W. E. WORTHEN.

PUMP-VALVE.

No. 189,830. Patented April 17, 1877.

Fig: 1.

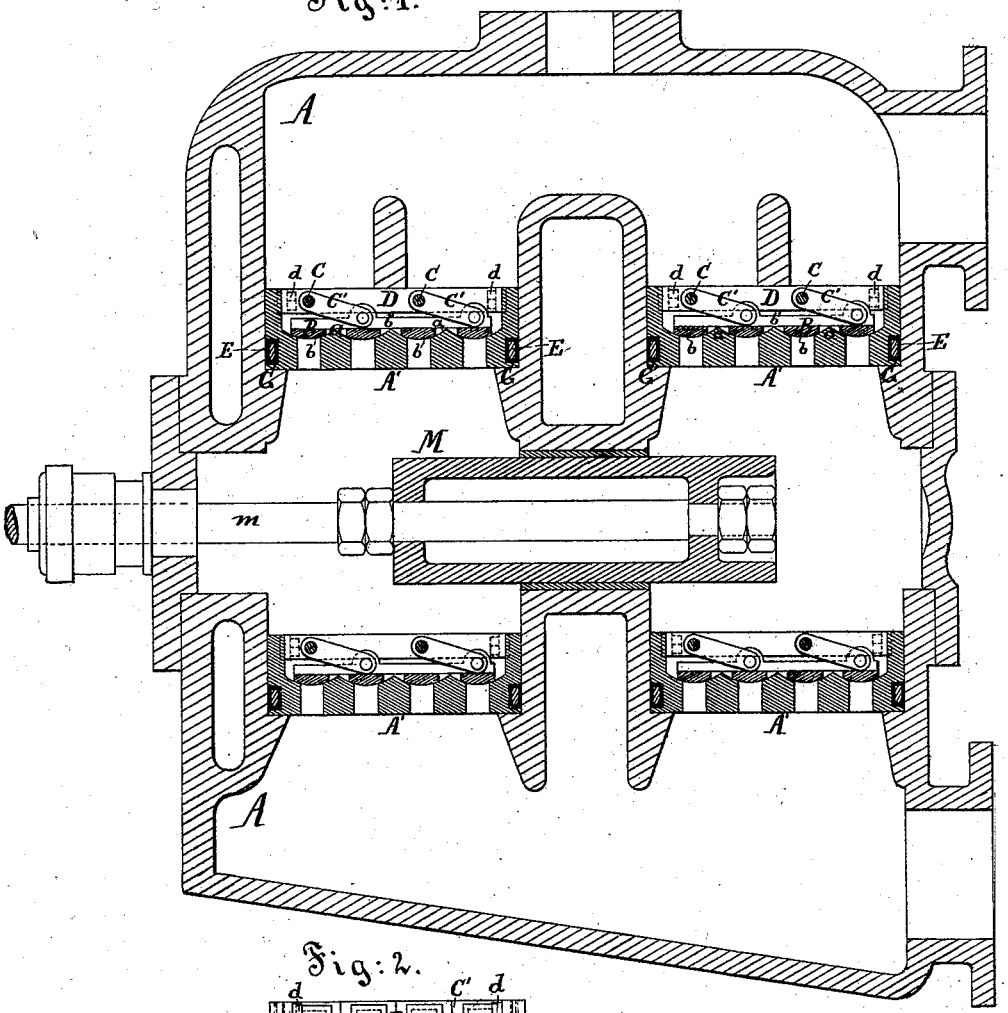


Fig: 2.

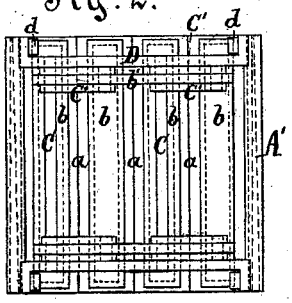
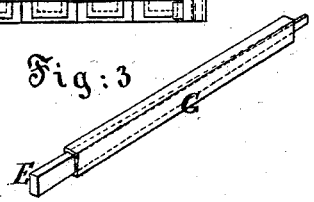


Fig: 3



Witnesses:

A. Henry Gentner.

Chas. C. Stetson.

Inventor:

W. E. Worthen

by his Attorney

C. C. Stetson

UNITED STATES PATENT OFFICE.

WILLIAM E. WORTHEN, OF NEW YORK, N. Y.

IMPROVEMENT IN PUMP-VALVES.

Specification forming part of Letters Patent No. **189,830**, dated April 17, 1877; application filed March 26, 1877.

To all whom it may concern:

Be it known that I, WILLIAM E. WORTHEN, of New York city, in the State of New York, have invented certain new and useful Improvements relating to Pump-Valves, of which the following is a specification:

The object of the invention is to obtain a liberal water-way with only a slight motion, and consequently only a light beat of the valve.

The piston velocity allowable, and consequently the efficiency of a pump of a given size, is practically determined by the area of the passage-way, and the amount of lift of the valves. If the size of the ports be small the water will not flow so rapidly in or out of the pump-barrel, and if the lift of the valves be large the beat in opening and seating the valves will be noisy and destructive. I have devised a construction in which the passages are ample and the necessary lift of the valve very small.

I employ a gridiron-valve rising and sinking on a gridiron-seat, being efficiently controlled in a parallel motion.

In some large work which I am now making according to the invention, the widths of the ports are five-eighths of an inch, and the lift only five-sixteenths. I provide for preventing the flow of the currents against each other, and cause them to be deflected smoothly upward through the spaces.

The following is a description of what I consider the best means of carrying out the invention. The accompanying drawings form a part of this specification.

Figure 1 is a central vertical section through a pump provided with my valves. Fig. 2 is a plan view of one valve or set of valves and their appurtenances. Fig. 3 is a perspective view of some of the parts detached, showing the peculiarities somewhat exaggerated.

Similar letters of reference indicate like parts in all the figures.

A is the fixed portion constituting the body of the pump, made of cast-iron or other suitable material. M is the plunger, and *m* the piston-rod or plunger-rod. The plunger plays through packing of any ordinary or suitable character.

The valve-seat is formed in a removable piece, A′, and I provide for fitting it with its several attachments complete on the bench before applying it in the pump. There are, as usual, separate valves controlling the induction and the eduction from each end making four sets. A description of one will suffice for the whole.

I will use the term "bars" to describe the separate parts of the gridiron-valve, and "bridges" to describe the several parts of the seat. A number of bars, *b*, are combined together by rigid connections *b′* to constitute a unit, which I designate as "the valve," and will represent, when necessary, by the single letter B. Links C′ are pivoted at one end to lugs on the connections *b′*, and at other end to rocking-shafts C. There are two of these rocking-shafts C turning in bearings in the bars D, one or both of which latter bars may be removed at will by taking out the holding-bolts *d*, which bind them to the removable seat A′, and then the shafts C and their connections may be readily withdrawn through bonneted openings provided for the purpose.

The number of the bars *b* may be increased or diminished, the seat and the other parts being correspondingly formed. I have shown four bars, *b*, and a corresponding number of apertures each a little narrower and shorter in the removable seat A′. The lower face of each bar *b* is rounded. The surface of the seat A′ which receives it is correspondingly hollowed. The considerable ridge or elevation *a* in the surface of the seat A′, which is presented between the bars *b*, serves to deflect the water when the valve is up. The current flowing from under one bar *b* if allowed to flow horizontally as it would on a flat seat, would strike squarely against the corresponding stream from under the adjacent bar *b*. The collision of the currents would retard the motion.

My ridges *a* on the seat between the resting places of the bars *b* deflects each current smoothly upward. The united streams flow upward through the openings between the bars *b* directly and smoothly.

The pieces D perform the double functions of affording bearings for the shafts C and stops to arrest the lift of the valve B.

One or both the striking-surfaces, where the valve B strikes the pieces D, as also one or

both the surfaces where the lower faces of the valve strike the seat, may be equipped with leather, rubber, wood, or other material adapted to soften the concussion. But the lift of my valve is so small that the blow is slight, either in striking the seat or in striking the stops D.

The removable seats A′ and their attachments, after being nicely formed by hand or by suitable machinery, and put together and inserted in their proper places in the pump-body A, are firmly secured by peculiar means.

Long and only slightly-tapering wedges E of iron, smoothly finished, are inclosed within casings of lead or analogous soft metal G, and matched in the recesses represented in each side of the removable seat A′. When a seat, A′, is introduced into the body A it locks under projections in the body or in the bonnets, which hold the seat firmly down to the body and makes it serve as a unit. But it is highly desirable to not only hold it stiffly, but to make the joint tight along each edge. This I accomplish by driving the tapering keys E farther into their soft inclosing material G. The wedge E being made considerably longer than is required is driven forcibly into the lead casing G, and the latter is caused to apply very tightly both to the interior of the groove in the removable seat A′ and to the adjacent surfaces of the body A.

The projecting ends of the wedges or keys E are planed off after the driving is completed.

Various modifications may be made in the forms and proportions of the details by any good mechanic without departing from the principle of the invention.

I propose to make some or all of the parts of brass, where the expense will be warranted.

I claim as my invention—

1. The links C′, turning on the fixed centers C, and guiding a gridiron-valve working to and from a gridiron-seat, as and for the purposes specified.

2. The links C′ and shafts C in combination with the gridiron-valve B and with the bars D, performing the double functions of bearings and stops, as herein specified.

3. The deflectors *a* in the gridiron-seat between the bars *b* of a gridiron-valve, rising and sinking thereon, as herein specified.

4. The wedges E and soft-metal envelopes G, matched in recesses between a removable valve-seat and the body of a pump, as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 24th day of March, 1877, in the presence of two subscribing witnesses.

WM. E. WORTHEN.

Witnesses:

W. L. BENNEM,

CHAS. C. STETSON.