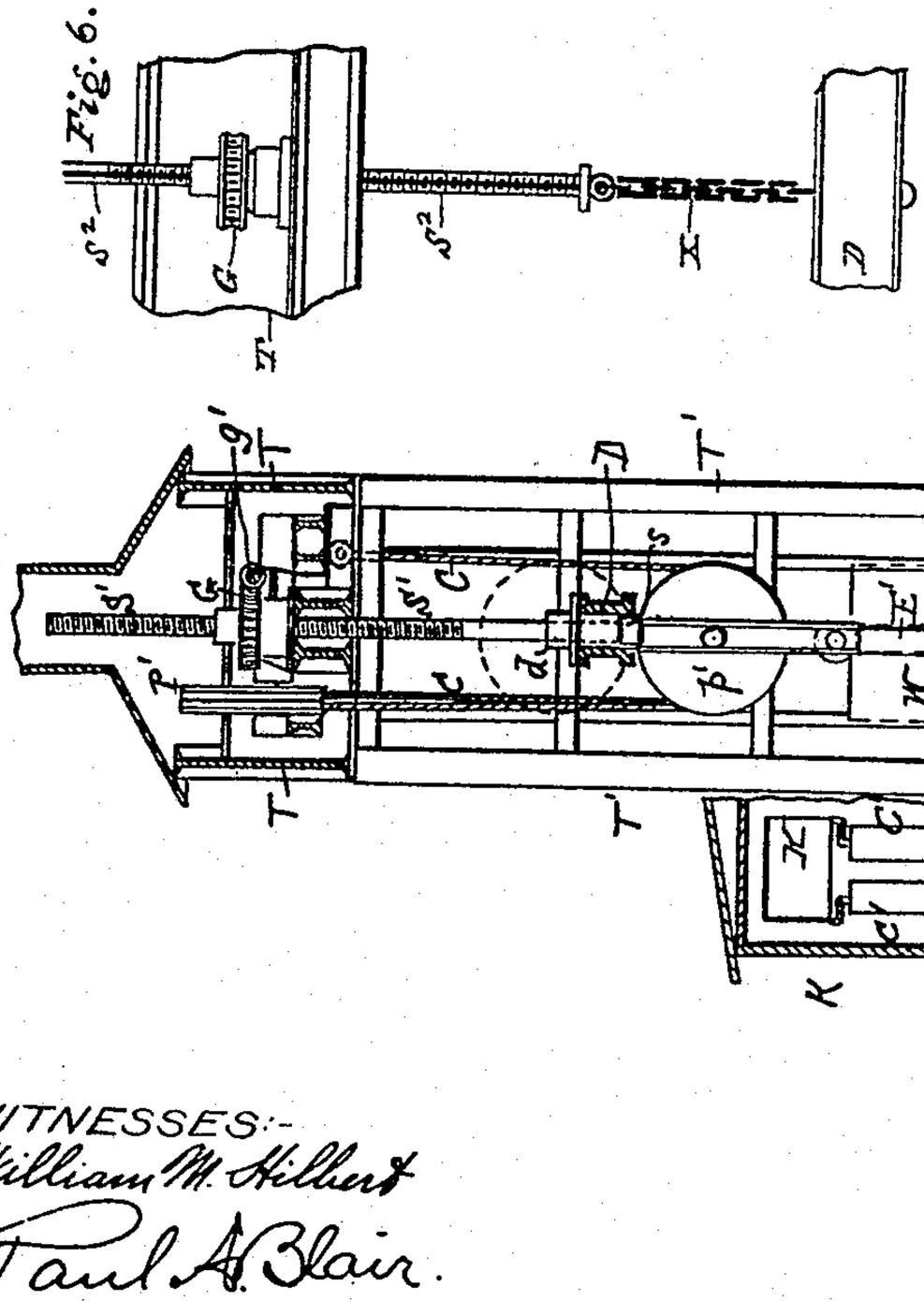

Fig. 6.

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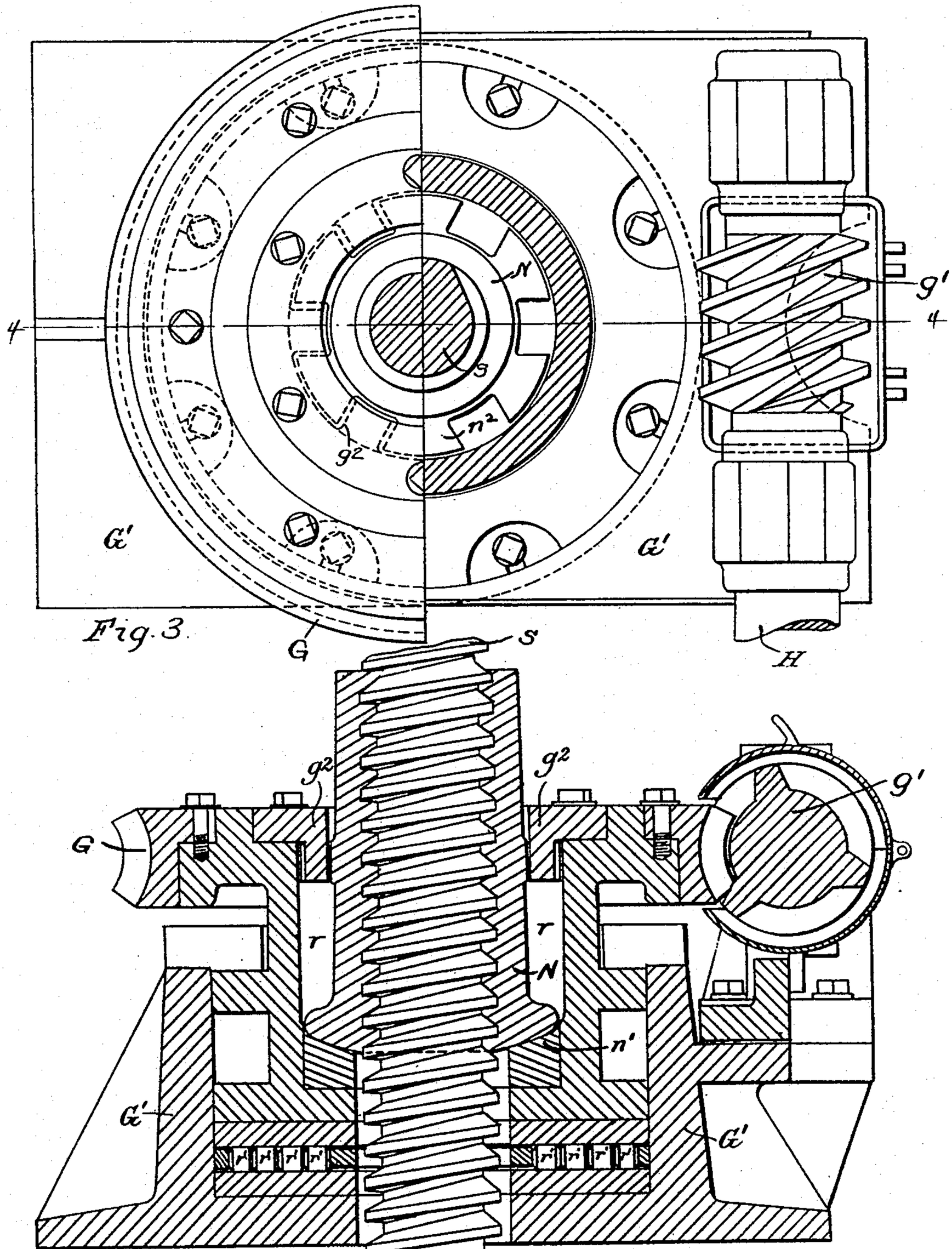

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

NATHAN W. CONDICT, OF JERSEY CITY, NEW JERSEY, AND JAMES B. FRENCH, OF JAMAICA, NEW YORK.

FERRY-BRIDGE.

No. 824,627. Specification of Letters Patent. Patented June 26, 1906.

Application filed October 3, 1905. Serial No. 281,199.

To all whom it may concern:

Be it known that we, NATHAN W. CONDICT, a resident of Jersey City, in the county of Hudson, State of New Jersey, and JAMES B. FRENCH, a resident of Jamaica, in the county of Queens, State of New York, citizens of the United States of America, have invented an Improved Ferry-Bridge, of which the following is a specification.

Our invention relates to the construction and operation of bridges for use in connection with ferry-boats for passengers or ferry-boats for cars, these latter boats being commonly termed "transfer-boats."

These bridges are connected up to the boats when the latter are moored to their slips to permit the passengers, vehicles, or cars to be moved onto or off the boats. Commonly these bridges are supported at their outer or free ends by pontoons and by counterweights.

Our invention relates more particularly to a construction of ferry-bridge in which pontoons are dispensed with, the main object of our invention being to provide an improved mechanical construction for handling the bridges without pontoons and without the use of aprons commonly used for transfer-bridges. This object we accomplish by adjusting the bridge by means of screws which have a slip connection with the bridge and are provided with self-adjusting nuts accommodating themselves to the varying positions of the bridge.

In the accompanying drawings we have shown our invention as applied to a type of ferry-bridge which is more especially designed for use in connection with transfer-boats for the handling of railroad-cars; but it will be readily understood that the invention is equally applicable to ferry-bridges for passenger and vehicle traffic.

Figure 1 is an end view, partly in section, of a transfer ferry-boat bridge embodying our invention. Fig. 2 is a longitudinal section on the line 2 2, Fig. 1. Fig. 3 is a plan view, partly in section and drawn to an enlarged scale, of the gearing for the screw. Fig. 4 is a vertical section of the same on the line 4 4, Fig. 3. Fig. 5 is an enlarged view of another detail, and Fig. 6 is a view of a modification.

In the drawings, representing the invention as applied to bridges for transfer-boats, we have shown the bridge as in two parts A A′ for two railroad-tracks or gangways; but of course it will be understood that the bridge may be in one part. At the shore end the bridge, whether in one part or in two parts, is sustained on the usual rocking logs or pivoting-supports B, Fig. 2. At its forward end, to which the ferry-boat is to be connected, the dead load of the bridge may be supported to a greater or less extent by counterweights, although these are not necessary in all cases. In the present instance we have shown counterweights W on wire ropes or chains C C, passing over pulleys P P′ on the fixed trestle-work T T′ and also over pulleys *p p′*, which are carried by the suspension-beams D D. The outer ends of the two parts A A′ of the bridge are suspended from these beams by chains or links E E′. In connection with each of these suspension-beams D D′ we provide two vertical screw-rods S S′, and we prefer to make one with a right-handed and the other with a left-handed thread. The lower ends of these screws pass through housings *d* in the beams D and have heads *s* at their lower ends, on which the beams and the suspended bridges may be supported, but permitting the beams to rise on the rods S when desired, as indicated by dotted lines at the right of Fig. 1. In this way a slip connection is provided between the screw-rods and the bridge, whereby the latter may rise on the rods or irrespective of them. The upper ends of these screws pass through nuts mounted in bearings in the horizontal part T of the fixed trestle, and in order that these nuts and screws way serve to elevate the bridge when desired it is necessary that the one shall rotate and the other shall not. In the present instance we have shown the screws as non-rotatable, while provision is made to rotate the nuts. These nuts, hereinafter more particularly described, are adjustably connected with worm-wheels G, turning on bearings on the trestle and meshing with worms *g g′* on shafts H, which may be provided with means for turning them by hand, as through chain-wheels, but preferably are driven by electric motors. By preference the two worms operating the worm-wheels and nuts for the two screw-rods of each beam are mounted on the same shaft H and are right and left worms, so as to avoid end thrust on the shaft. The detailed construction of the nuts and worms and worm-wheels will be under-

stood by reference to Figs. 3 and 4. One of the important features of this part of our invention consists in mounting the nut in such a way that the nut may rock or cant to accommodate itself to any tilting of the screw-rod owing to movement of the bridge. The nut N in each case is for this reason mounted on its bearing-ring n' so that it can rock therein, as by making a ball-joint or universal joint between the two. This ring n' is in the hollow hub r of the worm-wheel G, which hub can turn in the fixed housing G', preferably on roller-bearings r', Fig. 4. The worm-wheel G has inwardly-projecting teeth g^2, Fig. 3, engaging outwardly-projecting teeth n^2 on the nut N with sufficient freedom of play between the two to permit the nut to rock on its bearing-ring n'. When, as in the case described, the nuts are constructed to be rotated while the screws are non-rotating, the screws may be held from turning by the provision of key-seats in each screw-rod to receive the keys on some non-rotating part of the frame. In the case illustrated in the drawings we have shown key-seats k in the screws receiving keys d' in the housings d on the suspension-beams D, as shown in the enlarged plan view, Fig. 5.

At any suitable point—as, for example, on one of the upright parts T' of the trestle—may be provided a controller-house K with switches l and controllers C', by which the motors M may be thrown into operation.

The manner of handling the apparatus in loading and unloading the boats is as follows: A loaded ferry-boat entering the slip is secured by its mooring-ropes, and the bridge being raised with its "toggles" R R', Figs. 1 and 2, projected, the bridge is now lowered by the operation of the motors to bring the toggles to rest on the boat and the screws S being run down so that their heads are clear of the beams D, and the whole weight of the bridge is sustained by the boat. The boat thus now performs the function of a pontoon for the bridge. As the boat Q is relieved of its load it will rise in the water, as indicated by dotted lines in Fig. 2, and the bridge will rise with it. (See also dotted lines at right of Fig. 1.) The sustaining-beams D D run freely on the screw-rods S. In loading the boat everything would remain in the same condition until the mooring-ropes were loosened. Whenever desired, the operator can run up the screws S S' and sustain the excess weight of the bridge upon the screws.

In this specification we use the term "slip connection" in a sufficiently broad sense to include any mechanical substitute for the slide already described and which will permit the bridge to rise independently of the screws. For example, in Fig. 6 we have shown as a modification a slip connection in the form of a chain X, connecting the lower end of each screw-rod S^2 to the suspension-beam D, so that while the raising of this screw-rod will consequently raise the bridge the latter can rise independently of the screw-rod by the slacking or slip of the chain. In this case the screw-rod can be prevented from turning by providing keys in a part carried by the trestle-work T and by having the key seat in the rod S^2 correspondingly farther up, as indicated.

We claim as our invention—

1. The combination of a ferry-bridge with a trestle, screw-rods to support the bridge with a slip connection, nuts fitted on the rods and carried by the trestle with rocking joints, and means to rotate one of said parts (nuts and rods) while the other is held from rotating.

2. The combination of a ferry-bridge with counterbalancing means, a trestle, screw-rods to support the bridge with a slip connection, nuts fitted on the rods and carried by the trestle with rocking joints and means to rotate one of said parts (nuts and rods) while the other is held from rotating,

3. The combination of a ferry-bridge with a trestle, non-rotating screw-rods to support the bridge with a slip connection, nuts fitted on the rods and carried by the trestle with rocking joints and worm-gear means to rotate the nuts.

4. The combination of a ferry-bridge with a counterbalancing means, a trestle, non-rotating screw-rods, supporting the bridge with slip connections, nuts fitted on the screw-rods, and carried by the trestle with rocking joints and worm-gear means to rotate the nuts.

5. The combination of a ferry-bridge, with a trestle, non-rotating screw-rods to support the bridge with a slip connection, nuts fitted on the rods, worm-wheels mounted to turn in bearing in the trestle and supporting the nuts with a rocking connection.

6. The combination of a ferry-bridge with a trestle, non-rotating screw-rods to support the bridge with a slip connection, nuts fitted on the rods, worm-wheels mounted to turn in bearings in the trestle and having ball-joint supports for the nuts with toothed connections between the worm-wheels and nuts.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

NATHAN W. CONDICT
JAMES B. FRENCH.

Witnesses:
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EDNA W. COLLINS.