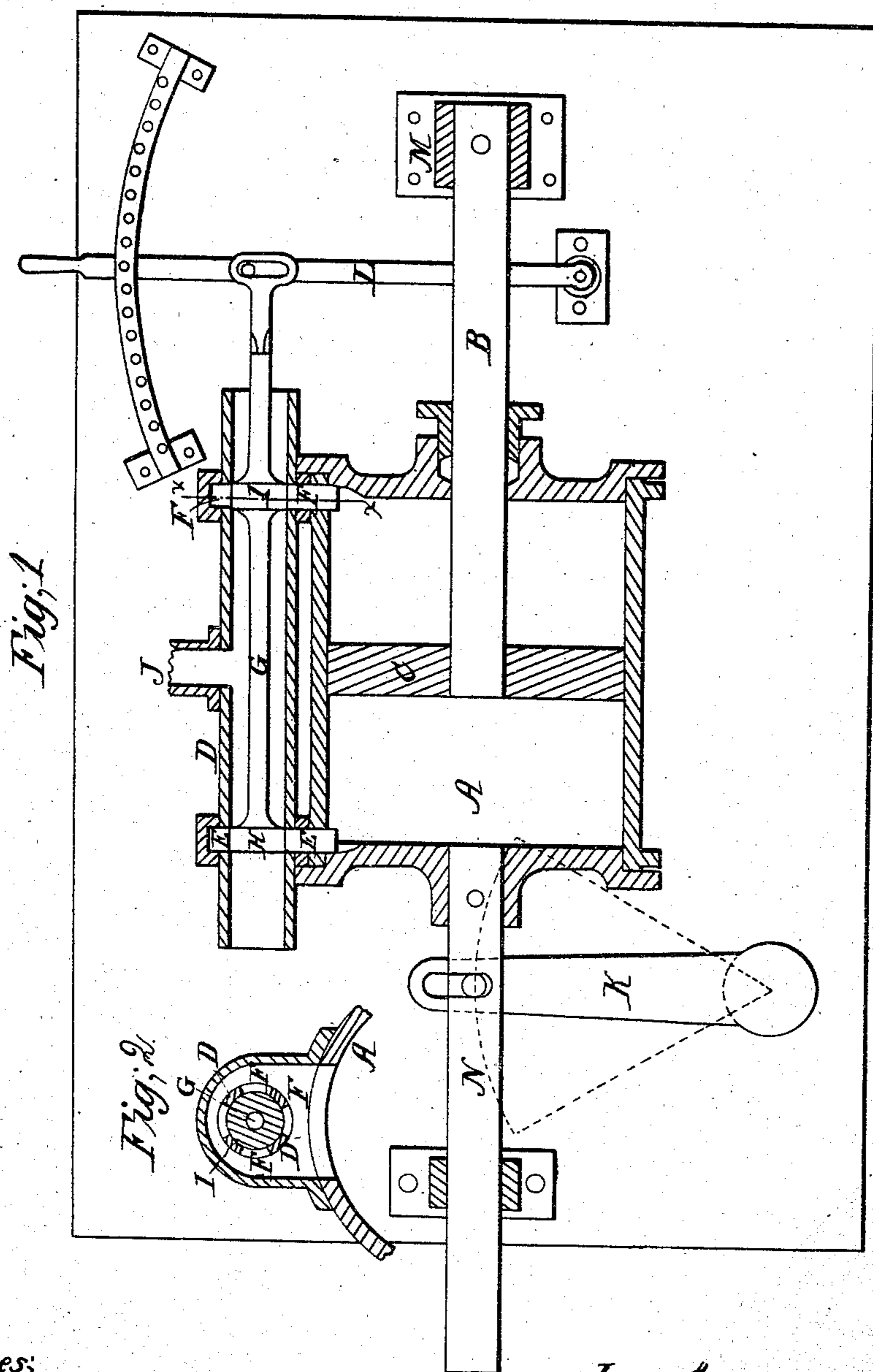


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*N<sup>o</sup> 88,431.*

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# United States Patent Office.

JEARUM ATKINS, OF WASHINGTON, DISTRICT OF COLUMBIA.

Letters Patent No. 88,431, dated March 30, 1869.

## IMPROVEMENT IN DEVICES FOR CONTROLLING FLUIDS UNDER PRESSURE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JEARUM ATKINS, of Washington, in the county of Washington, and District of Columbia, have invented a new and useful Improvement in Mechanical Movements for Controlling the Action of Fluids under Pressure; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a horizontal section through my apparatus, to exhibit the relation and movements of its parts.

Figure 2 is a cross-section on line *x-x*, to exhibit the structure of the parts.

My invention consists in producing a cut-off motion by alternate movements of a valve and its seat; that is to say, the valve moves away from its seat, to open a port, and the seat moves to the valve, to close said port.

In all valve-motions heretofore constructed, the port could only be opened and closed by the movements of the valve, the valve-seat being relatively stationary.

The principle of operation of my apparatus is applicable to many different purposes, for which great power for execution and sensitiveness to control are required. Among these purposes I will mention operating the rudder to steer a ship, handling heavy guns, and other ponderous masses, controlling the link-motion of steam-engines, operating iron-planing machines, controlling the throttle-valves of steam-engines, &c.

The drawing represents my invention in its simplest form, and divested of all those accessories which may be required to adapt it to particular purposes, my intention being to exhibit only the essential principle of operation in which my invention rests, and which must be present, however much its form and the details of construction may be varied.

I will now describe the elements of my invention as embodied in the simple apparatus shown in the drawings.

A is a cylinder working over a stationary piston, C.

The piston-rod B is rigidly secured, at its outer end, to some portions of the frame-work M, by which the apparatus is supported, and works through a stuffing-box at the end of the cylinder.

At the opposite end of the cylinder is a rod, N, the axis of which is coincident with the axis of the piston-rod B. The rod N is rigidly secured to the end of the cylinder, and moves forward and backward, in the direction of its length, in a bearing upon some convenient and proper portion of the frame-work that supports the apparatus.

It will thus be seen that the cylinder A may move forward and backward upon the piston-rod B, said rod serving as a guide at one end of said cylinder, and the rod N serving as a guide for the other end of the same.

If fluid under pressure be admitted to one end of the cylinder A, said cylinder will be caused to move, in obedience to the pressure of said fluid against the

piston C on the one side, and the cylinder-head on the other, and the expression of the power exerted by said movement is found by multiplying the area of the piston into the pressure of the fluid. This motion of the cylinder may be communicated in a variety of ways to such mechanisms as it may be desired to influence.

The lever K, then, is to be understood as representing any appliance which it may be desirable to use in communicating the motion of the cylinder A to the mechanism to be actuated. The form in which this appliance may be put, and the manner of its connection with the motor, may be as various as the different purposes for which the appliance may be used.

This invention has for its object the principle of operation by which the movements of the cylinder may be controlled, and its operation made intermittent, or irregular, at the will of an attendant, or in obedience to the movements of some other mechanism.

I attach to the side of the moving-cylinder, a valve-case, D, having ports which communicate with either end of the cylinder, and a feed-pipe, J, by which the fluid under pressure may be conducted to the interior of the valve-case. Within said valve-case is arranged a valve, to cover the ports when the apparatus is at rest.

The valve-case is represented in the drawings as a hollow cylinder, D, open at each end, and surrounded by two annular chambers, which form the ports E and F.

The valve is represented by a cylindrical stem, G, provided with two flanges, or collars, H I, accurately fitted to the interior surface of the valve-case, and placed upon said stem, at distances from each other equal to the distance between the ports E and F, so that both of said ports will begin to open or be entirely closed at the same instant.

Attention is now called to the fact that the valve-case is attached to and forms a part of the cylinder, and partakes of its movements. It may be cast in one piece with the cylinder, or it may be made separately, and bolted fast to it.

Suppose it is desired to move the lever K to the right, say one inch, the valve G must then be moved to the right one inch. The ports E and F are thereby uncovered. The port F becomes an induction-port, and the port E, an exhaust.

The fluid under pressure, which at all times fills the space between the flanges, or collars H I, within the valve-case, instantly begins to flow through the port F, and causes the cylinder itself to move to the right and communicate its motion to the lever K, and the mechanisms attached thereto. As the cylinder moves, it carries the valve-case with it. As it advances upon the valve, the ports are closed again, and when they are entirely closed, the pressure is cut off, and motion will cease. At that point the apparatus will rest until a new movement of the valve again uncovers the ports and admits pressure to the cylinder.

It will be apparent, from the above description, that

while the valve may be moved, to open the ports and produce action on the part of the motor, no further movements of the valve are required to discontinue said action at the proper movement.

The valve G is to be placed under the control of a power independent of the cylinder, as the latter must always move only in obedience to and in the directions indicated by the valve.

I therefore represent the valve G as connected, by a stem, to a lever, L, and this lever is to be understood as being the representative of controlling power, whether the same is exercised by a living intelligence, through mechanical appliances, or is simply the reflex action of other mechanisms.

If this apparatus is employed for moving the rudder of a ship, then the lever L represents a hand-wheel. If to move the throttle of a steam-engine, then the said lever represents a primary governor, operating through the reflex action of the prime mover.

If compressed air is the fluid employed to move the cylinder, then the valve-case D may be made open at both ends, and the exhaust be permitted to escape directly into the surrounding atmosphere. This would be objectionable, however, if steam or water should

be employed, and in that event the valve-case D should be provided with passages to conduct away the exhaust.

In, operation the valve and the cylinder, or its equivalent, will move practically at the same moment, the cylinder following close upon the movement of the valve, and under no circumstances can the cylinder move past the point of equilibrium, because, in doing so, the ports would be opened to a reverse action of the fluid under pressure; that is to say, the induction-port would be open as an exhaust, and the exhaust as an induction, and pressure introduced to oppose said movement.

Having described my invention,

What I claim as new, is—

The combination of a movable valve-case, D, provided with ports E F, and a movable valve, H I, said valve and valve-case having a reciprocal movement, as described, so that the ports will be opened by a movement of the valve, and closed by a movement of the valve-seats, substantially in the manner and upon the principle herein set forth.

Witnesses:

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