

(No Model.)

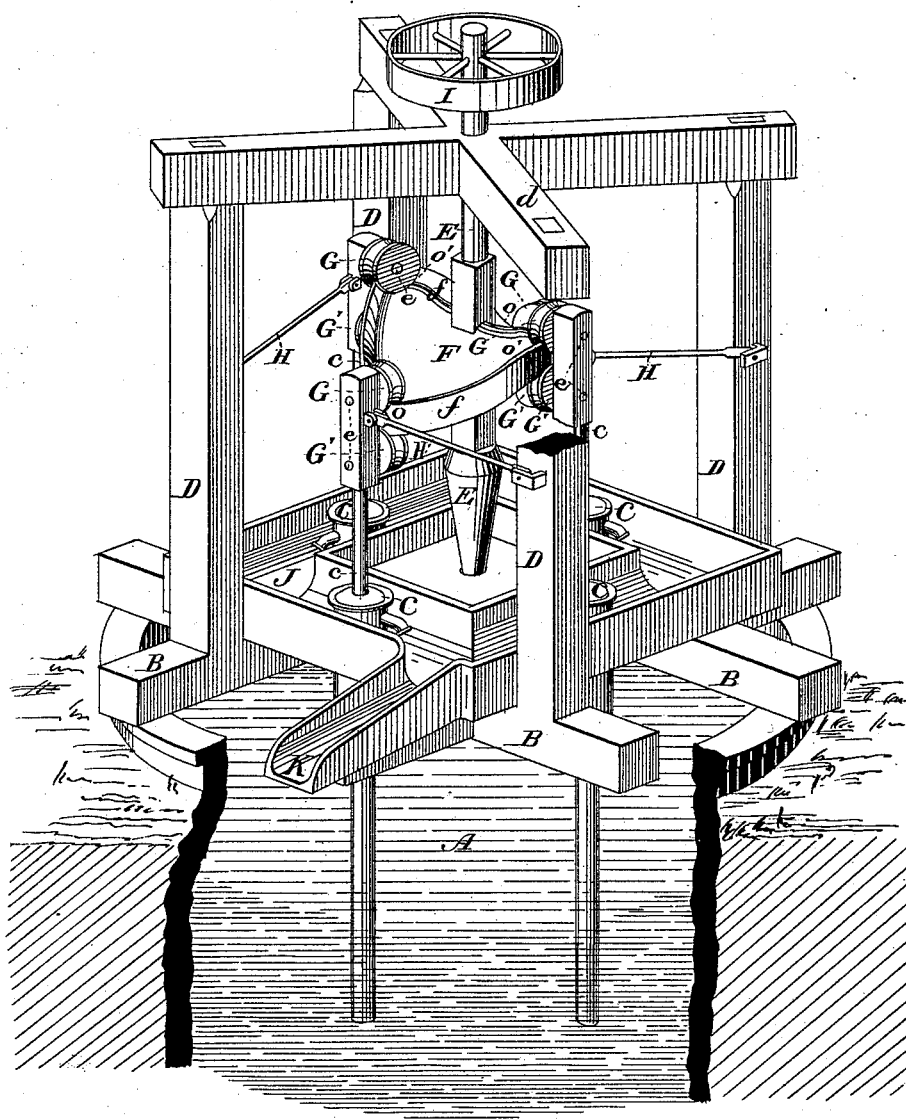
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G. P. HARDING.  
PUMP.

No. 306,152.

Patented Oct. 7, 1884.

*Fig. 1.*



Witnesses,  
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J. H. Stone

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(No Model.)

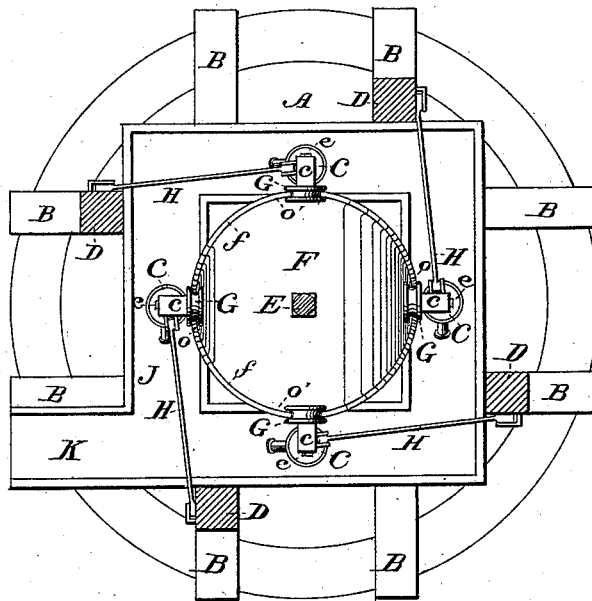
2 Sheets—Sheet 2.

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*Fig. 2.*



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# UNITED STATES PATENT OFFICE.

GEORGE P. HARDING, OF WOODLAND, CALIFORNIA.

## PUMP.

SPECIFICATION forming part of Letters Patent No. 306,152, dated October 7, 1884.

Application filed August 13, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE P. HARDING, of Woodland, county of Yolo, and State of California, have invented an Improvement in Pumps; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to that class of pumps in which the piston is operated by a cam; and it consists in a novel cam, and in the arrangement of pistons connected therewith, whereby the pump is operated to the best advantage, as will hereinafter fully appear, reference being made to the accompanying drawings, in which—

Figure 1 is a perspective view of my pump, a portion of one of the uprights being broken away. Fig. 2 is a plan of the same, the cross-head *d* being left off.

The object of my invention is to operate the pump with the least expenditure of power and to its greatest capacity, producing a continuous discharge.

A is a well or other water-supply, and B is a frame-work over it.

C represents four pumps extending within the water-supply, and *c* their piston-rods. These pumps are arranged in the lines of a square, as shown.

D are uprights supporting a cross-head, *d*, in which is mounted the upper end of shaft E, the lower end of which is stepped in the center of the frame-work B. Upon this shaft is the cam F. This consists of a plate having a track-rim, *f*, formed with gradual and continuous curves, with opposite depressions at *o* and opposite elevations at *o'*.

Upon the upper ends of piston-rods *c* are short shafts *e*, upon which are journaled rollers G, fitted upon the track *f* of the cam. Similar rollers, G', are secured to the piston-rods underneath and travel on the under surface of said track, whereby the piston-rods are properly connected with the cam.

In order to steady the piston-rods as much as possible in their reciprocating movement, I have the connecting-rods H joined to the piston-rods at a point between the two rollers and to the uprights D.

I here show a pulley, I, upon the shaft E, as a means for imparting revolution thereto. As the cam F revolves, the piston-rods are reciprocated and the pumps operated. They discharge into a trough, J, having a spout, K.

I am aware that it is not new to reciprocate a pump-piston by means of a cam, and I do not herein claim such a feature as my invention, but I simply claim as new the arrangement herein shown, whereby certain advantages are obtained. In the first place, by this arrangement of cam and four piston-rods the two opposite pistons work alternately with the others—that is, two are always ascending or descending when the other two are moving oppositely. As a consequence, a steady and continuous discharge is effected, and the power is equally taxed at all times. In the second place, the cam is rendered steady in its revolution, as the pistons balance it. The weight is equally divided, one-half falling on each of opposite sides of the rim of the cam, and is a great advantage over any movement where the entire weight is on one side. Again, the weight of the ascending pistons operates to depress the descending ones. The curves of the track *f* are uniform and gradual throughout, whereby all jarring and jerking of the piston-rods is avoided. The capacity of this pump is great, for at every revolution of the cam eight strokes are made, each piston making two strokes. This reciprocation of the pistons may be in a true perpendicular, and no loss is therefore occasioned from deflection, as is the case with a crank. The connecting-rods which steady the piston-rods might be so arranged with joints and slots as to cause no deflection whatever, but herein I have not deemed it necessary to show any but the simplest construction, which, in the short stroke of the pistons, occasions such a slight deflection as to be inappreciable.

Instead of four separate and independent cylinders, I could have two, the piston-rods of which might so branch as to form four for the proper connection with the cam.

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

In a pumping apparatus, the frame B, having uprights D and cross-head *d*, in combination with a trough, J, having a discharge-spout, K, and a series of pumps arranged to operate substantially as and for the purpose herein set forth.

In witness whereof I have hereunto set my hand.

Witnesses:

GEORGE P. HARDING.

R. CLARK,

J. W. PEEK.