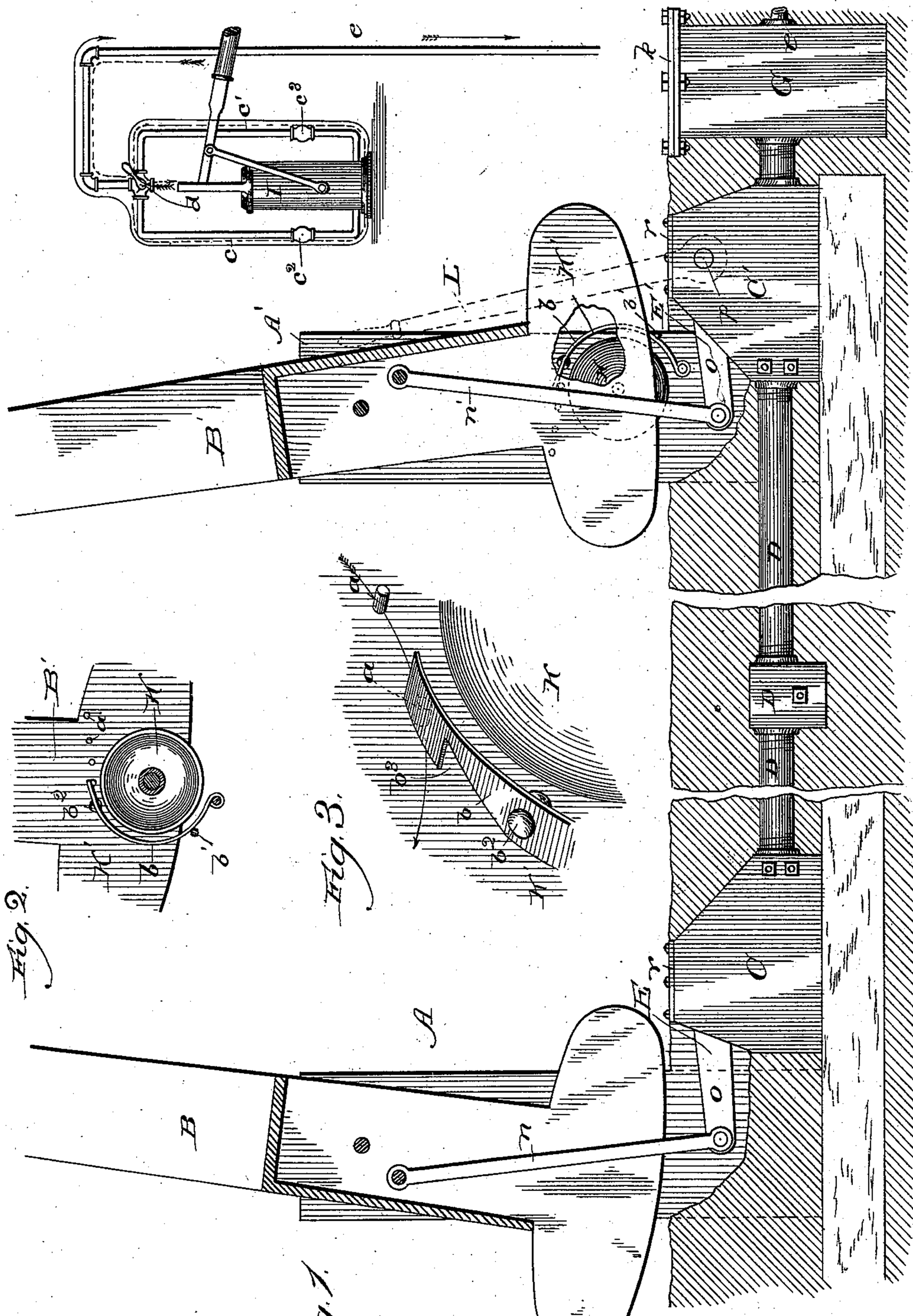
(No Model.) 2 Sheets—Sheet 1.

M. B. & F. W. MILLS.

GATE.

No. 381,159. Patented Apr. 17, 1888.



Witnesses:
Chas. E. Gaylord.
J. W. Dyrenforth.

Inventors:
Mortimer B. Mills.
Frank W. Mills.
By Dyrenforth & Dyrenforth,
Attys.

(No Model.) 2 Sheets—Sheet 2.

M. B. & F. W. MILLS.

GATE.

No. 381,159. Patented Apr. 17, 1888.

Fig. 4.

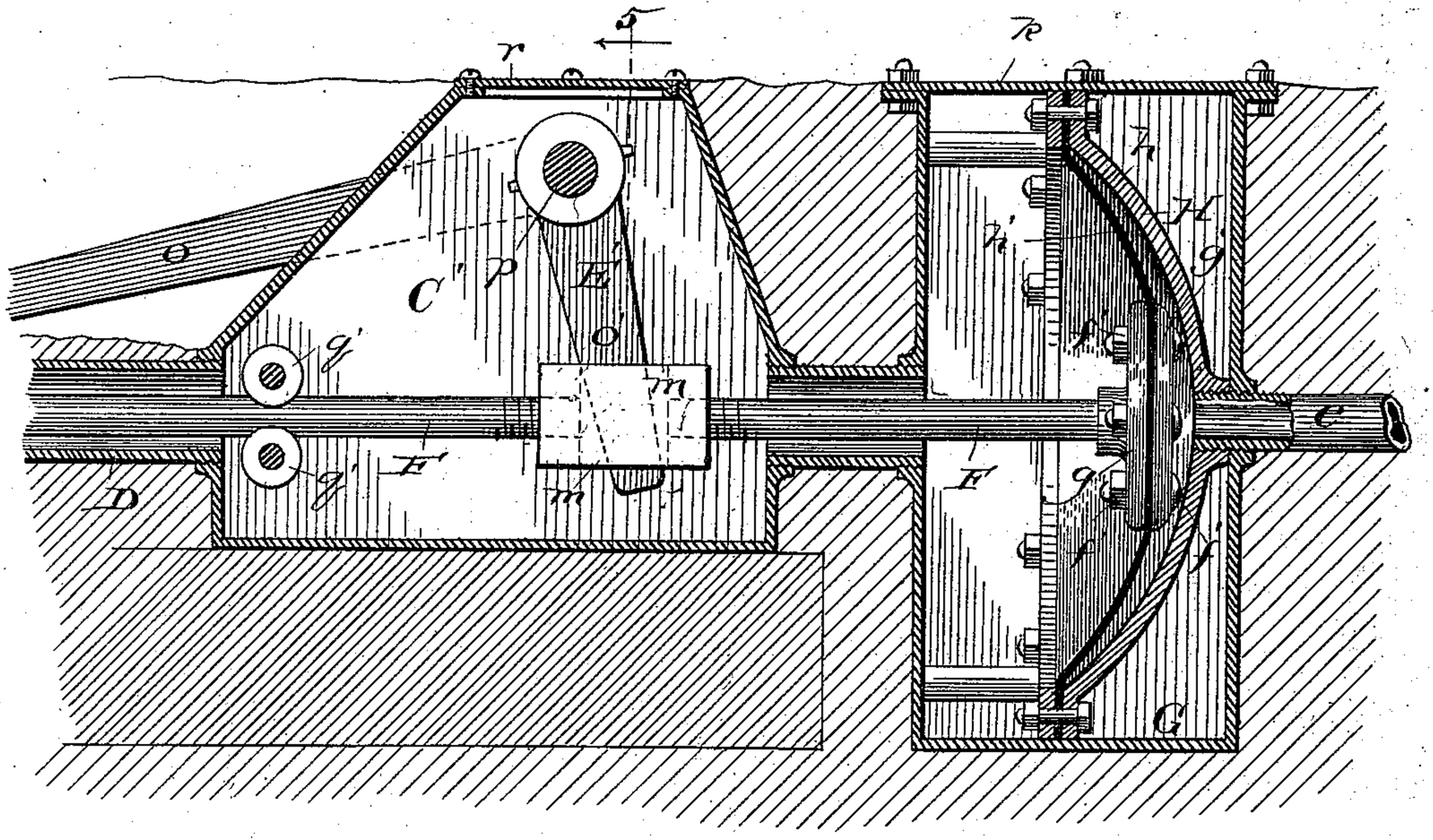


Fig. 6.

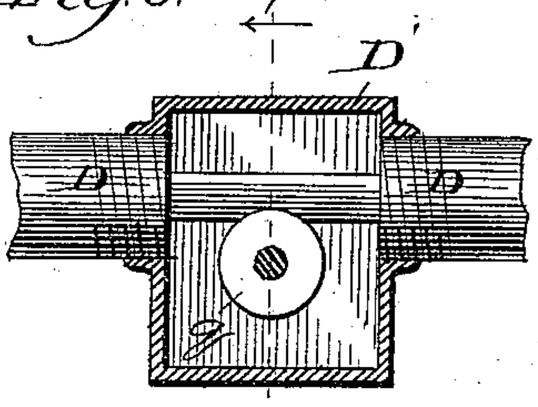


Fig. 5.

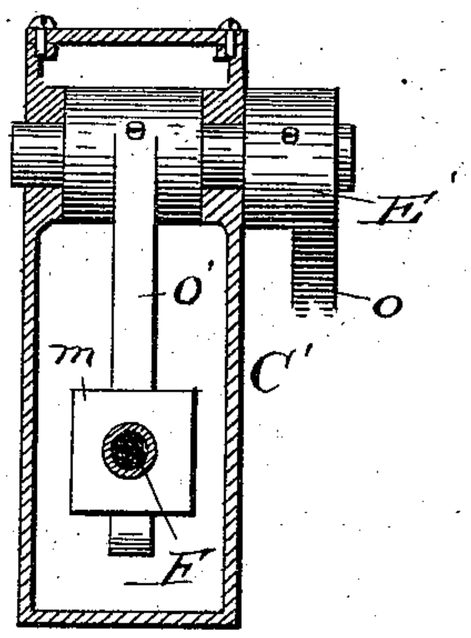


Fig. 8.

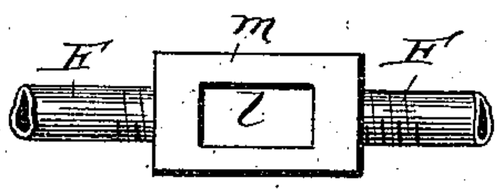


Fig. 7.

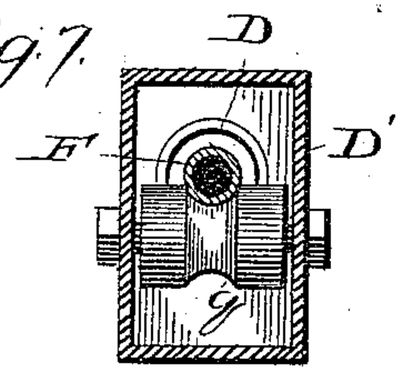
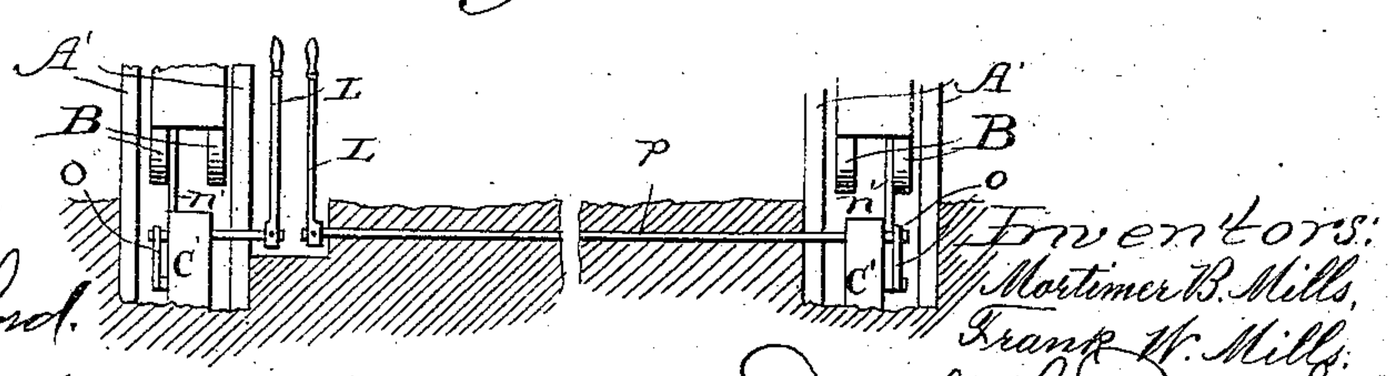


Fig. 9.



Witnesses:
Chas. E. Gaylord.
J. H. Dyrenforth.

Inventors:
Mortimer B. Mills,
Frank W. Mills,
By Dyrenforth and Dyrenforth,
Atty's.

UNITED STATES PATENT OFFICE.

MORTIMER B. MILLS AND FRANK W. MILLS, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE MILLS RAILROAD GATE COMPANY, OF SAME PLACE.

GATE.

SPECIFICATION forming part of Letters Patent No. 381,159, dated April 17, 1888.

Application filed September 17, 1887. Serial No. 249,948. (No model.)

To all whom it may concern:

Be it known that we, MORTIMER B. MILLS and FRANK W. MILLS, citizens of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Gates, of which the following is a specification.

Our invention relates to an improvement in the class of gates used most commonly at the crossings of railroad-tracks, and comprising posts supporting swinging arms connected together in a manner to cause both arms to rise or fall together and uniformly to open and close the gate, thereby preventing wind, or friction of the parts, and the like, from exerting any effect in the way of obstructing the rise or descent of one bar while it hastens that of the other.

Our improvement when applied to gates of the foregoing class relates more particularly to the underground tie for each pair of swinging bars constituting a gate, whereby they are actuated simultaneously and uniformly for the purpose stated, and to the means for actuating the bars to raise and lower them.

The objects of our invention are to provide simple and effective underground mechanism for operating the bar or bars, which shall be proof against the access to the movable parts of moisture, which, if it were to gain access, would be liable to freeze in cold weather and interfere with the operation, and to employ a single diaphragm device, (collapsible receiver,) or, if preferred, piston and cylinder, controlled from a fluid-pressure supply, or a lever to operate both gate-bars simultaneously in either direction.

Our invention consists, broadly, in a swinging bar, a pivotally-supported bell-crank connected from one arm with the bar to one side of its axis and having its other arm inclosed in an underground water-tight casing, and connected by a horizontal rod to air-pressure mechanism for actuating the bell-crank to operate the bar.

It further consists in details of construction and combinations of parts, as hereinafter more fully set forth.

In the drawings, Figure 1 is a broken sectional elevation of our improved gate, showing the fluid-pressure pump, forming one means of operation, detached, and a hand-lever, forming another means of operation, in dotted lines; Fig. 2, a broken view of one end of a swinging-gate bar provided with means for actuating the striker of an adjacent gong; Fig. 3, a broken perspective view showing the gong and construction of striker to enable it to be actuated intermittingly by studs projecting in a row from the rear end of a gate-bar; Fig. 4, an enlarged broken sectional view showing the diaphragm form of device, one of the bell-cranks, and underground connection incased in their relative operative positions; Fig. 5, a section taken on the line 5 of Fig. 4 and viewed in the direction of the arrow; Fig. 6, a broken sectional view of a detail; Fig. 7, a section taken on the line 7 of Fig. 6 and viewed in the direction of the arrow; Fig. 8, a broken plan view of another detail; and Fig. 9, a diagrammatic view, showing the arrangement of the levers, (when used for actuating the gate-bars,) of two gates on opposite sides of a crossing to bring the levers into convenient position for handling from one point of operation.

A and A′ are the gate-posts, each formed in two vertical parts planted in the ground, and between which the gate-bars B and B′, of ordinary construction, are pivotally supported in the usual manner. Below the surface of the ground, respectively adjacent to the posts A and A′ and on relatively opposite sides thereof, are boxes affording chambers C and C′, preferably, though of course not necessarily, of the form shown, the upper contracted ends of which extend to the surface and are provided with removable covers *r*, the removal of which permits access to the chambers and mechanism hereinafter described contained within them, and the securing of which in position renders them water-tight, suitable packing being provided, if required, between the covers and the edges of the boxes upon which they are secured. The two boxes C and C′ are connected together to communicate by a sectional conduit, D, (preferably metal pipe,) which enters adjacent sides of the boxes and is embedded in the ground, and between the sections of conduit is a box, D′, containing a grooved pulley, *q*, supported therein to revolve. At the chambers C and C′ are bell-crank levers E and E′, supported at their an-

gles upon rock-shafts *p*, extending transversely across the chambers near their upper ends and having their bearings in the opposite sides of the chambers. Corresponding arms, *o*, of the levers E and E′ project from outside the chambers horizontally, or nearly so, toward the posts A and A′ and extend between the vertical parts forming the latter, where they are pivotally connected with the lower ends of links *n* and *n′*, pivoted at their upper ends to the bars B and B′ at corresponding sides of the axes of the latter, below and behind the axes, as shown, or above and forward of them, if preferred. The opposite arms, *o′*, of the levers E and E′, which are entirely within the chambers on the shafts *p*, extend through slots *l*, formed vertically through boxes *m*, into opposite ends of which sections of a rod, F, extend to support them, and the rod F, which is preferably gas-pipe, having its sections connected by the boxes *m* to render it practically continuous, is sustained within the conduit D, upon the pulley *q* in the box D′, and passes between guide-pulleys *q′*, supported one above the other in pairs, respectively, in the chambers C and C′ near the adjacent openings therein, at which the opposite ends of the conduit D enter them.

G is a housing buried in the ground to a depth which causes its upper end, provided with a removable cover, *k*, to be flush with the surface, the housing being water-proof when the cover is secured in position, and a short section of the conduit D affords communication between the housing G and chamber E′.

H is a collapsible receiver in the form of a bowl-shaped base, *h*, supported in vertical position in the housing G and covered by a flexible diaphragm, *h′*, bolted around its edge to that of the base *h* in a manner to render air-tight the space covered by it, and the rod F extends from the box *m* in the chamber C′ through the section of conduit D, between the said chamber and housing, into the latter, and is screwed into or secured to a plate, *g*, bolted to the outer face of the diaphragm *h′*, by bolts *f*, which pass through the latter and through a plate, *g′*, on the inner side of the diaphragm, the plates and diaphragm being compressed tightly together and held between the heads of the bolts and nuts *f′* on their ends. The collapsible receiver H communicates through its rear side by a pipe, *e*, with a fluid-pump, I, located in convenient position.

As described, the operation of our device is as follows: The pump I is of the construction which on turning a four-way cock, *d*, to produce communication of the pipe *c*, containing an upwardly-opening check-valve, c^2, with the pipe *e*, and of the outer air with the pipe *c′*, containing a downwardly-opening check-valve, c^3, causes air on actuating the pump-handle to enter through the cock *d* and be forced into the collapsible receiver A by way of the pipes *c*, *c′*, and *e*. As shown to be constructed, the bars B and B′ are thereby lowered, since the diaphragm *h′* is expanded and forces the rod F to cause the slotted boxes *m* to turn the arms *o′* of the bell-cranks E and E′ in the direction toward the post A, thereby raising the opposite arms of the bell-cranks and with them the links *n* and *n′*, the pressure of which against their pivots on the gate-bars lowers the latter. To raise the bars, the rod F and arms *o* and *o′* of the bell-cranks must be moved in the opposite direction, which we accomplish in using the receiver mechanism H, by exhausting the air previously introduced into it to lower the bars, whereby the diaphragm is collapsed and pulls the rod F in the direction of its collapse, the plate *g′* preventing the diaphragm from being torn from the plate *g* by the force of the vacuum. The exhausting operation of the pump I is produced by turning the cock *d* to open communication between the pipe *c* and the open air and of the pipe *c′* with the pipe *e*, whereby the air in the receiver H will by actuating the pump be exhausted through the pipes *e*, *c′*, and *c* into space. The courses of the fluid to and from the collapsible receiver H are respectively indicated in Fig. 1 by full and dotted arrows.

K is a gong supported on the inner side of a vertical part of a post, A′, upon which is also secured the striker K′, comprising a flat strip of springy metal, *b*, secured to the post at one end and bent to follow the outline of a portion of the periphery of the gong, being braced by a pin, *b′*, and carrying a striker-head, b^2, near its free end, just behind a beveled notch, b^3, cut into one edge of the spring, which forms the handle of the striker. On the rear portion of the gate-bar B′ is a row of studs, *a*, in line to engage successively with the spring *b* while the gate-bar is being swung, when the studs pass, one after the other, under the free end of the spring *b*, to raise the striker-head b^2, and, clearing the spring at the notch b^3, release it, which causes it by its resilience to force the head b^2 against the gong and sound the latter by a violent stroke. By these means a gong, besides being provided in a most convenient position, is sounded by simple automatic mechanism with rapidly-repeated and violent strokes, which enable the alarm to be heard at a considerable distance from the gate.

While I have shown and described, and also prefer ordinarily to use, a collapsible receiver for actuating the mechanism of our gate to raise and lower the bars, it is quite obvious—so obvious that it is not deemed necessary to illustrate it—that a cylinder containing a piston having its rod connected with or forming part of the rod F would also be operative in performing our purpose, and such a device is intended to be included as within the spirit of our invention. Whichever the form of device used, it will be seen that it operates by alternate pressure and exhaust, thereby avoiding the requirement of two collapsible receivers or pistons and cylinders, each for pressure in an opposite direction. We may, however, operate our improved gate without fluid-pressure mechanism by means of a lever,

L, upon the end of the rock-shaft *p* of a bell-crank, as indicated in Fig. 1. Where a gate like that described, is provided on each side of a railroad-crossing, and levers L are employed to operate them, the rock-shaft *p* of a bell-crank of one gate may be extended below the surface of the ground, as shown in Fig. 9, into proximity to that of the other gate carrying a lever, L, whereby both levers are in convenient position with relation to each other to permit the operation of both from the same point. This means of operation is not broadly new, however, as a gate has already been patented in which two vertically-swinging gate-bars have bell-cranks connected from corresponding arms with the rear ends of the gate-bars, and connected together from their opposite arms to cause the movement of one bell-crank to raise or lower one bar, to move the other simultaneously to raise or lower the other bar, the movements of the bell-cranks being effected through the medium of a lever on one of them.

When fluid-pressure is used to operate two or more gates, as last described, the collapsible receiver or piston and cylinder mechanism of each should communicate with the same pump, at which both gates may be controlled simultaneously or independently by means of suitable cocks.

Where a single bar is used to form the gate, as is sometimes the case at narrow crossings, the mechanism shown at the right in Fig. 1 may be used alone, when the opening in the chamber C′, for the conduit D at the left of the chamber, would be closed.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a gate, the combination of a swinging bar, a pivotally-supported bell-crank having one arm inclosed in an underground water-tight casing, and its other arm outside the said casing, and connected with the bar to one side of its axis, and a collapsible receiver, H, having its diaphragm connected with the incased arm of the bell-crank by a horizontal rod, and communicating with a fluid-pump, I, substantially as described.

2. In a gate, the combination of a swinging bar, a pivotally-supported bell-crank connected from one arm with the bar to one side of its axis, and having its opposite arm inclosed in a water-tight casing, a collapsible receiver, H, communicating with a fluid-pump, I, and having plates *g* and *g′* on opposite sides of its diaphragm, and a rod, F, connecting the plate *g* with the inclosed arm of the bell-crank, substantially as described.

3. In a gate, the combination of two swinging bars, B and B′, underground chambers C and C′, an underground housing, G, an underground conduit, D, connecting the chambers and housing, bell-cranks E and E′, pivotally supported at the said chambers, and their arms *o* and *o′*, respectively, outside and within the said chambers, and having their arms *o* connected with the bars to corresponding sides of the axes thereof, a collapsible receiver, H, in the housing G, communicating with a fluid-pump, I, and a rod, F, extending through the chambers and conduit D, connecting the diaphragm of the collapsible receiver with the arms *o′* of the bell-crank, substantially as described.

MORTIMER B. MILLS.
FRANK W. MILLS.

In presence of—
J. W. DYRENFORTH,
CHAS. E. GORTON.