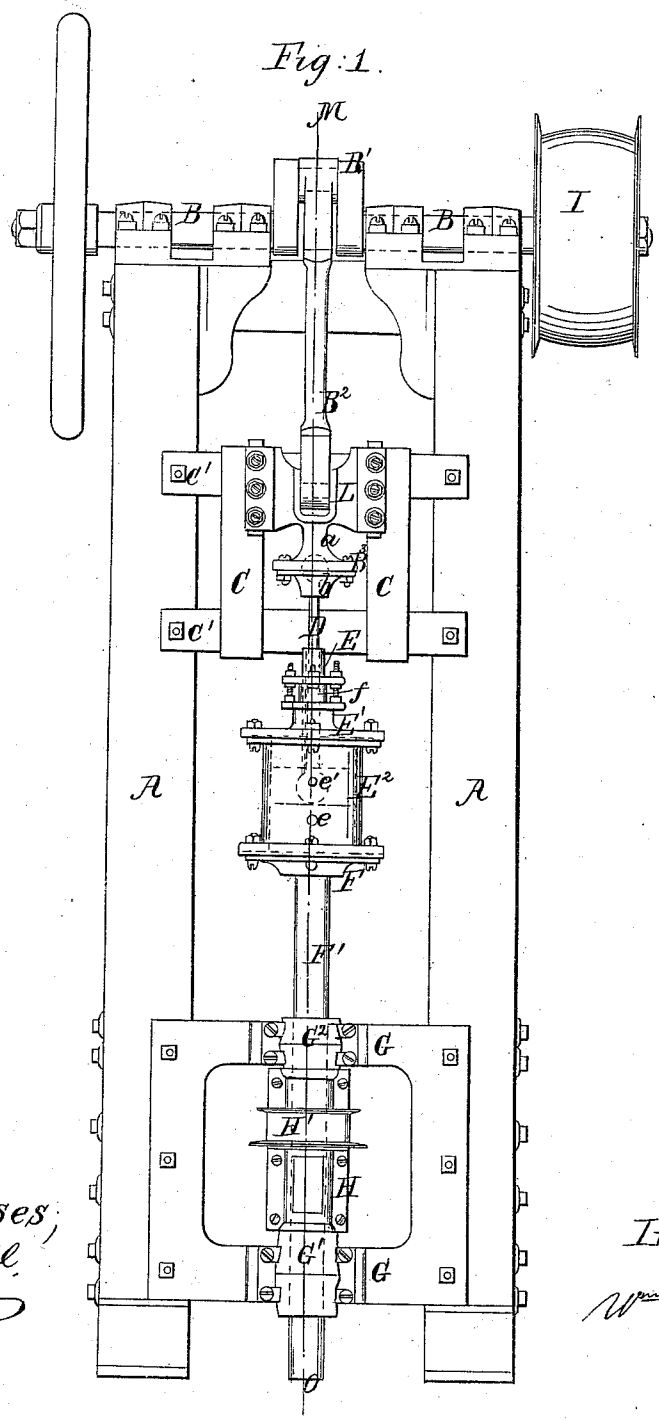
2 Sheets—Sheet 1.

W. BALL.

FORGING AND STAMPING MACHINE.

No. 98,839. Patented Jan. 18, 1870.

Fig. 1.



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Inventor;
Wm Ball

2 Sheets—Sheet 2.

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Fig. 2.

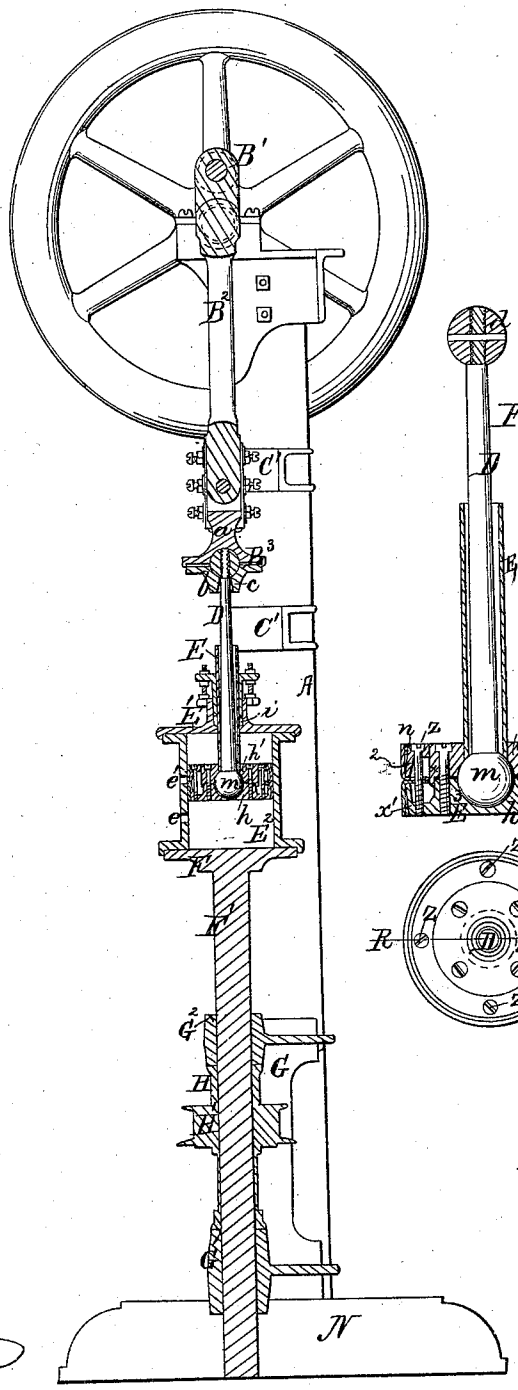


Fig. 4.

Fig. 3.

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United States Patent Office.

WILLIAM BALL, OF CHICOPEE, MASSACHUSETTS.

Letters Patent No. 98,839, *dated January* 18, 1870.

IMPROVED FORGING AND STAMPING-MACHINE.

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, WILLIAM BALL, of Chicopee, in the county of Hampden, and State of Massachusetts, have invented a new and useful Improvement in Atmospheric Crank Stamps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and to the letters of reference marked thereon, in which—

Figure 1 is a front elevation of my invention, as applied to a stamp-shaft;

Figure 2, Plate II, is a vertical section through line M O of fig. 1, Plate I;

Figure 3 is a plan view of the piston, with the tube attached; and

Figure 4 is a vertical section of the same, through line R S of fig. 3.

My invention consists in the construction of a stamp-shaft, having a cylinder attached thereto, said cylinder being provided with a piston, which is connected to the crank-shaft by means of a rod and cross-head, having a ball-and-socket joint, together with a connecting-rod attached to said cross-head; and in providing the said stamp-shaft with a groove and key, and pulley, whereby the said shaft may be made to rotate, while, at the same time, it performs a reciprocating vertical movement, by means of the piston moving in the cylinder, and actuated by the crank. A tube is attached to the piston, through which tube extends the piston-rod, which is attached to the piston-head by a ball and-socket joint, and the tube being somewhat larger in diameter than the rod, ample space is provided for any side play of the rod during its movements, so that the piston may play freely in the cylinder.

That others skilled in the art may be able to make and use my invention, I will proceed to describe its construction and the mode of its operation.

In the drawings—

A represents two upright posts or standards, to the top of which are firmly secured proper bearings, I', in which rotates the shaft B, operated by means of a belt applied to the pulley I.

To the posts A are firmly secured pieces C', having the ways or guides C thereon, and the block L, properly fitted to said ways or guides, operates therein in a vertical direction.

At the lower part of the block L is the part *a*, the under side of which is plane or flat, and circular in form, with a hemispherical cavity in the under side.

A block, *b*, flat upon its upper side, and with a hemispherical cavity also on the upper side, is fitted and bolted to the under side of the block *a*, so that the cavity between, or the two cavities, form a spherical cavity.

Into this spherical cavity is placed a ball, *d*, having a threaded hole therein, and a tapered hole, *c*, is made in the piece *b*, extending from the said cavity down through the said block or piece *b*, the lower part of the hole being the largest, while the upper part is somewhat less in diameter than the ball within the said cavity.

E² is a cylinder, having holes *e* therein, at proper distances from each end, say about one-third the length of the cylinder from each end, said cylinder fitting properly the top of the shaft F', at F, and bolted firmly thereto.

The piston consists of two circular plates, of suitable thickness, *h'* and *h*, the upper one, *h'*, having a threaded hole made therein, and a tube, E, with a screw-thread cut upon one end, is turned in tightly into the threaded hole made in said plate *h'*.

Upon the lower side of the plate *h'* is a hemispherical cavity, and there is also an annular flange, *x*, around the lower edge of said plate.

The lower plate, *h*, has its upper part fitted into the lower part of the upper plate, *h'*, inside the flange *x*, and said lower plate has also a hemispherical cavity on its upper side or face, so that when the two plates are secured together, the two cavities together form a spherical cavity.

The lower plate, *h*, has an annular flange, *x'*, projecting upward to nearly the same height as the main part of the plate *h*.

The rod D is of suitable length, and is made with a spherical knob, *m*, upon the lower end, and a screw-thread cut upon the other end, and said rod may be somewhat smaller in diameter at the upper end.

Before the two plates *h* and *h'* are secured together, the tube D is screwed tightly in place in the threaded hole in the plate *h'*, and the end of the rod D, having the screw-thread cut thereon, is introduced into the tube E, from the lower side of the plate *h'*, and the rod is drawn up into the tube, until the ball *m* enters the cavity in the lower side of said plate *h'*. The lower plate, *h*, is then placed against the lower side of the upper plate, the annular flange *x* encircling and fitting properly the middle raised portion of the upper side of the lower plate *h*, and, holes being provided for that purpose, the two plates are then secured together by bolts, or by any other suitable means.

n represents a packing-ring, annular in form, and having a flange, x^2, projecting down nearly to the top of the flange x^1, on the lower plate, while the upper surfaces of the ring *n* and plate *h'* are on the same plane.

Two pieces of leather, or other suitable material, of the proper shape, are placed between the two flanges x^1 and x^2, and the ring *n* is then firmly secured to the lower plate *h*, by means of the screws or bolts *z*. This holds the pieces of leather *o o* with a firm gripe, so that one of them may be turned up all around, and the other turned down. This serves as a packing to make the piston sufficiently tight within the cylinder.

After the rod D is secured in the piston in the man-

ner above described, the plate *b* is passed on to the rod, and the upper ball *d* is then turned on to the threaded end of the rod D securely. Before this is done, however, the tube E, with the rod D therein, should be passed up through the top plate or head E′ of the cylinder, and the stuffing-box connected therewith. This stuffing-box is similar to others in common use, and, separately considered, is not new.

To the lower part of the posts A, is properly secured the frame G, having the bearings G^1 and G^2, in which operates the shaft F′; and said shaft has one or more longitudinal slots made therein, and a frame, H, fitting properly the said shaft, and having a projection on the inside, which fits into the slots made in the shaft, is clamped firmly together over said shaft, a pulley, H′, being made upon said frame H, so that by means of a belt, the shaft may be made to have a slow rotary motion, while the shaft moves freely in a vertical direction through the frame H.

The cylinder, with the piston therein, and the head E′ secured thereto, is firmly secured to the top F, of the shaft F′, and all the other parts being together, the machine is ready for operation.

Motion being communicated to the shaft B and crank B′, by means of a belt applied to the pulley I, if the piston in the cylinder is below the upper aperture, *e′*, in the cylinder, the air is free to pass in through said aperture, and as the piston passes up by said aperture, the air is prevented from passing out, and, as the piston still continues to pass up, the said air becomes compressed in the upper part of the cylinder, finally to such a degree that the piston lifts the cylinder, together with the shaft F′, and whatever else may be attached thereto, by merely its pressure against the compressed air in the upper part of the cylinder.

When the piston is above the lower aperture *e*, and passes down in the cylinder, the operation is precisely similar.

Is is evident that the machine may as well be used in a horizontal as in a vertical position, and it is equally obvious that it is applicable to any use where it is desirable to remove the jar and strain usually attendant upon the moving or operation of heavy machinery propelled by a positive motive-power, as steam, as it will be seen at a glance that the compressed air in either end of the cylinder serves to enable the piston to accumulate its powers upon the shaft, or start it in either direction, gradually, while it moves with equal velocity and power when it does move; and in its operation, it will be seen that the piston, together with the tube E, will move up and down in the cylinder, before the shaft moves either way, if the machinery be heavy, so that the sudden transition from one vertical movement to another, with the injurious results, are avoided.

It will be perceived that the tapered form of the hole *c*, in the block *b*, and the size and form of the rod D, as compared with the size of the interior of the tube E, provides for a free movement of the rod D, block *a*, or cylinder E^2, should there be any deviation of the same from a straight or true vertical line.

In crushing ore, the shaft F′ may be made to rotate slowly, by applying a belt to the pulley H′, for the purpose of more equally and thoroughly crushing the ore.

As there is liability to more or less variation in the amount of ore placed within the mortar, thereby causing a corresponding variation in the length of stroke of the shaft, I use two apertures, *e e′*, instead of one, for the admission of air into the cylinder, for the purpose of more perfectly accommodating the stroke of the shaft to the amount of ore in the mortar.

Having thus described my invention,

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

1. The combination of the shaft F′, cylinder E^2, and piston E^1, with mechanism for reciprocating the same in a vertical direction, and mechanism for rotating the same in a horizontal direction, substantially as described.

2. The construction and arrangement of devices herein described, or their equivalents, for connecting the crank to the piston.

3. For the purpose of connecting the piston to the sliding cross-head L, and to permit a movement of rotation to be imparted to the cylinder, the connecting-rod D, and ball-and-socket joints, as herein described.

WM. BALL.

Witnesses:
E. O. CARTER,
E. P. BALL.