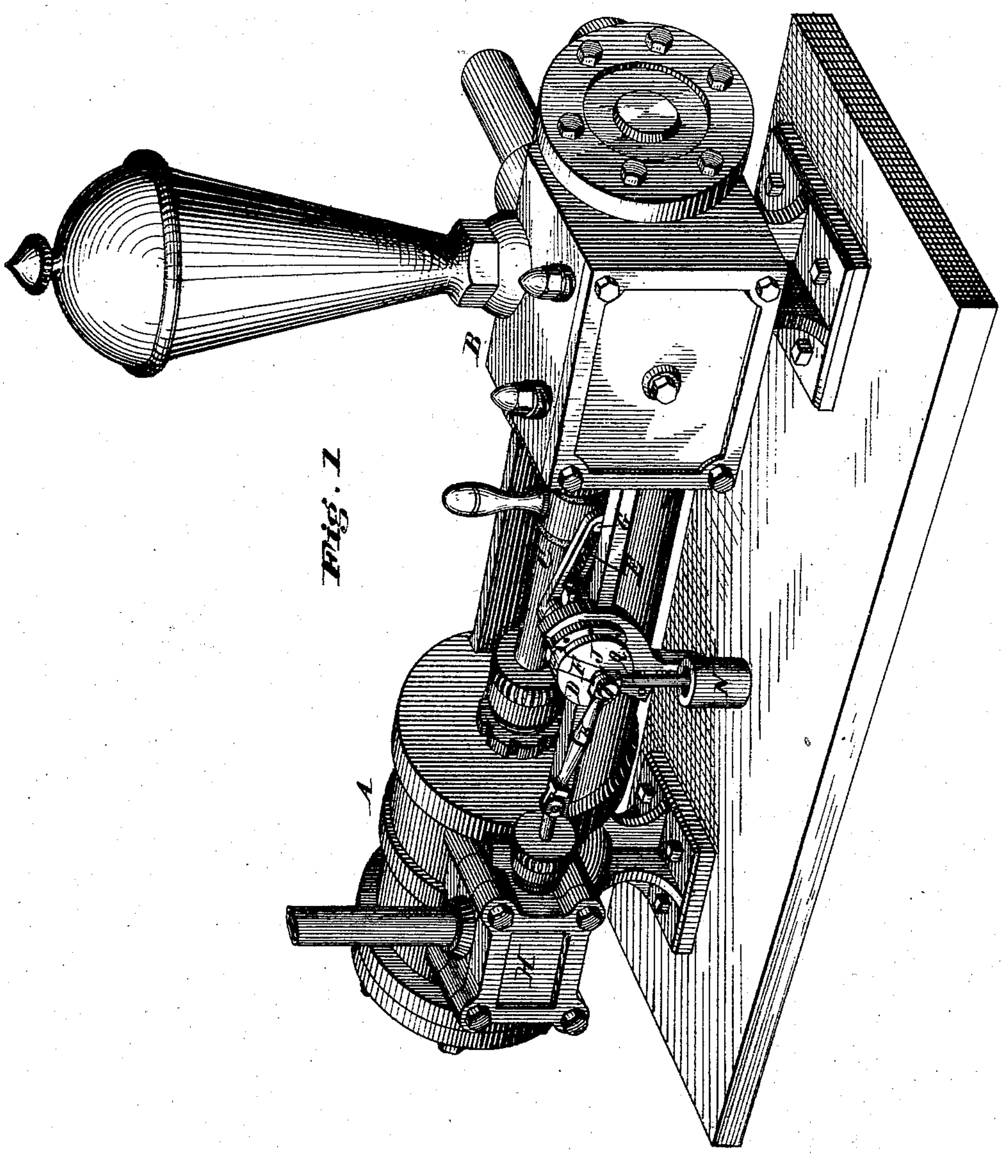
2 Sheets--Sheet 1.

J. TESSEYMAN & E. E. BARNEY.

Steam-Pumps.

No. 154,102. Patented Aug. 11, 1874.



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2 Sheets--Sheet 2.

I. TESSEYMAN & E. E. BARNEY.

Steam-Pumps.

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Fig. 2

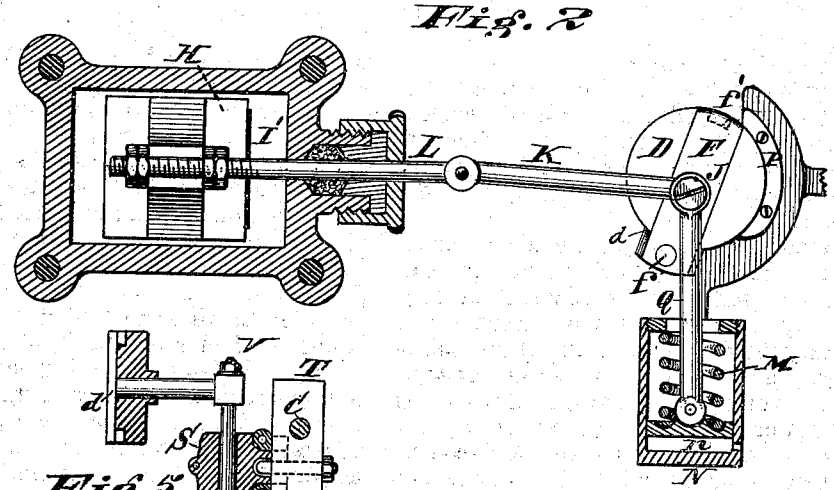


Fig. 5

Fig. 3

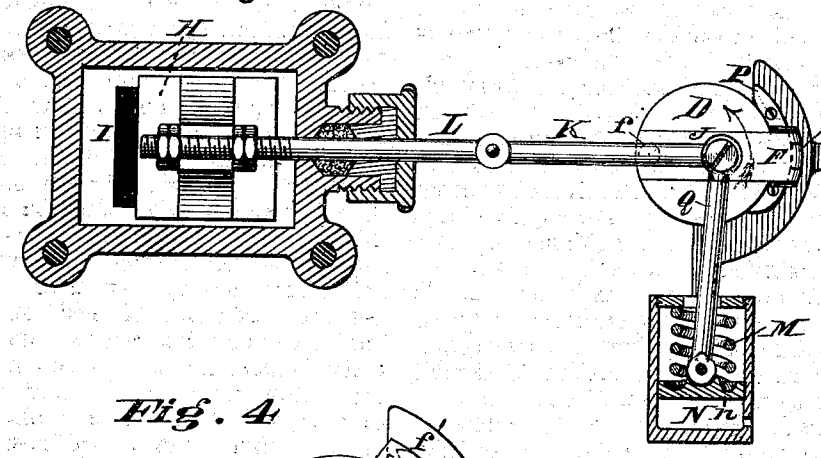
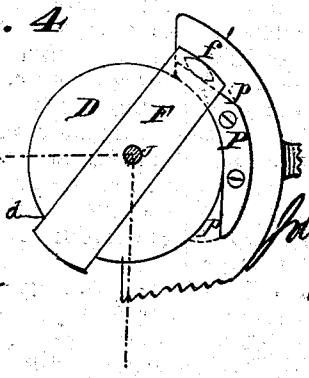


Fig. 4



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UNITED STATES PATENT OFFICE.

JOHN TESSEYMAN AND EDWARD E. BARNEY, OF DAYTON, OHIO.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. **154,102**, dated August 11, 1874; application filed June 17, 1874.

To all whom it may concern:

Be it known that we, JOHN TESSEYMAN and EDWARD E. BARNEY, both of Dayton, Montgomery county, State of Ohio, have invented certain new and useful Improvements in Steam-Pumps, of which the following is a specification:

Our invention relates to the class of steam-pumps in which the valve which governs the supply of steam to the steam-cylinder is operated by the reciprocating piston-rod of the steam-cylinder without the intervention of a crank-shaft; and our invention consists, first, of a certain combination of gravitating slide, carrying a crank-wrist to operate the valve, and a partially rotating and reciprocating disk, in which this slide operates, the disk being moved by direct gearing, lever, or link connection with the piston-rod, and operating, in its rotation through the slide, to give the required motion to the valve, the gravitating character of the slide serving to so change the location of the crank-wrist at the proper time as to give the necessary lead of steam at the end of the stroke, and enable the motion of the piston on the return stroke to open the valve to the fullest extent. Our invention consists, in the second part, in the provision of a spring, in connection with the slide, by which it may be more forcibly and definitely operated as to precise time of movement than gravitation can alone provide for. Our invention consists, in the third part, of a dash-pot or cushion in connection with the slide, by which the movement of the latter may be cushioned in completing its stroke across the partially-rotating disk. Our invention further consists of a curved guide for definitely controlling the length of stroke of the engine, and of relief-spaces on said guide for enabling the cutting off of the steam before the termination of the stroke.

Figure 1 is a perspective view of a steam-pump embodying our invention. Fig. 2 is a section of the valve-chamber and driving mechanism in a position at the beginning of the stroke. Fig. 3 is a section of the valve-chamber and driving mechanism in a position at the middle of the stroke. Fig. 4 exhibits the curved guide constructed to cut off steam before the termination of the stroke. Fig. 5 illustrates a modification in the construction of a part of the valve-gear.

A is the steam-cylinder, and B the steam-pump. The latter may be of any preferred construction, and may be, in fact, omitted, and in place thereof our steam-cylinder and valve-operating mechanism may be applied to a crank-shaft or other steam-engine appliance. C is the piston-rod of the engine. D is a disk or crank-plate, journaled in suitable bearings in the frame of the machine, and adapted, when in operation, to partially rotate in both directions. It is operated by direct connection with the reciprocating piston-rod C, and it is obvious that there are many ways by which the connection may be made to give the required motion to the disk D—such, for example, as a gear-wheel on the disk-shaft, and a rack on the piston-rod—but in order that the distance between the pump and engine may be as short as possible, we prefer to attach a slotted lever, E, to the disk-shaft, and to project from the piston-rod a stud, G, to engage in said slot. With this connection the rectilinear motion of the stud G will produce a vibratory curvilinear motion in the lever. H is the valve of the engine, which, as shown, may be the ordinary slide-valve so much preferred by experienced engineers, by reason of its extreme reliability and durability, and we prefer to use a balanced slide-valve for this purpose, so as to avoid excessive friction on the valve-moving appliances. The steam-ports I I′, and the exhaust-ports under the valve, are arranged in the ordinary way for common slide-valves. Across the face of the disk or crank-plate D we cut a groove, *d*, preferably dovetailing, and insert therein a slide, F, which carries the crank-wrist J, to which the pitman K of the valve-rod L is connected.

The rotative motion of this slide serves to enable the crank-wrist to increase the width of the opening of the steam-port as the piston moves off from the end of the stroke, and to close or partially close the same before the termination of the stroke, and the motion of the slide across the face of the crank-plate serves to entirely close the port at the termination of one stroke, and to open the opposite port sufficiently to give the required lead

of steam for the return stroke, and not only this, but it so changes the location of the wrist J with relation to the center of the disk-shaft, as to place the said wrist on the side of the shaft, which gives the proper direction of motion to enable said wrist to continue the opening of the port as the stroke progresses.

Owing to the weight and consequent gravitating character of the slide F, (and the same effect may be, of course, produced by a spring,) if the disk-shaft should be vertical, the slide, as it approaches the vertical position in the rotative movement of the disk or crank plate D, moves across the disk so as to cause the wrist to occupy a position on the other side of the shaft of the disk, and to close the port which has furnished steam for one stroke, and partially open the port to supply steam for the return; and to perform all this it is only necessary absolutely to use the parts already described, the slide being, of course, provided with stops to limit its motion across the disk. We have had pumps in operation successfully in which these parts have alone been used.

The stops we prefer to use are attached to and project from the rear of the slide F, so as to project over the rear edge of the disk. These stops are shown by the letters *f f'* in the drawings, and each is made to enter a notch in the face of the disk when it moves inward. In addition to these parts, however, we prefer, for reliability of slide-movement, to employ a spring, M, to move, or assist in moving, the slide F at proper time, and to avoid concussion in the movement of the slide we prefer to use a cushion or dash-pot, N; and to insure accuracy in length of stroke of the piston we prefer to combine the slide F *f' f* with a curved guide, P. The spring is secured to the wrist J by a rod, Q, the spring resting, at its upper end, against the top of the cushion-chamber N. At the lower end of this same rod the piston *n* of the cushion is secured, and adapted to slide accurately in the cushion-chamber, and form, thereby, a component part of the cushion.

As the slide is moved for the termination and commencement of each stroke the piston is cushioned on the air contained in the chamber, and violent concussion of the slide against its stops is prevented. The ends of the guide P serve to indicate and determine exactly at what point the slide shall move, and the thickness of the guide governs exactly the degree of opening given to the ports of the valve. It is so arranged that when the disk moves in the direction of the arrow, Fig. 3, the stop *f'* rubs against the outside of it, as shown; and when the direction of motion is reversed the stop rubs against the inside, as it is about to do in Fig. 2.

In order that this guide may cut off steam at any preferred point in the stroke, after the middle, we cut relief-spaces *p* from the guide P, and these act in the movement of the disk to allow the slide to close the valve at the time designed in the manner shown in Fig. 4.

The lever E may be so constructed with reference to the length of its slot that the latter may act to positively limit the length of stroke, so as to render the pump safe against unforeseen contingencies.

As mentioned above, the disk D or crank-plate is operated by direct connection with the reciprocating piston-rod C, and several ways are possible to make this connection; but preference has been given to the slotted lever E, secured to the disk-shaft, and the stud G, secured to the piston-rod, to engage in the slotted lever.

As a direct modification of this last device, we provide the disk-shaft with a steel rod, of suitable dimensions, to engage freely in a swiveling head or box, S, secured to the cross-head T of the piston-rod C by a wrist-pin or journal connection. When the piston-rod is in motion, it carries the box S along in rectilinear motion, and vibrates the rod R, the box in the operation swiveling in the head T and sliding on the rod R, the motion operating to give the necessary curvilinear motion to the disk-shaft. To act as a preventive against the jamming of the cylinder-heads at the ends of the stroke, we provide the rod R with a stop-nut, V. The box S is made in halves, in order to take up lost motion.

We claim—

1. The combination of the valve and rod K L of a steam-engine or steam-pump, vibrating disk D connected to the piston-rod of the engine, and automatically-shifting slide F, the parts being combined and operated substantially in the manner and for the purpose specified.

2. The combination of valve and rod H L, disk or crank plate D, slide F, and spring M, operating substantially as and for the purpose specified.

3. The combination of valve and rod H L, disk D, slide F, spring M, and cushion N *n*, operating substantially in the manner and for the purpose specified.

4. The curved guide P, in combination with the disk D and slide F *f'*, operating substantially as and for the purpose specified.

5. The curved guide P, having relief-spaces *p*, in combination with the disk D and shifting slide F *f'*, substantially as specified.

In testimony of which invention we hereunto set our hands.

JOHN TESSEYMAN.
EDWARD E. BARNEY.

Witnesses:
W. C. HOWARD,
JOHN HOWARD.