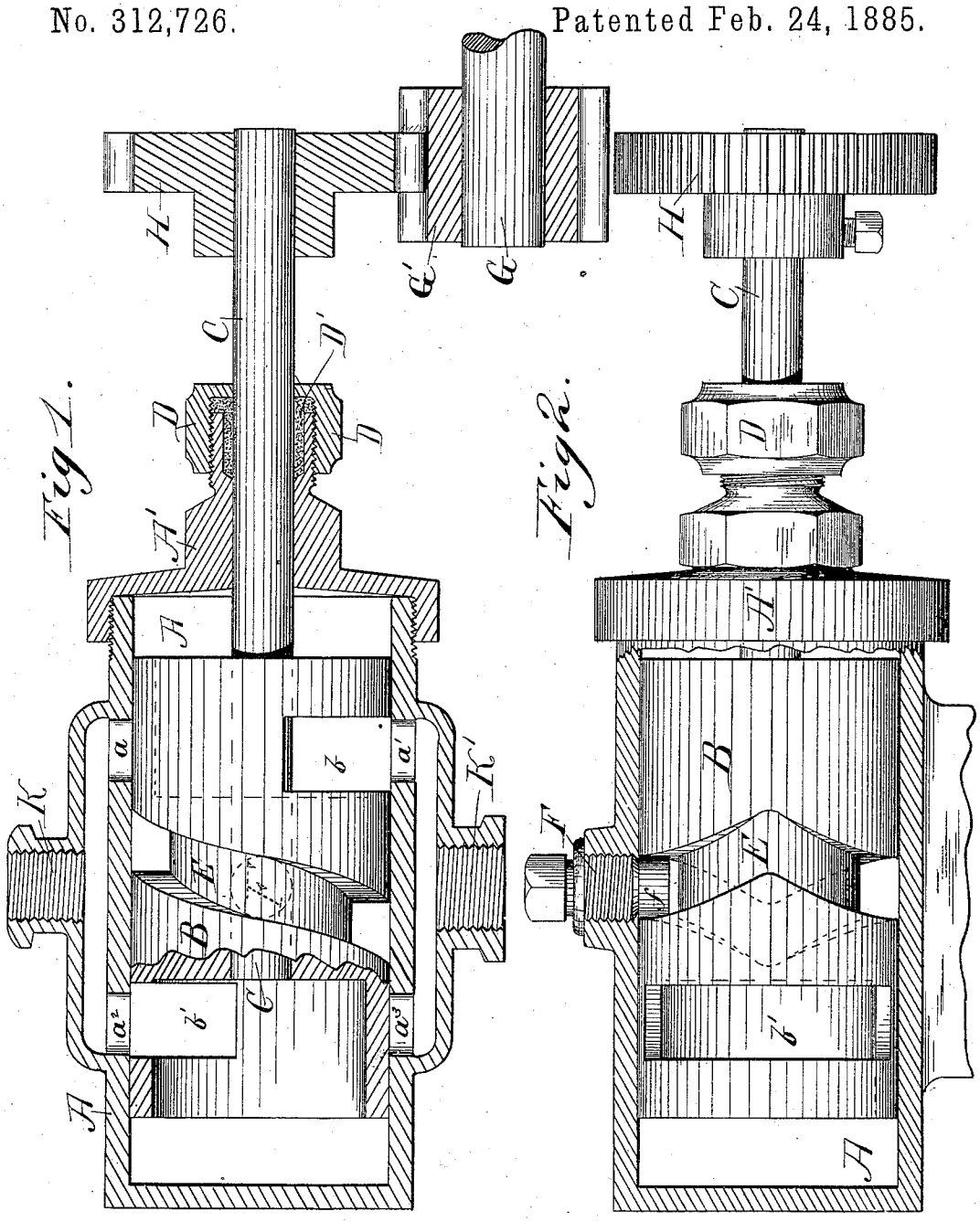
(No Model.)

A. JOHNSTON.

PUMP AND ENGINE.

No. 312,726. Patented Feb. 24, 1885.



Witnesses:
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UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

PUMP AND ENGINE.

SPECIFICATION forming part of Letters Patent No. 312,726, dated February 24, 1885.

Application filed June 19, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALLEN JOHNSTON, a citizen of the United States, residing in Ottumwa, in the county of Wapello and State of Iowa, have invented a new and useful Improvement in Pumps and Engines, of which the following is a specification.

The present invention consists in a cylinder for pumps or engines having a piston which both reciprocates and rotates. The reciprocation of the piston effects the function of receiving and discharging the liquid pumped or the steam or other expansive fluid used, while the rotation of the piston effects the function of opening and closing the ports of the cylinder. The principle of the invention is, however, unchanged if, in reducing it to practice or working form, the former of these functions is effected by the rotation of the piston, while the latter is effected by its reciprocation. As the piston both reciprocates and rotates, it operates in itself also to convert a rotary into a reciprocating motion, or a reciprocating into a rotary motion, as may be desired. When used as a pump, the piston may be reciprocated by simply giving it a rotary motion from the source of power, and when used as an engine the piston itself converts its reciprocating motion into a rotary motion, so that the power generated may be utilized in that form, if desired, without the necessity of employing any intermediate mechanism to convert the reciprocating motion of the piston into a rotary motion.

The means for reciprocating the piston from its rotary motion, or of revolving it from its reciprocating motion, according as the power may be applied to it in the one or the other of these ways, may consist, for example, of a cam on the piston which engages with a pin projecting through the cylinder; but any other suitable means may be employed for this purpose, and if a cam is used it may be located on the shaft of the piston outside of the cylinder instead of on the inside, and the cam may be on the cylinder while the pin is on the piston; but one feature of my present improvement, however, consists in providing the piston with a grooved cam for this purpose, as this I deem a better way of effecting this result.

In the accompanying drawings, which form a part of this specification, Figure 1 is a central longitudinal section of a device embodying my invention, the same being taken through the ports of the cylinder; and Fig. 2 is a similar view taken taken at right angles to that of Fig. 1.

In the drawings, A represents the cylinder, and B its rotating and reciprocating piston. The cylinder A is provided with ports $a\ a'\ a^2\ a^3$, two of said ports being located near each end of the cylinder and diametrically opposite each other.

C is the piston stem or shaft. The head A′ is secured to the cylinder by screw-threads, and the other end of said head is also threaded so as to form, with the nut D, the stuffing-box D′. The piston B is provided at each end with openings or cut-away portions $b\ b'$, which register with the ports of the cylinder as the piston revolves. These openings $b\ b'$ are on opposite sides of the piston, so that while the receiving-port a^2 is open the discharging-port a' will also be open at the opposite end of the cylinder. The opening $b\ b'$ should occupy a little less than one-half the circumference of the piston. Each end of the piston should preferably be made hollow.

E represents a grooved cam cut spirally around the periphery of the piston, and F is a screw-pin secured in a threaded hole in the cylinder, the end of which is provided with a friction-roller, *f*, and fits into this grooved cam.

G represents a driving-shaft, and G′ a gear thereon, which meshes with the gear H on the shaft or stem C of the piston, by means of which the piston and cylinder may be operated as a pump. The revolution of the piston will cause it at the same time to reciprocate by action of the cam E and pin F. The revolution of the piston will alternately open and close the diagonally-opposite ports of the cylinder, so that the liquid while it is being received into the cylinder at one end will be discharging at the other.

K represents, for example, the ingress-opening, and K′ the discharge-opening.

By admitting steam to the cylinder alternately at each end the piston will be reciprocated thereby and the grooved cam E and pin F will serve to rotate the piston, and thus open and close the ports alternately at each end of the cylinder.

When used as a steam-engine, rotary motion

may be derived directly from the piston itself by providing its stem or shaft with a gear-wheel or driving-pulley, or, if preferred, a reciprocating motion may be derived therefrom in the usual manner; but in such case the pitman-rod should have a swivel-connection with the piston or with its stem or shaft C, so as to permit of the revolution of the piston. When used as a steam or other engine, the piston or its stem C should be furnished with a fly-wheel to render the action steady and uniform and to insure the continual revolution of the piston.

In practicing my invention the piston need not be given a complete revolution or a continuous revolution in the same direction; but, if desired, it may be simply rotated part of a revolution in one direction and then back, the ports being arranged so that such partial rotation will open and close them. That shown in the drawings and before described is, however, what I deem to be the best way known to me of practicing my invention. For engines, however, I think it will be better to place the cam outside the cylinder generally.

I claim—

1. The combination of a cylinder having ports in its cylindrical surface with a rotary and reciprocating piston having openings or cut-away portions, whereby said ports are opened and closed by the rotation of said piston, while the fluid is received and discharged by the reciprocation of said piston, substantially as specified.

2. The combination of a cylinder provided with ports in its cylindrical surface with a rotary and reciprocating piston having openings registering with said ports, whereby they are opened and closed, and a cam for communicating to said piston one of its motions, substantially as specified.

3. The combination of a cylinder having diametrically-opposite ports near each end with a rotating and reciprocating piston having openings near each end diagonally opposite each other, substantially as specified.

4. The combination of cylinder A, provided with ports a a' a^2 a^3, and having an interiorly-projecting pin, F, furnished with friction-roller f with a rotating and reciprocating piston, B, having diagonally-opposite openings b b', and provided with grooved cam E, substantially as specified.

ALLEN JOHNSTON.

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