Jan. 16, 1923. 1,442,381.

R. E. BOLE.

GRINDING AND POLISHING MACHINE.

FILED JUNE 7, 1921.

Fig. 1

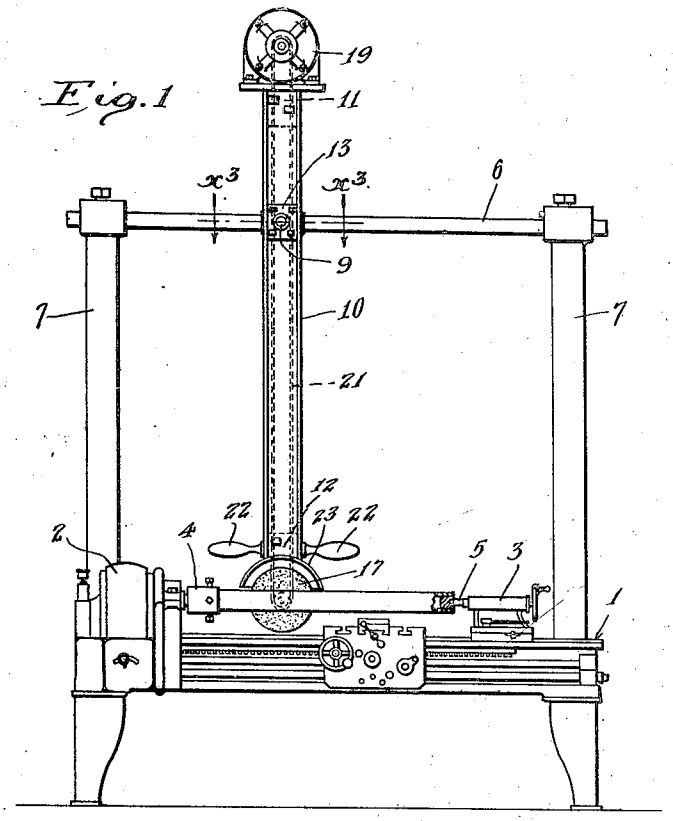


Fig. 2.

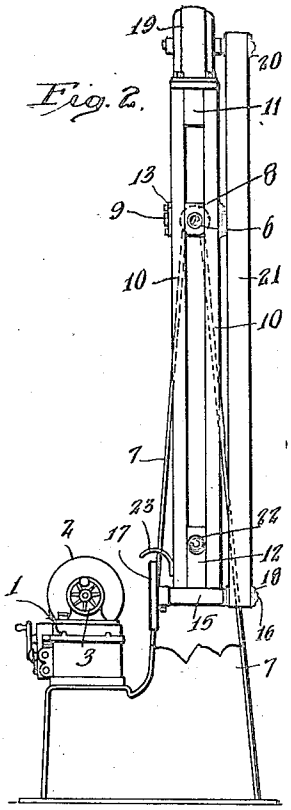
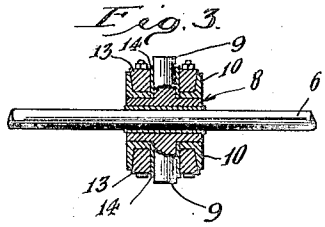


Fig. 3.



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UNITED STATES PATENT OFFICE.

ROBERT E. BOLE, OF LOS ANGELES, CALIFORNIA.

GRINDING AND POLISHING MACHINE.

Application filed June 7, 1921. Serial No. 475,605.

To all whom it may concern:

Be it known that I, ROBERT E. BOLE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Grinding and Polishing Machine, of which the following is a specification.

This invention relates to a grinding and polishing machine particularly adapted for grinding and polishing cylindrical surfaces and has for its object to provide a machine combining means for rotating the work, and a grinding wheel rotatably journaled in a plane at right angles to the axial plane of the work whereby the side surfaces of the wheel engage the work.

Another object is to provide a machine in which the grinding wheel engages a relatively long area of the work to contact several high spots at one time, functioning in the manner of a straight edge and grinding the high spots down to a true surface.

Another object is to provide a machine having a grinding wheel which is rotatably journaled in a plane at right angles to the axial plane of the work and which is freely universally movable towards and from the work and longitudinally of the work with the side surface of the wheel engaging the work and functioning as a straight edge simultaneously spanning and extended area of the work whereby the necessity for a positive feed of the wheel relative to the work is obviated.

Another object is to provide a machine of the above character in which the grinding wheel is carried by a pendulum arm universally movable on its supporting means and longitudinally translatable relative thereto.

Another object is to provide a machine having a pendulum arm carrying the grinding wheel and a motor and transmission means for said wheel, with the arm universally supported for movement of the wheel to and from the work and longitudinally of the work, and bodily movable longitudinally of the machine to vary the zone of the work engaged by the wheel.

Various other objects and advantages will be more fully apparent by the following description and accompanying drawings, which form a part of this disclosure and which illustrate a preferred form of embodiment of the invention.

Of the drawings:

Figure 1 is a front elevation of the machine.

Figure 2 is an end elevation with one of the upright frame extensions broken off.

Figure 3 is an enlarged detail section on line x^3—x^3 of Figure 1.

The machine of the present invention is particularly designed to grind and polish cylindrical pieces of work such as shafting, tubing, cylinders or other parts having relatively extended cylindrical surfaces of uniform diameter, and the machine is arranged to accurately and rapidly accomplish the grinding of such cylindrical surfaces with a grinding wheel which is universally mounted and free to swing in any direction, thereby eliminating the necessity of providing positive feeding mechanism for the grinding wheel and also eliminating any requirement for primary adjustment or setting of the mechanism.

In the present device, in which the side of the grinding wheel engages the work and in which the wheel is of a size which will span a considerable portion of the length of the work, the wheel functions in the manner of a straight edge to produce a true, accurately grounded surface and will operate without any tendency to spring the work.

The machine as illustrated comprises a bed 1, a head stock 2 fixed at one end of the bed and a tail stock 3 slidable along the bed, the live spindle of the head stock having associated therewith a suitable chuck 4 to receive the work and the tail stock having the dead center 5 axially aligned with the head stock spindle. This arrangement may follow the standard type of engine lathe as illustrated or may be of any suitable special design.

The grinding mechanism is carried by an overhead support comprising a stationary rod 6 fixed at opposite ends in upright extensions 7 of the framework of the lathe. The rod 6 is relatively aligned parallel with the axial plane of the work and slidable longitudinally of the rod 6 is a carriage 8 which is also freely rotatable on the rod, and which is provided with opposed trunnions 9. (See Fig. 3.) A pendulum arm is formed of two opposed channel beams 10 relatively held in

spaced relation by end blocks 11 and 12, with the beams and the blocks rigidly secured together to form an integral unit. The channel beams 10 intermediate their ends are transversely apertured and have secured to their outer surfaces filler blocks 13 which are correspondingly apertured with the apertures of the beams 10 and their respective filler blocks being aligned to receive bearing bushings 14. The opposed trunnions 9 of the carriage 8 engage in the respective bearing bushings 14, this structure providing a universal connection for the pendulum arm which will permit it to swing transversely or longitudinally and at the same time will permit the arm to be bodily translated along the rod 6. At the lower end of the pendulum arm is a journal bearing 15 (see Fig. 2) disposed in a plane at right angles to the axial plane of the work and the rod 6, and rotatably journaled in said bearing is a spindle 16 having fixed to its forward end the grinding wheel 17 and to its rearward end a belt pulley 18. Mounted upon the upper end of the pendulum arm is an electric motor 19 having a belt pulley 20 and a belt 21 engages over the belt pulley 20 and the belt pulley 18. Opposed handles 22 are provided at the lower end of the pendulum arm and a suitable guard 23 extends over the upper edge of the grinding wheel.

The operation of the machine, with the work in position in the lathe and being rotated by the head stock spindle, the operator by means of the handles 22 swings the grinding wheel forwardly to engage the work and then swings it longitudinally of the work in a grinding operation. At intervals and by a preponderant longitudinal pull on one of the handles 22, the operator can translate the pendulum arm bodily along the rod 6 so that the zone of the work engaged by the wheel will be varied from time to time until the entire length of the work has been engaged. This longitudinal swing of the pendulum and its translation bodily along the work will be continued until the work has been ground down to the required diameter.

It will be evident from the above that this machine is capable of accurately and quickly grinding cylindrical surfaces by engagement of the side of the grinding wheel with the work and that the wheel will function as a straight edge so as to produce a job of universal diameter throughout its length without the employment of any type of positive feed for the wheel. In practical use of the machine illustrated in the drawings it has been found that there is a certain flexibility in the pendulum arm 10, which permits the operator to precisely align the side of the grinding wheel with the work to be ground. If it is desired to taper the work this can be accomplished by shifting the center in the tail stock.

It is to be understood that the present invention is not limited to the precise details of construction of the grinding wheel mounting or of the work rotating means as it is evident that various types of work rotating means may be employed and that various modifications of the construction of the grinding wheel mounting may be made without departing from the broad scope of the claims which follow.

I claim:

1. In a machine of the nature disclosed, the combination with means for rotating the work, of an overhead support, a depending arm universally connected to the support to permit a pendulum swing of the arm longitudinally and transversely of the work, a grinding wheel journaled in the lower end of the arm in an axial plane at right angles to the axial plane of the work adapting its side surface to engage the work, the universal connection permitting the arm to be swung transversely to bring the wheel into engagement with the work and to be swung longitudinally during a grinding operation and arranged to permanently maintain the side surface of the grinding wheel parallel with the work.

2. In a machine of the nature disclosed, the combination with means for rotating the work, of an overhead slideway longitudinally aligned parallel with the work, a pendulum arm mounted to slide longitudinally of the slideway and to swing universally thereon, a grinding wheel journaled in the lower end of the arm in a plane at right angles to the axial plane of the work, the universal connections permitting the arm to be swung transversely to bring the side of the wheel against the work and to be swung longitudinally during a grinding operation and arranged to permanently maintain the side surface of the grinding wheel parallel with the work, the arm being slidable on the slideway to vary the zone of longitudinal swing of the arm.

3. In a machine of the nature disclosed, the combination with means for rotating the work, a frame including an overhead rod parallel to the axial plane of the work, a carriage slidable on the rod and adapted to rock in a plane transverse thereto, a pendulum arm pivoted on the carriage to swing longitudinally of the rod, a grinding wheel journaled in the lower end of the arm in a plane at right angles to the axial plane of the rod with the side surface of the wheel parallel with the work.

4. In a machine of the nature disclosed, the combination with work rotating means, of a frame including an overhead rod parallel with the axial plane of the work, a pendulum arm universally connected inter-

mediate its ends to the rod, a grinding wheel journaled in the lower end of the arm in a plane at right angles to the axial plane of the work with its side surfaces parallel with the work, a motor supported on the upper end of the arm, and transmission means connecting the motor and grinding wheel.

Signed at Los Angeles, California, this 31st day of May 1921.

ROBERT E. BOLE.

Witnesses:
L. SAXTON LYON,
L. BELLE WEAVER.