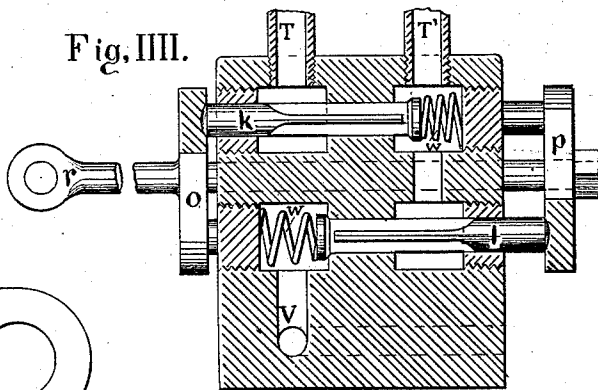
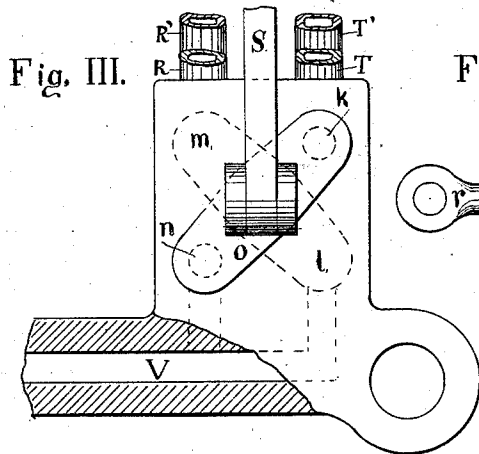
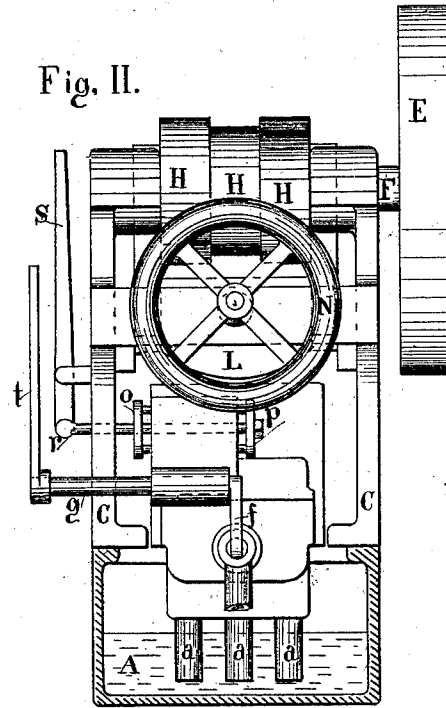
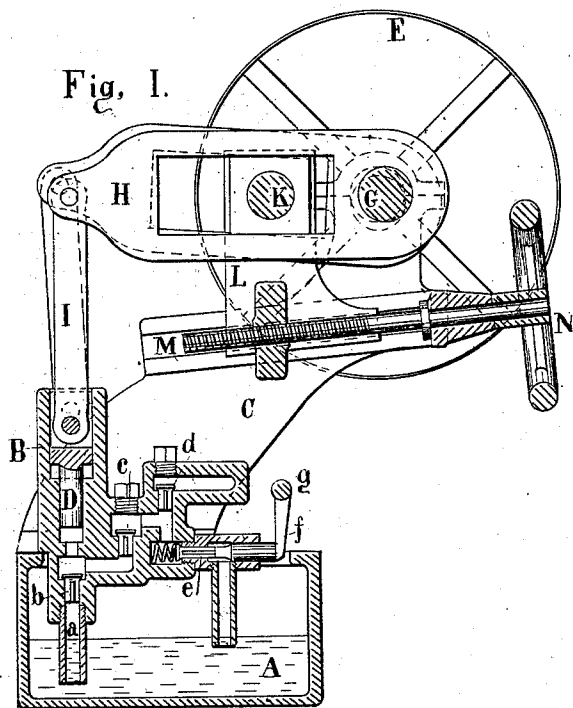


T. OLSEN.
Hydraulic-Pump for Testing-Machines.
No. 216,752. Patented June 24, 1879.



Witnesses,
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IMPROVEMENT IN HYDRAULIC PUMPS FOR TESTING-MACHINES.

Specification forming part of Letters Patent No. **216,752**, dated June 24, 1879; application filed.
January 10, 1879.

To all whom it may concern:

Be it known that I, TINIUS OLSEN, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Hydraulic Pumps for Testing-Machines, of which the following is a specification.

The invention relates to hydraulic pumps for testing-machines and for other purposes.

Heretofore such pumps have not been provided with adjustable stroke when three or more plungers are necessary, for the sake of an even flow of fluid to the jack, and the adjustable feature is necessary for making different classes of tests. Also, heretofore, for working the ram in both directions, two pumps or other more or less cumbersome appliances have been employed.

The object of my invention is to so arrange the device for working the plungers, when three or more are used, that the stroke of same may be adjusted while they are running; and the object also is to run the ram or the piston of jack in both directions with one pump.

The invention consists in the adjustable central fulcrum of levers interposed between the eccentrics and the connecting-rods of the plungers of the pump; and it also consists in the arrangement of change-valves for reversing the flow of fluid to either end of a hydraulic jack or cylinder, and so change the movement of plunger or piston for same.

In accompanying drawings, in which similar letters of reference indicate like parts, Figure I is a side view in section; Fig. II, an end view of the pump and the arrangement for its working; Fig. III, end view, and Fig. IIII a section through the change-valves.

On top of reservoir A is secured the pump B, as well as the standards C for the driving arrangement.

The motion of the three plungers D is transmitted from driving-pulley E through shaft F, eccentrics G, yokes or levers H, and connecting-rods I, all of which are supported on the standards C.

The yokes H are pivoted on the shaft K. Shaft K is so arranged that it can be moved from one end to the other of the yokes H by means of the sliding frame L, in which it is

secured. Frame L is guided in the standards C, and can be moved back and forth by the screw M and hand-wheel N. By this means the stroke of the plungers can be made longer or shorter at will without stopping the pump when in operation.

a a a are the suction-pipes of the pumps; *b*, the suction-valves, and *c* and *d* check-valves, between which is the relief-valve *e*, which, when open, prevents any flow of fluid to the jack, and is under control of the operator through the lever *f*, shaft *g*, and handle *t*.

The change-valves *k*, *l*, *m*, and *n*, Figs. III and IIII, serve the purpose of directing the flow of the fluid to either end of the cylinder or jack. The opening of the valves is performed by the cross-bars *o* and *p*, the ends of which each fit on the ends of two alternate valves, as shown in Fig. III, ends of bar *o* fitting on to ends of valves *k* and *n*, and ends of bar *p* fitting on the ends of valves *m* and *l*.

Through the bars *o* and *p*, as well as longitudinally and centrally between the four valves, passes the rod *r*. To this rod *r* are secured the bars *o* and *p*, a certain distance apart, so that when the bar *r*, by the lever S, Figs. II and III, is pushed in, the valves *k* and *n* are open and the valves *l* and *m* shut. A contrary motion will open the valves *l* and *m*, the valves *k* and *n* being left free to shut, the closing motion of the valves being performed by the pressure of the fluid and a small spring, *w*, on the head of the valves.

The connection between one end of the jack and the first pair of valves shown in Fig. IIII will be as follows: Pipe T is the conduit to the reservoir, and pipe T' to the end of the jack. V is the conduit from the pump. As the valves are represented in Fig. IIII, no fluid is admitted to that end of the jack to which these valves belong. The fluid, however, can freely return through pipe T', valve *k*, and pipe T to the reservoir. By reversing the valves it will be seen that the valve *k* will shut, stopping the return flow to the jack, and valve *l* open, and the fluid from the pump passing through the same. The second pair of valves, *m* and *n*, with pipes R and R', are placed in the conduit from the pump to the other end of the jack, and are operated similar to the first, *k*

and *l*, only their relative position to the jack is reversed—that is to say, if the first pair are placed for flow from the pump to the jack, the second are placed for flow from the jack to the reservoir, and vice versa.

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

1. The shaft *F*, eccentrics *G*, yokes *H*, shaft *K*, sliding frame *L*, and screw *M*, in combina-

tion with plungers *D*, for the purpose herein specified.

2. The combination of the change-valves *k*, *l*, *m*, and *n*, cross-bars *o* and *p*, and rod *r*, for the purpose herein set forth.

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Witnesses:

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