

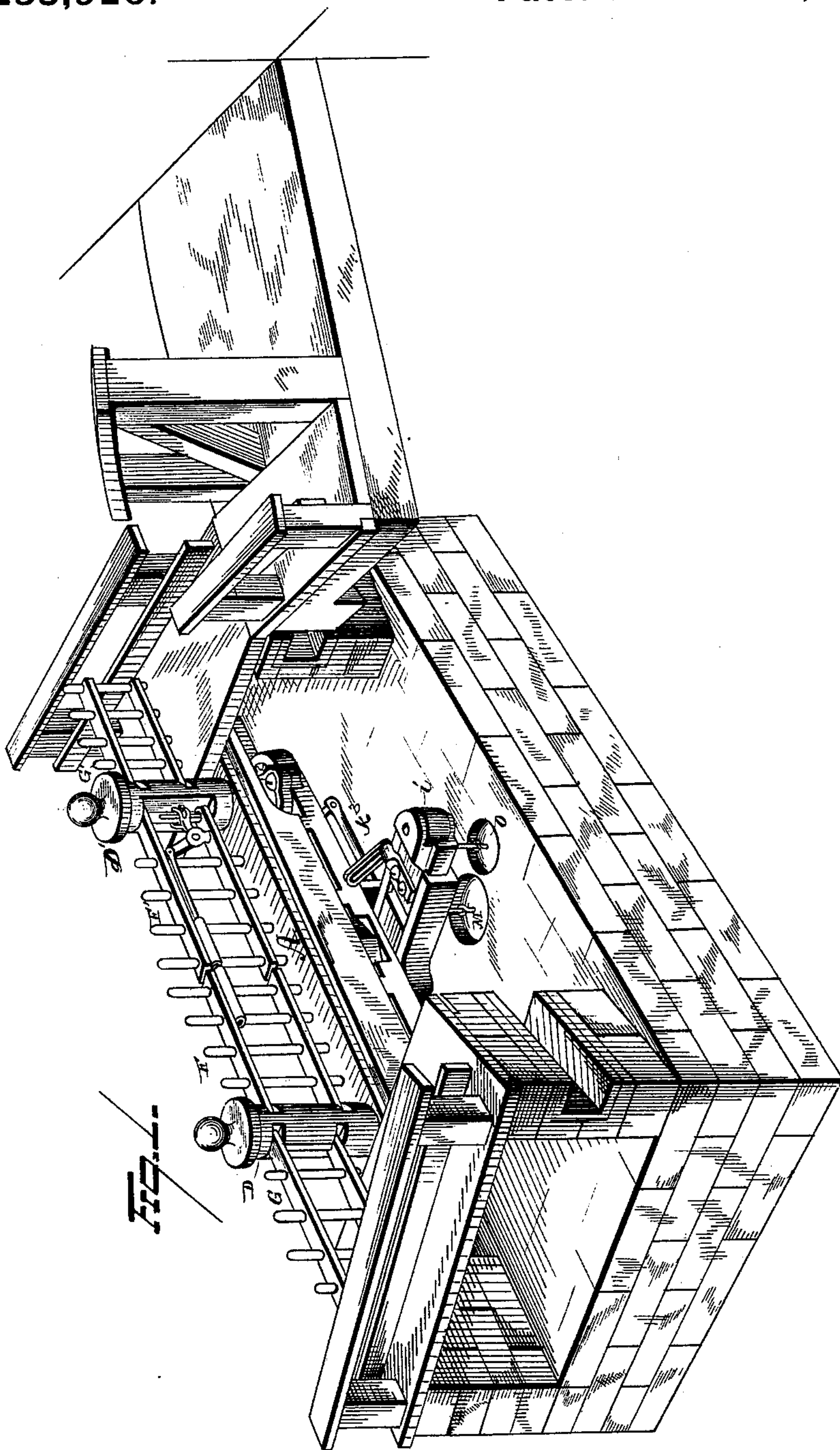
(Model.)

4 Sheets—Sheet 1.

T. J. GRAY.
Draw Bridge Gate.

No. 233,926.

Patented Nov. 2, 1880.



WITNESSES

E. J. Nottingham
A. M. Bright

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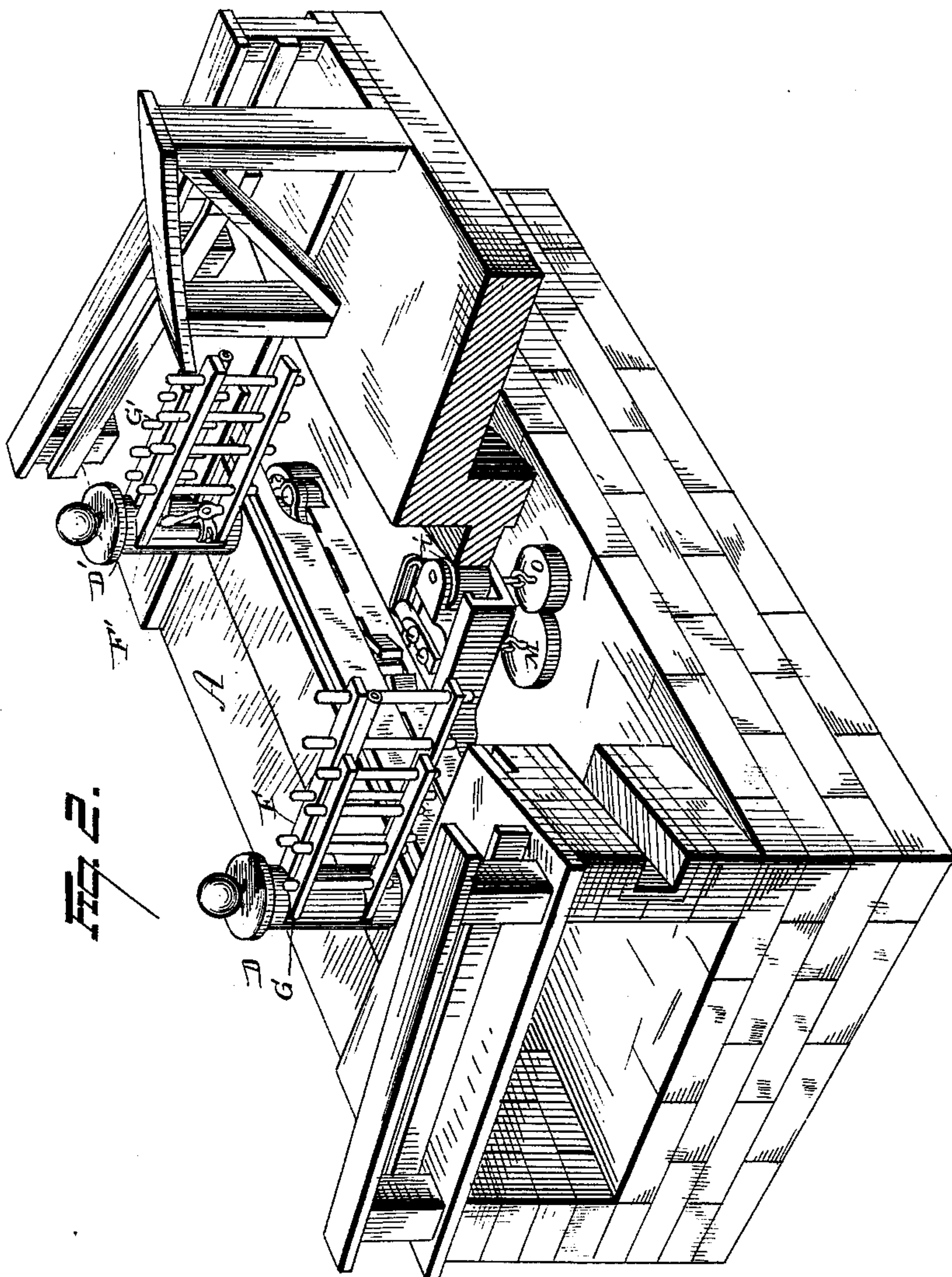
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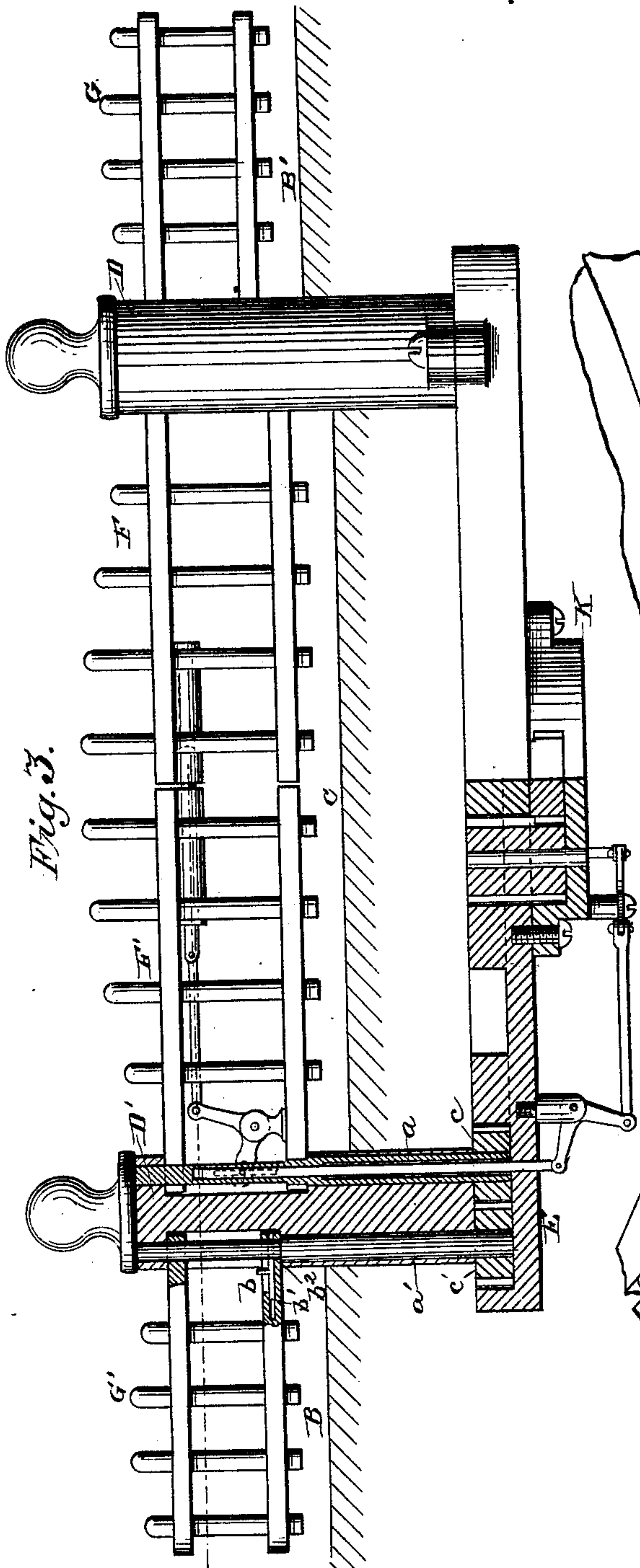


Fig. 3.

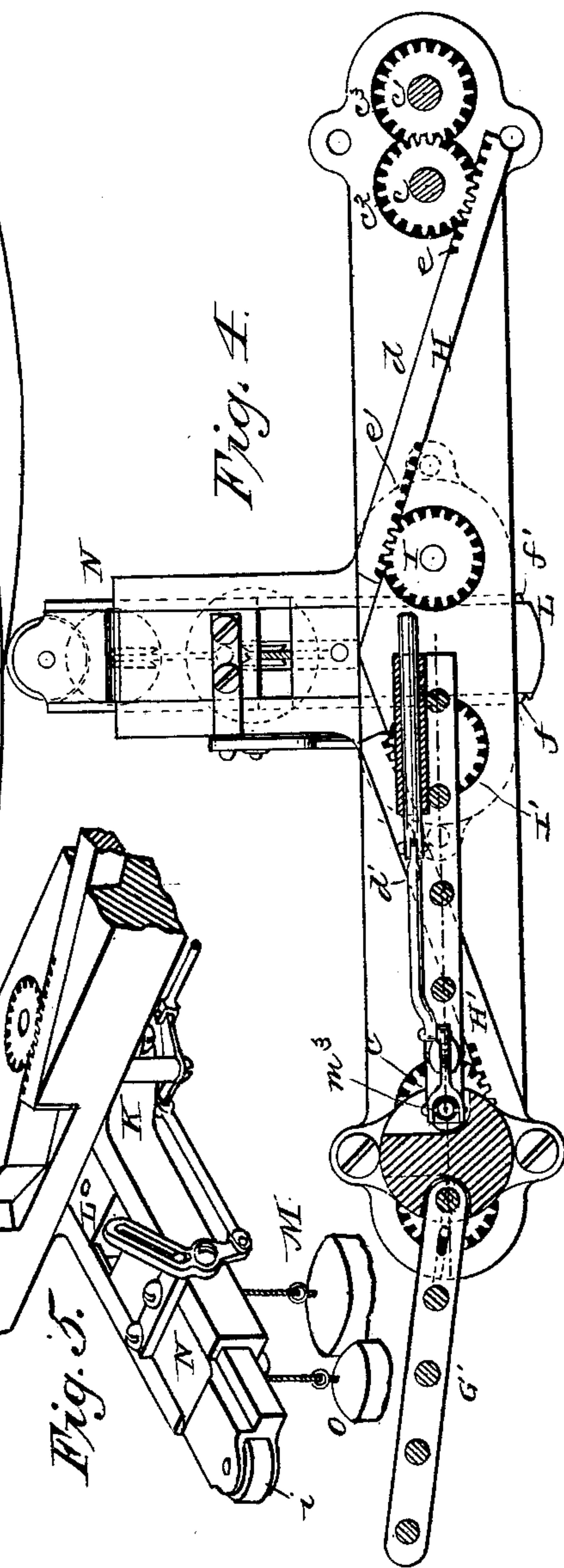


Fig. 4.

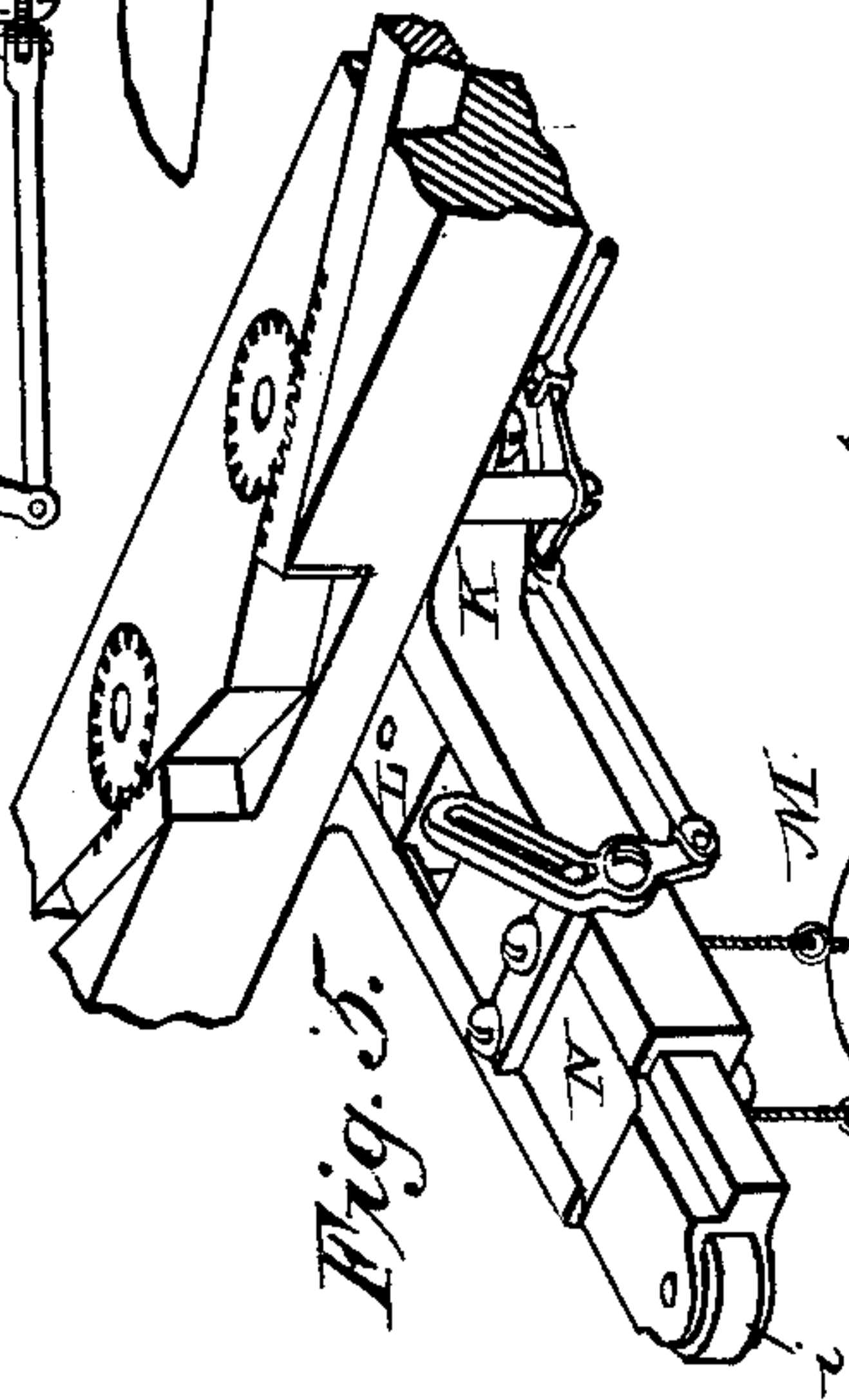


Fig. 5.

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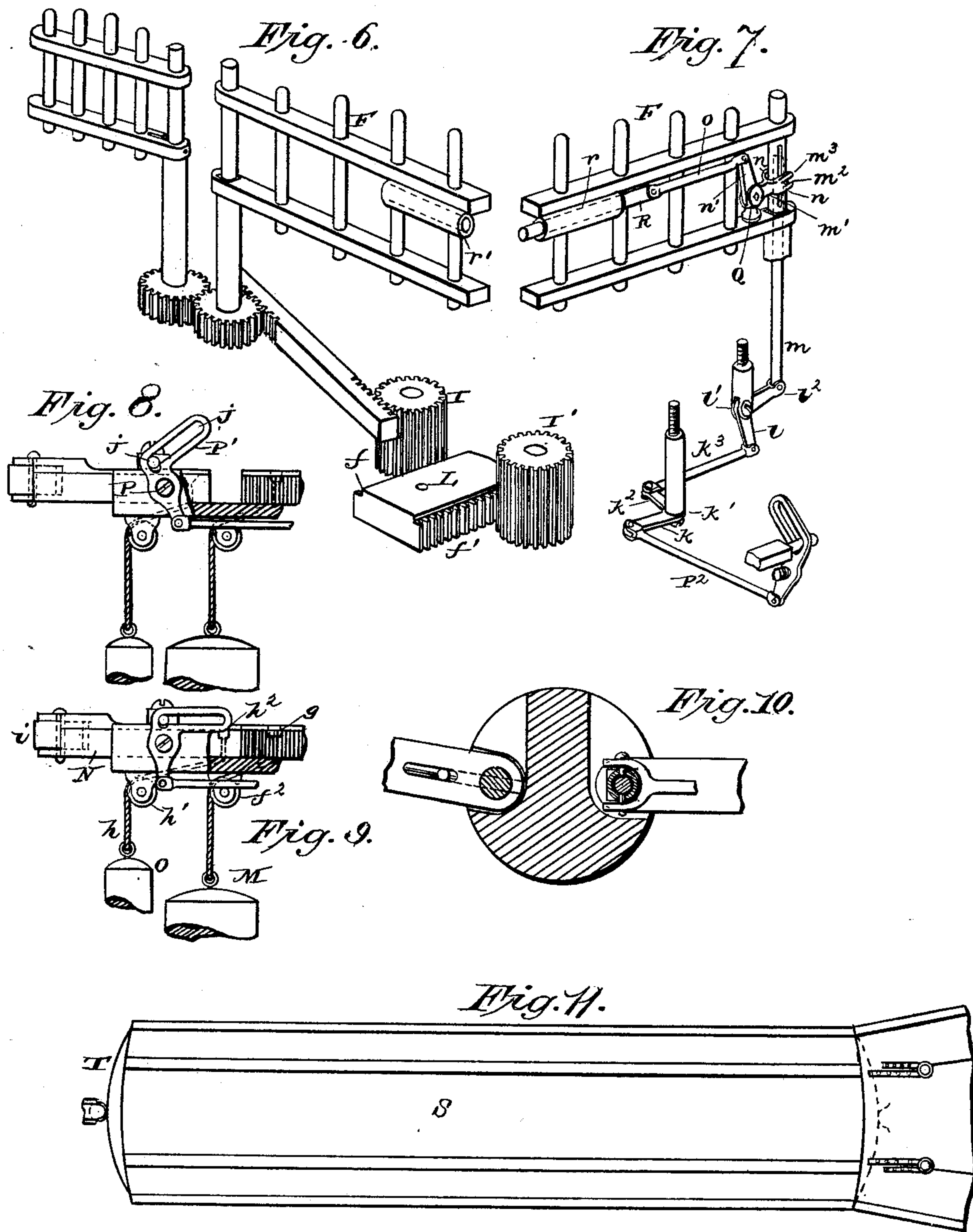
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UNITED STATES PATENT OFFICE.

THOMAS J. GRAY, OF CHICAGO, ILLINOIS.

DRAW-BRIDGE GATE.

SPECIFICATION forming part of Letters Patent No. 233,926, dated November 2, 1880.

Application filed March 10, 1880. (Model.)

To all whom it may concern:

Be it known that I, THOMAS J. GRAY, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Draw-Bridge Gates; and I do hereby 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in automatic draw-bridge gates, the object being to provide draw and swing bridges, ferry-boat landings, &c., with gates which will be automatically opened and closed by the movement of the bridge or ferry-boat; and to this end my invention consists in an automatic draw-bridge gate comprising certain novel details of construction, and combination and arrangement of parts, as will hereinafter be explained, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view, in perspective, showing the relative position of the different parts of the gate and actuating mechanism when the draw-bridge is closed. Fig. 2 is a similar view showing the draw open. Fig. 3 is a view, partly in side elevation and part vertical section, of the gate-posts. Fig. 4 is a view, partly in plan and part in transverse section, of the slide-bar and rack-and-pinion gearing for actuating the gates. Fig. 5 is a view, in perspective, of the slide-bar and weights connected therewith. Fig. 6 is a detached view, in perspective, of two gates, with their rack-and-pinion actuating mechanism. Fig. 7 is a detached view, in perspective, of one of the gates and devices for automatically reciprocating the locking-bolt. Fig. 8 is a detached view, part in side elevation and part in vertical section, of the slide-bar and weights connected therewith, illustrating this position of parts when the draw is open. Fig. 9 is a detached view of the slide-bar and weights, showing the relative position of parts when the draw has closed sufficiently to unlock the gates. Fig. 10 is a transverse section of one of the gate-posts. Fig. 11 is a plan view of a draw-bridge and the gates in their open position.

A represents the approach to a draw-bridge

or a ferry, B B' representing the footways, and C the roadway.

On opposite sides of the roadway C are firmly secured the gate-posts or standards D D', each having the two rotating gate standards or shafts *a a'* journaled therein. Shafts *a a'* may be provided with step-bearings at their lower ends, and be supported below in suitable recesses found in the supporting-base E, and proper provision made for lubricating their lower ends.

To the inner gate-shafts or standards *a a'* are rigidly secured the roadway-gates F F', while to the outer shafts, *a' a'*, are secured the footway-gates G G'. The latter may be rigidly secured to their shafts; but I preferably secure one or both of the gates G G' to the shafts by means of the locking-bolt *b*, which is simply a sliding bolt located in a recess, *b'*, and adapted to be forced into a slot, *b²*, in the gate-shaft. This provision is made in order that the footway-gates may be opened and closed independently of the position of the main gates F F', as it is often desirable for persons to have access to the draw or ferry for repairs or other purposes, when it is not desired to open the other gates.

While I have shown one form of locking device for locking the footway-gate to its shaft, it is evident that other forms of locking devices may be employed, and hence I do not restrict myself to the particular form shown and described.

To the lower ends of the shafts *a* is secured a pinion, *c*, which meshes with a pinion or cog-gear, *c'*, rigidly secured to the lower end of the shaft or standard *a'*. These pinions or cogs *c c'* are located in suitable recesses *c² c³* formed in the supporting-base E.

In the supporting-base E are formed recesses *d d'*, which serve as guideways for the rack-bars H H', the latter having a series of cog-teeth, *e*, formed on their outer ends, which mesh with the pinions or cog-gears *c* and with a series of cog-teeth, *e'*, on their inner ends at opposite sides, which mesh with the cogs or teeth of the pinions or cog-wheels I I', which latter are located in the central portion of the supporting-base E.

Instead of forming recesses *c² c³* in the supporting-base E to constitute guideways for the

rack-bars, I may employ adjustable plates or blocks for this purpose, and thus compensate for any wear, by means of screws extending outside of the supporting-base, whereby the plates or blocks may be readily adjusted to preserve a perfect mesh between the teeth of the pinions and rack-bars.

To the under side of the supporting-base E is bolted a guide-frame, K, in the rear end of which the cogs or pinions I I' are journaled. Between the pinions I I' is placed a sliding rack-bar, L, provided on opposite edges with the series of teeth $f f'$, which respectively engage with the pinions or cog-wheels I I', and hence when the rack-bar L is reciprocated it operates to impart a simultaneous rotary movement to the two cog-wheels I I'.

The rack-bar L is held against a rearward movement by the large weight M, to which is secured a cord, preferably a small wire-rope, which passes over a pulley, f^2 , journaled in brackets secured to the under side of the frame K, and secured at its opposite end to the rack-bar at g .

Within the outer end of the guide K is placed a slide-bar, N, which is retained against rearward movement by means of the small weight O, to which is attached one end of a wire rope or cord, h , the latter passing over a pulley, h' , journaled in hangers secured to or formed integral with the guide, the opposite end of the cord being secured at h^2 to the rear end of the slide-bar. In the outer end of the slide-bar is journaled a roller, i .

Instead of employing weights and cords for retaining the slide and rack-bars in their forward adjustment, I may use bell-crank levers and secure weights to the laterally-projecting arms located beneath the slide and rack-bars, and locate the upwardly-projecting arms of the levers in slots formed in the under side of the slide and rack-bars. Any form of weight will answer the desired purpose.

If large heavy gates are employed, I may attach strong boxes to the lower ends of the ropes or bell-crank levers, and fill the boxes or receptacles with rock, sand, or other material.

To the side of the guide K is pivoted a lever, P, which is provided with a link, P', on its upper end, said link being rearwardly inclined and provided with an elongated slot, j , in which works a pin or stud, j' , secured to the upper face of the slide.

P² is a connecting-rod, one end of which is pivoted to the lower end of lever P, and its opposite end to the arm k of bell-crank lever K'.

To the other arm, K², of bell-crank lever K, is pivoted one end of a connecting-rod, K³, the opposite end of which is pivoted to the arm l of bell-crank lever P', the other arm, P², of which is pivoted to the lower end of a vertically-reciprocating rod, m , which is located in the hollow gate-shaft a .

To the main gate F' is pivoted a bell-crank

lever, Q, the arm m' of which is provided with fingers n , having elongated slots m^2 formed therein, within which slots engages a pin, m^3 , secured to the vertically-reciprocating rod m . The other arm, n' , of the bell-crank lever Q is pivoted to a connecting-rod, o , which, in turn, is pivoted to the rear end of a sliding bolt, R, this being located in a tube, r , and its outer end adapted to engage in a tube, r' , secured to the opposite gate, F.

The end of the draw S is provided with a cam-shaped bar or plate, T, which is secured in any desired manner.

The bar or plate T is made of sufficient width to adapt it for operation under various conditions—as, for instance, to compensate for any sagging of the bridge, or, in the event that it is connected with a ferry-boat, to provide for the varying conditions of the tide.

Having described the construction and relative arrangements of the several parts of my improved automatic gate, I will now briefly describe its operation.

When the draw is open, as illustrated in Fig. 2, the foot and roadway gates are closed and locked, thus effectually barring all avenues to the open draw or ferry-landing. The four swinging gates are held in their closed position by means of the sliding locking-bolt, which latter is retained in its locked position by means of the weight O acting to force the sliding bar N forward, thereby causing the pin or stud j' connected therewith to turn the lever P on its pivot, and through the intermediate mechanism to retain the locking-bolt R in engagement with the socket or tube r' .

If it is desirable that one or both of the small or footway gates should be opened for any purpose while the main gates are closed, it can readily be done by simply disengaging the sliding bolt b from the gate-standard.

When the draw is closed the cam plate or bar on the end thereof strikes against the roller i , journaled in the end of the slide-bar N, and forces the latter rearwardly, which has the effect of turning the lever P, and, through the medium of the connecting-rod, bell-crank levers to depress the rod m , and thereby oscillate the bell-crank lever Q and withdraw the locking-bolt from its socket, thereby unlocking the gates. This operation of automatically unlocking the gates is performed prior to any movement being imparted to the gates; or, in other words, the slide-bar, which operates the locking mechanism, is made separate from and independent of the rack-bar through which the gates are operated, a space, U, being formed between the two to allow of the independent movement of the slide-bar N without affecting the rack-bar L. As the draw continues to move into its closed position the slide-bar is forced backwardly until the end strikes the forward end of the rack-bar L, and then the latter is forced rearwardly and operates to revolve the cogs or pinions I I', which

causes the rack-bars $H H'$, meshing therewith, to be reciprocated or drawn toward each other, and thereby rotate the pinions $c c$, attached to the gate-standards $a a$, and in turn rotate the

5 pinions $c' c'$, secured to the gate-standards $a' a'$. It will thus be observed that the swinging gates $G' F'$ are swung around toward each other, and the gates $G F$ also turned on their bearings, as illustrated in Fig. 1 of the drawings.

10 It will be observed that the four independent gates are automatically turned on their pivoted standards simultaneously, and the gates moved from a closed to their open position.

15 When the draw is opened the pressure of the roller i , journaled in the slide-bar N upon the inclined face of the cam plate or bar T of the draw assists quite materially in starting the latter and imparting movement thereto as the slide N is forced outwardly during the first part of its travel, by the combined power exerted by the weights M and O .

20 The continued movement of the draw from a closed to an open position allows the rack-bar L to be moved forward by the action of the weight M , and thus revolves the pinions or cogs $I I'$, forces the rack-bars outwardly or away from each other, and rotates the pinions

30 $c c'$ and closes the gates. The elongated slot j of the link P' allows the slide-bar N to be forced backwardly the desired distance without affecting the devices for actuating the locking mechanism, as will be understood on reference to Fig. 9 of the drawings.

35 While I have described one form of mechanism for automatically locking and unlocking the gates, it is evident that other connecting devices may be employed for effecting the same result—as, for instance, the rope or cord attached to the weight O may pass over suitable sheaves, and be connected at its opposite end to the bell-crank lever, which is pivoted to the reciprocating rod m ; and hence I would have it understood that I do not restrict myself to the particular construction and arrangements of parts shown and described for automatically locking and unlocking the

40 50 gates. Again, instead of employing a rack-bar to transmit rotary motion from the pinion I to the pinion c , both of said pinions may be provided with arms, and the latter be connected by a connecting-bar.

55 The connecting rack-bars may be made adjustable in length, and also adjustable stops are preferably secured to the gate-posts for stopping the gates.

60 Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with two or more swinging gates, of a rack-bar provided on opposite

65 sides with teeth which mesh with pinions or

cog-gears, and rack-bars provided with teeth at opposite ends for transmitting motion to pinions attached to the gate standards or shafts, substantially as set forth.

2. The combination, with gate-posts located on opposite sides of the roadway, each gate-post having two independent shafts or standards journaled therein and furnished with pinions which mesh with each other, of independent gates secured to said shafts, mechanism for operating all the gates simultaneously, one or more of said gates being rigidly secured to its shaft by a locking device, substantially as set forth.

3. The combination, with two swinging gates and a locking device connected with the gates, of a slide-bar, weight connected therewith, and intervening mechanism for unlocking the gates when the slide-bar is retracted, the weight serving to actuate the locking-bolt and lock the gates, substantially as set forth.

4. The combination, with a draw or swing bridge, or ferry-boat having a cam-plate or bar secured to its end, of two swinging gates having locking devices directly attached thereto, a rack-bar and intervening mechanism for opening the gates by the pressure of said cam-plate, exerted indirectly upon said rack-bar, a slide-bar adapted to move independently of the rack-bar, said slide-bar connected with the gate-locking devices by intervening mechanism, the several parts being constructed and arranged to allow the cam plate or bar to push back the slide-bar and withdraw the locking-bolt of the gate, and afterward push back the rack-bar and open the gates, substantially as set forth.

5. The combination, with two or more swinging gates having locking devices attached thereto, of a slide-bar arranged to be pushed back by a cam plate or bar secured to the end of a draw-bridge or ferry-boat, intervening mechanism connecting the slide-bar with the locking devices on the gates, and a weight connected with the slide-bar for locking the gates when in their closed position, substantially as set forth.

6. The combination, with a gate-post having two vertical gate shafts or standards journaled therein, and intermeshing pinions secured to their lower ends, of a rack-bar adapted to be pushed back by a cam-plate secured to the end of the draw, and an intermediate rack-bar for imparting rotary motion to one of the pinions secured to the gate-standard, substantially as set forth.

7. The combination, with the rack-bar L , cog-gears or pinions $I I'$, rack-bars $H H'$, pinions c , gate standards or shafts a , and gates $F F'$, substantially as set forth.

8. The combination, with the rack-bar L , cog-gears or pinions $I I'$, rack-bars $H H'$, pinions $c c'$, gate standards or shafts $a a'$, and gates $F F'$, $G G'$, substantially as set forth.

9. The combination, with the gates and in-

tervening mechanism, of the rack-bar L, slide-bar N, and weights M O, substantially as set forth.

10. The combination, with the rod *m*, and
5 devices for automatically reciprocating the same, of the hollow shaft *a*, bell-crank lever Q, connecting-rod *o*, and sliding bolt R, substantially as set forth.

11. The combination, with the locking mechanism, of the slide-bar N, lever P, provided

with link P', and stud or pin secured to the slide-bar, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 16th day of February, 1880.

THOMAS J. GRAY.

Witnesses:

P. J. MEANEY,
JAMES HAINING.