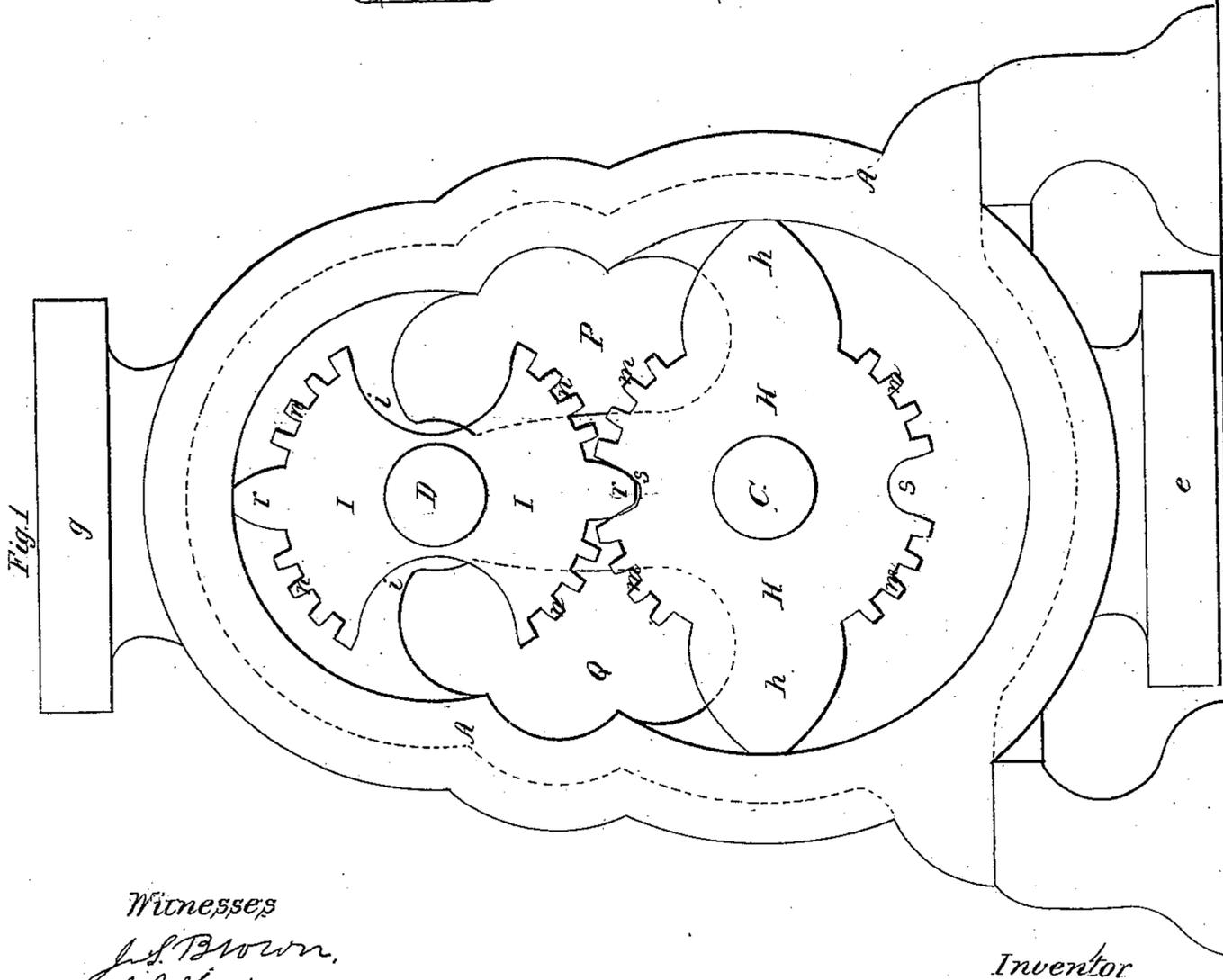
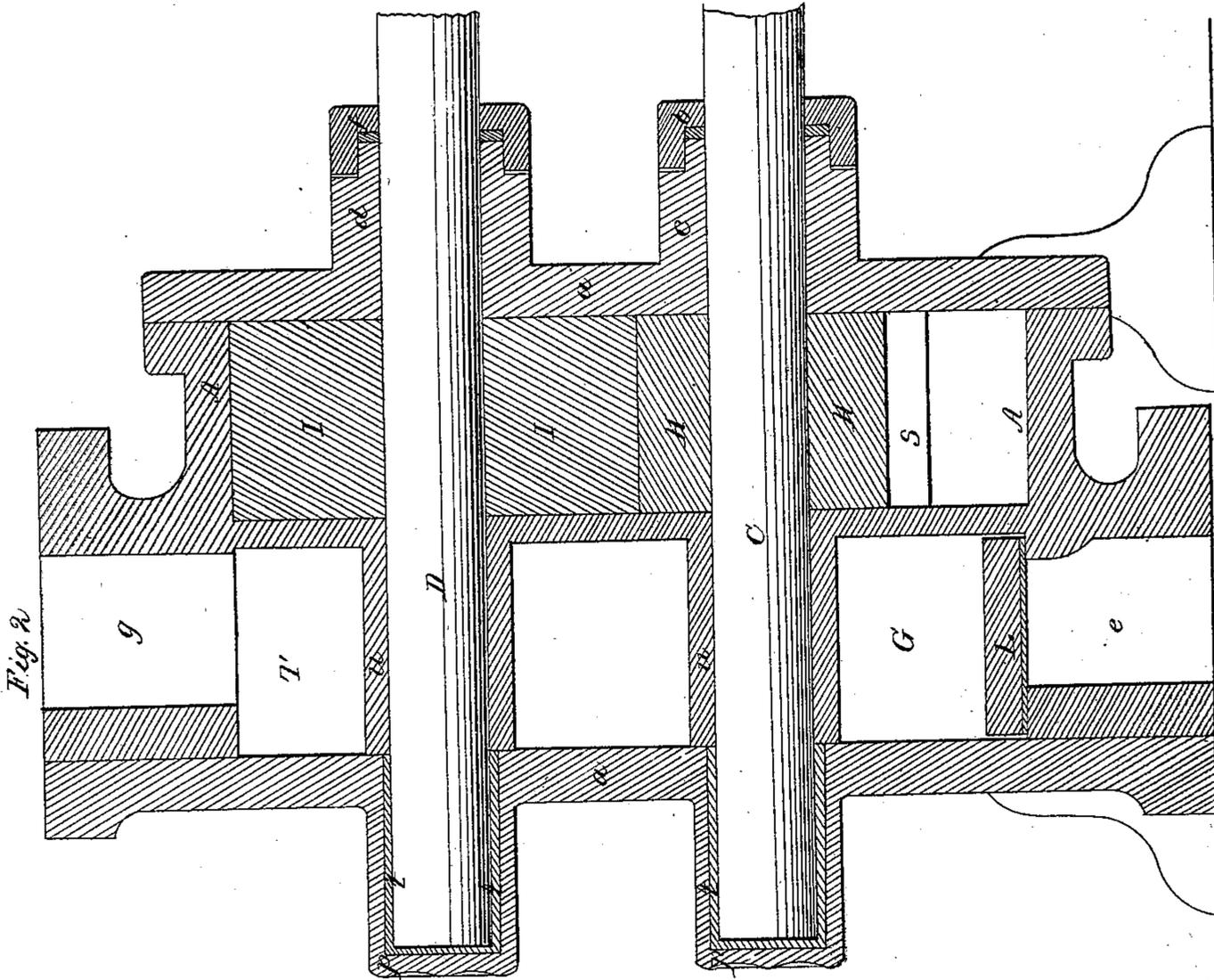


*A. H. Knapp*  
*Rotary Pump*

*No 92,842.*

*Patented Jul 20, 1869*



*Witnesses*  
*J. S. Brown,*  
*A. G. Hoyt*

*Inventor*  
*A. H. Knapp*

# United States Patent Office.

A. H. KNAPP, OF NEEDHAM, MASSACHUSETTS.

Letters Patent No. 92,842, dated July 20, 1869; antedated July 17, 1869.

## IMPROVEMENT IN ROTARY PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, A. H. KNAPP, of Needham, in the county of Norfolk, and State of Massachusetts, have invented an Improved Rotary Pump; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being an elevation of the pump, the face-plate of the case being removed, so as to show an end view of the piston-wheel and its butment.

Figure 2, a vertical section thereof through the centre lines of the piston and butment-shafts.

Like letters designate corresponding parts in both figures.

My present improvements approximate to the kind of rotary pumps in which a revolving piston-wheel is employed, gearing into a rotary butment, which revolves therewith, and gives passage to the pistons thereof, by means of concavities in its periphery.

The general construction and operation are the same as set forth in Letters Patent granted to me on the 17th day of November, 1863, and, therefore, not necessary to repeat here.

In the former Letters Patent the butment performs little or no work, but is intended merely to give passage to the pistons, and theoretically this would seem to be the proper construction, since the butment is driven by transmitted power, involving friction and wear, in proportion to the amount of power required to turn it, and when it merely serves the purpose of a butment, no further power is required than simply to overcome its own inertia and friction. But practically it has proved that where the butment performs no work, it vibrates forward and backward in its path of revolution, as much as the slight play of its gearing will permit, producing much jar, especially when the pump is working at a high speed and under heavy pressure, the jar rapidly increasing with the increase of speed.

This, if not actually destructive, at least is more or less injurious and very undesirable.

This vibration, owing to slight variations in the quantity of water thrown in different parts of the revolution of the piston, which want of perfect uniformity of a nearly inelastic fluid, produces alternate pulsations of action and reaction in the flowing stream, operates in such a manner or direction upon the butment as to throw it forward of the action of the piston, in the alternate pulsations of the water.

I remedy this objectionable action of the pump by extending one (or more) of the teeth of each geared portion *n* of the butment I outward beyond the remainder of the teeth, as at *r r*, fig. 1, and only these extended teeth fit the inside of the case A, while there is a narrow space left between the extremities of the other teeth and the case, thereby, to speak in exact terms, making the butment a piston-wheel of smaller size and capacity of work than the main piston-wheel H.

The effect of this construction is to throw a small amount of work upon the butment, or smaller piston-wheel, since the extended teeth *r r* carry round a small quantity of water at each revolution.

This work, put upon the butment, or smaller piston-wheel, produces a continual back pressure on the butment, and if this back pressure is greater than the pulsating variation between the forward and reaction pressure of the main stream of water, it will obviously prevent the vibration of the butment or smaller piston-wheel.

The extent of projection given to the teeth *r r* should not greatly exceed what is necessary to prevent the vibration, since all work put upon the butment, or smaller piston-wheel beyond what is necessary for this purpose, is injurious. It need never exceed one-third the projection of the pistons *h h* of the piston-wheel H beyond its gear-teeth *m m*, as indicated in the drawings, and unless the pressure in the pump is very great, it may be much less than that proportion.

The extended teeth *r r* fit into suitable enlarged cavities *s s* in the piston-wheel H, substantially as shown, to allow their passage by the piston-wheel.

Another feature of improvement consists in the extension of the rear bearings *p p* of the piston and butment-shafts C D beyond the case, substantially as shown in fig. 2.

By this construction I obtain a long bearing-surface for the journals of the shaft, thereby diminishing the wear of the journals and bearings.

I usually line the projections *p p* with Babbit metal, as at *t t*, fig. 2.

Close tubes, *u u*, surround the shafts C D, where they extend through the water-chambers G T, as shown. These increase the extent of the journal-bearings.

These extended bearings, projecting from this face-plate *a* of the case, also give additional support to the shafts, and take away a great part of the strain from the partition E, between the water-chamber and piston-chamber.

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

The two piston-wheels H I, of unequal size, and constructed as described, and arranged and operating in combination, substantially as and for the purpose herein specified.

I also claim the combination of the projecting bearings *p p*, outside of the water-chambers G T, and the close tubes *u u*, extending through the said water-chambers, substantially as and for the purposes set forth.

The above specification of my improved rotary pump signed by me, this 25th day of January, 1866.

A. H. KNAPP.

Witnesses:

J. S. BROWN,

A. J. HOYT.