(No Model.)

3 Sheets—Sheet 1.

W. S. MORTON.

AUTOMATIC DRAW BRIDGE GATE.

No. 334,084. Patented Jan. 12, 1886.

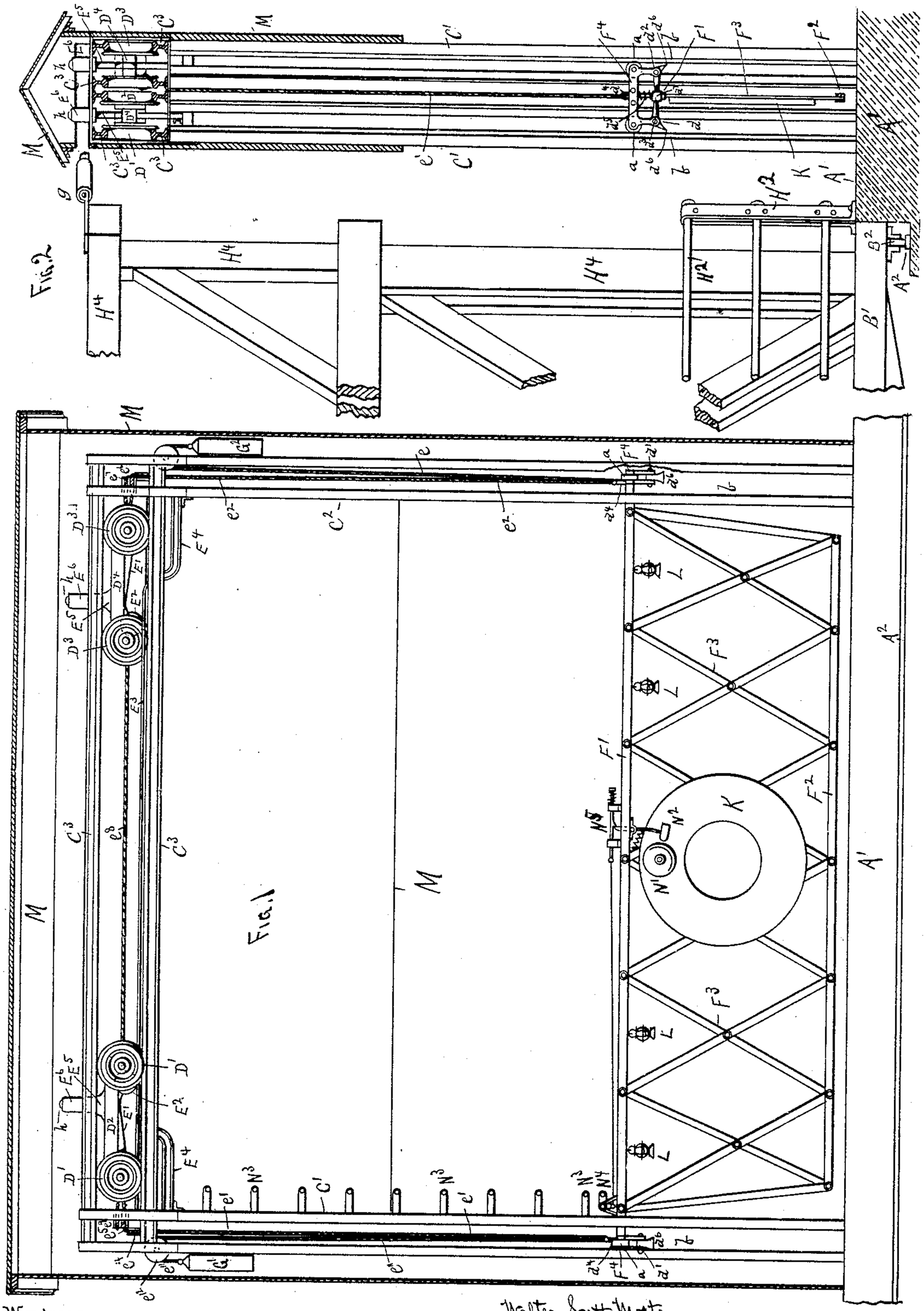

FIG. 2

FIG. 1

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(No Model.)

3 Sheets—Sheet 2.

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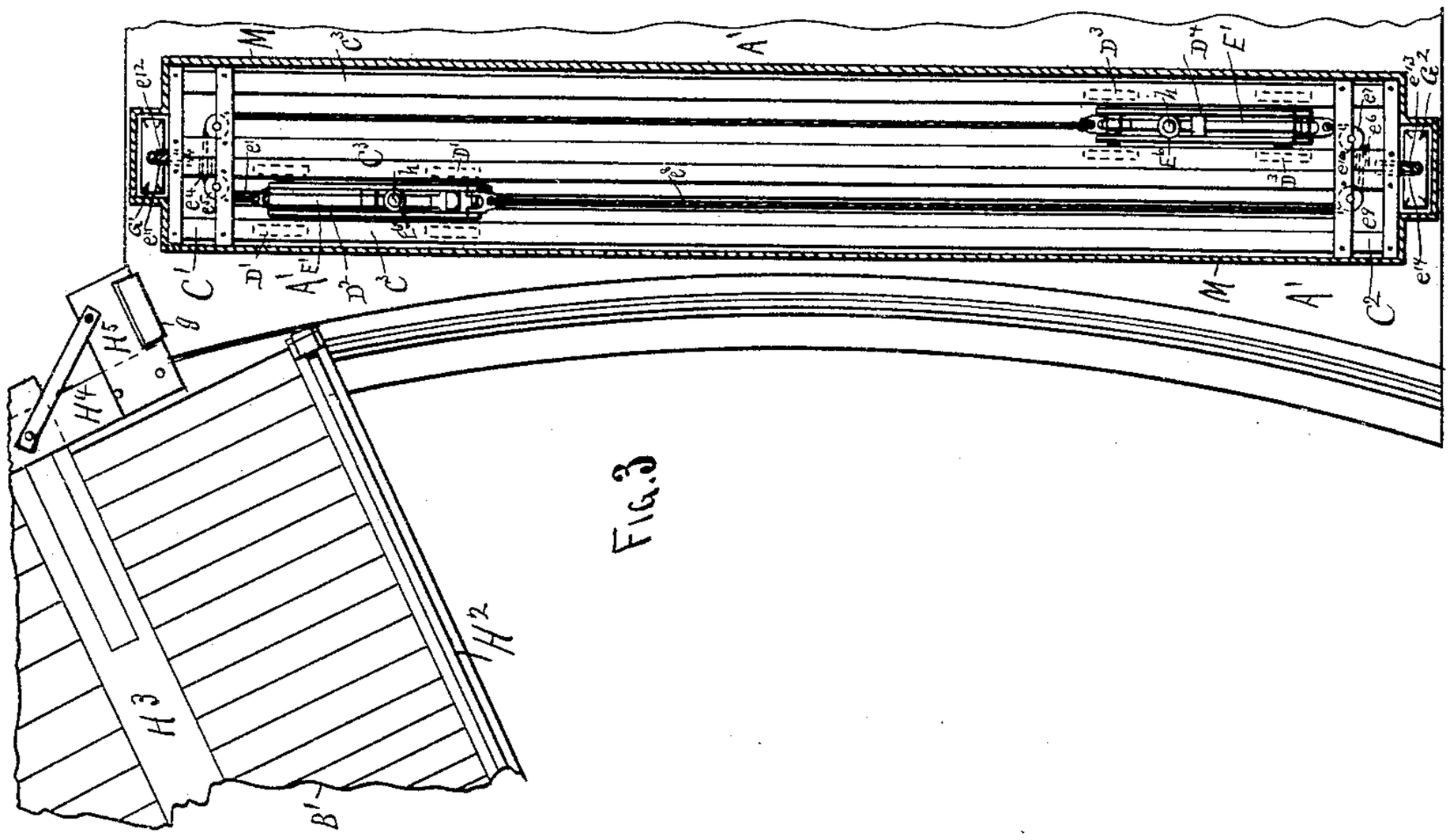

FIG. 3.

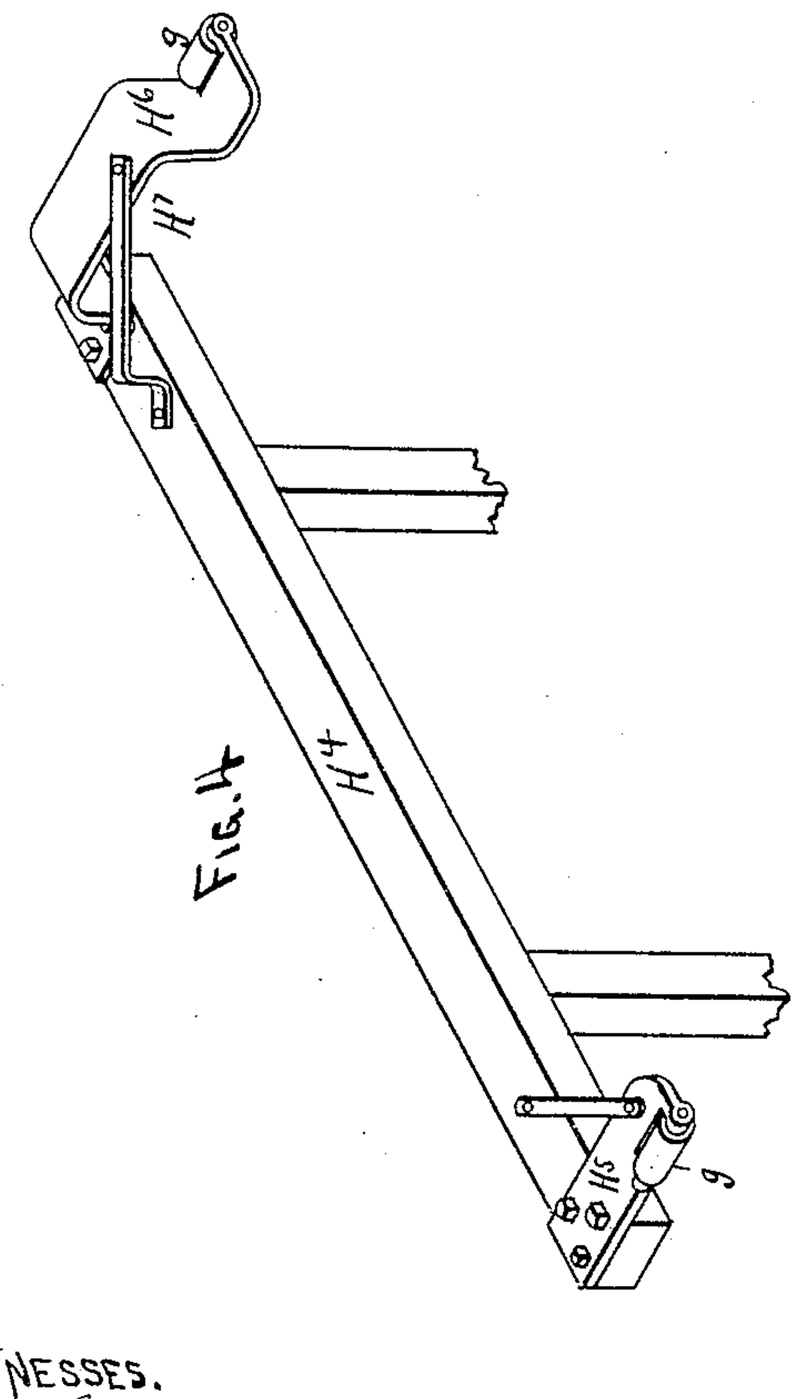

FIG. 4.

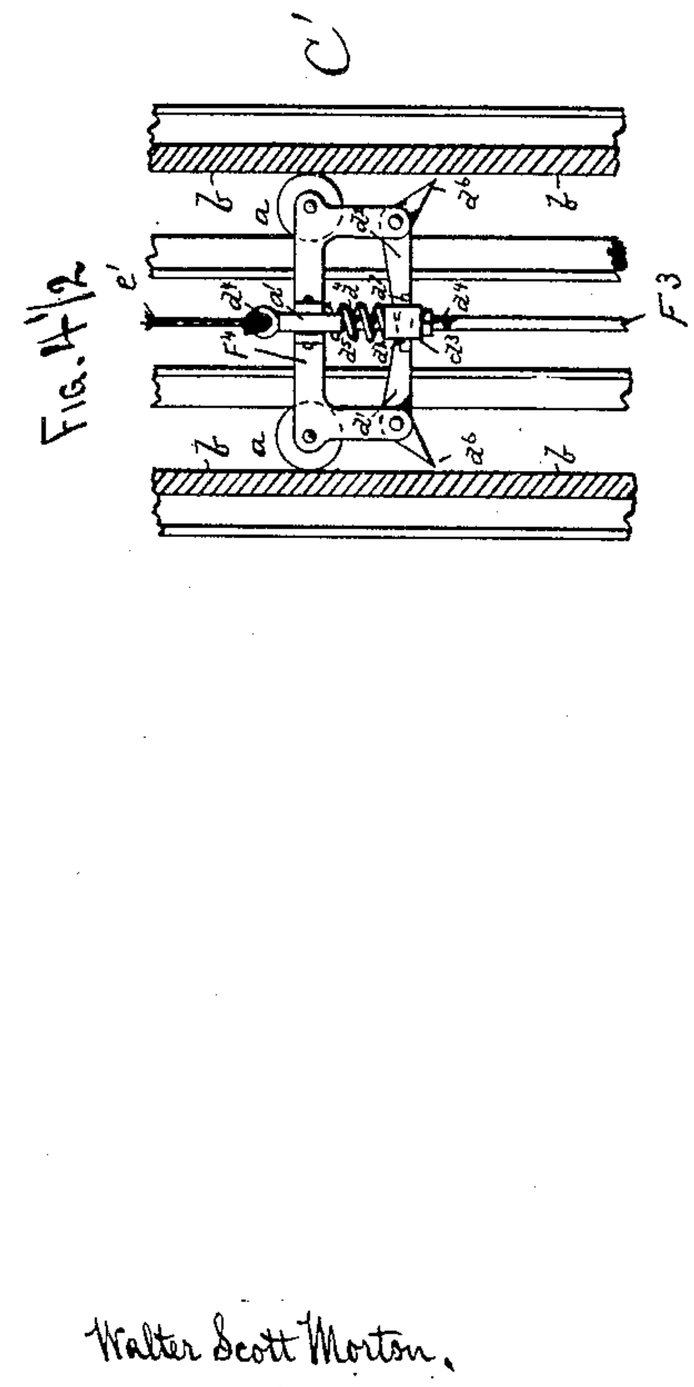

FIG. 4½.

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(No Model.) 3 Sheets—Sheet 3.

W. S. MORTON.

AUTOMATIC DRAW BRIDGE GATE.

No. 334,084. Patented Jan. 12, 1886.

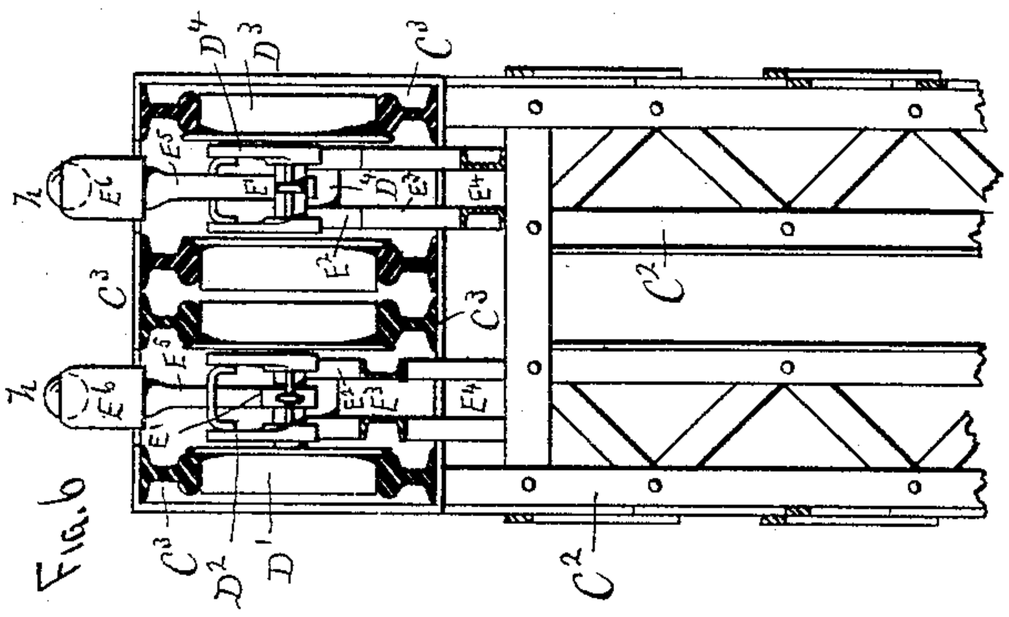

Fig. 6

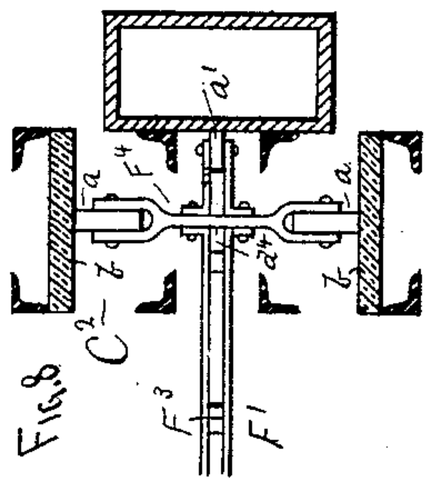

Fig. 8

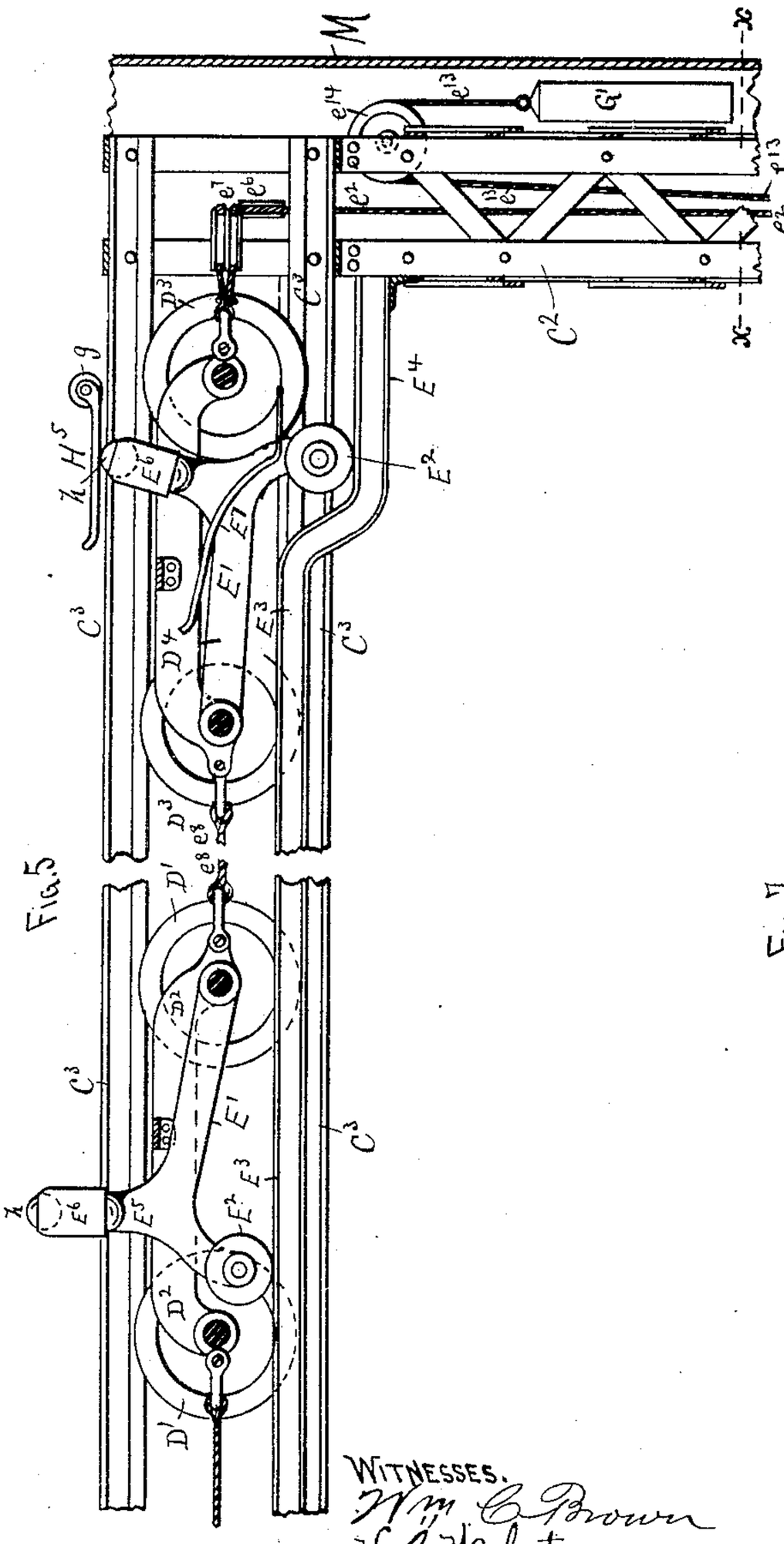

Fig. 5

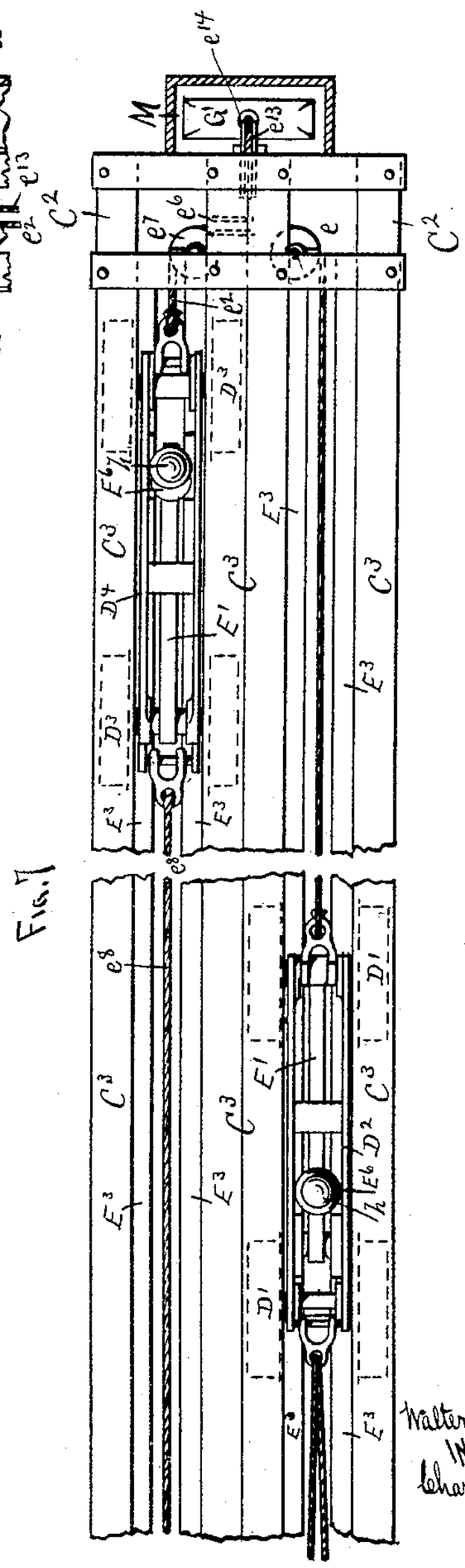

Fig. 7

WITNESSES.
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Charles N. Woodward.
Atty.

UNITED STATES PATENT OFFICE.

WALTER S. MORTON, OF ST. PAUL, MINNESOTA.

AUTOMATIC DRAW-BRIDGE GATE.

SPECIFICATION forming part of Letters Patent No. 334,084, dated January 12, 1886.

Application filed July 31, 1885. Serial No. 173,181. (No model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT MORTON, a citizen of the United States, and a resident of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Automatic Draw-Bridge Gates, of which the following is a specification.

This invention relates to gates adapted to be opened and closed across the entrances of draw-bridges by the action of the bridge in closing and opening; and it consists in the construction, combination, and arrangement of parts, as hereinafter shown and described.

In the drawings, Figure 1 is a sectional front view of one of the gates and its operating mechanism, the gate being shown closed. Fig. 2 is a cross-sectional view of the parts shown in Fig. 1, with a portion of the bridge shown in perspective. Fig. 3 is a plan view of the parts as shown in Fig. 2. Fig. 4 is a perspective view of the frame-work attached to the bridge and carrying the gate-operating arms. Fig. 4½ is an enlarged sectional detail illustrating more fully the construction of the automatic safety-catches. Fig. 5 is an enlarged sectional side view. Fig. 6 is an enlarged sectional end view, and Fig. 7 is an enlarged sectional plan view of the frame-work, tracks, and gate-elevating trucks, illustrating more fully their construction and mode of operation. Fig. 8 is a cross-sectional view on the line *x x* of Fig. 5.

A′ represents the roadway or approach to the bridge, and B′ represents a portion of one end of a draw-bridge floor, the latter being arranged to swing around upon a circular track, A^2, upon truck-wheels B^2, in the ordinary manner, so that when the bridge is closed an unbroken connection will be formed between the roadway and bridge. Erected upon the sides of the roadway, near the point of junction of the bridge and roadway, are two upright posts or frames, C′ C^2, connected across the roadway at their tops by horizontal bars C^3 of railroad-rails, the posts C′ C^2 and the rails C^3 thus forming an arch across the roadway or entrance to the bridge The rails C^3 will be of a sufficient height above the roadway to permit a gate to be elevated up beneath them and still leave a clear space beneath the gate for the passage of the largest wagons or their highest loads. Usually the space beneath the gate should be from twelve to eighteen feet, but may be more or less, as preferred. The gates will be usually from four to ten feet high; hence the bottom of the rails C^3 should be from sixteen to twenty-five feet above the roadway. The posts C′ C^2 will usually be constructed of iron, braced and strengthened in a suitable manner, as shown in Figs. 5 and 6, but may be constructed in any other approved manner.

For the rails C^3 I will usually adopt the ordinary "T" railroad-rail, but other forms may be used, although I prefer the arrangement shown.

For a draw-bridge which always opens in one direction only four of the rails C^3 will be required, two above and two below; but for a bridge which opens from both directions eight of the rails C^3 will be used, as shown, four above and four below. The lower rails, C^3, are set with their "treads" or "heads" upward, and are arranged in pairs, as shown in Figs. 2, 5, and 6, the two lower rails on the left forming a track for the flanged wheels D′ of one truck, D^2, and the two lower rails on the right forming a track for the flanged wheels D^3 of a truck, D^4. These two trucks are adapted to be moved back and forth over their respective tracks independently of each other. Where a bridge opens only in one direction, only one of these trucks and its respective tracks will be used; but where the bridge is adapted to be opened in both directions two trucks and their tracks will be required. The upper sets of rails, C^3, will be placed directly above the lower sets of rails, so that each of the lower rails will have a companion rail directly above it, and with its tread or head pointing downward. The upper rails are merely intended to act as guides to the trucks D^2 D^4 to keep them from leaving the lower rails. Each of the trucks D^2 D^4 is provided with an arm, E′, pivoted to one of the axles of the wheels D′ D^3, and passing inward toward its other axle, and provided with bearings-wheels E^2, adapted to run upon tracks E^3, formed of channel-iron bars, and set between the lower rails, C^3, of each truck. The arms E′ of each respective truck point in opposite directions, as shown in Fig. 5. The tracks E^3 are straight and parallel with the rails C^3, except near one end, where they are depressed, as shown at E^4 in Fig. 5, each pair

of the rails E^3 being thus bent downward only at one end, and at the end toward which the bearing-wheels E^2 point. By this arrangement, when the trucks are moving along the rails C^3, the bearing-wheels E^2 will run upon the rails E^3, and while thus running upon the horizontal parts of the rails E^3 the arms E′ will be held upward, as shown at the left of Fig. 5; but when the wheels E^2 reach the depressed portion E^4 the bearing-wheels E^2 will run down upon these depressed portions, as shown at the right of Fig. 5.

Attached to each of the arms E′ is an upright projection, E^5, upon whose upper ends are journaled rollers E^6, the rollers projecting up above the upper rails, C^3, when the arms E′ are held upward, as at the left of Fig. 5, and adapted to fall below the upper line of the rails C^3 when the bearing-wheels E^2 run down into the depressed portions E^4, as at the right of Fig. 5.

Fixed to the rails C^3 or E^3 in any suitable manner are guides E^7, conforming to the curves of the depressed portions E^4 of the rails E^3, beneath which the wheels E^2 are adapted to run, so as to insure the passage of the wheels E^2 into the depressed portions E^4. By this means the "dip" of the rollers E^6 beneath the upper surfaces of the upper rails, C^3, is insured, this being the function of the depressed portions E^4, as hereinafter explained.

The gate may be formed in any suitable manner or of any suitable material, but should be as light as is consistent with strength and durability.

The gate will be long enough to reach entirely across the roadway, including sidewalks, averaging about forty feet; but this distance will vary according to circumstances.

In the drawings I have shown a gate formed of iron bars in lattice-work design, F′ F^2 being the upper and lower "chords," respectively, and F^3 being the diagonal connecting-braces or tie-bars. The ends of the upper chord, F′, are extended outward between the sides of the posts C′ C^2, and are provided with cross-bars F^4, in the ends of which anti-friction rollers *a* are journaled and adapted to run against the inner surfaces, *b*, of the posts. These surfaces *b* will be of hard wood attached to the interior of the posts, as shown. Suspended beneath the cross-bars F^4 are two small levers or "dogs," *d′ d²*, their outer ends or points, d^6, sharpened and lying close to the surfaces *b*, and their other ends, d^7, projecting inward toward each other, and both held loosely in one common strap or ring, d^3. Attached to each of these straps or rings d^3 is a bolt, d^4, each bolt passing upward through the ends of the chord F′, and each having connected to it a wire cable or a chain, *e′ e²*, as shown. The cable *e′* passes upward over a pulley, e^4, journaled in the upper part of the post C′, and thence over another pulley, e^5, and thence to the truck D^2, to which it is attached. The cable e^2 passes upward over pulleys e^6 e^7 in the post C^2, and thence to the truck D^4, to which it is attached. A third cable, e^8, is attached by one end to the opposite end of the truck D^2 from the end to which the cable *e′* is connected, and passes thence around pulleys e^9 e^{10} to the truck D^4, being attached thereto at the opposite end from the cable e^2, as shown.

e^{11} is another cable connected to one of the bolts d^4 and passing upward alongside the cable *e′*, and thence over a pulley, e^{12}, to a counter-weight, G′, while a similar cable, e^{13}, is connected to the other bolt, d^4, to which the cable e^2 is attached, and runs upward alongside the cable e^2, and thence over a pulley, e^{14}, to a counter-weight, G^2. Thus each end of the gate is counterweighted, so that less force will be required to elevate it. The weights G′ G^2 will not be heavy enough to balance the gate, but a little less in weight, as the gate is required to fall by its own weight, the function of the weights being to render its elevation more easy.

Between the cross-bars F^4 and the rings d^3 the bolts d^4 will be surrounded by coiled springs d^5, to form cushions to prevent the sudden pulling upward upon the cables *e′ e²* affecting the gate injuriously. The springs also perform another function—viz., they act as a safety-force to depress the long arms d^7 of the levers *d′ d²*, and thus throw their pointed ends d^6 outward to cause them to engage with the wooden surfaces *b* and arrest and support the gate in event of the breakage of the cables *e′* or e^2 when the gate is elevated.

The levers *d′ d²* will be so formed that when their inner ends, d^7, are held upward by the rings d^3 their outer pointed ends, d^6, will not touch the surfaces *b;* but when the inner ends of the levers are depressed the outer ends will be thrown outward and be embedded into the wooden surfaces *b*, and thus firmly support and hold the gate. The whole weight of the gate is thus borne by the springs d^5 at all times, and when the cables *e′ e²* are intact this weight of the gate serves to keep the springs depressed and the points d^6 away from the surfaces *b;* but just the moment the cables *e′ e²* are released the reaction of the springs throws the points d^6 outward and arrests the downward movement of the gate. Thus a safety attachment is formed that is dormant except when required to be used, as above mentioned.

Another important function of the springs d^5, as above mentioned, is that they form cushions to the gate, so that any sudden upward force applied to the cables *e′ e²* will not be communicated directly to the gate, but its force will be expended upon the springs and not affect the gate.

B′ represents a section of the floor, H^2 the hand-rail, H^3 the truss, and H^4 an extension-frame carrying the trips or arms H^5 H^6, (see Fig. 4,) which act upon the rollers E^6. Of course different forms of bridges will require different forms of the frames H^4, but I have shown positions of an approved form of a bridge for the purpose of illustration. When the bridge opens from one side only, the arm

H^5 only will be required, but where the bridge opens from both sides then an additional arm, H^6, will be required, the latter being arched to enable it to pass over one of the rollers E^6 without affecting it, as hereinafter shown. The arms H^5 and H^6 will each be provided with an anti-friction roller, *g*, to nullify the friction on the rollers E^6, and into the upper end of each of the rollers E^6 will be inserted a ball, *h*, to receive the impact of the under surfaces of the arms H^5 H^6 as they pass over them, and thus nullify the friction at those points.

When the gate is down or closed, as in Figs. 1 and 2, the trucks D^2 D^4 will be held at opposite ends of their tracks from the depressed portions E^4, and when the gate is elevated the trucks will be held at the other extremes of their strokes or travel, and with the bearing-wheels E^2 down into the depressions E^4, and with the rollers E^6 *h* held down beneath the arms H^5 or H^6, as shown in Fig. 5 at the right. When the bridge is to be closed, the trucks being in the position shown in Fig. 1, the arm H^5 or H^6 (according to the direction from which the bridge is moving) will strike one of the rollers E^6 and push the trucks along the tracks C^3, and through the connection of the trucks with the gate by the cables the latter will be drawn upward.

Just as soon as the truck upon which the arm H^5 or H^6 is acting begins to move, the other truck, of course, being connected to it by the cable e^8, also begins to move toward it, the two trucks passing each other and the two rollers E^6 E^6 "dipping" downward by the action of the bearing-wheels E^2, running into the depressions E^4, and allowing the arms H^5 H^6 to pass over them, and when the bridge is closed each of the arms H^5 H^6 will remain above its respective roller E^6 and hold it depressed, and thus positively hold the gate elevated so long as the bridge is closed.

In Figs. 2 and 3 a section of the bridge with the arm H^5 attached is shown, and with the arm just on the point of striking the roller E^6, the other arm, H^6, being inoperative when the bridge is being moved in the direction shown by the arrows. When moved in this direction, the arm H^6 does not act except to pass over one of the rollers E^6 after it is depressed. When, however, the bridge is to be closed from the opposite direction to that indicated by the arrows in Fig. 3, the arm H^6 will be active and the arm H^5 inoperative. The arm H^6 acts upon the roller E^6 of the truck D^4 only, and is arched, as shown at H^7 in Fig. 4, to enable the roller E^6 on the truck D^2 to pass beneath it. Thus the gate will be elevated by the action of the bridge in closing, no matter from which direction the bridge may be moved.

As before stated, where the bridge is opened in one direction only, only one set of the tracks C^3 and only one truck, D^2, will be required, and consequently the arm H^5 only will be required. In that event the cable e^8 will be carried from one end of the truck D^2 around the pulleys e^6 e^7 e^9 e^{10}, and thence to the other end of the truck D^2. Otherwise there will be no change in the arrangements.

In the center of the gate will be placed a large target, K, of any suitable material, form, or color, which can be readily distinguished at a distance, to denote to the driver of an approaching vehicle that the gate is closed, and that consequently the draw-bridge is open.

A number of lanterns, L, with red or other colored globes, will be suspended from the gate to give warning at night, when the target K is not discernible.

The upper parts of the posts C′ C^2 and the tracks C^3 will be inclosed within a housing, M, to protect them, and also the trucks and cables, from the weather. This housing M will project downward far enough, so that when the gate is elevated it will be entirely covered and out of sight. I accomplish two objects by this arrangement—first, the gate is protected from the weather when elevated, which will be, of course, continually, except at short intervals when the "draw" is opened; and, secondly, the housing forms a hood to the target K by day and the lanterns L by night, so that if the persons who desire to pass over the bridge do not see the target or the lights they will know that the bridge is closed and the passage-way clear.

Attached to the gate is a "gong" or bell, N′, upon which a hammer, N^2, is adapted to strike by a series of pins, N^3, fixed at regular intervals on one of the posts C′ or C^2, acting upon a system of bell-cranks N^4 and trips N^5, and thus gives warning all the time the gate is being raised and lowered.

I am aware that for analogous purposes—as, for example, in railway-crossing gates—automatic mechanisms for striking warning gongs or bells while the gates are closing have hitherto been contemplated and used, and also that the ringing of such gongs has been effected by a striking mechanism set in motion by a series of operating-pins attached to the gates and arranged to act successively during the descent of the same. I therefore make no claim to such mechanism in general, but limit myself to the devices which have just been described.

The lower chord, F^2, of the gate will be shorter than the upper chord, F′, so that if one end of the gate is elevated faster or a little ahead of the other the lower chord will not come in contact with the posts. By this means an extremely delicate or close adjustment of cables and trucks will not be required, as a little variation will not interfere with the perfect operation of the gate. Anti-friction rollers *a′* may be placed in the ends of the upper chord, F′, to prevent any end movement of the gate cramping it in the posts C′ C^2.

When the bridge is being opened, the arms H^5 H^6 passing from above the rollers E^6, the weight of the gate will cause the trucks to follow up the arms H^5 H^6, and the gate will be

retarded and move downward with a motion corresponding to the motion of the bridge and move just as fast and no faster than the bridge is opened.

Having thus described my invention, what I claim as new is—

1. In an automatic draw-bridge gate, a gate arranged to be raised and lowered across the entrance to the bridge, a horizontal track arranged crosswise of the entrance, a truck adapted to travel upon said track, and cables connecting said truck to the ends of said gate, whereby the movement of the truck along said track in one direction will open said gate, in combination with a draw-bridge, and an operating-arm fixed to said bridge, which co-operates with said truck to move the same so as to open the gate, and to hold said gate at all times open when the draw is closed, substantially as set forth.

2. In an automatic draw-bridge gate, a gate arranged to be raised and lowered across the entrance to the bridge, a housing above said gate, in which it is entirely concealed when raised, and a truck adapted to travel upon a suitable track across the entrance to said bridge within said housing, and connected by cables to said gate, so that when moved in one direction upon said track it will elevate said gate, and an operating-arm attached to said draw-bridge and adapted to act upon said truck when said bridge is being closed to elevate said gate, and hold it elevated while the draw is closed.

3. In an automatic draw-bridge gate, a gate arranged to be raised and lowered across the entrance to the bridge, a horizontal track above said gate, a truck adapted to travel upon said track, and connected to the ends of said gate by cables, so that the movement of said truck along said track in one direction will elevate said gate, and an arm fixed to said bridge and adapted to move said truck along said track when said bridge is being closed to elevate said gate, and hold it elevated at all times while the bridge is closed, substantially as set forth.

4. In an automatic draw-bridge gate, a gate arranged to be raised and lowered across the entrance to the bridge, horizontal double tracks extending parallel with each other crosswise of the entrance, two trucks which travel on said tracks, respectively, in opposite directions, and cables connecting said trucks with each other, and each truck with one side of the gate, respectively, whereby movement of either truck will operate said gate, in combination with a draw-bridge which may be opened in either direction, and two fixed operating-arms secured to said draw-bridge, one of said arms being arranged to engage with one of said trucks only to open the gate, and the other arm being arranged to engage the other truck only, said arms acting, respectively, according as the draw is closed in one direction or the other, substantially as set forth.

5. In an automatic draw-bridge gate, the combination of upright posts C' C^2, horizontal double tracks C^3, connecting them at their upper ends, a gate adapted to project across and be raised and lowered between said posts and beneath said tracks, two trucks adapted to run in opposite directions upon said tracks and connected to each other and to said gate by cables e' e^2 e^8, so that the movement of either or both of said trucks will raise and lower said gate, an arm, E', pivoted upon each of said trucks and provided with upwardly-projecting rollers E^6 and bearing-wheels E^2, tracks E^3, upon which said bearing-wheels are adapted to travel, said tracks being provided with depressed portions E^4, into which said bearing-wheels E^2 are adapted to run, and arms H^5 H^6, fixed to said bridge and adapted to act upon said rollers, and arms to move said trucks and elevate said gate when said bridge is being closed, substantially as set forth.

6. In an automatic draw-bridge gate, a gate arranged to be raised and lowered across the entrance to the bridge, a horizontal track above said gate, a truck adapted to travel upon said track and connected to the ends of said gate by cables, so that the movement of said truck along said track in one direction will elevate said gate, and counter-weights G' G^2, connected to said gate, and a bar, H^5, fixed to said bridge and adapted to move said trucks along said track when said bridge is being closed to elevate said gate, and hold it elevated at all times while the bridge is closed, substantially as set forth.

7. In an automatic draw-bridge gate, upright posts C' C^2, between which the ends of said gate are adapted to project and the gate raised and lowered, a gong, N', attached to said gate and provided with a striking-hammer, N^2, and pins N^3 upon one or both of said posts and adapted to operate said hammer and sound said gong at short intervals during the raising and lowering of said gate, substantially as set forth.

8. In an automatic draw-bridge gate, a gate arranged to be raised and lowered across the entrance to the bridge, a housing above said gate, in which it is entirely concealed when raised, and a system of signals for night and day use attached to said gate, so that when said gate is lowered said signals are exposed, and when said gate is elevated said signals are entirely concealed, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WALTER S. MORTON. [L. S.]

Witnesses:

ROBERT B. WHITACRE,

S. J. HEWSON.