

M. SCHULTZ.
Steam-Pump.

No. 218,644.

Patented Aug. 19, 1879.

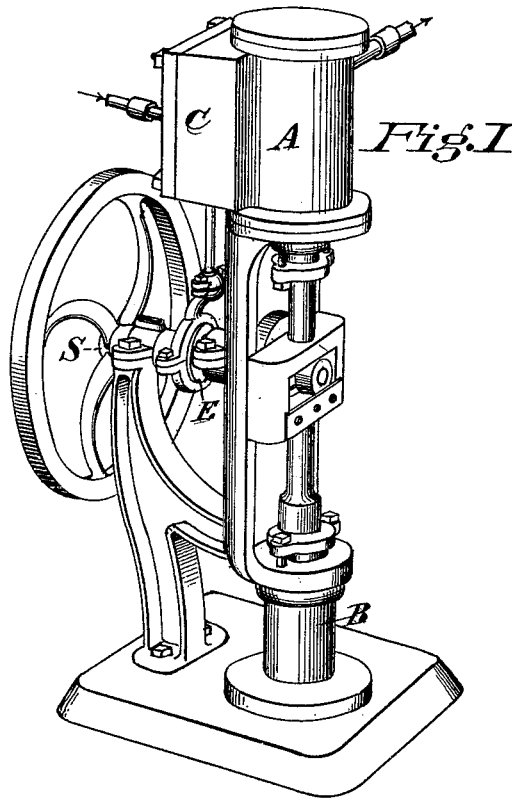


Fig. 2

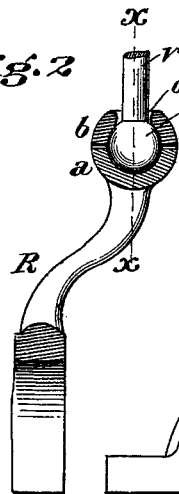
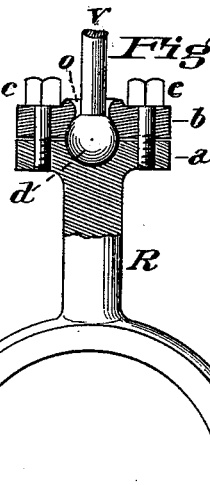


Fig. 3



Attest

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MICHAEL SCHULTZ, OF CINCINNATI, OHIO.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. **218,644**, dated August 19, 1879; application filed January 18, 1879.

To all whom it may concern:

Be it known that I, MICHAEL SCHULTZ, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Steam-Pumps, of which the following is a specification.

My invention relates to that class of steam-pumps employing steam and pumping-pistons combined to act in a direct manner, and in which motion is given to a governing fly-wheel by the rotation of a shaft journaled in the frame and carrying an eccentric or cam-wheel, by which the steam slide-valve is operated, and more especially relates to that class of such pumps used as "boiler-feeders," and which are operated under a considerable pressure of steam; and consists in the application of a "ball-and-socket joint" of peculiar construction as a means of connecting the stem of the slide-valve and the eccentric-rod, whereby a larger bearing-surface is provided, the unequal wear of parts and consequent lost motion prevented, while the peculiar form of construction enables it to be used as an oil-cup, thus insuring a constant lubrication of the joint and other advantages, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a perspective view of a vertical direct-acting steam-pump embodying my invention. Fig. 2 is an edge, partly sectional, view of the eccentric-rod and valve-stem, showing the ball-and-socket joint; and Fig. 3 is a side sectional elevation of the same through the line *x x*.

A denotes the steam-cylinder, C the valve-chest, and B the pump-cylinder, of a vertical direct-acting steam-pump, such as is commonly used as a boiler-feeder, operating a governing fly-wheel upon a horizontal shaft, S, interposed between the steam-cylinder and pump in suitable bearings upon the supporting and connecting-frame. Immediately beneath the valve-chest is the eccentric-wheel E, upon the shaft operating the valve by means of a yoke and eccentric-rod, R, jointed to the valve-stem *v*.

The necessity for a large slide-valve in these constructions is obvious, as the pump is operated under high pressure of steam against the resistance of the boiler-pressure, and must be slow of movement. It is necessary, therefore,

to employ very strong connections for the valve-movement and to avoid lost motion in the parts.

To remedy the difficulties heretofore experienced in this regard, and as a simple, efficient, and cheap substitute for the ordinary pin or pivot connection between the valve-stem and eccentric-rod, I interpose a connection formed and constructed as follows: I terminate the valve-stem with a spherical ball, *d*, preferably of steel or hardened iron, of a radius, say, about the diameter of the valve-stem, and provide a socket-connection for the same upon the eccentric-rod, as shown in detail in Figs. 2 and 3.

The socket for the reception of the valve-stem consists of two parts, *a* and *b*, the part *a* being a lateral enlargement of the upper end of the eccentric-rod, having a flat surface at right angles to the general length of the rod, with a depression in the center to conform to and receive the lower part of the ball *d*, while the part *b* is a corresponding cap with a depression to receive the upper part of the ball *d*, and perforated, as shown at *o*, for the passage of the valve-stem *v*, which perforation is sufficiently large to admit the vibratory play of the eccentric-rod and yoke. The sides of the perforation are made funnel-shaped above for this purpose, and the opening thus formed may be utilized as a receptacle and reservoir for oil. Screw-bolts *c c* secure the cap *b* to the lower part, *a*, the valve-stem thus being secured by its enlargement *d*, the stem *v* projecting through the perforation *o* of the cap *b*.

It will be seen that this construction allows the rotation of the valve-rod without disturbing the relations of the parts constituting the joint; and by thus occasionally rotating the rod slightly new portions of the valve-stem enlargement are exposed to wear, and thus unequal wear is prevented. But in order to reduce the wear of the parts as much as possible, I provide the socket with chilled interior surfaces, produced in the following manner: I insert in the matrix a ball of steel or iron, (steel being preferred on account of its better heat-conducting qualities,) which forms the core for the cavity constituting the portion of the socket so cast. It is better to use a core with a short arm or spindle attached, by which

it may be more accurately and firmly held in position in the mold, and also furnishes a larger amount of metal for the conduction of heat from the cast surfaces of the socket. As soon as the casting is set the sand and core are removed, and the socket cooled rapidly by exposure to the air. By this means the socket is formed with chilled surfaces, which, operating in contact with a ball being also hardened or made of steel, a more durable joint is secured.

This construction and arrangement of parts is at once simple, cheap, and exceedingly durable, and has given the most satisfactory results in actual use.

Having fully described my invention, I claim—

1. The combination, in a reciprocating steam-pump, of a slide-valve governing the movements of the steam-piston, a valve-stem terminating in a ball, *d*, an eccentric-rod formed with a partial socket at its end, and cap *b*, perforated for the passage and relative play of the valve-stem and completing the socket for the reception of the ball, substantially as and for the purpose specified.

2. The arrangement, in a vertical reciprocating steam-pump, of a ball-and-socket joint, constructed as described, beneath and in line with the valve-stem, forming a connection between the valve-stem and eccentric-rod, and an oil-receptacle for the lubrication of the joint, substantially as specified.

3. The valve-stem *v*, having the spherical enlargement *d*, in combination with the half-socket enlargement *a* of the eccentric-rod and perforated cap *b*, substantially as and for the purpose specified.

4. The ball-and-socket joint consisting of the rod *v*, cast with chilled enlargement *d*, in combination with the parts *a* and *b*, constituting the socket with chilled interior surfaces, substantially as described, and for the purpose specified.

In witness whereof I have hereunto set my hand.

MICHAEL SCHULTZ.

Witnesses:

L. M. HOSEA,
E. A. ELLSWORTH.