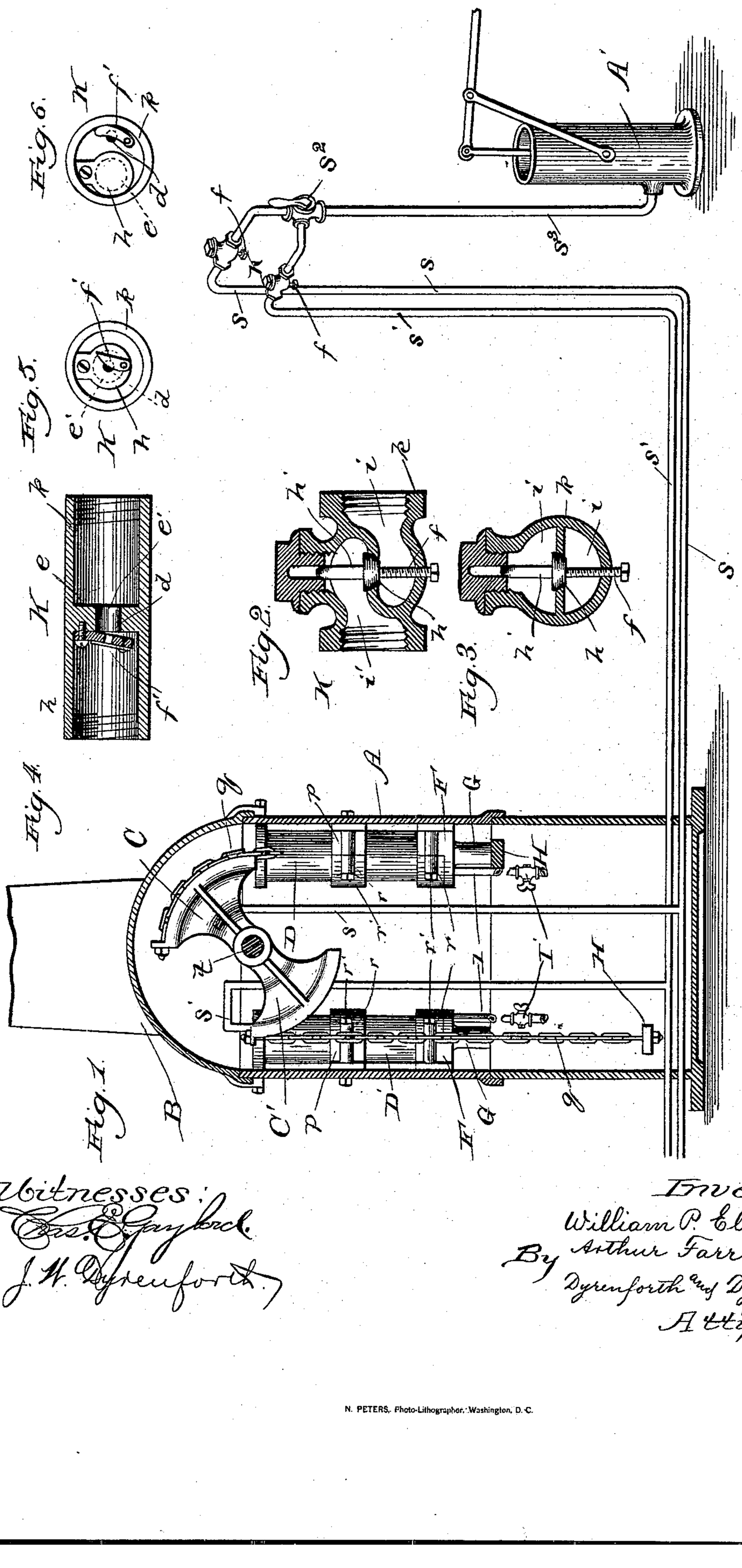
(No Model.) 3 Sheets—Sheet 1.

W. P. ELLIOTT & A. FARRAR.

GATE.

No. 395,885. Patented Jan. 8, 1889.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 7.

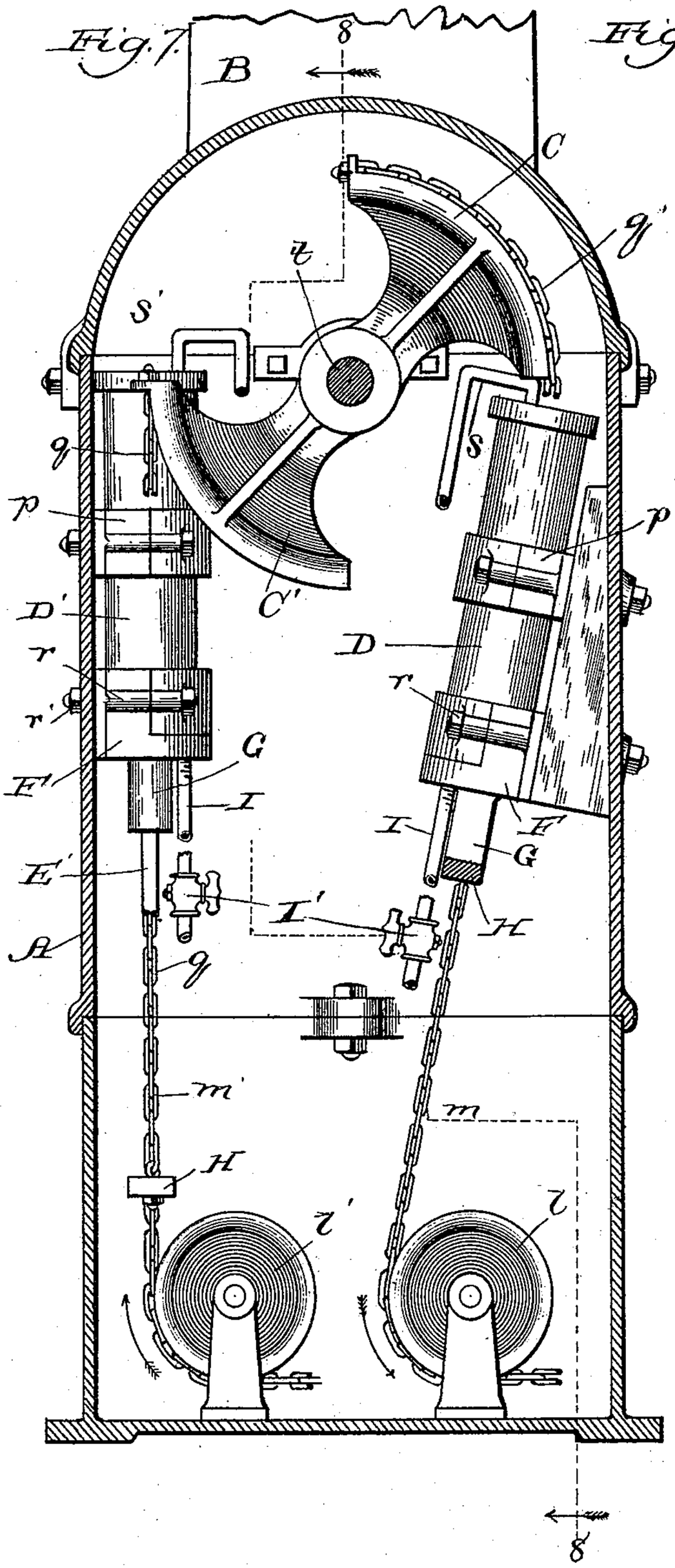

Fig. 8.

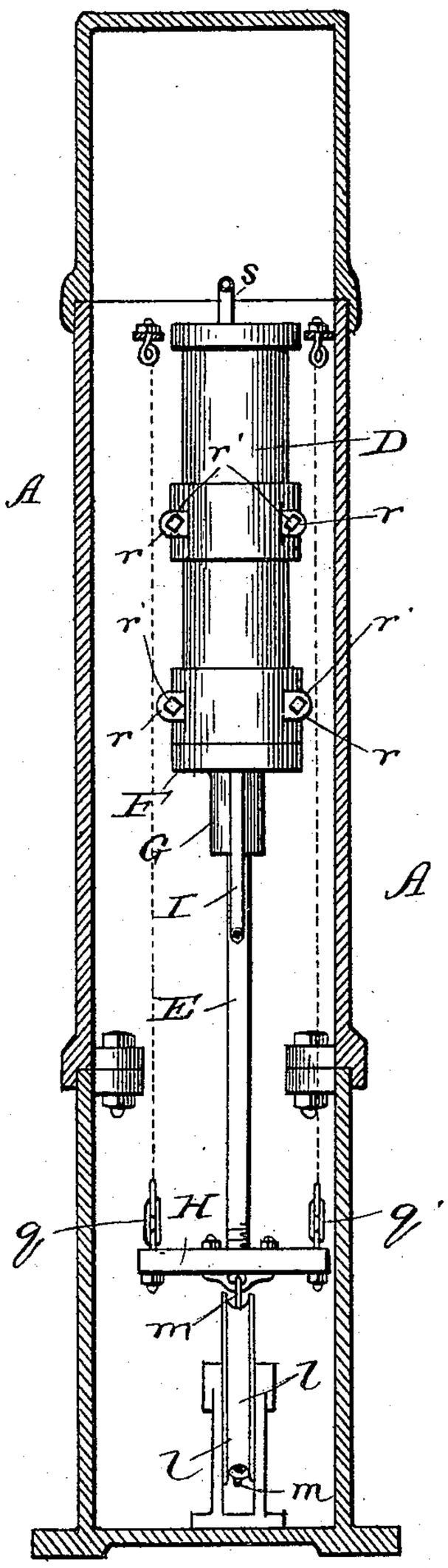

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Fig. 9.

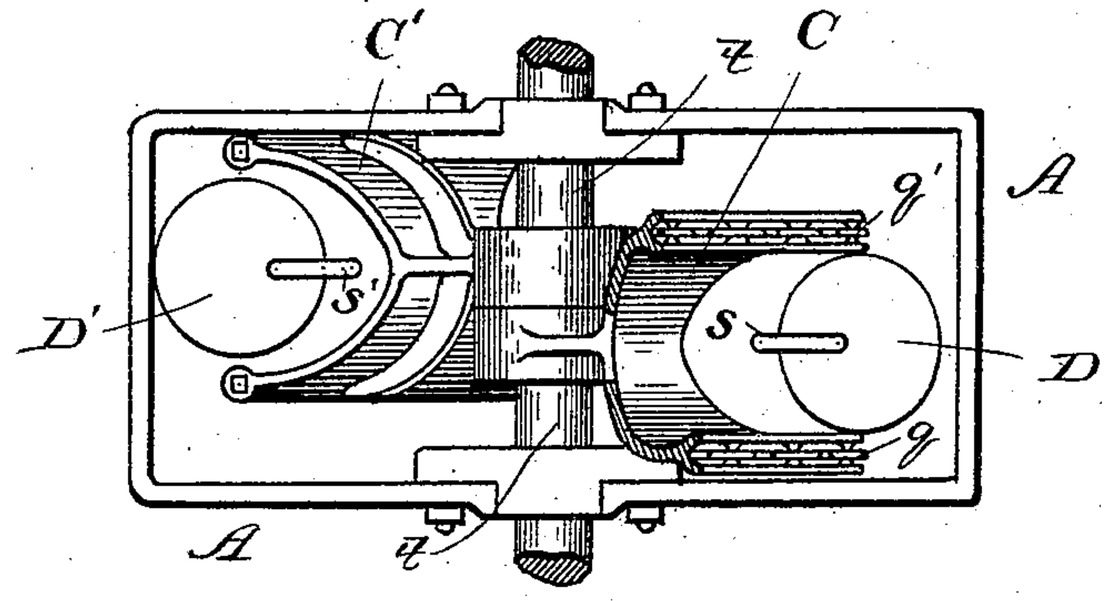
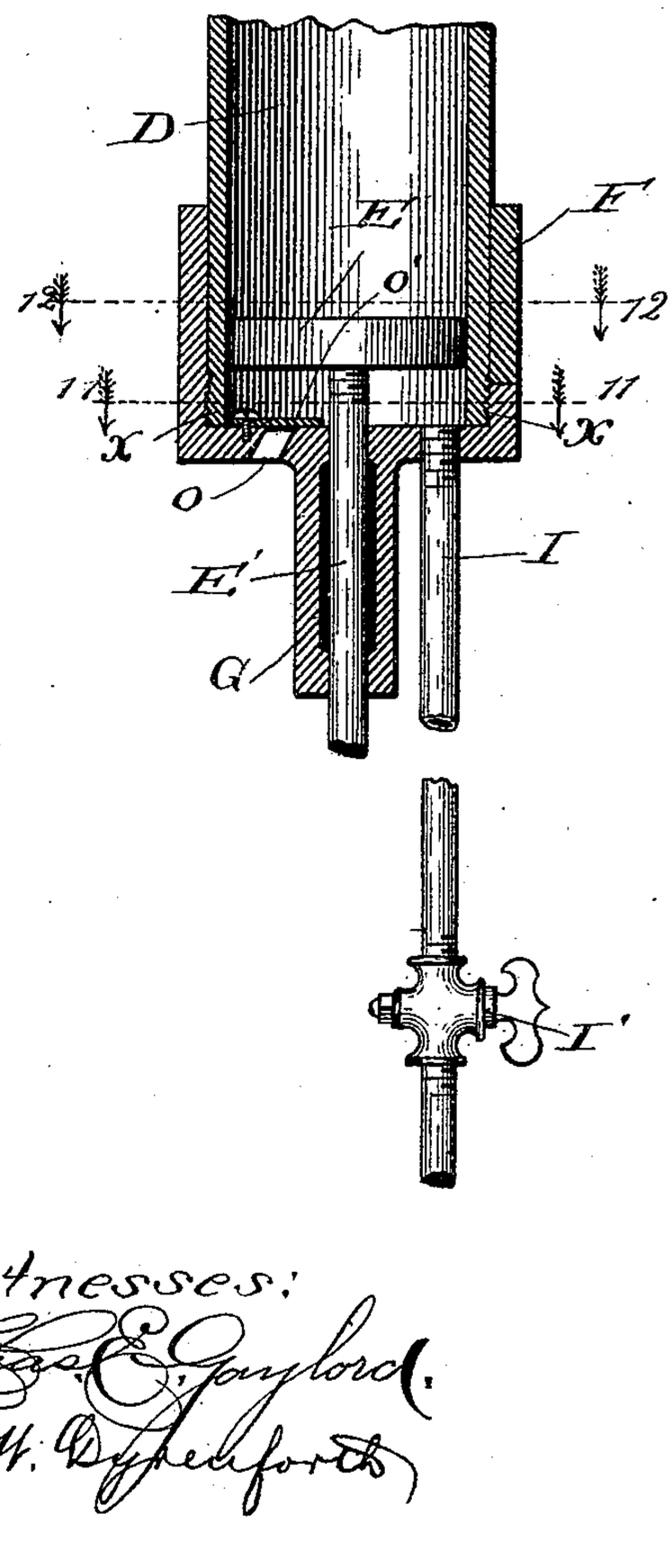


Fig. 10.

Fig. 11.



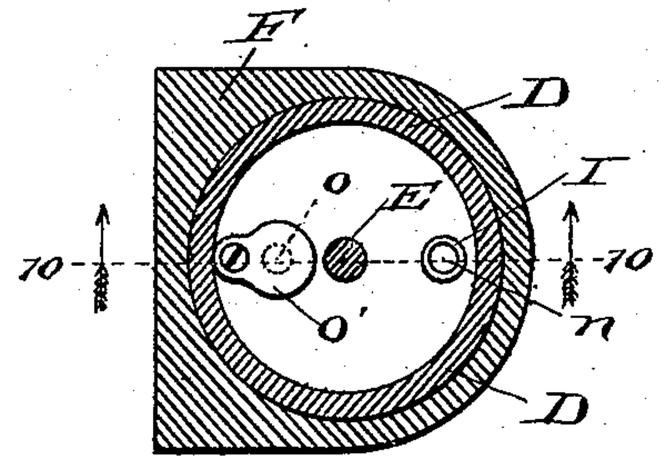
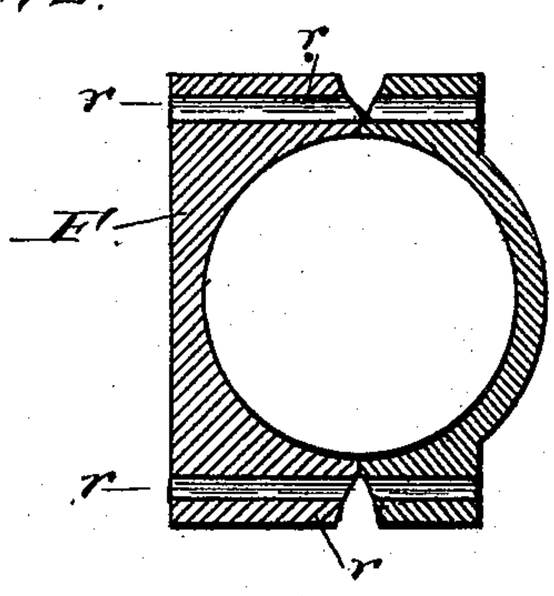


Fig. 12.



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UNITED STATES PATENT OFFICE.

WILLIAM P. ELLIOTT AND ARTHUR FARRAR, OF CHICAGO, ILLINOIS.

GATE.

SPECIFICATION forming part of Letters Patent No. 395,885, dated January 8, 1889.

Application filed January 31, 1887. Serial No. 225,957. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM P. ELLIOTT and ARTHUR FARRAR, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Gates; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates particularly to improvements in the class of railway-crossing gates in which bars provided upon posts to swing vertically are actuated in both directions—that is, to be raised and lowered—by fluid-pressure.

The mechanism involved in gates of the class referred to comprises, generally stated, a single post carrying a swinging gate-bar, with which to form the barrier, or two posts in line with each other, both carrying such gate-bars, with which to form the barrier by lowering them toward each other from their normally-raised positions; and it further comprises a fluid-pump controllably communicating with fluid-pressure mechanism—piston and cylinder or collapsible receiver mechanism—in or at each gate-post and connected with the gate-bar to raise and lower the same by fluid-pressure exerted from the pump. Ordinarily these gates, when the barrier is formed by two swinging bars, have the latter connected together to cause the rise or descent of one to raise or lower with it the other, the connection being either in the form of chains or cables, usually underground, or air-conduits; and as it is common to provide a gate, most usually like that last mentioned—that is, having the swinging bars—on each side of a railroad-crossing, and sometimes at opposite sides of each track at the crossing, all the posts having the fluid-pressure mechanism are caused to communicate with the one pump to be operated simultaneously.

We illustrate and describe our improvements by showing and explaining their application to a gate involving a single post and swinging gate-bar, since their purposes may be thus as clearly set forth as by illustrating and describing them in connection with the more complicated forms of gates, to show which, however, would require unnecessarily elaborate drawings and entail consequent prolixity in the description.

Part of our present improvements are designed to be used particularly upon the construction of gate, or gate involving the means of operation, shown and described in Letters Patent of the United States, No. 380,447, granted to Mortimer B. Mills on the 3d day of April, 1888. In the gate here referred to each cylinder is provided with an external rectangular frame, by which its piston-rod is connected with the pulley or sections thereof on the gate-bar axis and which forms a guide for the piston-rod; and each cylinder is open at the end opposite that at which the air-pressure is introduced to avoid the formation and consequent resistance of an air-cushion to the movement of the piston in one direction by such air-pressure or of a vacuum when the piston is moved in the opposite direction.

The objects of our present improvements are to avoid the use of the rectangular frame referred to, and thereby save the space (some eighteen inches) provided in the post to permit it to work therein with the movement of the piston-rod, with which it is connected, and to provide the fluid-pressure mechanism for each post with means whereby the air—the preferred form of fluid—shall not be allowed to escape therefrom freely by the force of the air-pressure used to actuate the bar or bars, but shall be utilized to produce a controllable resistance to the movement of the piston portion of the mechanism, and thereby afford a form of governor for producing uniform motion of the gate-bar or of all the gate-bars, if there be more than one, actuated from the same pump. This control over the movements of the gate-bars is particularly desirable where several are operated from the same pump, since, owing to possible mechanical defects in the piston mechanism, and more especially to the difference in the degrees of friction in the parts of the devices immediately connected with the gate-bars, to possible differences in the weights of the gate-bars, and to the effect of wind upon the motion of the same, the latter are liable to lack the desired uniformity of action.

In the drawings, Figure 1 is a partly sectional and broken diagrammatic view of a pneumatic railroad-gate provided with our improvements; Fig. 2, a longitudinal section of a detail; Fig. 3, a cross-section of the same;

Fig. 4, a longitudinal section of a modified form of the detail shown in Figs. 2 and 3; Fig. 5, an end view of the detail shown in Fig. 4; Fig. 6, a similar view of a modified construction of the same; Fig. 7, an enlarged sectional side elevation of a gate-post containing our improvements illustrated in the gate-post shown in Fig. 1, and having parts broken away; Fig. 8, a section through the post, taken on the line 8 8 of Fig. 7 and viewed in the direction of the arrows; Fig. 9, a plan view of the same having the top of the post removed; Fig. 10, a broken section taken on the line 10 10 of Fig. 11, viewed in the direction of the arrows, and showing details; Fig. 11, a section taken on the line 11 11 of Fig. 10, and Fig. 12 a section taken on the line 12 12 of Fig. 10 and viewed in the direction of the arrows.

A is a hollow gate-post, transversely across which, near its upper end, extends the shaft *t*, journaled at opposite ends in the post, and carrying to turn with it the gate-bar B, all as is common in gates of the present class. Secured upon the shaft *t* within the post are opposite sections, C and C′, of a wheel or pulley of wide periphery, deeply recessed longitudinally or "bifurcated," as shown in Fig. 9. If desired, the entire wheel or pulley might be employed, instead of sections thereof, when it would be deeply recessed about its periphery.

D and D′ are cylinders permanently closed at their upper ends and secured within the post A at opposite sides of the same, in the manner hereinafter described, and communicating, respectively, through their upper ends with a suitable air-pump, A′, by pipes *s* and *s′*, and alternately, as is common in gates of the present class, with the open air through the medium of a suitable common three-way cock, s^2, (not shown in detail,) in the vicinity of the air-pump, at the junction of the pipes *s* and *s′* with the pipe s^3, which affords their common communicating medium with the pump. Within each cylinder is a piston, E, Fig. 10, having a rod, E′, extending from its lower side through and beyond the lower end of the cylinder, which is open and screw-threaded externally, as shown at *x*, Fig. 10. Each cylinder is supported in a cap, F, cast, preferably, in two parts, as represented in Fig. 12, and having lateral horizontal sockets *r* to receive bolts *r′*, which secure the caps in position, as shown, on the inner walls of the post and the parts of the caps together, and the caps are threaded internally around their sides near the base of each, as also shown at *x*, Fig. 10, to permit the threaded ends of the cylinders to be screwed into them. A hollow extension or nipple, G, projects from the center of each cap F and affords a guide for the piston-rod E′, which passes through it, and each piston-rod is provided at its extremity with a cross-head, H, near the ends of which are secured chains *q* and *q′* or cables fastened, respectively, at their opposite ends to the upper extremities of the bifurcated portions or edges, directly above them, of the grooves in the sections C and C′. The cylinders are further supported by means of collars *p*, as shown.

In the base of each cap F, on one side of the opening of the nipple G, is an aperture, *o*, Fig. 10, provided with a suitable internally-opening check-valve, *o′*, and on the opposite side of the opening to the nipple is a threaded aperture, *n*, to receive a tube, I, leading to any desired point and provided with a stop-cock, I′.

The bifurcated or grooved form of the pulley-sections permits them in their oscillatory movements in working the gate-bar to embrace the respectively adjacent cylinders; hence thus permits the latter to extend nearly to the top of the post, and, further, obviates the necessity of connection with any form of frame on the cylinders to extend above the same, permitting also direct connection by the chains *q* and *q′* with the piston-rods at the cross-heads H.

The operation of the device thus described is as follows: Air introduced into the cylinder D forces the piston E therein downward, thereby pulling downward the chains *q* and *q′*, connecting the piston-rod with the recessed or bifurcated pulley-section C, and lowering the gate-bar, the descent of which, owing to the connection of the recessed or bifurcated pulley-section C′ with the piston-rod of the cylinder D′, as described, raises the piston E′ in the latter. As a piston rises in its cylinder, it admits air below it through the valved aperture *o*, which is closed when the piston is forced down again, necessitating the discharge of the air thus admitted through the aperture *n*. Such discharge, however, is regulated by the stop-cock I′, which may be at or near the cylinder, or in the operator's cabin adjacent to the pump by extending the pipe I sufficiently far. By means of this stop-cock the descent of the piston may be regulated as to speed and uniformity, and consequently, also, the accompanying movement of the gate-bar, and where two gate-bars are connected together, as indicated by the chains *m* and *m′*, passing over pulleys *l* and *l′*, Fig. 7, or by the pipes leading to the cylinders from the pump which operates all the bars, Fig. 1, to cause the rise or descent of one simultaneously to raise or lower with it the other, when each post is provided with cylinders having their pistons connected with the gate-bars thereon at opposite sides of the axis of the latter, this control afforded by the stop-cocks I′ produces increased uniformity in the movements of all the bars. Of course, if there be but one cylinder in the post, it is only necessary to groove or bifurcate one section-pulley. The uniform motion of the gate-bar attained by the controlling mechanism thus described for the discharge or waste air may also be attained by the mechanism shown on the sheet of drawings with Fig. 1, and which may be employed in conjunction with

the controlling mechanism already described, or, like the latter, alone.

In suitable position within each pipe *s* and *s'* (that is, where access to them for purposes of regulation, as hereinafter described, may be had most conveniently,) we provide a check-valve device, K, preferably of the construction shown in Figs. 2 and 3, and comprising a short tube or shell, *k*, provided internally with two intercommunicating chambers, *i* and *i'*, the communication of which is obstructed by means of a check-valve, *h*, on a stem, *h'*. The stem *h'* extends into a recess in a threaded plug, *g*, screwed into a flanged opening in the side of the short tube *k*, whereby the valve *h*, though confined, may have free play with relation to its seat in the communication between the two chambers *i* and *i'*. A regulating-screw, *f*, extends through the bottom of the shell or short tube *k* against the under side of the valve *h*, whereby turning the screw *f* raises or lowers the valve with relation to its seat. The shells *k* are adjusted in the pipes *s* and *s'* with the chambers *i* nearest the pump, whereby the pressure from the latter for actuating the bar B may pass into a cylinder, D or D', depending upon which way the handle of the three-way cock s^2 is turned, (the arrangement of the latter to prevent mistake being such that when its handle is in the vertical position shown the pipe or passage leading from the pump to the cylinder which serves in raising the gate-bar is open,) without obstruction from the valve *h*, while the contents of such cylinder can only return to escape at the three-way cock when the piston of the other cylinder is actuated through the opening between the chambers *i* and *i'*, the size of which is regulated by raising and supporting the valve by the screw *f*. The screw *f* serves to adjust and support the valve *h* in a position to regulate the opening for the return or waste air to any size desired to control the rapidity of escape of the return or waste air, and thus affords a controllable resistance to the movement of the gate-bar.

The same result may be attained by employing the form of valve K shown in Figs. 4 and 5, and comprising a short tube or shell, *k*, to be adjusted like the shells *k* already described, and having an internal disk, *e*, provided with a central orifice, *e'*, covered on the side farthest from the air-pump by a hinged check-valve, *h*, which is perforated at its center, as shown at *d*, the size of the opening *d* being regulated by means of a pivotal finger, *f'*. If desired, however, the opening *d* may be in the disk *e* to one side of the hinged check-valve *h*, as shown in Fig. 6, instead of in the valve itself, when, of course, the pivotal controlling-finger *f'* is placed accordingly.

The mode of operation of the form of valve last described is substantially the same as that of the valve device shown in Figs. 2 and 3; but we prefer to use the latter, owing to the readiness of accessibility to its regulating feature *f*, it being necessary to regulate the other to detach it from the pipe *s* or *s'*, into which it is adjusted.

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

1. In a gate having a vertically-swinging bar on a post, and a cylinder having its piston connected with the bar on one side of the axis thereof, to actuate the same by fluid-pressure introduced against one side of the piston, the combination, with the cylinder, of a cap, F, having a hollow extension, G, forming a guide for the piston-rod, a valved air-inlet, *o*, and a controllable discharge-outlet, *n*, substantially as and for the purpose set forth.

2. In a gate having a vertically-swinging gate-bar on a post, and a cylinder having its piston connected with the bar on one side of the axis thereof, to actuate the same by fluid-pressure introduced against one side of the piston, the combination, with the cylinder and gate-bar, of a cap, F, having a hollow extension, G, forming a guide for the piston-rod, a cross-head, H, on the piston-rod, and a pulley-section on the axis of the gate-bar, recessed on its periphery and connected on opposite sides of its recess with the cross-head H, substantially as and for the purpose set forth.

3. In a gate having a vertically-swinging bar on a post, and a cylinder having its piston connected with the bar on one side of the axis thereof, to actuate the same by fluid-pressure introduced against one side of the piston, the combination, with the cylinder on the opposite side of the piston, of a valved air-inlet, *o*, and a controllable discharge-outlet, *n*, and, on the side of the piston against which the pressure is introduced, of an adjustable valve device, K, substantially as and for the purpose set forth.

4. In a gate having a vertically-swinging bar on a post and actuated by fluid-pressure introduced against a piston in a cylinder and connected with the gate-bar, means for connecting the piston with the gate-bar, comprising a recessed pulley or pulley-section on the gate-bar axis and a cross-head, H, on the piston-rod, connected near opposite ends with the recessed pulley or pulley-section, substantially as and for the purpose set forth.

5. In a gate having a vertically-swinging bar on a post and actuated by fluid-pressure introduced against a piston in a cylinder, and connected with the gate-bar, the combination, with the gate-bar and cylinder, of a cap, F, having a guide-extension, G, for the piston-rod, a cross-head, H, on the piston-rod, and a recessed pulley or pulley-section on the gate-bar axis, connected with the cross-head H near its opposite ends, substantially as and for the purpose set forth.

WILLIAM P. ELLIOTT.
ARTHUR FARRAR.

In presence of—
FRANK L. DOUGLAS,
J. W. DYRENFORTH.