

T. GOODRUM.

Improvement in Machines for Polishing the Inner Surfaces of Cylinders.

No. 129,402.

Patented July 16, 1872.

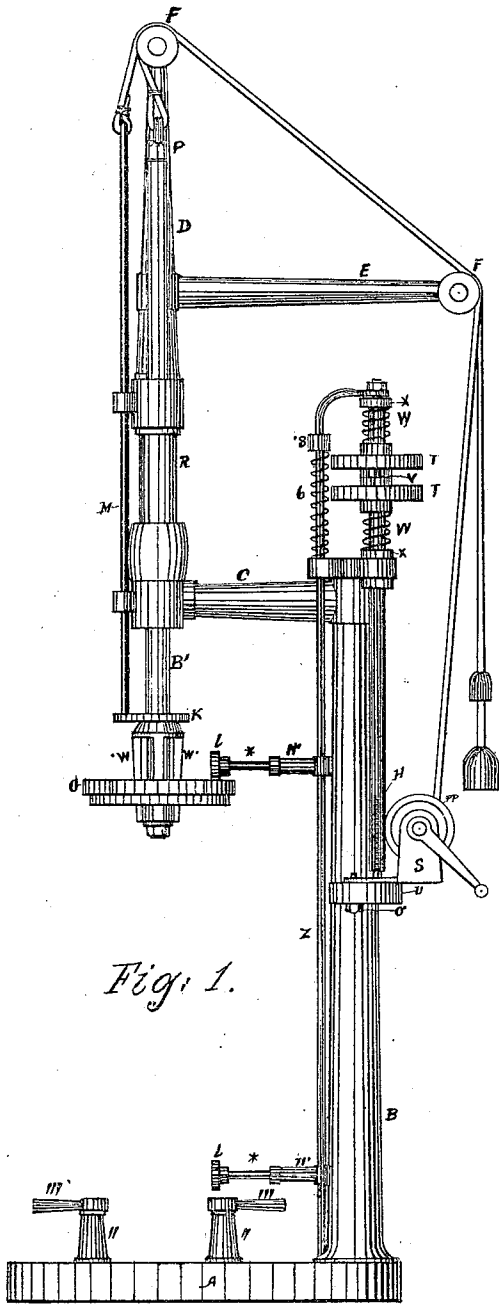


Fig. 1.

Witnesses.  
*A. M. Andrews.*  
*Geo. Giles.*

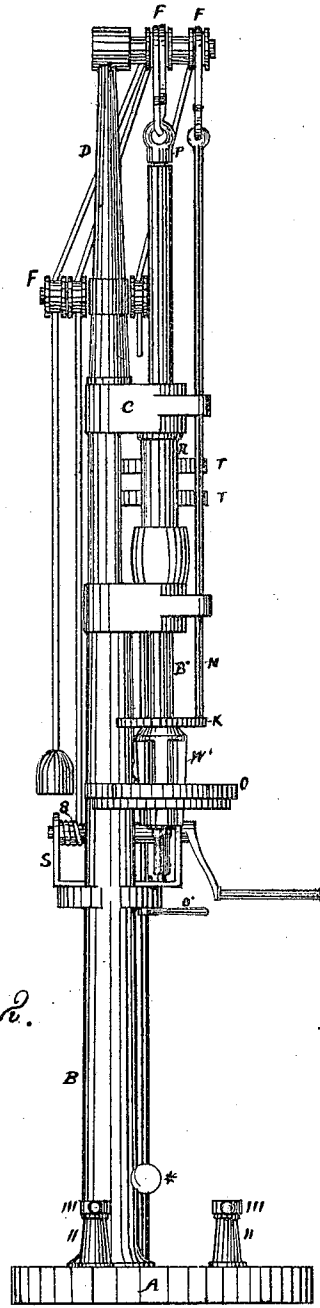


Fig. 2.

Inventor.  
*Thomas Goodrum*  
 By his Att'y *John Dancy*

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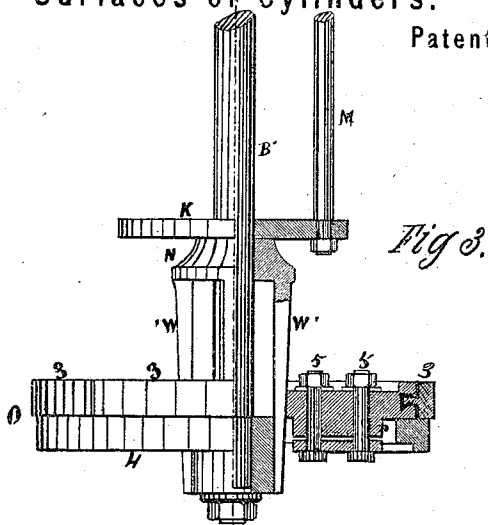


Fig 3.

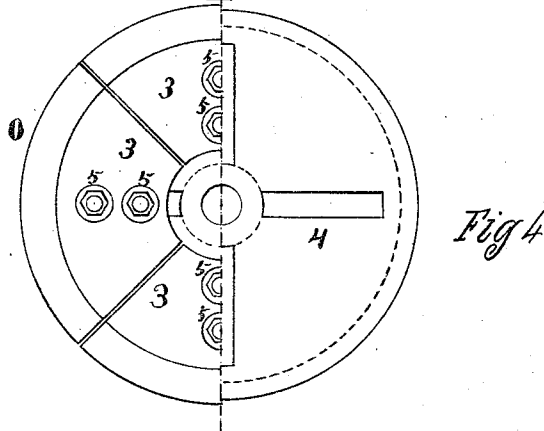
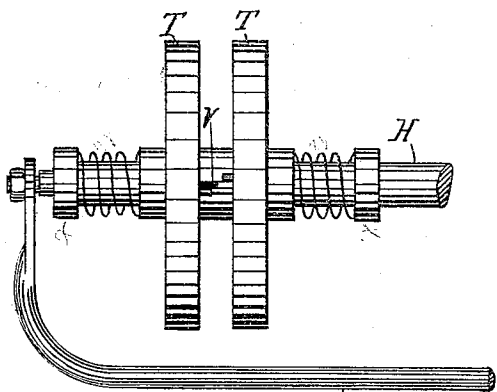


Fig 4

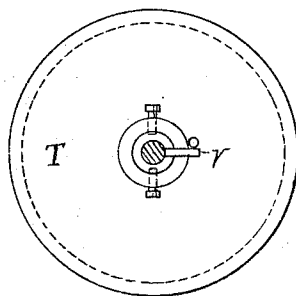
Fig 5



Witnesses. *Z*

*Chas. Andrews*  
*Geo. Giles*

Fig 6



Inventor.

*Thomas Goodrum*  
*By his Atty John Danks*

# UNITED STATES PATENT OFFICE.

THOMAS GOODRUM, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN MACHINES FOR POLISHING THE INNER SURFACES OF CYLINDERS.

Specification forming part of Letters Patent No. 129,402, dated July 16, 1872.

*To all whom it may concern:*

Be it known that I, THOMAS GOODRUM, of the city of Providence, county of Providence, in the State of Rhode Island, have invented new and useful Improvements in Machines for Polishing the Inner Surfaces of Cylinders, &c.; and I do hereby declare the following to be a full, clear, and exact description thereof, referring to the accompanying drawing, which will enable others skilled in the art to make and use the same.

My invention consists of certain novel combinations constructed and arranged for the purpose of grinding out and polishing the inner surfaces of cylinders and other bodies containing circular holes. It relates to an expanding grinding-wheel that may be graduated in diameter while in motion inside of a cylinder, or otherwise; also to the simple and effective devices for expanding the above-named wheel; an adjustable automatic shifting apparatus, in combination with other devices, supported by a pivoted movable frame connecting with the feed-screw.

Referring to the drawing, Figure 1 represents a side view of my machine. Fig. 2 represents a front view of my machine; Fig. 3, a sectional detail of the grinding-wheel and its connections; Fig. 4, top of grinding-wheel with part of the sections removed, showing slots in the plate; Fig. 5, enlarged details of feed-wheels and connections; Fig. 6, face of wheels showing shaft, sliding-pin, or clutch.

To enable others skilled in the art to make and use the same, I will describe by referring to the letters of reference on the drawing, in which A is a bed or base; B, column; C, extending arms supporting bearings for the spindle B'; D and E, extensions for chain or rope wheels; F, rope-wheel; I, cord; K, hammer attached to rod M; N, wedge; O, expanding grinding-wheel; P, shell with a loop formed thereon; R, sleeve-pulley; S, movable platform supporting drum, worm-wheel, and crank; H, feed-rod or screw; T T, clutch-pulleys; V, sliding clutch-pin; W W, springs; X X, set collars; Z, shifter-rod; \*, adjustable arms with wheels to operate the shifter; ||, movable pedestals; |||, cams; O', cams or eccentrics.

I construct my polishing-machine from any suitable metals, and in the usual way that

similar machinery is made. The base or bed and the column are similar in form to an ordinary upright drilling-machine. The bed is provided with radial slots, in which movable pedestals ||, provided with lever-cams |||, are secured and adjusted to support the cylinder for the operation of polishing. The column is provided with suitable extended arms forming bearings for the main spindle B', also supporting the rope-wheels above. It is also provided with a fixed platform, U, for the support of the swinging frame S. Bearings are formed at the top for the support of the feed-shaft or screw H and the shifter-rod Z.

The grinding-wheel O is constructed of sectional pieces, 3 3 3, of wood or metal, with their circumferential faces covered with or composed of emery or a similar grinding material, all secured to a radially-slotted plate, 4, by means of bolts 5 5 5, as is more clearly shown in the enlarged details, Figs. 3 and 4; the conical-shaped wedge N, formed with prongs W W, extending from a hub, said prongs penetrating the slots of the grinding-wheel for the purpose of forcing outward the sections 3 3 3 to enlarge its diameter. (See Fig. 3.) The hammer K, surrounding the main spindle to which the rod M and cord I are attached, is made in any suitable form that will serve to drive the wedge N. The shifting apparatus consists of a rod, Z, (supported by bearings in or near the base, and at the top of the column,) to which is attached the sliding-sleeves N' N', extension arms \*\*, and pulleys ll, spring 6, and collars 8, said rod being suitably curved at the top to support a movable stud which enters the end of the feed-shaft or screw H that operates the clutch-pin. The sliding-sleeves N N are formed of hollow tubes with suitable pieces fitted into the same, serving as arms. At the end of each are small pulleys, to prevent abrasion when the rotating emery-wheel comes in contact to operate the shifter. The vertical feed-shaft or screw H' should be of a suitable length to rest in bearings on the platform U and extend above sufficiently to receive two clutch-pulleys in line parallel with the sleeve-pulley R, from which they are driven in opposite direction, said shaft being supported at the top of the column, in bearings formed thereon. This shaft is provided with a screw

adjacent to the lower bearing, which meshes into the worm-wheel P P, to revolve the same with the drum, to which it is connected, for the purpose of winding and unwinding the cord which causes the spindle with the grinding-wheel to feed upward or downward. I would remark that the worm-wheel is made to engage or disengage the screw-shaft H by means of a cam or lever secured to the platform and connected to the swinging-frame by any suitable means. When disengaged the drum may be operated by hand, by means of a crank, which may be convenient at times. I would also remark that the main spindle, to which the grinding-wheel O is attached in the usual manner, is provided at the top with a flange, or shaped like a "ball," for the purpose of surrounding the same with a "shell," in such a manner that the spindle may be permitted to revolve freely. This shell may be formed with an eye, to which a cord may be attached for the purpose of elevating or lowering said spindle. The sleeve-pulley R is formed with two sizes in diameter. The larger is for revolving the spindle, while the smaller serves to drive the clutch-wheels on the feed-screw. This pulley is provided with the usual feather sliding in a groove formed in the spindle.

To enable others to use my invention, I will describe: I place the body or cylinder, with its opening, in a vertical position directly under the center of the grinding-wheel, resting the same upon the ends of the pedestals, and there clamp the same by means of the cam-levers. The main spindle, with the grinding-wheel attached, is rotated, in the usual manner, with great rapidity, and may be lowered to its work by disengaging the worm-wheel from the feed-screw and using the crank with the hand. The grinding-wheel should enter the cylinder slightly, and, by the use of the hammer, which is operated by pulling the cord for that purpose, the wheel may be expanded sufficiently to do its work. I would remark that after the wheel is expanded properly to do its work the worm-wheel may engage the feed-shaft or screw, and thus operate automatically, as, in the descent downward, the grind-

ing-wheel is forced against the shifter, or the wheel on the extension arm, which reverses the same, and, in rising, comes in contact with the wheel above, and is there reversed.

The object of my invention is to provide a convenient automatic grinding-machine for the use of manufacturers for finishing the inner surface of cylinders of steam-engines and pumps more perfectly than has heretofore been accomplished by other means. Prior to my invention the cylinders of large engines and pumps have almost invariably been left in the same rough condition as when taken from the boring-lathe, in consequence of the lack of proper means or machinery for a better finishing. My invention enables me to finish the inner surface of a cylinder in the most perfect manner and with as fine a polish as is possible to be obtained on the outer surface of any body. Consequently, a better engine or pump is the result.

Having thus described my invention, I claim—

1. An automatical polishing-machine provided with the revolving shaft B', grinding-wheel O, wedge N, and hammer K, as and for the purposes set forth.

2. The adjustable sliding arm \*\*, in combination with the shifting-rod Z, operated by the rotating grinding-wheel O, for moving the clutch to engage pulleys T T, as and for the purposes set forth.

3. The sliding platform S supporting the drum 8 and worm-wheel P P, to which the screw H is made to engage or disengage by means of lever O, as and for the purpose set forth.

4. The expanding grinding-wheel O, consisting of plate 4, to which are attached movable sections 3 3 3 3, of suitable grinding material and metal, secured by bolts 5 5 5 5, operated by wedge N and hammer K, as and for the purposes herein set forth.

THOS. GOODRUM.

Witnesses:

WALTER B. VINCENT,  
NATHANIEL L. MORGAN.