

J. M. POOLE.

Improvement in Machines for Grinding Objects Cylindrical.

No. 130,741.

Patented Aug. 20, 1872.

Fig 1

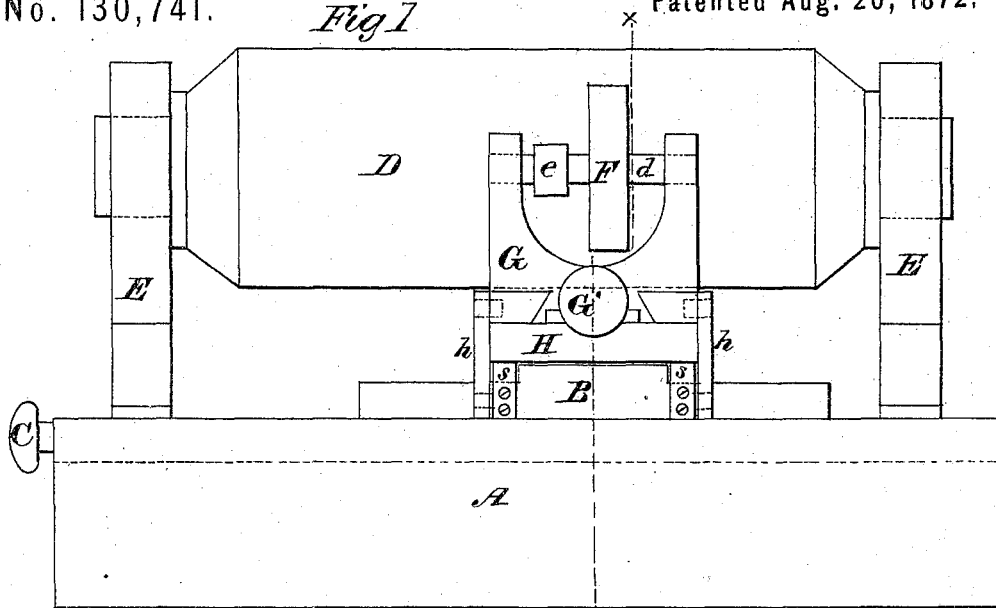
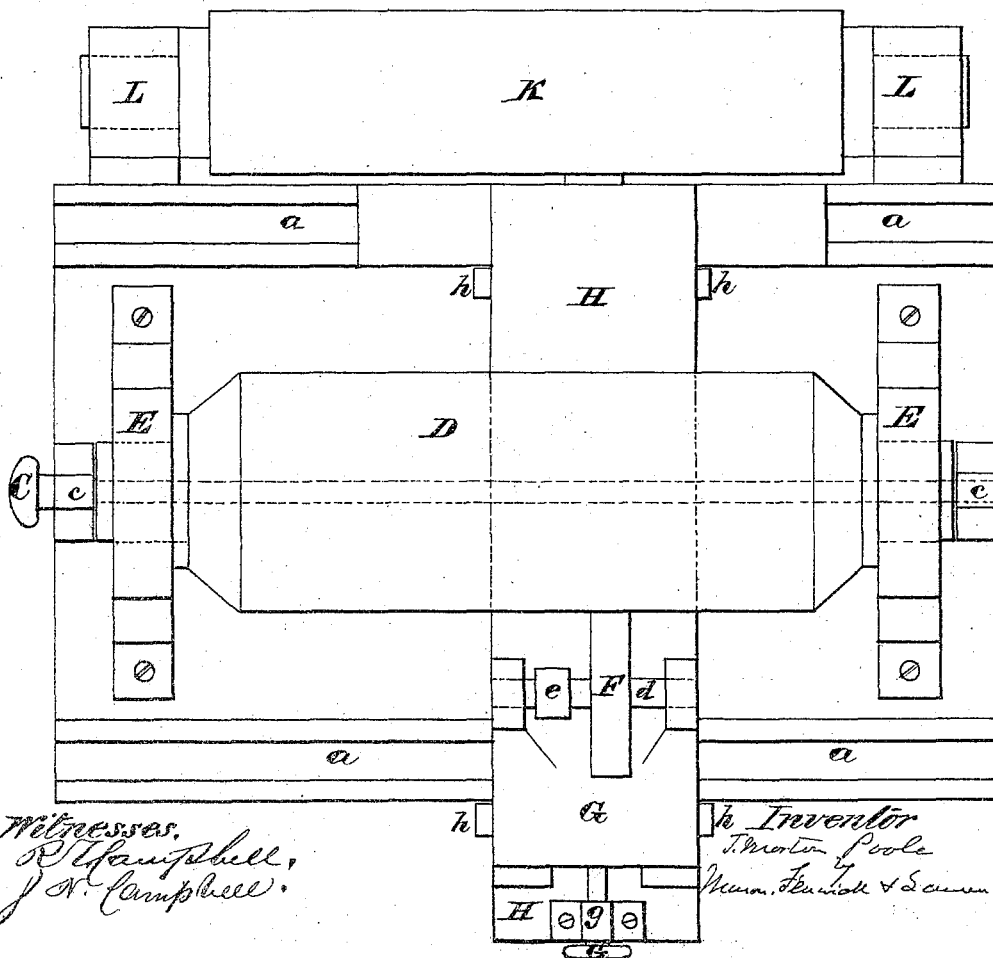


Fig. 2



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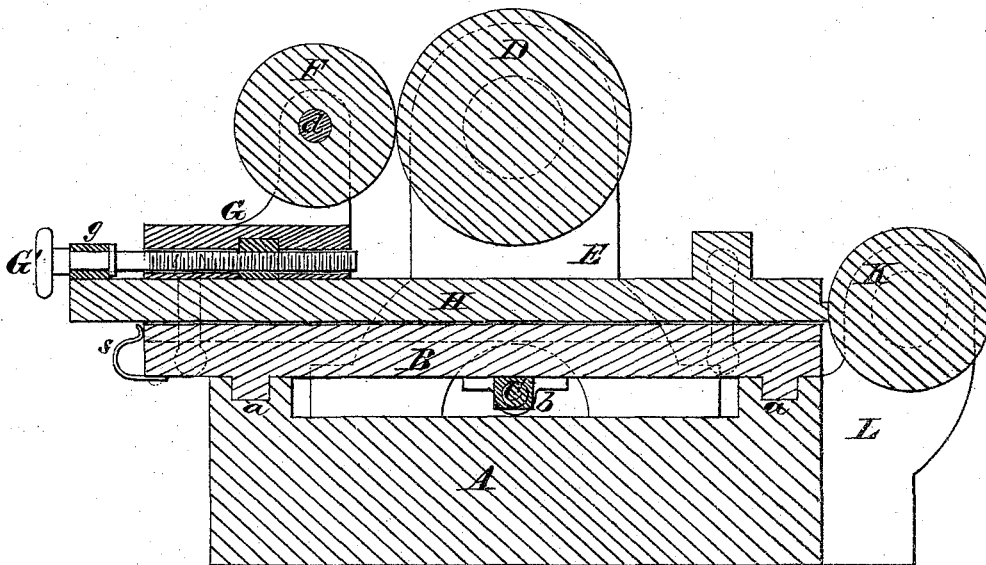
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*Fig. 3*



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# UNITED STATES PATENT OFFICE.

J. MORTON POOLE, OF WILMINGTON, DELAWARE, ASSIGNOR TO HIMSELF,  
W. T. PORTER, AND THOMAS S. POOLE, OF SAME PLACE.

## IMPROVEMENT IN MACHINES FOR GRINDING OBJECTS CYLINDRICAL.

Specification forming part of Letters Patent No. 130,741, dated August 20, 1872.

*To all whom it may concern:*

Be it known that I, J. MORTON POOLE, of Wilmington, in the county of New Castle and State of Delaware, have invented a new and Improved Machine for Grinding Objects Cylindrical; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1, Plate 1, is an elevation of one side of those parts of the machine which are necessary to illustrate my invention. Fig. 2, Plate 1, is a plan view. Fig. 3, Plate 2, is a section taken vertically and transversely through the machine in the planes indicated by dotted lines *x x* on Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to a new and useful improvement which is designed to overcome certain difficulties experienced in machinery for grinding objects cylindrical—that is to say, objects which are right-line cylinders, or which vary very slightly and almost imperceptibly from a true cylinder, being such a solid as would be generated by the revolution of a rectangle—having one side slightly concave or convex around its straight side as its axis. In machines for grinding cylindrical objects, as usually constructed, the rest carrying the grinding-wheel is traversed from one end to the other of the object, and is dependent for its rectilinear movements upon the truth of the ways upon which it travels. The ordinary planing-machine produces only an approximation to the truth, and even if the ways upon which the rest of such machine travels could be planed perfectly true at first, it is evident that they would soon lose their accuracy by the natural wear of one part upon another, and the rest would no longer run true. To overcome this difficulty the nature of my invention consists in providing means whereby the grinding-wheel shall be compelled to run in a right line independently of the irregular movement of the rest, as will be hereinafter explained.

The following description of my invention will enable others skilled in the art to understand it.

The horizontal bed A of the machine may be constructed of any required length and width, and it should be fixed to a good foundation, as in a lathe or planing machine. Upon this bed A a slide-rest, B, is supported and guided by tenons which are fitted into grooved ways *a a*, as shown in Fig. 3, Plate 2. The rest B lies transversely across the bed A, and may be moved laterally by means of a leader-screw, C, turned by hand or otherwise, which screw is tapped through an eye, *b*, on the bottom of the rest, and is supported on its ends by suitable bearings *c c* upon the bed A. At or near the extremities of the bed are standard-bearings E, which are designed for supporting the ends of the object D, which it is required to grind. These bearings should be so constructed that the work can be readily introduced into the machine and removed therefrom. F represents a grinding-wheel, which is fixed on a horizontal spindle, *d*, which has its bearings in the standards of an adjustable rest, G, and which is provided with a pulley, *e*, around which passes the belt for communicating rotary motion to the grinding-wheel. The screw G' with its hand-wheel is designed for adjusting and fixing the grinding-wheel at any desired point depending upon the diameter of the object to be operated upon. This screw G' is supported by the bearing *g*, which is fast upon the upper surface of a horizontal transverse saddle, H. The saddle H is hung from the upper ends of the links or arms *h h h h*, so that it will swing transversely with respect to the object D, with very little friction. Any other means, such as anti-friction rollers for reducing the friction of the transverse movement of the saddle, may be used instead of the one indicated. The four arms *h* are pivoted at their lower ends on the sides of the saddle H, sufficient space being left between this saddle and the rest to allow the swinging movement above mentioned. K represents a guide-bar or straight-edge, which I prefer to make of chilled iron ground perfectly true and of uniform diameter, by means of the machine for grinding objects cylindrical, for which Letters Patent were granted to me numbered 79,683. I do not, however, confine myself to a roll, K, as a guide, for I may use any straight-edge made by the well-known

mechanical processes. I prefer the use of the roll as the guide, on account of the facility with which it can be made of chilled iron or hardened steel, and also for the reason that when a part which has been acted on by the rest H, is worn so that it is no longer straight, a new and true surface can be presented to the rest *h* by simply turning the roll slightly about its axis. The machine should be provided with an extra roll, so that when one is worn so that it is useless as a guide, the spare one could be substituted and the worn one ground anew. The guide-roll K is supported in the bearings L L, which should be so constructed that it can be readily removed when necessary, and also turned around as described. *s s* are springs which press the saddle H against the guide-roll. They may be substituted by a weight or some other equivalent device which will keep the rest H pressed with some force in contact with the guide-roll. It will be seen that while the main rest B is forced to follow any irregularities of the bed A the saddle H, carrying the grinding-wheel, being pressed in contact with the guide-bar K, is obliged to move in the path indicated by the outline of the guide-roll entirely independent of the irregular movement of the rest beneath it. My invention is intended to be applied among other purposes to grinding the long rolls used in the operation of calendering paper. A calendering-machine for this purpose generally consists of from six to eleven rolls, placed one above the other, and the paper, passing between the bite of the rolls, is calendered. It is customary in a calender to make the bottom roll much larger and stronger than the others, to resist its tendency to bend under the weight of the superimposed rollers. Even with this precaution it is found that the lower roll must be made slightly largest in the middle or slightly barrel-shaped to compensate for its deflection, so that the paper will be pressed uniformly. Rolls used in the manufacture of sheet-iron, on the contrary, require to be ground more or less concave, as, the metal being rolled hot, it heats the rolls in the middle of their length much more than

at the ends, and they consequently expand so much that when fully heated up they are uniform in diameter. It is evident that if the guide-roll, instead of being perfectly cylindrical, was of the convex or concave form required, the rolls ground in the machine would be of the same form. Instead, however, of having my guide-roll concave or convex I make it perfectly straight and bend it, either by a screw placed in the middle of its length or by other suitable device. I am thus enabled to give any desired amount of convexity or concavity to the roll upon which I am operating, by simply adjusting the bent roll K about its axis.

I am aware that patterns and guides have been employed in lathes for turning irregular forms, illustrations of which will be seen in Letters Patent granted to D. Slate, January 31, 1865, and to A. Warth, 1854, and therefore I do not claim such as my invention; but I am not aware that a grinding-machine which is emphatically an instrument of precision, has ever been contrived after the plan I have described, and in which work taken from the most accurately-finishing turning-lathe may be placed, and its nicest imperfections, not before discovered even by the application of the calipers, be developed and removed. This being so I do not think a grinding-machine can be classed as a lathe, it being a machine for higher powers and different kind of work.

I do not wish to be understood as claiming broadly the employment of a guide in a grinding-machine, irrespective of the combination set forth, and manner in which my machine is constructed and operated.

What I do claim as my invention, and desire to secure by Letters Patent, is—

The combination of the bed A having standards E E, slide-rest B, screw C, grinding-wheel F, saddle H, spring or springs *s s*, and guide-bar K, all substantially in the manner described, and for the purpose set forth.

J. MORTON POOLE.

Witnesses:

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