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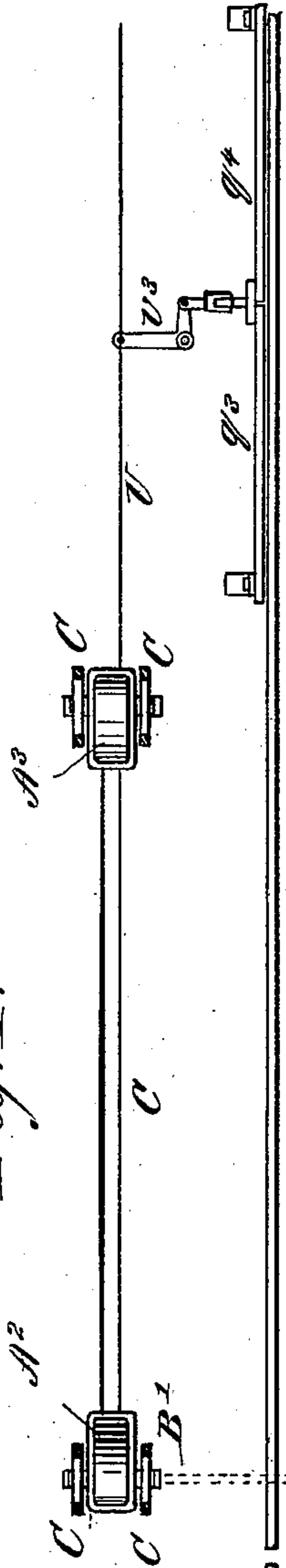
3 Sheets—Sheet 1.

O. H. P. CORNELL.
RAILWAY GATE.

No. 363,808.

Patented May 31, 1887.

Fig. 1.



WITNESSES

Donn Twitchell.
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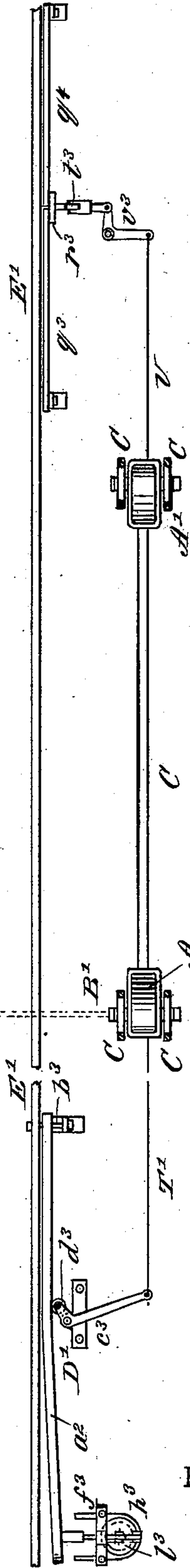
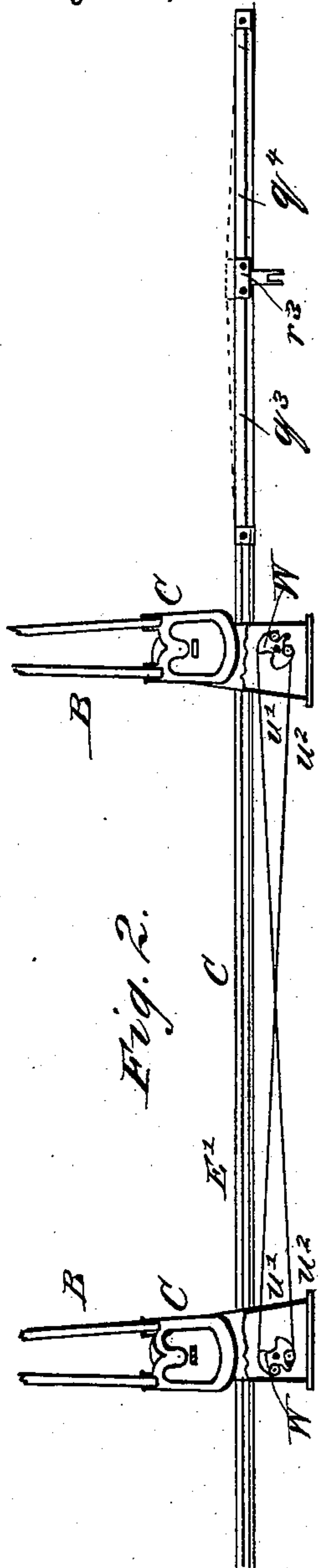


Fig. 2.



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(No Model.)

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3 Sheets—Sheet 2.

No. 363,808.

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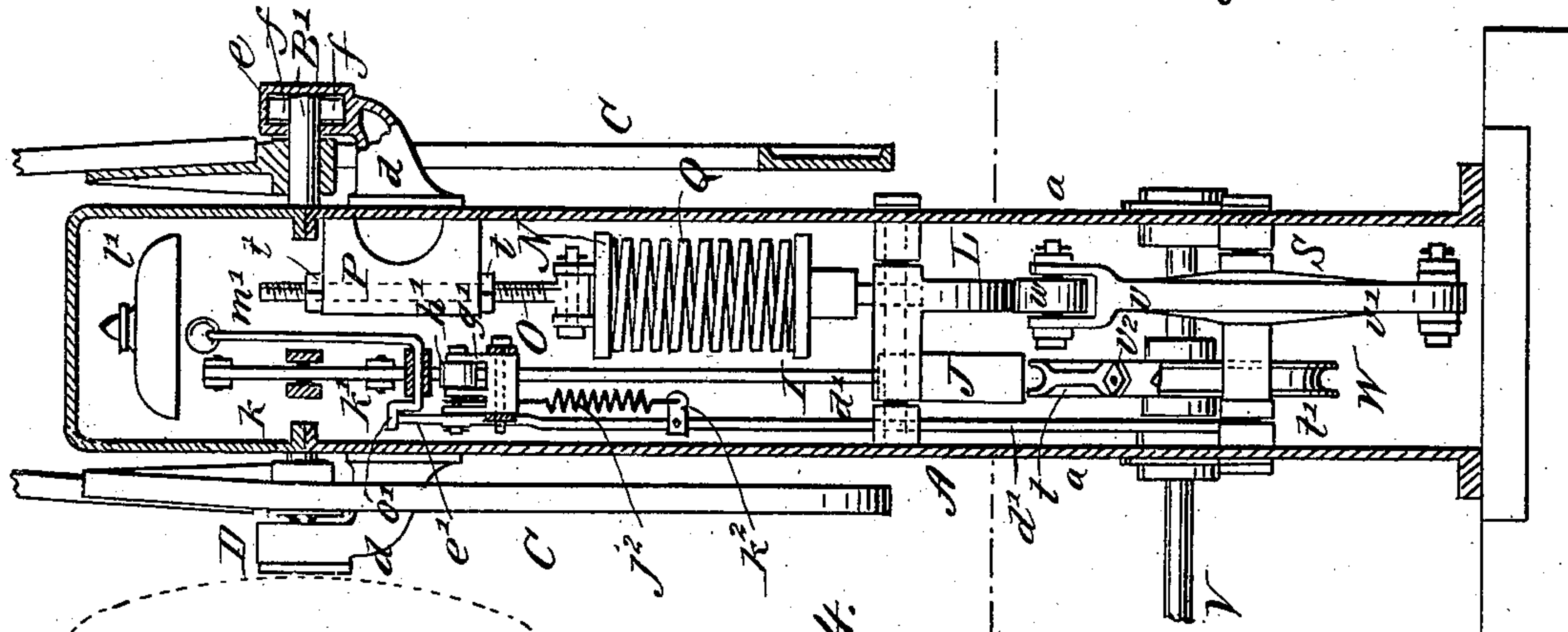


Fig. 4.

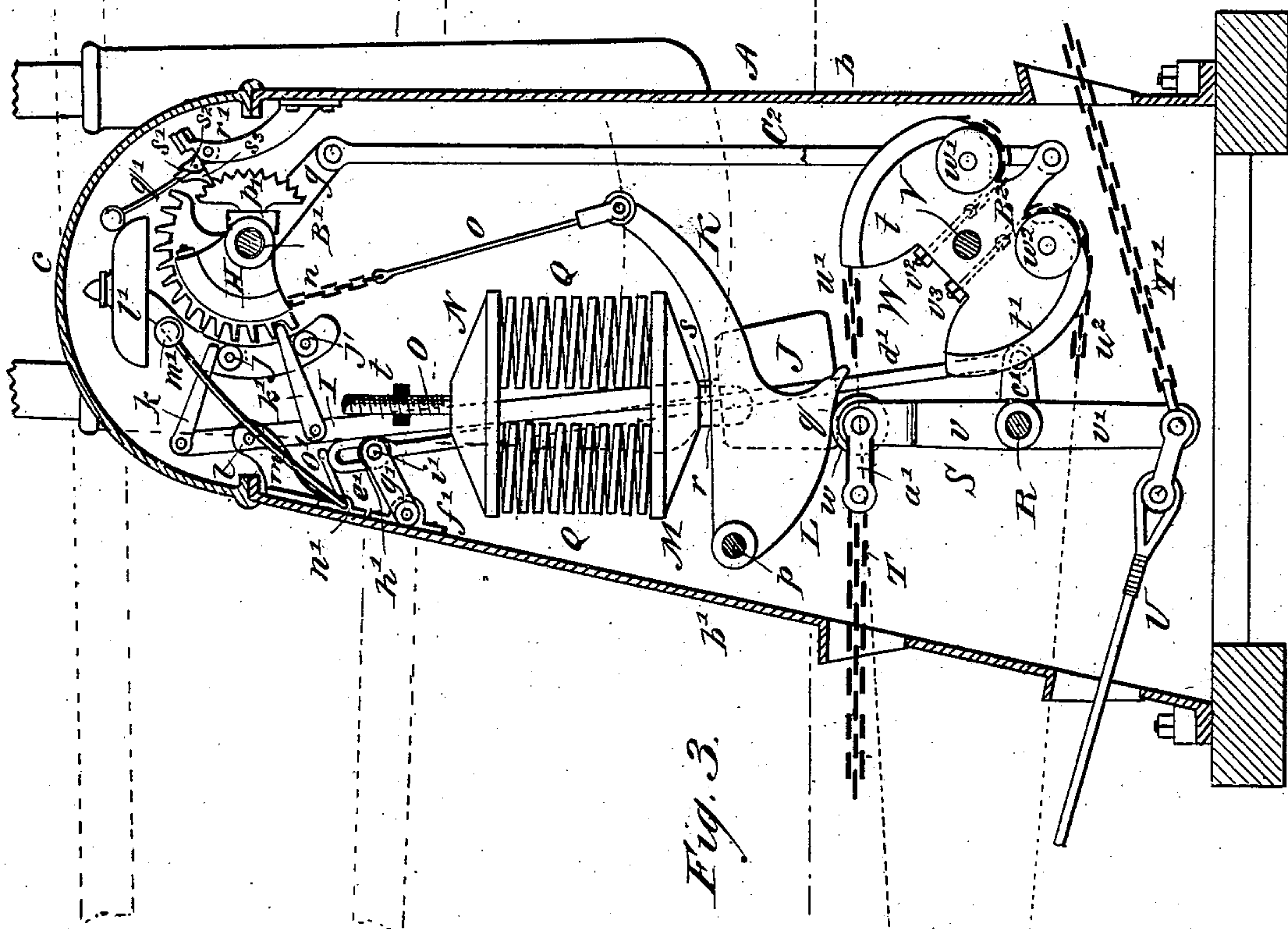


Fig. 3.

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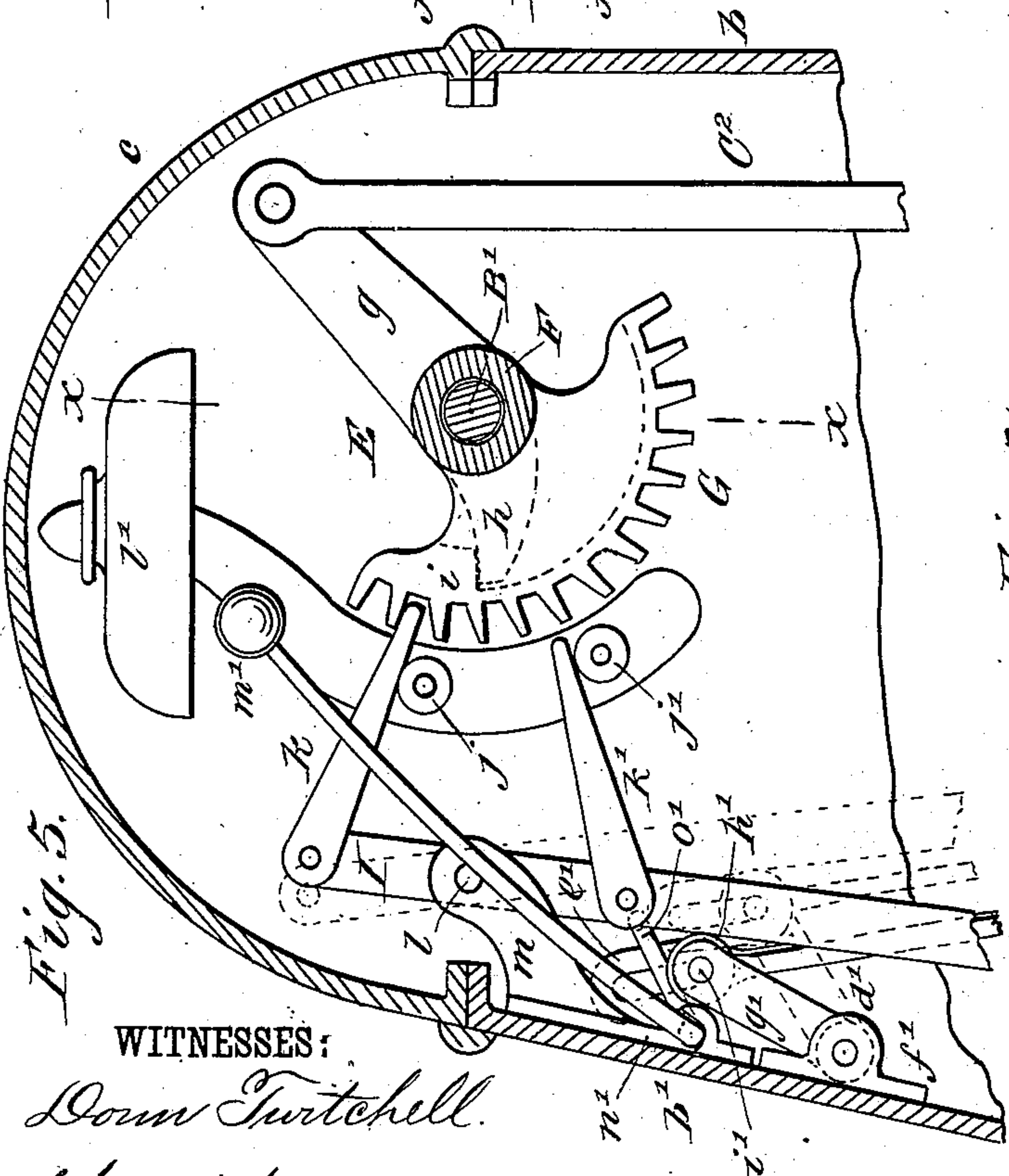
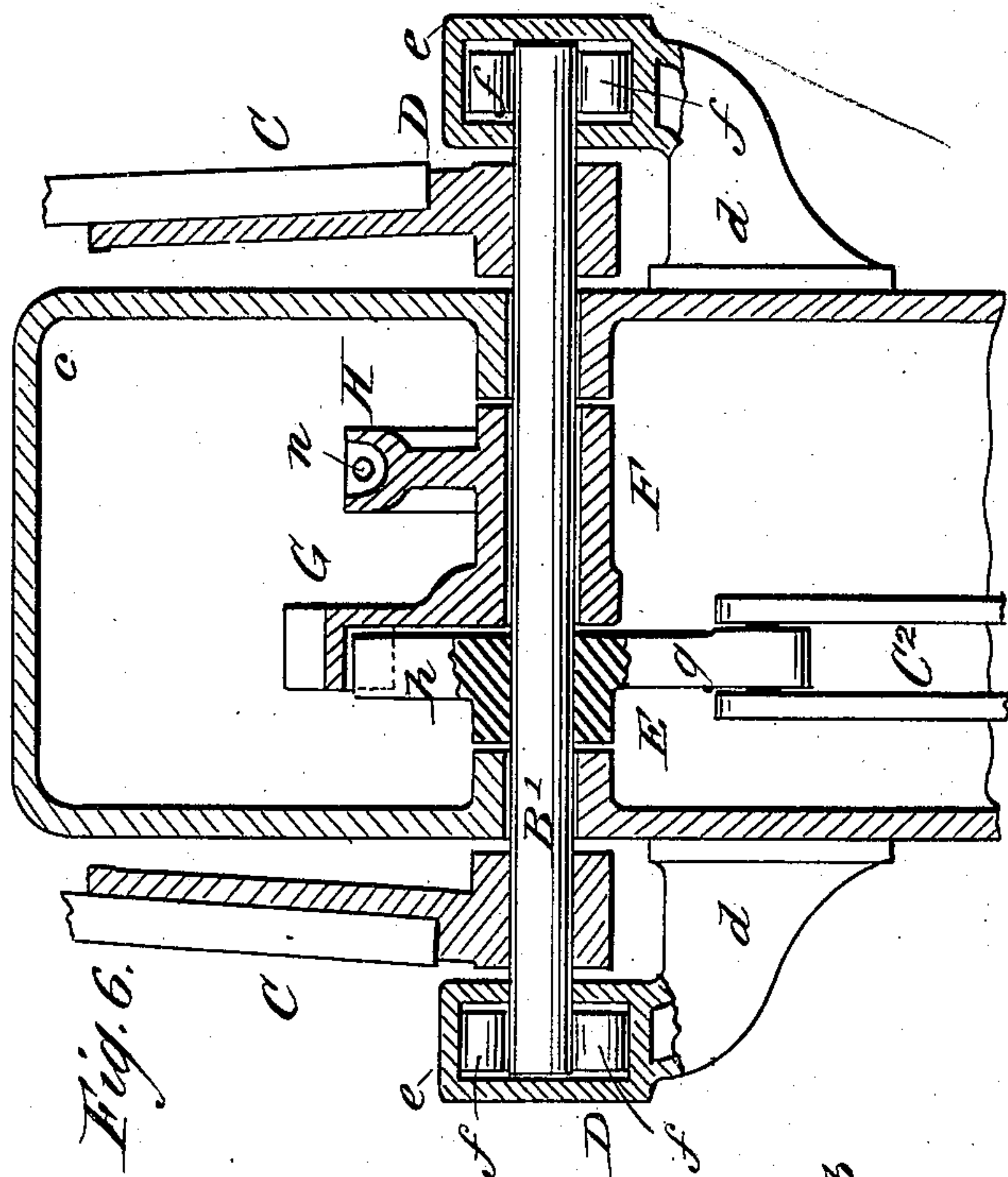
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RAILWAY GATE.

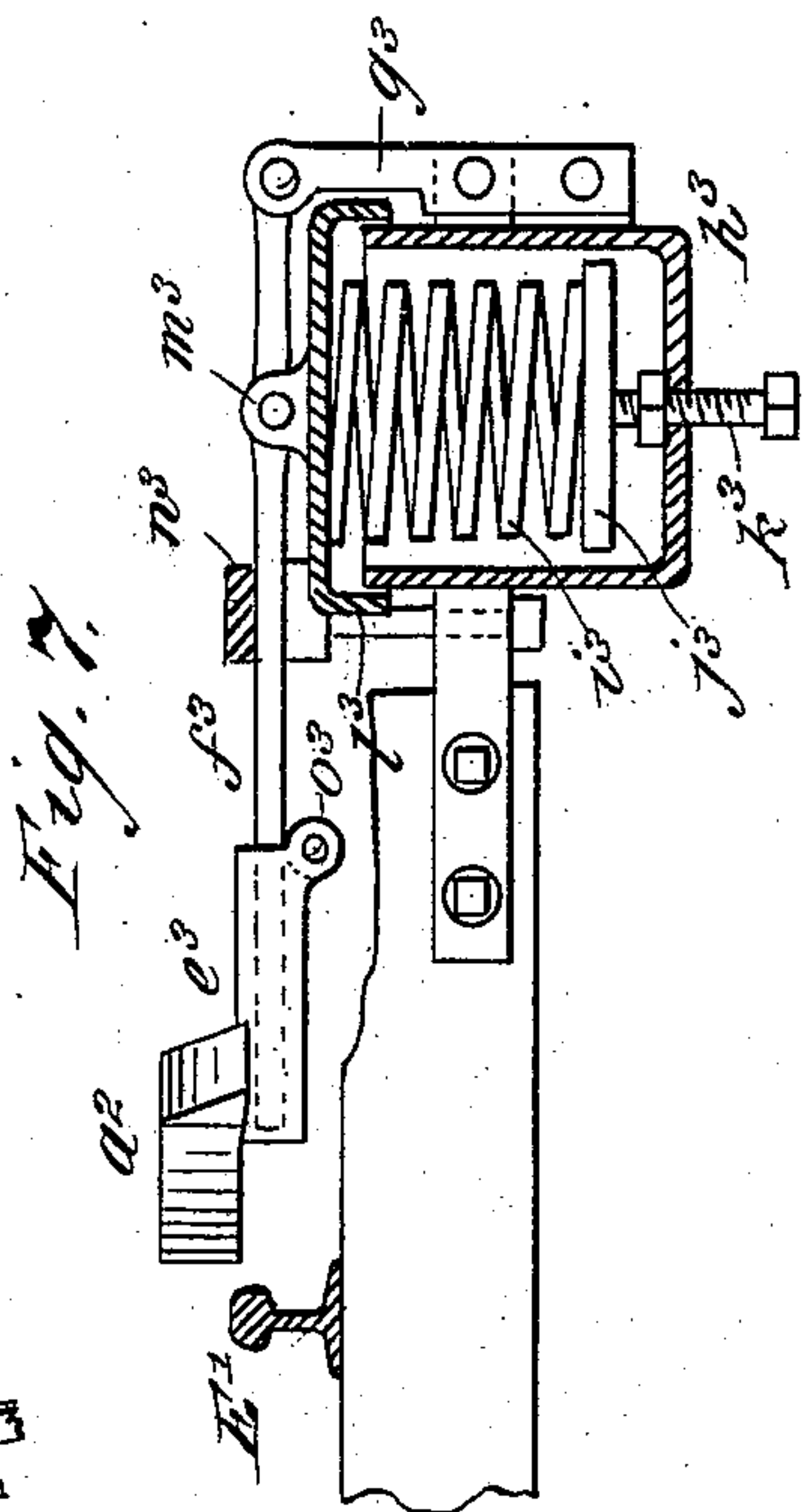
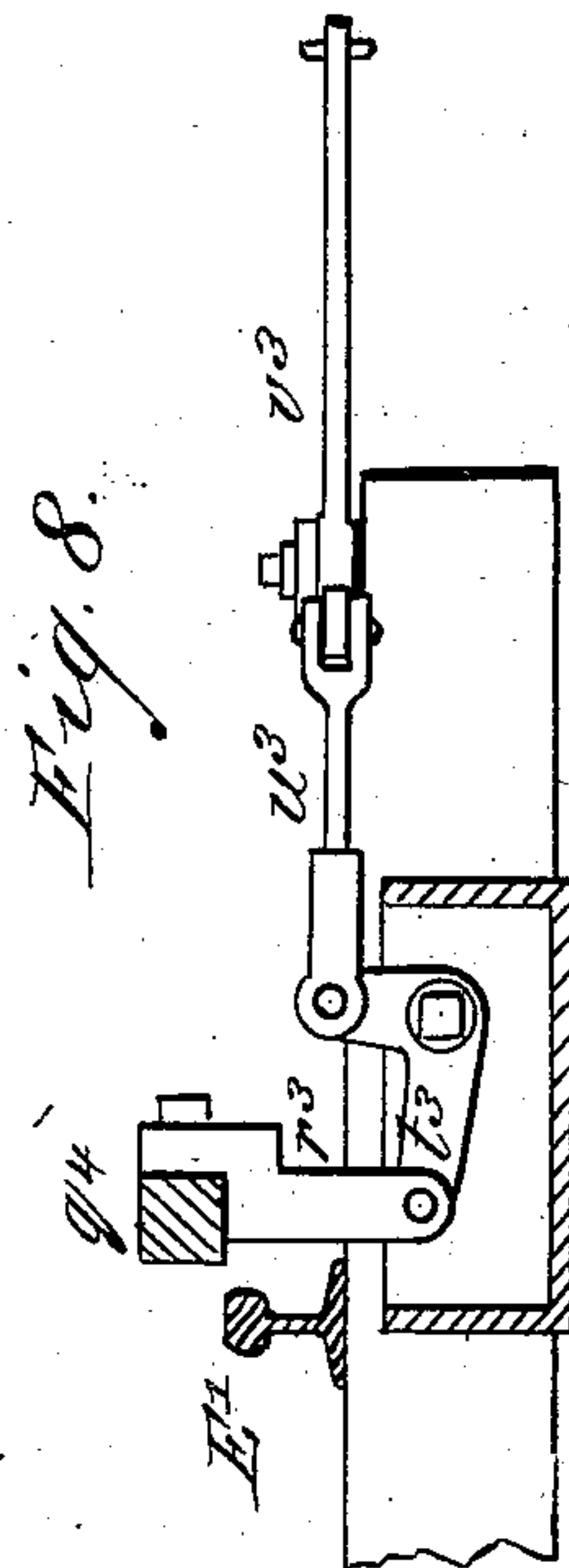
3 Sheets—Sheet 3.

No. 363,808.

Patented May 31, 1887.



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UNITED STATES PATENT OFFICE.

OLIVER H. P. CORNELL, OF ALBANY, NEW YORK.

RAILWAY-GATE.

SPECIFICATION forming part of Letters Patent No. 363,808, dated May 31, 1887.

Application filed April 9, 1886. Serial No. 198,347. (No model.)

To all whom it may concern:

Be it known that I, OLIVER H. P. CORNELL, of Albany, in the county of Albany and State of New York, have invented a new and useful Improvement in Railway-Gates, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a plan view showing the arrangement of gates and track-levers. Fig. 2 is a side elevation, partly in section, of a pair of gates arranged on opposite sides of the highway. Fig. 3 is a vertical transverse section of one of the gate-posts, showing the mechanism contained therein. Fig. 4 is a vertical transverse section taken on a plane at right angles to that of Fig. 3. Fig. 5 is an enlarged detail sectional view of the escapement. Fig. 6 is a vertical transverse section taken on line *xx* in Fig. 5. Fig. 7 is an end elevation of the gate-closing track-lever, showing the spring-case in section. Fig. 8 is a transverse section of the gate-opening track-lever.

Similar letters of reference indicate corresponding parts in the different figures of the drawings.

The object of my invention is to provide an improvement in automatic gates for closing highways at their intersection with railways, and for giving an alarm just before and during the closing of the gates.

The construction and combination of parts are as hereinafter described and claimed.

In Fig. 1 I have shown the mechanism as applied to two pairs of gates for protecting a highway-crossing where a double track system is employed. Four hollow posts, *A A' A² A³*, are arranged in pairs on opposite sides of the track, each post being provided with a gate, *B*, which is capable of swinging down over the highway *C* and closing the highway. The posts *A A²* in the present case contain gate-operating mechanism; but where the gate is used in connection with a single-track railway only the post *A* will be provided with the gate-operating mechanism.

The post *A* is formed of a hollow iron casing made of several pieces secured together by bolts. The sides *a* of the posts are parallel, the side *b* is vertical, the top *c* is preferably semicircular, and the side *b'* is inclined at a slight angle from the vertical to afford space

for the gate-operating mechanism contained by the posts, and also to increase the base of the post. On a shaft, *B'*, passing transversely through the post near the upper end thereof, are mounted the gate-arms *C*, which converge beyond the post and are united, forming a single gate. The ends of the shaft *B'*, outside the gate-arms *C*, turn in roller-bearings *D*, supported by brackets *d* at the sides of the post. The roller-bearings *D* consist of the cylindrical casing *e*, and the rollers *f* surround the ends of the shaft *B'*. To the shaft *B'* within the post is secured a two armed lever, *E*, having the longer arm, *g*, and the shorter arm, *h*, projecting from opposite sides of the shaft, the short arm *h* being turned up slightly out of the plane of the arm *g*.

On the shaft *B'*, between the lever *E* and the side of the post, is loosely placed a sleeve, *F*, having formed on or attached to it a segmental scape-wheel, *G*, and a segmental sheave, *H*. The segmental scape-wheel *G* is chambered to receive the shorter arm, *h*, of the lever *E*, and is provided with a shoulder, *i*, for engagement with the end of said arm of the lever *E*.

Rollers *j j'*, journaled in fixed supports near the periphery of the scape-wheel *G*, support pallets *k k'*, pivoted to the pendulum-rod *I* above and below the pivot *l* of the rod. The pivot *l* of the pendulum-rod turns in bearings formed in a bracket, *m*, secured to the side *b'* of the post *A*. The pendulum-rod *I* extends downward in the post *A*, and is provided with a pendulum bob or weight, *J*, which is adjustable up and down on the rod *I*. When the scape-wheel is moved forward in a direction tending to press the pallets *k k'* down upon the rollers *j j'*, the pallets will alternately engage the teeth of the scape-wheel; but when the scape-wheel is turned in the opposite direction the pallets are free to rise from the rollers *j j'*, and will allow the segmental scape-wheel *G* to turn without moving the pendulum.

A chain, *n*, extending around the segmental sheave *H* and secured thereto, is attached to a rod, *o*, which is pivoted to the end of a cam-lever *K*, supported by the shaft *p*, passing transversely through the post *A*. The cam-lever *K* is curved upward from a point near its middle to the free end thereof, and upon the under surface of the lever there is a cam, *L*, formed on a volute curve of quick pitch,

terminating in a reverse curve, q , near its extremity. In the upper surface of the cam-lever K, about opposite the reverse curve q , is formed a socket, r , for receiving an ear, s , projecting from the under surface of the lower spring-plate, M, and pivoted in the socket.

The upper spring-plate, N, is secured to a screw-threaded rod, O, which extends through a bracket, P, projecting inward from the side of the post, the rod O being secured adjustably in the bracket P by nuts t , above and below the bracket. Springs Q are placed between the spring-plates M N, and are put under the required compression by adjusting the nuts t . Below the cam-lever K, and nearly in line with the ear s and rod O, is journaled a rock-shaft, R, to which is secured a lever, S, having two equal arms, v v' . The arm v is forked and carries a roller, w , which rolls in contact with the surface of the cam L. The arm v of the lever S is also connected by a yoke, a' , with the chain or cable T, extending to the gate-opening track-lever, presently to be described.

The lower end of the arm v' of the lever S is connected by a chain or cable, U, with the gate-closing track-lever, which will also presently be described. The arm v' of the lever S is connected with a gate-opening track-lever by the chain or cable T'. When the gate is used in connection with a double-track railway, the chains or cables U T' only are used; but when the gate is used in connection with a single-track railway it becomes necessary to connect the lever S with gate-closing track-levers on opposite sides of the highway, and in such cases two gate-opening chains or cables, T T', are required.

To the shaft R is secured a short arm, c' , which is arranged at right angles with the lever S, and is pivoted to a rod, d' , extending upward toward the top of the post, and provided with an oblong eye, e' .

To a bracket, f' , projecting inward from the side b' of the post, is pivoted an arm, g' , which is forked and carries a roller, h' , which is journaled on the pin i , passing transversely through the arm g' . The pin i also passes through the oblong eye e' on the end of the rod d' . The same pin also receives one end of a spiral spring, j^2 , the other end of the spring being connected with an arm, k^2 , projecting from the side of the rod d' . The spring j^2 is normally under tension, and when the gate is not in operation the roller h' bears upon the side of the pendulum-rod I.

In the upper part of the post A is supported a gong, l' , and a hammer, m' , is pivoted in an ear, n' , with an arm, o' , projecting out into the path of the upper end of the rod d' , so that when the rod is suddenly raised in the manner presently to be described the bell-hammer m' will be made to strike the bell l' .

A toothed sector, p' , is secured to the sleeve F, and a bell-hammer, q' , pivoted in a bracket, r' , carries a pallet, s' , which is engaged by the teeth of the sector p' when the sleeve F is turned. The pallet s' consists of a pair of ears,

s^2 , secured to the arm of the bell-hammer, and a right-angled arm, s^3 , pivoted between the ears and projecting into the path of the teeth of the sector p' , so that when the sector is moved upward it will engage the extremity of the right-angled arm s^3 and trip it once for each tooth of the sector; but when the sector is moved in the opposite direction the arm s^3 will yield and allow the teeth to pass without moving the bell-hammer.

In the lower part of the post A is journaled a shaft, V, to which is secured a double segmental sheave, W, having two circumferentially-grooved parts, t t' , for receiving the chains u' u^2 . The chains u' u^2 are provided with eyebolts v^2 v^3 , which pass through the body of the segmental sheave W parallel with each other and serve to adjust the tension of the chains u' u^2 . Between the eyebolts v^2 v^3 and the grooved parts t t' of the sheave, and upon opposite sides of the body of the sheave, are journaled disks w' w^2 , Fig. 3, each pair of disks acting as a sheave for guiding the chain in its passage from the grooved part of the segmental sheave W to the adjusting-eyebolts v^2 v^3 . The latter serve to tighten the chains u' u^2 whenever necessary, and the disks w' w^2 serve as sheaves which support alternate links of the chains and furnish a rolling surface for the chains to run on, thus avoiding friction when the chains are drawn in the act of tightening. An arm, B^2 , attached to or formed integrally with the segmental sheave W, projects from the body of the sheave between the disks w' w^2 , and is pivotally connected with a rod, C^2 , which is jointed to the arm g of the lever E. The chain u' is connected with the chain u^2 of the gate on the opposite side of the highway, and the chain u^2 is connected with the chain u' of the gate on the opposite side of the highway, these chains crossing each other, as shown in Fig. 2, to secure the simultaneous movement in opposite directions of the segmental sheaves W of the pair of gates.

When a double-track railway is provided with my improved gates, the mechanism of the posts A A² is connected by prolonging the shafts V and connecting them together, as indicated in dotted lines in Fig. 1.

The gate-closing track-lever D' is placed a sufficient distance from the gate to insure the closing of the gate before the fastest train could travel from the track-lever to the highway. The track-lever D' consists of a bent rail, a^2 , supported on a horizontal bolt, b^3 , arranged at right angles to the track-rail E', and a right-angled lever, c^3 , pivoted on a fixed support, and connected with the chain or rod T'. The rail a^2 is convex toward the track-rail E', and the shorter arm of the right-angled lever c^3 is provided with a roller, d^3 , which rests in contact with the outer side of the rail a^2 . The shorter arm of the lever c^3 is directed toward the gate, so that an outward pressure upon the rail a^2 would move the lever c^3 , so as to draw upon the chain or rod T'.

The end of the rail a^2 farthest from the

highway stands away from the track-rail E' , so that the wheels of a train running in the direction indicated by the arrow will engage the inclined side of the rail a^2 and push it laterally away from the rail E' , thereby moving the lever c^3 . The free end of the rail a^2 is connected with a sleeve, e^3 , which slides upon a lever, f^3 , fulcrumed in a fixed support, g^3 , and between the fulcrum of the lever f^3 and the track-rail E' is rigidly supported a spring-casing, h^3 , containing a spring, i^3 , which rests on an adjustable plate, j^3 , supported by a screw, k^3 , passing through the bottom of the casing h^3 . A cap, l^3 , rests on the top of the spring i^3 and covers the casing, and is provided on its upper surface with ears m^3 , which are pivoted to the lever f^3 . The top n^3 , attached to the support of the casing h^3 , limits the upward movement of the lever f^3 , so that when the lever f^3 is in its highest position the rail a^2 will be held opposite the head of the rail E' .

To diminish the friction of the sliding sleeve e^3 on the lever f^3 , a roller, o^3 , is journaled in ears projecting from the lower side of the sleeve at its outer end and bears upon the under surface of the lever f^3 . This arrangement of the rail a^2 allows it to be depressed by the car-wheels when passing away from the highway without operating the lever c^3 and rod or cable T' and mechanism connected therewith.

At the side of the track-rail E' near the highway is placed the gate-opener p^3 , which consists of two oppositely-disposed track-levers, q^3 q^4 , supported on pivots at their outer ends, with their adjacent free ends resting on a standard, r^3 , pivoted to a right-angled lever, t^3 , journaled on a fixed pin and connected by a link, u^3 , with the right-angled lever v^3 , turning in a plane at right angles to that of the lever t^3 . The remaining arm of the right-angled lever v^3 is connected with the rod or cable U .

The free and adjacent ends of the track-levers q^3 q^4 are supported normally above the level of the top of the track-rail, so that the tread of the wheels running over the rails E' will engage these levers and depress them. With a single or double track only one gate-opening lever is required for each track.

The operation of my improved railway gate is as follows: The parts of the mechanism contained by the post being in the position shown in Figs. 3 and 4, and the track-levers being in the position shown in Fig. 1, the train approaching the highway C in the direction indicated by the arrow, by the engagement of its wheels with the side of the rail a^2 , pushes the rail laterally, swinging the lever c^3 on its pivot, thus drawing on the rod or cable T' , turning the lever S in the post A , thus releasing the cam-lever K , when the springs Q force the cam lever down, pulling on the rod o and chain n . Simultaneously with the release of the lever K the rod d' is pushed upward by the arm c' , carrying the bell-hammer m' against the bell,

and at the same time turning the arm g' , so as to remove the roller h' from the pendulum-rod I , thus releasing the pendulum, so that it is free to swing and present the pallets k k' , alternately, to the teeth of the scape-wheel G . The scape-wheel G tends to turn under the pull of the rod o and chain n ; but it is retarded by the engagement of the pallets k k' with its teeth, which are made to pass the pallets by a step-by-step movement whose rapidity depends upon the rate of the vibration of the pendulum.

The function of the pendulum may be described as follows: Suppose a gate to be in operation on a double-track railroad. Now, assume that it requires four hundred pounds spring-power to close the gates under the worst circumstances—viz., during a strong wind blowing at right angles to the railroad or broadside against the gate arms, thereby causing the greatest amount of friction on the gate-pivot. Under these circumstances the gate must close within the time required for the fastest train to reach the crossing after leaving the closing-lever—say sixteen seconds. Now, on a still day, with no wind, it will require fully twenty per cent. less power, or only three hundred and twenty pounds, to close the gates, and the pendulum will be required to hold back eighty pounds, and still restrict the closing of the gate to sixteen seconds. Now, suppose that on a still day two trains come into the block, one on each track, setting the gate-closing machinery in operation for closing the gates of both tracks at the same time, then the three hundred and twenty pounds will be divided between two sets of machinery, or only one hundred and sixty pounds to each, then each pendulum will be required to hold back three hundred and forty pounds of surplus pressure and still restrict the closing of the gates to sixteen seconds.

The escapement-teeth have no pitch—that is, the straight sides of the teeth are arranged on radii of the scape-wheel, and the pendulum is so hung that when it is vertical the straight side of the tooth will strike the end of the pallet, thus obviating recoil of the escapement-pallets. With fifty pounds pendulum-ball and a leverage of six to one pallets over the fixed rollers as fulcrums, the pendulum will, if necessary, hold back effectually three hundred pounds of surplus pressure. Now, by increasing the weight of the pendulum-ball a proportional increase can be made to the holding-back capacity of the pendulum.

The scape-wheel G , in turning, by virtue of the engagement of the shoulder i with the arm h of the lever E , turns the lever, and with it the shaft B' , to which the lever and the gate-arms C are secured.

The connection of the arm g of the lever E with the arm B' causes the segmental sheave W to draw on the chain w^2 , when the gate-actuating spring is released, and imparts to the gate at the opposite side of the highway a motion similar to that of the gate directly

acted upon by the track-lever, but in the opposite direction, so that the two gates of the pair close down over the highway simultaneously from opposite directions. While the segmental scape-wheel G is turning the toothed sector p' also turns, imparting a vibratory motion to the bell-hammer q' and giving a continuous alarm while the gate is closing.

The escapement and pendulum insure a sufficiently slow movement to the gate-arms to allow a vehicle to cross the track after the gate begins to close, so that the vehicle and animals connected therewith may have ample time to escape from the track and avoid being shut in by the gates.

As soon as the train has passed the highway its wheels run upon the track-levers $q^3 q^4$ of the gate-opener, and, through the medium of the lever t^3 , link w^3 , and lever v^3 , draw upon the rod or cable U and return the lever S to its vertical position, and in so doing cause the roller w in the upper end thereof to roll along the surface of the cam L and return the cam-lever K to the point of starting, at the same time compressing the springs Q and drawing down the arm g' into engagement with the side of the pendulum rod I, stopping the vibration of the pendulum.

The gate-arms are counterbalanced, so that they open of their own gravity. The turning of the shaft B' during the opening of the gate is permitted by the rising of the lower pallet, k' , as the scape-wheel is turned backward toward the point of starting.

The gate-operating mechanism in either post is capable of operating the entire series of gates, and when applied to a double track a train coming into the block on one of the tracks sets in operation the mechanism in the post on that track, and the power communicated through the shaft V to the post on the opposite track turns the double segmental sheave W in that post, pushing upon the rod C' and arm g , thereby turning the shaft B' and operating the nearest gates, and also (through the chains $u' u^2$) the gates on the opposite side of the highway. The escapement-segment G in this instance does not turn, since its spring-power and the pendulum have not been released, and the escapement is loose on shaft B', as before described. Now, if a train comes in the block on the other track it will simply release the springs in its post, which will run down against the pendulum alone, and double power will be holding the gates closed. The first train out of the block will take off its spring-power, the gates remaining closed until the second train leaves the block on the other track and takes off the spring-power on that track.

It is obvious that instead of providing the pallets with rounded ends I may furnish them with rollers for engaging the teeth of the scape-wheel.

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

1. The combination, with the spring-actuated gate, of a scape-wheel connected with the pivoted shaft of the gate and provided with teeth having working-faces formed on radii of the scape-wheel, a pendulum pivoted on a fixed support in the vicinity of the scape-wheel, and pallets pivoted to the pendulum-rod above and below its pivot and having rounded free ends and rollers arranged to turn on fixed pivots and supporting the pallets in position to be thrust in alternation into the path of the teeth of the scape-wheel when swung by the pendulum, substantially as described.

2. The combination, with the post A and gate shaft B', of the springs Q, mounted in said post, the pivoted cam-lever K, the pivoted two-armed lever S, provided with the roller W, and means, substantially as shown and described, for connecting the cam-lever with said gate-shaft, substantially as described.

3. The combination, with the gate-shaft B', of the two-armed lever E, secured thereto, the sleeve F, placed loosely on the shaft and carrying the segmental scape-wheel G, provided with the shoulder i , and segmental sheave H, the pallets $k k'$, rollers $j j'$, pendulum-rod I, springs Q, cam-lever K, connections intermediate between the cam-lever and the segmental sheave H, and the post A, arranged to support the parts, substantially as herein shown and described.

4. The combination, with the part A and shaft B', and gate-arms C, carried thereby, of the lever E, fixed to the shaft, the sleeve F, placed loosely on the shaft, the segmental sheave H, attached to the sleeve, the segmental scape-wheel G, attached to the sleeve and provided with the shoulder i , arranged to engage the shorter arm, h , of the lever E, the cam-lever K, and connections intermediate between the cam-lever and the sheave H, the springs Q, pallets $k k'$, rollers $j j'$, pendulum-rod I, and weight J, attached thereto, the lever S, provided with the roller w , adapted to engage the cam-lever K, and track-levers connected with the lever S and arranged to swing the lever so as to compress or release the spring, and means for supporting the gate and gate-operating parts, substantially as herein shown and described.

5. The combination, with the post A and pendulum-rod I, of the arm g' , pivoted to the side of the gate-post, provided with the roller h' , the rod d' , having a slotted end, e' , received on the pin i' , the spring j^2 , connected with the arm g' and the rod d' , the arm c' , carried by the lever S, and means for supporting the working parts, substantially as herein shown and described.

6. The combination, with the segmental sheave W and chains or cables $u' u^2$, of the eye-bolts $v^2 v^3$ and the disks $w' w^2$, pivoted on opposite sides of the segmental sheave, and forming guides for the chains $u' u^2$, substantially as herein shown and described.

7. The combination, with the gate-operating rod or cable T', of the bent rail a^2 , loosely piv-

oted to the track-rail at one end and spring-supported at the opposite end, and the right-angled lever c^3 , pivoted on a fixed support connected with the rod or cable T' , and provided with a roller, d^3 , bearing against the outer surface of the bent rail a^2 , substantially as herein shown and described.

8. The combination of the bent rail a^2 , the pin b^3 , forming the pivot and support of one end of the rail, the right-angled lever c^3 , pivoted to a fixed support and provided with the roller d^3 , the spring-casing h^3 , fixed to the timbers of the road-bed, the spring i^3 , contained by the casing, the cap l^3 , received on the spring and covering the casing, and the lever f^3 , pivoted to a fixed support and to the cover l^3 and forming the support for the free end of the rail a^2 , substantially as herein shown and described.

9. The combination of the bent rail a^2 , the pin b^3 , forming the pivot and support of one end of the rail, the right-angled lever c^3 , pivoted to a fixed support and provided with the roller d^3 , the spring-casing h^3 , fixed to the timbers of the road-bed, the spring i^3 , contained by the casing, the cap l^3 , received on the spring and covering the casing, and the lever f^3 , provided with the sliding sleeve e^3 , secured to the rail a^2 and forming the support for the free end of the rail, substantially as herein shown and described.

10. The combination, in railway-gate operating mechanism, of track-levers $q^3 q^4$, pivoted at their outer ends near the track-rail and oppositely arranged with respect to each other, the standard r^3 , angled lever t^3 , link u^3 , and the angled lever v^3 , substantially as shown and described.

11. In railway-gate operating mechanism, the combination, with the hollow post, of the laterally-moving rail a^2 , right-angled lever c^3 , cable or rod T' , the cam-operating lever S , connected with the cable T' , the track-levers $q^3 q^4$, angled levers $t^3 v^3$ and intermediate connections, rod or cable U , connected with the lever S , the cam-lever K , arranged to be acted on by the lever S , the springs Q and gate-closing mechanism connected with the cam-lever K , and means for supporting the working parts, substantially as herein shown and described.

12. The combination, with the shafts B' and

gate-arms C , of a pair of gates arranged on the same side of the railway-track, of levers E , secured to the shafts B' , segmental sheaves W , journaled in bearings below the shafts B' , rods C^2 , connecting the levers E with the segmental sheaves W , and chains or cables $u' u^2$, crossing each other and connecting the segmental sheaves of the pair of gates to cause them to move in opposite directions, substantially as herein shown and described.

13. The combination, with the segmental sheaves W , of the disks $w' w'$, pivoted on opposite sides thereof and forming guides for the chains $u' u^2$, substantially as herein shown and described.

14. The combination, with the hollow posts A of a pair of gates located on opposite sides of the railway-track, the gate-shafts B' , and gate-arms C , supported thereby, of the levers E , secured to the shafts B' , the shafts V , provided with the arms B^2 , and the rod C^2 , connecting the levers E with the arms B^2 , the shafts V of the gates on opposite sides of the railway being connected together, substantially as herein shown and described.

15. The combination, with the post A and cam-lever K , and gate-closing mechanism connected therewith, of the springs Q , spring-plates $M N$, the screw-threaded adjusting-rod O , the bracket P , and nuts t , and means for supporting the several parts, substantially as shown and described.

16. The combination, with the post A and gate-arms C , counterweighted to cause them to open when released, of the springs Q , cam-lever K , segmental scape-wheel G , provided with the shoulder i , the lever E , provided with the arm h , adapted to be engaged by the shoulder i , connections intermediate between the cam-lever K and the scape-wheel G , the pallets $k k'$, arranged to engage the teeth of the scape-wheel, rollers $j j'$, for supporting the pallets, the pendulum-rod I , pivotally connected with the pallets and provided with the weight J , and means, substantially as shown and described, for stopping and starting the pendulum and for supporting the moving parts.

OLIVER H. P. CORNELL.

Witnesses:

EDGAR TATE,
GEO. M. HOPKINS.