JAMES T. GILMORE & JOHN S. CRANE.

Improvement in Machines for Dressing Millstones.

No. 115,600. Patented June 6, 1871.

Fig. 1.

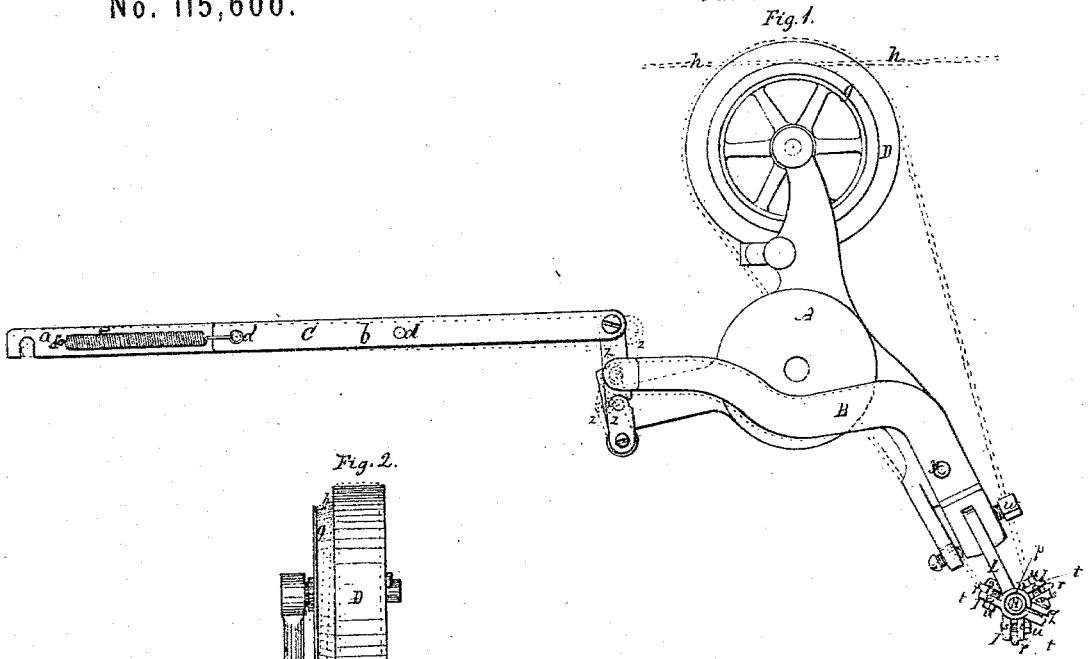


Fig. 2.

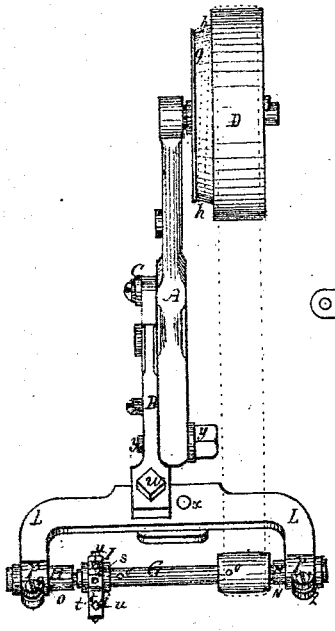


Fig. 3.

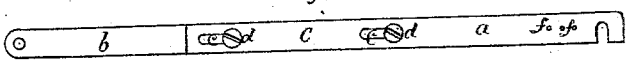


Fig. 4.

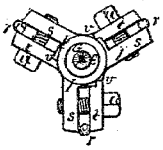
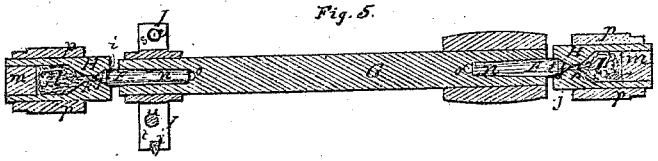


Fig. 5.



Witnesses:-
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UNITED STATES PATENT OFFICE.

JAMES T. GILMORE AND JOHN S. CRANE, OF LAKE VILLAGE, N. H.

IMPROVEMENT IN MACHINES FOR DRESSING MILLSTONES.

Specification forming part of Letters Patent No. 115,600, dated June 6, 1871.

To all whom it may concern:

Be it known that we, JAMES T. GILMORE and JOHN S. CRANE, of Lake Village, in the county of Belknap and State of New Hampshire, have invented certain new and useful Improvements in Machines for Dressing Millstones; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing making part of this specification—

Figure 1 being a side elevation of the reciprocating tool-carriage of a revolving diamond stone-dressing machine; Fig. 2, an end elevation thereof; Fig. 3, a side view of the connecting-rod by which the reciprocating motion is communicated to the tool-carriage, the view being opposite to that shown in Fig. 1; Fig. 4, an end view of the dressing-tool; Fig. 5, a central longitudinal section of the dressing-tool and its bearings.

Like letters designate corresponding parts in all of the figures.

Our improvements are upon machines for dressing millstones, or other stones, in which the cutting or dressing-tool is a revolving diamond or diamonds, as patented by James T. Gilmore May 20, 1863, and by James T. Gilmore and Leonard Anderson January 26, 1869; and consists in several special features for overcoming difficulties in or improving the action of the parts, all relating to the tool or its reciprocating carriage, as we will proceed to specify in order.

In the drawing, A represents the reciprocating carriage; B, a pivoted arm thereof, which bears the dressing-tool; C, the connecting-rod, through which the reciprocating motion is communicated to the dressing-tool; and D, the pulley through which the revolving motion is received from the power and transmitted to the diamond or diamonds.

The reciprocating and revolving motions are produced in substantially the same manner as represented and described in the Letters Patent of Gilmore and Anderson above referred to, and need no further description. But, in communicating the reciprocating motion to the tool-carriage, when an unyielding connecting-rod is employed as the means of communicating the movement, if a very hard part of the stone or other increased resistance, or any obstruction is offered to the action of the dressing-tool, there is a sudden check on the motion of the machine, producing liability to break or injure some part thereof, particularly the diamond-tool. We overcome this difficulty by means of a connecting-rod, C, elastically extensible in length. In order to give this elastic extensibility to the connecting-rod without injuriously affecting its strength and rigidity, it is represented as composed of two bars, *a b*, lapping upon each other, and connected by means of longitudinal slots *c c* in one and screws or head-bolts *d d* projecting from the other through the said slots. The length of the slots is to be sufficient only to give the required extent of extensibility. The elasticity is given to the extensibility, as shown, by means of a coiled spring, *e*, attached to the two bars so as to hold the connecting-rod shortened, if the forward or cutting movement of the tool-carriage is effected by the drawing stroke of the said connecting-rod, as we construct the machine. A set of holes, *f f*, arranged lengthwise of one of the bars, enables the force of the spring to be varied by hooking it into different holes of the set. There is also a difficulty in transmitting the revolving motion to the diamonds through the traverse-pulley D. The part *g* of the pulley, around which the driving-belt *h* (shown by dotted lines) runs when of ordinary form, is apt to cause one turn of the belt, where it crosses itself in passing round the pulley, to rub upon the other turn and ride it, thereby breaking the belt or throwing it from the pulley. We completely obviate this difficulty by giving the part *g* of the pulley a somewhat conical form, as shown in Fig. 2, the effect of which is to cause the belt, as it runs upon the pulley, to climb toward the enlarged side and thus keep clear of the turn of the belt which runs off from the pulley. The enlargement of one side of the pulley need not be of precisely conical form, but may be curved either concavely or convexly.

The rapid revolution of the diamond tool (generally not less than twenty thousand revolutions a minute) renders it very difficult to prevent the heating and rapid wearing of the journals of its shaft or spindle in their bearings. One cause of this is that the rapid revolving motion causes the lubricating oil to be thrown out of the bearings by centrifugal action if the journals are conical, (the most

desirable form,) since conical journals and bearings keep the shaft centered most accurately, an important desideratum for the diamonds; but, on the other hand, cylindrical journals and bearings allow a freer motion to the tool, because conical journals require the bearings to be adjusted very closely to them, and it is important to have a very free as well as accurate revolution of the tool. We obviate these difficulties and secure the desired object by combining the conical with the cylindrical form in each journal and bearing of the revolving diamonds. Thus, as shown in Fig. 5, each journal E of the tool-shaft G has a short cylindrical portion, *i*, and then terminates in a conical portion, *j*, and these parts fit into corresponding forms of the bearing H. The conical part keeps the shaft centered and accurately adjusted endwise, while the cylindrical part prevents lateral play. But the most important effect of these combined forms is that of the cylindrical portion preventing the oil from being thrown out of the bearing by the centrifugal action of the conical portion. We connect with the conical journals and bearings an improved self-lubricating device, consisting of a small passage, *k*, reaching from an oil-cavity, *l*, in each bearing H, into the conical cavity of the bearing, as shown in Fig. 5. This passage is threaded with a cotton-wick or some other capillary substance, which occupies the cavity *l* with the oil. The said oil-cavity may open at the outer end of the bearing, as shown, and be closed by a cork or plug, *m*. The journals E E of the shaft are made removable from the shaft, so that they may be removed and replaced at any time without the trouble and expense of renewing the shaft, they being the only parts of the tool subject to wear, except the diamonds themselves. Their shanks *n n* are slightly tapering and fit in sockets of the same form in the ends of the shaft, so that, although they wedge and are firmly held in the sockets, they can readily be started and removed therefrom. There are holes *o o* in or transversely through the shaft just at the inner ends of the shanks, as shown, to enable a wire or some slender instrument to be inserted for starting the shanks from their sockets. The bearings H H of the tool-shaft are held in clasp-sockets *p p* on the ends of the branches of the arm or lever B of the carriage A. These sockets are clamped close around the bearings by tightening-screws *q q*. By this means the bearings can be accurately adjusted endwise and held firmly in any position. The diamond-holder I, as represented in the drawing, holds three diamonds, *r r r*, in as many clamps, composed each of a fixed jaw, *s*, projecting from the hub or eye of the holder, and of a movable jaw, *t*, tightened toward the fixed jaw upon the diamond by a set-screw, *u*, as shown most clearly in Fig. 4. The inner end of the movable jaw fits a square rabbet or notch, *v*, in the holder, as shown, whereby the jaw is held in a position parallel with the fixed jaw, while it can be adjusted freely toward the latter. The diamonds, therefore, are free to be adjusted laterally as well as radially between the jaws, it being required that the points of the several diamonds shall revolve accurately in the same plane, as well as in the circumference of the same circle, in order to do accurate work, and for one diamond to assist the action of another, and to continue or maintain the work if one breaks or is displaced. As a guide in setting the diamonds in the holder the ends of the jaws are marked each with a central line on the outer end, all in the same plane, as indicated in Fig. 2. The entire holder can be adjusted laterally, if desired, by moving the bearings H H endwise, and also by adjusting the holder on the shaft G. The arm-branches L L, which hold the bearings H H of the diamond-tool, form a separate part that is held in the end of the lever-arm B of the reciprocating carriage by a set-screw, *w*, and by that means may be adjusted both laterally and angularly around the said set-screw. Depressions or holes *x x*, Fig. 2, may be formed in the surface of the branch piece, at uniform distances apart, to receive the end of the set-screw. The arm B is pivoted on the reciprocating carriage A at *y*. The arm has a slight vibratory movement on this pivot to raise the diamonds out of action in the receding movements of the carriage, and to bring them down again into action in the forward movements of the carriage.

We have an improved device for communicating this vibratory movement to the arm B automatically by the connecting-rod C. It consists in two toggle-bars, *z z*, pivoted together, one of which is also pivoted to the carriage A, and the other to the arm B and to the connecting-rod C, substantially as shown in Fig. 1. As the connecting-rod draws forward it straightens the toggle-bars, and, by thus lifting that end of the lever-arm B slightly, it lowers the diamond into action at the other end, as indicated by full lines in the drawing. But when the connecting-rod pushes back the carriage it bends the toggle-bars, as shown by dotted lines in Fig. 1, and produces an opposite vibratory movement of the lever-arm B, thereby raising the diamonds out of action.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The elastically-extensible connecting-rod C, substantially as and for the purpose herein specified.

2. The cylindrical pulley D, having the conical portion *g* thereon or connected and revolving as one therewith, substantially as and for the purpose herein specified.

3. The revolving diamond-tool when provided with journals E E having the combined cylindrical and conical forms, as described, in connection with a corresponding double form of bearings, H H, to receive the journals, for the purpose herein specified.

4. The small capillary-threaded lubricating

passage *k* arranged just at the apex or extremity of the conical bearings H H of the diamond-tool journals, for the purpose specified.

5. The detached jaws *t t* of the diamond-holder I, having a free self-adjusting movement to adapt themselves to the irregular shapes of the diamonds, in combination with the fixed jaws *s s*, substantially as herein specified.

6. The toggle-bars *z z*, arranged in combination with the carriage A, lever-arm B, and connecting-rod C, substantially as described, and for the purpose specified.

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