

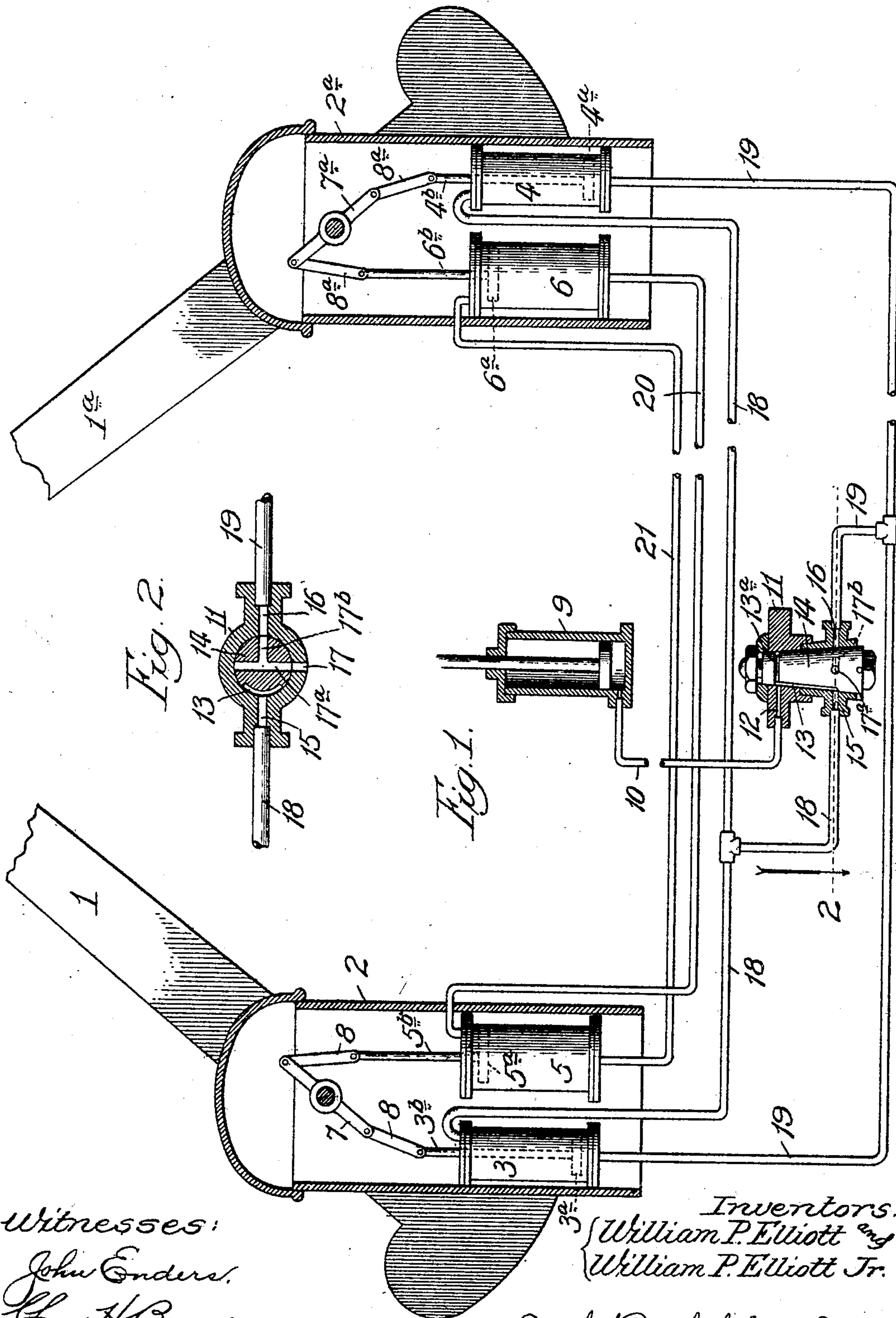
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W. P. ELLIOTT & W. P. ELLIOTT, JR.

GATE.

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UNITED STATES PATENT OFFICE.

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ILLINOIS.

GATE.

No. 835,184.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, WILLIAM P. ELLIOTT and WILLIAM P. ELLIOTT, Jr., citizens of the United States, residing at Chicago, in the 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 involving a pair of arms supported on posts to swing vertically toward each other for producing the barrier and from each other for raising the barrier and in connection with which an "air-tie" is used for causing uniform or simultaneous action of the members of the pair of swinging arms to overcome the contrary tendency due to differences in the amount of friction in the movements of the arms or to other differences in the construction of their mechanism, and also and particularly to the force of the wind, which when blowing in the direction of the plane of movement of the arms tends to hasten the descent or rise of one, while it impedes that of the other.

Our invention is expressly intended to afford an improvement over the species of air-tie for the purpose stated, an example of which is set forth in United States Letters Patent No. 368,522, dated August 16, 1887, and granted to W. P. Elliott, one of the present applicants.

The principle of air-tie thus exemplified is found to present disadvantages, since the cylinders are for obvious reasons required to be all of the same capacity, whereas it is desirable that the area of surface of the pistons employed for controlling the uniformity of movement of the pair of gate-arms shall be as large as practically possible, and with the outer cylinder in each post communicating with the inner cylinder of the outer post through the air-pipe connecting the two leakage of the confined air-pressure in the upward direction past a piston in any cylinder necessarily tends to impair the purpose of the air-tie in producing uniformity of the movements of the gate-arms under the conditions referred to. Our present improvement overcomes these and other objections by the construction illustrated in the accompanying drawings.

In the drawings, Figure 1 shows by a broken view in sectional elevation a gate of

the swinging arm class referred to equipped with novel means for equalizing the movements of the gate-arms; and Fig. 2 is a section, taken at the line 2 on Fig. 1 and viewed in the direction of the arrow, of a three-way cock suitable for our purpose.

The gate-arms 1 and 1^a, of usual or any desired construction, are suitably journaled, respectively, on posts 2 and 2^a, shown in their preferred hollow form and supporting, respectively, the outer air-pressure cylinders 3 and 4, containing the pistons 3^a and 4^a, and the relatively larger inner air-cylinders 5 and 6, containing the pistons 5^a and 6^a. All the pistons are shown by dotted lines, those in the outer cylinders being represented in their lowered positions, to which they are brought when the gate-arms are raised, as shown, those in the inner cylinders being then in the raised position indicated. A rocker-arm 7, secured centrally on the journal of the gate-arm 1, has its ends connected by links 8 with the upper ends of the stems 3^b and 5^b of the pistons 3^a and 5^a, and a rocker-arm 7^a, similarly secured on the journal of the gate-arm 1^a, has its ends connected by links 8^a with the upper ends of the stems 4^b and 6^b of the pistons 4^a and 6^a.

The primary motor for operating the gate is an air-pump (indicated at 9) having a pipe connection 10 with a three-way cock 11, the inlet 12 in which leads to a recess 13 in a side of the rotary plug-valve 14, the outlet end of this recess being in the plane of the two ports 15 and 16 in the valve-casing, which also contains an exhaust-port 17 intermediate of the ports 15 16, and the inlet end of the recess 13 has an extension 13^a leading partly or entirely about the plug. The plug 14 contains in the plane of these ports a transverse passage 17^a, having a branch 17^b extending centrally from it at a right angle. An air-pipe 18 leads from the port 15 with one end entering the cylinder 3 at its top and the other end entering the cylinder 4 at its top, and an air-pipe 19 leads from the port 16 with one end entering the cylinder 3 at its bottom and the other end entering the cylinder 4 at its bottom.

With the plug-valve 14 turned to the position in which it is represented air-pressure from the pump 9 has passed through the cock 11 and pipe 18 into the cylinders 3 and 4 to lower their contained pistons and raise the

gate-arms. In this position of the plug-valve one end of its passage 17^a registers with the port 17, and the branch 17^b registers with the port 16 to permit the air ahead of the descending pistons 3^a and 4^a to exhaust by way of the pipe 19 through the port 17. By turning the plug half-way around in its casing the recess 13^a remains in registration with the air-pressure-supply port 12, while the recess 13 registers with the port 16 to admit the pressure-supply through the pipe 19 into the lower ends of the cylinders 3 4 to raise the pistons therein and lower the gate-arms. The described turning of the valve registers the other end of its passage 17^a with the port 17 and the branch 17^b with the port 15 to permit the air ahead of the rising pistons 3^a and 4^a to exhaust by way of the pipe 18 through the port 17.

No novelty is claimed for the mechanism by itself for producing the operation thus described, it being merely selected as one of the various means that may be employed and which need not even be fluid-pressure mechanism for operating the gate-arms while under the control of the means for equalizing their movements constituting our present improvement, which involves connecting the companion cylinders 5 and 6 by a pipe or conduit 20, leading from a point above the piston in one (as the cylinder 5) to a point below the piston in the other and by a pipe or conduit 21 leading from a point below the piston in the first-named cylinder to a point above the piston in the cylinder 6. Thus when the gate-arms in rising or descending are moving uniformly under normal conditions the fluid (preferably air) confined between either side of the piston 5^a and the opposite side of the piston 6^a remains at normal atmospheric pressure against both sides of each piston through the pipes 20 and 21. Any force, however, tending to expedite the movement of either arm will tend to move the piston in the inner cylinder of that arm correspondingly faster and compress the air ahead of it against the piston in the companion inner cylinder with the effect of expediting the movement of that piston and of the arm connected with it correspondingly, and obviously any force tending to obstruct the movement of either arm will similarly be counteracted to equalize the movement of both arms. Thus, for example, with the wind blowing in the direction of movement of the arm 1 in descending and tending to hasten its descent, while the arm 1^a is being obstructed in the same degree by the wind, the relatively faster moving piston 5^a will tend to rarefy the air confined between its upper side and the lower side of the piston 6^a through the pipe 20, while the air below the piston 5^a will be compressed through the pipe 21 against the upper side of the piston 6^a, and such rarefaction and compression

exerted, respectively, on the opposite sides of the piston 6^a move it at, or substantially at, the same rate of speed that the piston 5^a is moving downward.

The area of each of the similar sides or faces of each piston 5^a and 6^a, which are alike, being as large as practicable and preferably larger than that of either face of a piston 3^a or 4^a, if employed, enhances the steadiness in the movements of the gate-arms under the stress of forces tending to impair the uniformity thereof, and, as will be apparent, the closed fluid-controlled equalizing device for the swinging arms, being devoid of any communication with the fluid-pressure apparatus when employed for operating the arms, cannot be affected by leakage of pressure past the pistons of the apparatus. Moreover, the permanently-closed communication between the two inner cylinders renders them proof against access to their working parts of foreign matter that would wear them and maintains them in perfect operative condition, thus rendering their packings more durable.

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

1. In a gate, the combination of a pair of arms journaled on posts to swing toward and from each other, means for swinging said arms, and means for equalizing their movements, consisting of a fluid-cylinder for each arm containing a piston connected with the arm, a fluid-conduit leading from the upper part of one cylinder into the lower part of the other cylinder, and a fluid-conduit leading from the lower part of the last-named cylinder into the upper part of the companion cylinder, said conduits forming closed communication from each side of the piston in one cylinder to the opposite side of the piston in the other of the two cylinders connected by them.

2. In a gate, the combination of a pair of arms journaled on posts to swing toward and from each other, fluid-pressure mechanism for operating the gate, including cylinders containing pistons connected with the gate-arms, and means for equalizing the movements of said arms, consisting of air-cylinders, one for each arm, containing a piston connected with the arm, an air-pipe leading from the upper part of one cylinder into the lower part of the other cylinder and an air-pipe leading from the lower part of the last-named cylinder into the upper part of the companion cylinder, said pipes forming closed communication from each side of the piston in one to the opposite side of the piston in the other of the two cylinders connected by them.

3. In a gate, the combination of a pair of arms journaled on posts to swing toward and from each other, fluid-pressure mechanism for operating the gate, including similar cylinders containing pistons connected with

the gate-arms, and means for equalizing the movements of said arms, consisting of similar air-cylinders, one for each arm, of greater diameter than the cylinders of said fluid-pressure mechanism, and each containing a piston connected with the arm, an air-pipe leading from the upper part of one of said equalizing-cylinders into the lower part of the other and an air-pipe leading from the lower part of said other cylinder into the upper part of the companion cylinder, said pipes forming closed communication from each side of the piston in one to the opposite side of the piston in the other of the two cylinders connected by them.

4. In a gate, the combination of a pair of arms journaled on hollow posts to swing toward and from each other, air-pressure mechanism for operating the gate, including outer cylinders supported in said posts and containing pistons connected with the gate-arms, a fluid-pressure pump and valved

pipes leading from said pump into said cylinders, and means for equalizing the movements of said arms, consisting of inner air-cylinders supported in said posts, one for each arm, each containing a piston connected with the arm and with the piston of the adjacent outer cylinder, an air-pipe leading from the upper part of one of said equalizing-cylinders into the lower part of the other and an air-pipe leading from the lower part of said other cylinder into the upper part of the companion cylinder, said pipes forming closed communication from each side of the piston in one to the opposite side of the piston in the other of the two cylinders connected by them.

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In presence of—
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