H. BRADEN & E. N. AGNEW.

PUMP.

APPLICATION FILED DEC. 11, 1907.

906,190. Patented Dec. 8, 1908.

Fig. 1.

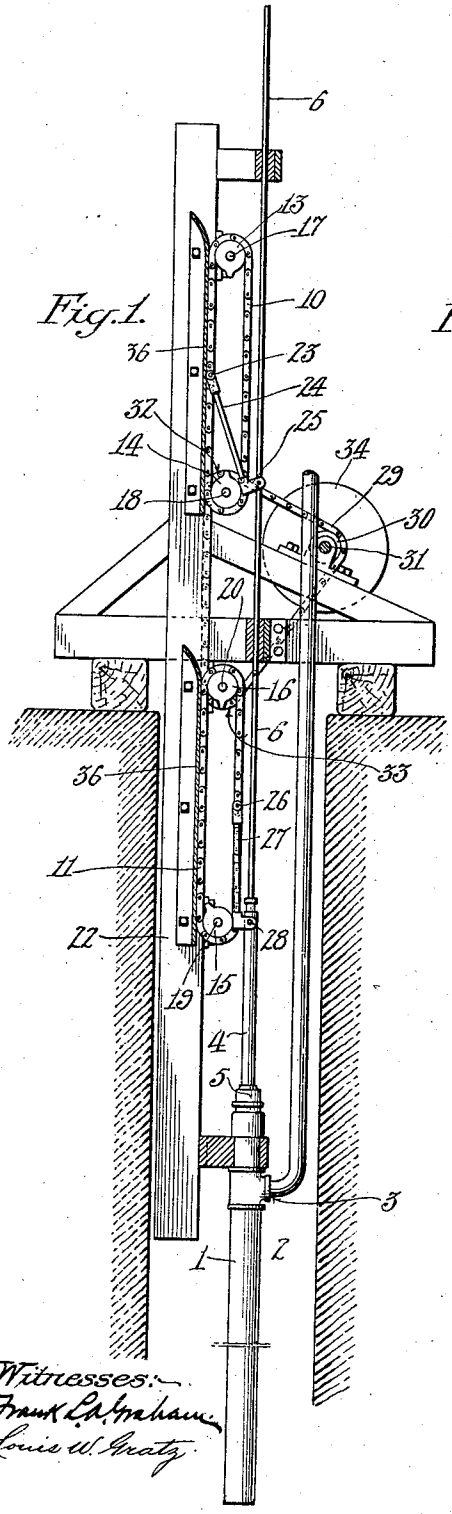


Fig. 2.

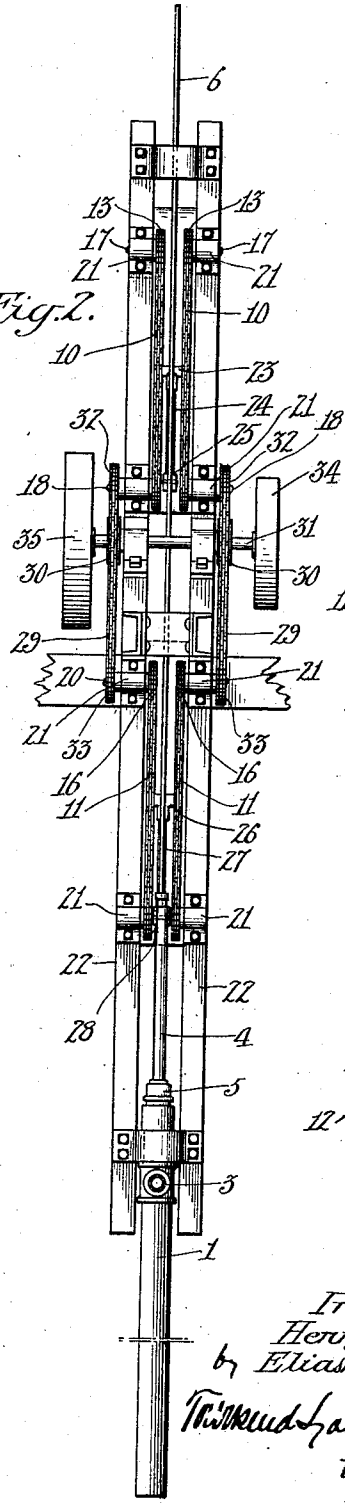
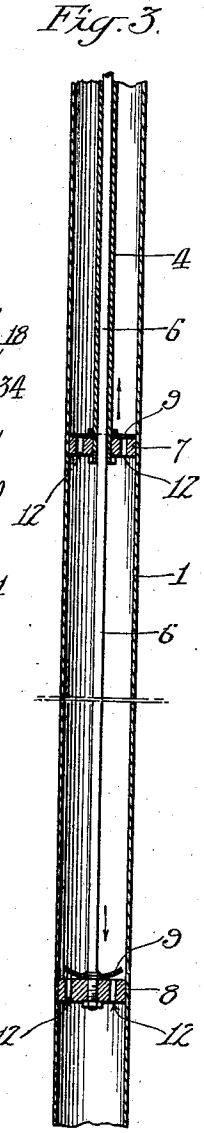


Fig. 3.



Witnesses:—
Frank L. Graham.
Louis W. Gratz.

Inventors,
Henry Braden
& Elias N. Agnew.
Thiskell Lauck & Hackley
their attys.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY BRADEN AND ELIAS NICHOLS AGNEW, OF LOS ANGELES, CALIFORNIA, ASSIGNORS OF TWO-THIRDS TO SAID BRADEN AND ONE-THIRD TO SAID AGNEW.

PUMP.

No. 906,190. Specification of Letters Patent. Patented Dec. 8, 1908.

Application filed December 11, 1907. Serial No. 406,098.

To all whom it may concern:

Be it known that we, HENRY BRADEN and ELIAS NICHOLS AGNEW, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Pump, of which the following is a specification.

The main object of the present invention is to provide a pump with operating means in which the power will be applied during the working stroke, with full force and without side strain.

A further object of the invention is to provide means whereby any desired length of stroke may be secured in a pump without undue lateral extension or projection of the machinery.

Another object of the invention is to provide means whereby the pump is given a substantially continuous action.

Another object of the invention is to provide for balancing the operating strains in a pump, so that the jar due to the operation will be minimized.

The accompanying drawings illustrate the application of the invention to a well pump.

Figure 1 is a vertical section of the upper portion of the well showing the pumping apparatus in operation. Fig. 2 is an elevation of the pump taken at right angles to Fig. 1. Fig. 3 is a vertical section of the working barrel of the pump.

1 designates the tube forming the working holder or barrel of a well pump, said tube being shown as extending in a well 2 and having an outlet 3 near its upper end. Within said tube extends a tubular sucker rod or piston rod 4 which slides through suitable gasket means 5 at the top of the tube. Another sucker rod or piston rod 6 works through the tubular sucker rod 4, these sucker rods being provided at their lower ends with pistons 7, 8, fitting within the working barrel or tube 1. Each of these pistons is provided with an upwardly opening valve, consisting, for example, of flaps 9 covering openings 12 in the piston, so that in the downward movement of the piston the flap will open allowing the fluid to pass through and above the piston and in the upward movement of the piston the flap will close so that the piston will carry the superimposed fluid upward with it.

The operating means for the pump comprises devices for imparting to the respective pistons 7 and 8 simultaneous motion in opposite directions, so that as piston 7 is rising piston 8 is descending, and vice versa. These devices consist of upper and lower sprocket chains, or endless flexible power transmitters, 10, 11, arranged in pairs and running over sprocket wheels 13, 14, 15, 16, mounted on shafts 17, 18, 19, 20, journaled in bearings 21 on a frame 22. The upper pair of sprocket chains are connected together by a cross-head 23, to which is pivotally connected a link 24 having a pivotal connection 25 to the inner sucker rod 6. Similarly the lower pair of chains are connected by a cross-head 26, to which is pivoted a link 27 pivotally connected at 28 to the outer sucker rod 4. Driving sprocket chains 29 run over sprocket wheels 30 on the shaft 31 and over sprocket wheels 32 on shaft 18 and over sprocket wheels 33 on shafts 20. A pulley 34 is mounted on a shaft 31 and may be driven by a belt from any suitable motor. The driving shaft 31 may also be provided with a fly wheel 35. The pairs of operating chains 10, 11, are arranged one above another adjacent to the vertical tubes of the sucker rods 4, 6, the inner run of each chain being close and parallel to the sucker rod connected thereto, so that when the cross-head is on this run of the chain the line of strain from the cross-head through the link to the sucker rod will extend substantially in line with the line of motion of the sucker rod and the driving connections are such that the working or lifting stroke of each sucker rod occurs when the cross-head is in this run adjacent to the sucker rod.

The sprocket wheels are made as small as is practicable, so that even when the cross-head is on the outer run of the chain, it will not be tilted to any considerable angle. A guide may, however, be provided, as shown at 36, on which these cross-heads run in their downward stroke, when farthest removed from the sucker rod, so that if any considerable force is required, owing to the resistance of the fluid in the downward stroke, the lateral strain resulting therefrom will be taken by this guide.

The operation is as follows: The driving shaft 31 being set in operation by suitable motive power, the chains 29 operating through the sprocket wheels 30, 32, 33, drive the shafts 18, 20 to operate the flexible power

transmitting means 10, 11, in continuous circulatory motion, the motion of the upper pair of flexible power transmitting means being opposite to that of the lower pair. The inner run of each chain, that is to say, the run which is nearest the line of motion of the corresponding sucker rod or piston rod, is caused to move upwardly, the cross-head being therefore carried upward on such inner run and then downwardly on the outer run of the chain the cross head extending between the two chains of a pair, and connecting the same, the action is balanced so that there is no side strain. In each upward motion, the cross-head draws the sucker rod or piston rod upwardly, the pull of the link 24 or 27 being exerted between the cross-head on the chain and the sucker rod or piston rod at points nearly in the same vertical plane, that is to say, nearly in the line or plane of motion of the piston rod. The full power of the motor is therefore exerted on the piston rod during this working stroke with substantially no lateral strain or side-draft. On reaching the upper end of the stroke the cross-head passes over and down on the outer run and allows or forces the piston rod or sucker rod to descend.

By the above described operation the two pistons, 7, 8, are moved simultaneously in opposite directions, for example, in the position shown in Fig. 1 the lower chain 11 is drawing link 27 upwardly causing the outer sucker rod to rise and lifting the piston 7 thereof, so that at this time said piston is raising water thereabove and expelling the same through outlet 3. At the same time the upper chain 10 is forcing or allowing the link 24 to descend, so that the inner sucker rod 6 connected thereto is descending, the valves thereof being open and allowing the liquid in the well to flow through the piston to the space between the two pistons and above the lower piston. As soon as this stroke is completed and the cross-heads have passed over the end sprockets, which requires but a small part of the time allowed for the stroke, the opposite stroke begins, forcing the upward piston 7 downwardly and lifting the lower piston, so that the water which has passed above the lower piston is raised and caused to pass through the upper piston and out through the outlet. The operation is therefore substantially continuous, the pistons acting alternately to lift the water, and water being lifted at all times, except when the cross-heads are passing around the sprockets. By the above described simultaneous and opposite operation of the two piston rods the mechanism is balanced so as to minimize jar.

By simply lengthening the operating chains 10, 11, any desired length of stroke may be obtained without otherwise varying the structure and without increasing the lateral extension of the machine, and in proportion as the stroke is lengthened the direction of pull in the working stroke, as well as in the return stroke of the sucker rod, is rendered more favorable.

What we claim is:—

In a pump, the combination with a sucker rod, of a flexible power transmitter, wheels over which said flexible power transmitter passes in two vertically extending runs, one of said runs being nearer the line of motion of the sucker rod and the other of said runs being further from said line of motion, a link pivotally connected to said flexible power transmitter and to the sucker rod, means for rotation of said wheels in a direction to cause the link to travel upwardly on the run nearer the sucker rod, and vertically extending guide means engaging the other run of the flexible power transmitter to withstand the lateral strain of the link.

HENRY BRADEN.
ELIAS NICHOLS AGNEW.

Witnesses for Henry Braden:
ARTHUR P. KNIGHT,
FRANK L. A. GRAHAM.

Witnesses for Elias N. Agnew:
HERMANN ECKSTEIN,
OSKAR OLSSON.