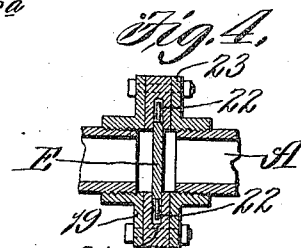
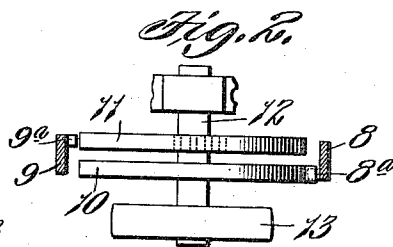
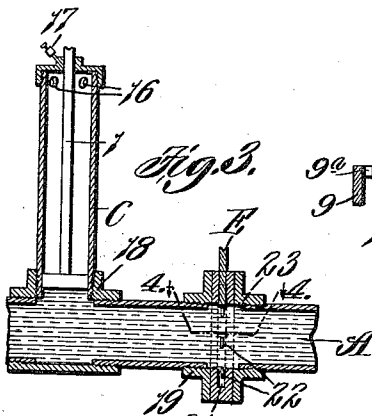
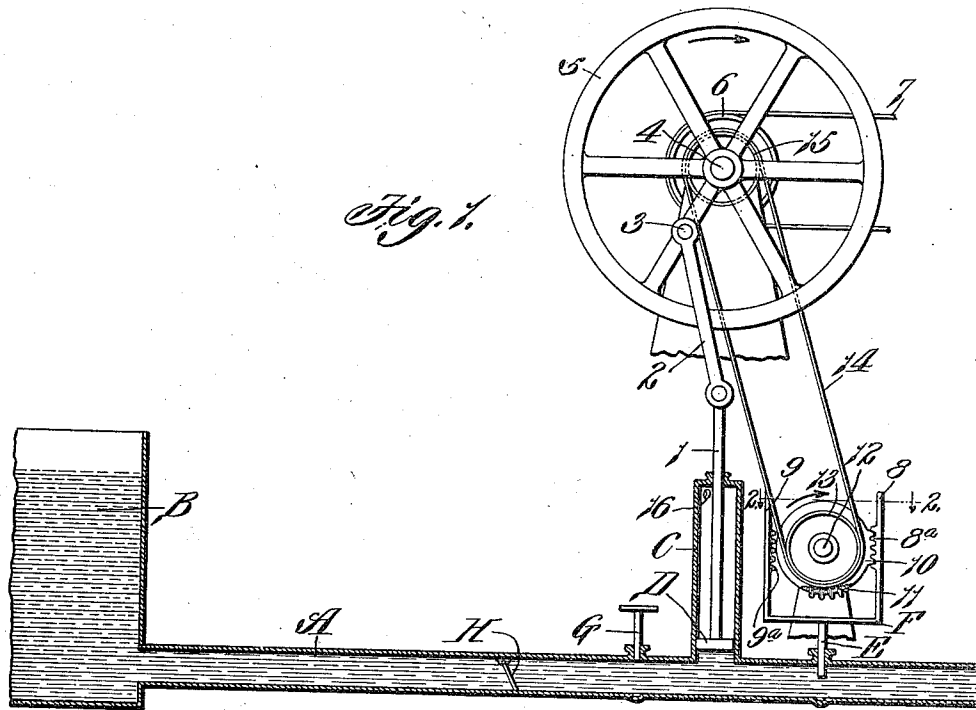


A. H. PERRY.
HYDRAULIC MOTOR.
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1,063,381.

Patented June 3, 1913.



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UNITED STATES PATENT OFFICE.

ALONZO H. PERRY, OF BARTLESVILLE, OKLAHOMA.

HYDRAULIC MOTOR.

1,063,381.

Specification of Letters Patent.

Patented June 3, 1913.

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To all whom it may concern:

Be it known that I, ALONZO H. PERRY, a citizen of the United States, residing at Bartlesville, Oklahoma, have invented a certain new and useful Improvement in Hydraulic Motors, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to hydraulic motors, and has for its object to provide a motor of simple construction which is so designed that great power can be obtained from a comparatively small column of flowing water.

Briefly described, my improved motor consists of a hydraulic ram, a conduit leading from a source of water supply and communicating with the cylinder of the ram, a driving shaft connected to the piston of the ram in such a manner that rotary movement will be transmitted to said shaft from the piston of the ram, and means actuated by said shaft for intermittently cutting off the flow of the water through said conduit so as to cause the force of the water to be exerted on the piston of the ram intermittently and thus cause the ram to reciprocate, the force that is exerted on the piston of the ram being equal to the weight of the column of water multiplied by its velocity.

Figure 1 of the drawings is a vertical sectional view of a hydraulic motor constructed in accordance with my invention; Fig. 2 is a detail horizontal sectional view taken on the line 2—2 of Fig. 1; Fig. 3 is a vertical sectional view illustrating the details of construction of the ram and the cut-off valve that arrests the flow of the column of water through the conduit; and Fig. 4 is a detail horizontal sectional view taken on approximately the line 4—4 of Fig. 3.

Referring to the drawings which illustrate the preferred form of my invention, A designates a conduit which communicates at one end with a supply of water B, and C designates the cylinder of a hydraulic ram which communicates with said water conduit A. The piston D of said ram, which is reciprocatingly mounted in the cylinder C, is provided with a piston rod 1 that is pivotally connected to a link 2 whose opposite end is pivotally connected to a crank-arm 3 on a driving shaft 4, said shaft being provided with a fly-wheel 5 and with a pulley

6 that drives a belt 7 or other suitable driving member that is operatively connected to the machine or device, not shown, which receives its power from my improved motor. A gate-valve E is arranged in the water conduit A at a point beyond the cylinder of the hydraulic ram, and means is provided for automatically opening and closing said gate-valve so as to cut off the flow of the water through the conduit A intermittently and thus cause the force of said water to be exerted on the piston D of the ram.

One means that may be used for actuating the gate-valve E consists of a vertically reciprocating frame F provided with two vertically disposed parallel portions 8 and 9 having rack teeth that coöperate with mutilated gears 10 and 11 secured to a shaft 12 that is provided with a pulley 13 which is surrounded by a belt 14 that passes over a pulley 15 on the driving shaft 4. The teeth of the mutilated gear 10 are so arranged that they will engage teeth 8^a on the portion 8 of the frame F and thus move said frame downwardly once during each complete revolution of the shaft 12, thereby closing the gate-valve E and thus arresting the flow of the water through the conduit A. The teeth of the mutilated gear 11 are so arranged that they will engage teeth 9^a on the portion 9 of the frame F and move said frame upwardly once during each complete revolution of the shaft 12, thereby opening the valve E and releasing the column of water in the conduit A. The water conduit A is provided with a valve G of any suitable type that can be closed so as to cut off the flow of the water through the conduit A when it is desired to stop the motor, and a check valve H is preferably arranged in the conduit A in the manner shown so as to prevent recoil when the forward flow of the column of water is interrupted by the closing of the gate-valve E.

When the valve E is moved downwardly so as to suddenly arrest the flow of the column of water through the conduit A said column of water strikes the piston D of the ram with a force equal to the weight of all of the water in the conduit A multiplied by its velocity. The actuating mechanism for said cut-off valve is so timed that the force of the water will be exerted upwardly on the piston of the ram when said piston is at the lower end of the cylinder C and just after

the crank arm 3 on the driving shaft 4 has passed dead center, the force being exerted on the piston while said crank arm is describing about one-third of its arc. The momentum of the fly-wheel 5 completes the revolution of the driving shaft 4 and thus causes the piston of the ram to move downwardly. The cooperating teeth on the mutilated gears 8 and 9 and on the frame G are so disposed that the gate-valve E will be closed quickly just as the piston of the ram reaches the position shown in Fig. 1 of the drawing, thereby causing the entire force of the momentum of the water to act against the under side of the piston and drive it upwardly. By arranging the cooperating elements of the motor in the manner illustrated there is no possibility of the motor stopping on account of the piston of the ram being on dead center when the force of the water is exerted on same, nor is there any liability of the piston of the ram obstructing the flow of the column of water through the conduit A. One advantage that results from constructing the motor in this manner is that the water is allowed approximately double the time to recover from its recoil and acquire its highest velocity. The pulley 15 on the driving shaft 4 that drives the belt 14 is preferably so proportioned that the gate-valve E will open and close once during each revolution of the fly-wheel 5, but if it is found that the water has not attained its highest velocity when the gate-valve closes a pulley of one-half the diameter of the pulley 15 may be used so as to cause the fly-wheel to make two revolutions to each cycle of operations of the gate-valve.

Any suitable means may be used for transmitting movement from the driving shaft 4 to the shaft 12 which actuates the frame F, and any suitable type of cut-off valve may be used for intermittently arresting the flow of the column of water through the conduit A. As shown in Figs. 3 and 4, the casing of the cut-off valve E may consist of two flanged members 19 and 23 arranged in the conduit A and combined with a vertically disposed channel-shaped guideway 21 for the valve E, friction-reducing rollers 22 being preferably arranged between the edges of the valve E and the guideway 21 so as to cause the valve to slide freely. The cylinder C of the hydraulic ram may be formed by securing a tubular-shaped member to a T 18 arranged on the conduit A and mounting a cap or end-piece on the upper end of said tubular-shaped member. An oil-cup 17 is preferably arranged in the head of the cylinder C, and ports 16 are formed in the upper end of said cylinder, as shown in Fig. 3 so as to permit air or water to escape from the upper side of the piston.

To start the motor the operator opens the

valve G in the conduit A and rotates the fly-wheel 5 forwardly so as to close the cut-off valve E, thereby suddenly arresting the forward flow of the column of water through the conduit A and thus causing upward pressure to be exerted on the piston of the hydraulic ram, the cut-off valve E being thereafter opened and closed intermittently until the operator closes the valve G in the conduit A. The motor adjusts itself automatically within considerable limits since if the gate-valve E is closed before the water attains its highest velocity the impulse is weaker and the fly-wheel slows down until the power and speed become balanced. If the gate-valve is moved upwardly and downwardly too rapidly the power of the hydraulic ram will be reduced and therefore I have designed the motor in such a manner as to allow the water sufficient time to acquire its highest velocity so that when suddenly checked by the closing of the gate-valve E the greatest force is applied to the piston of the ram. A motor of the above-construction makes available the full weight of all the water in the conduit A multiplied by its velocity in feet per second and thus produces great power from a comparatively small column of water acting under a low head of water.

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

1. A hydraulic motor comprising a conduit that communicates with a source of water supply, a hydraulic ram having a cylinder that communicates with said conduit, a piston in said cylinder, a driving shaft operatively connected to said piston and provided with a fly-wheel, a cut-off valve arranged in said conduit at a point beyond said cylinder, a valve-actuating member for moving said cut-off valve provided with parallel portions that have gear teeth, an actuating shaft arranged between said parallel members and provided with mutilated gears that cooperate with the teeth on said members, and means for driving said actuating shaft from said driving shaft.

2. A hydraulic motor comprising a conduit that communicates with a source of water supply, a hydraulic ram having a cylinder that communicates with said conduit, a piston in said cylinder, a driving shaft operatively connected to said piston and provided with a fly-wheel, a cut-off valve arranged in said conduit at a point beyond said cylinder, a valve-actuating member for moving said cut-off valve provided with parallel portions that have gear teeth, an actuating shaft arranged between said parallel members and provided with mutilated gears that cooperate with the teeth on said members, means for driving said actuating shaft

from said driving shaft, a check-valve arranged in said conduit between the cylinder of the ram and the source of water supply, and means under control of the operator for
5 interrupting the flow of the water through said conduit so as to cause the motor to stop.

In testimony whereof I hereunto affix my

signature in the presence of two witnesses, this 20th day of August 1912.

ALONZO H. PERRY.

Witnesses:

VERNON SELLERS,
L. P. SMITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
