G. R. WHITEHEAD.

DIAMOND POLISHING MACHINE.

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*Fig. 1.*

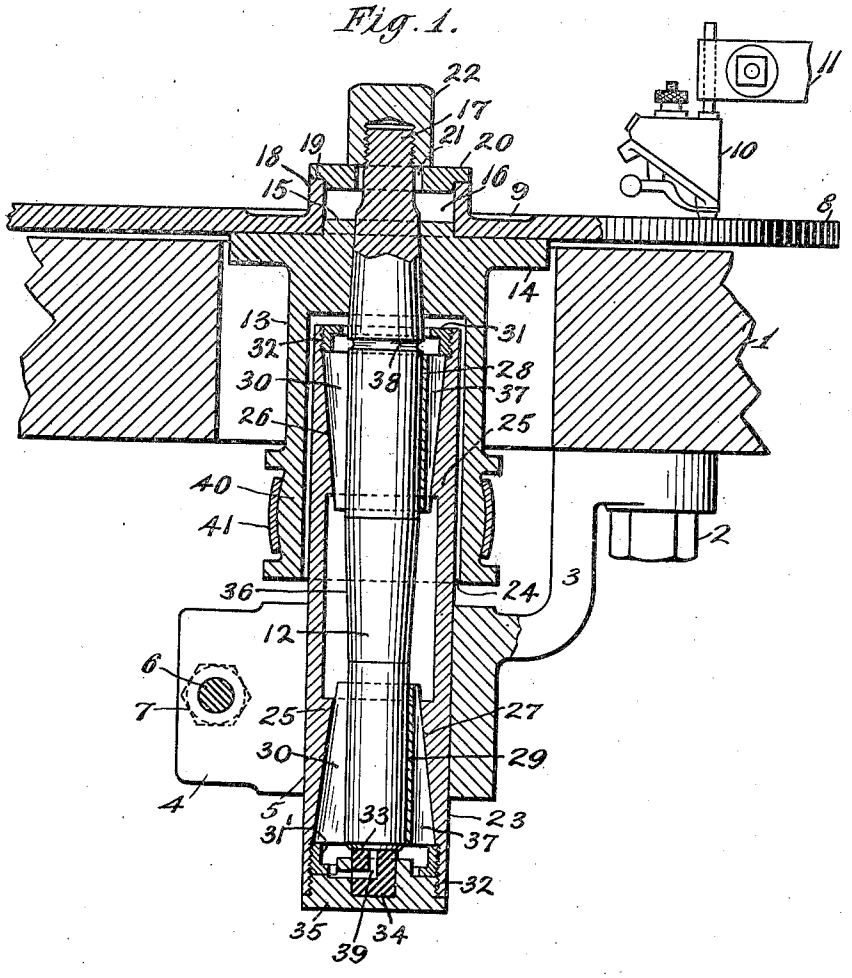
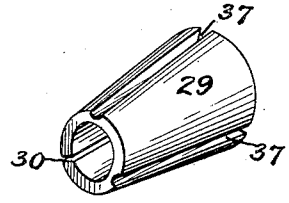



*Fig. 2.*




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# UNITED STATES PATENT OFFICE.

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## DIAMOND-POLISHING MACHINE.

1,374,267. Specification of Letters Patent. Patented Apr. 12, 1921.

Application filed April 28, 1920. Serial No. 377,171.

*To all whom it may concern:*

Be it known that I, GEORGE R. WHITEHEAD, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Diamond-Polishing Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in machines for cutting or polishing diamonds and similar stones.

In machines of this class a horizontal or flat wheel or lap is employed on which is placed a polishing agent such as a mixture of diamond dust and oil. The stone to be cut is held in a device technically known as a dop which is adjusted to run in contact with the surface of the wheel to effect the polishing of the stone. These wheels are necessarily run at very high speeds, and to properly effect the cutting or polishing of the facet of the stone these wheels must run perfectly true without any tipping or wabbling which would result in uneven cutting or polishing of the stone which it is essential to avoid.

In machines of this class as heretofore constructed, difficulty has been experienced in mounting the wheel so that it can run at the high speeds required without tipping or wabbling and being thrown out of true by additional weight being put thereon, as for instance, the pressure of an operator's hand. Difficulty has also been experienced in oiling the bearings for the wheel spindle so that they shall be oiled thoroughly and at the same time not deposit oil on the wheel which would change the consistency of the polishing mediums.

It is the especial object of the present invention to provide a diamond polishing machine in which the wheel is mounted so as to firmly and rigidly hold so that it will run perfectly true and not run out of its bearings, and in which a construction is employed for properly oiling the bearings of the wheel spindle and so that excess oil or other lubricant will not get on the wheel, and so that the spindle bearings are protected from dust and dirt.

A further object of the invention is to provide a construction in which the polishing wheel may be readily removed from its spindle so that if for any reason it is necessary to renew or repair a wheel the same can be quickly removed and another wheel placed in position without changing the bearing adjustment of the spindle, thus obviating a considerable loss in time, which is desirable in this class of machines.

With these and other objects not specifically referred to in view, the invention consists in certain novel parts and arrangements which will be fully described in connection with the accompanying drawings and claimed in the claims hereunto annexed.

In the drawings—

Figure 1 is a vertical section partly broken away of so much of a diamond polishing machine as is necessary for an understanding of the invention; and

Fig. 2 is a perspective view of one of the spindle bearings showing the preferred type of bearing used.

Referring now to these drawings, 1 indicates a frame which may be a part of the bench or work table. Secured to this frame by a bolt 2 is a bracket arm 3 having a split end 4 provided with a holding recess 5, the ends being arranged to be clamped together by a bolt 6 and nut 7. This bracket forms a support on which the mechanism hereinafter referred to is mounted.

The wheel is indicated at 8. This wheel may be of the usual construction which is in the form of a heavy flat metal plate on which the polishing agent is placed. This wheel has or may have a central depression 9 for collecting such of the polishing agent as may be directed thereinto by the spin of the wheel. Coöperating with this wheel or lap is the dop or stone holder, indicated at 10, this dop being supported from an arm 11.

This wheel is mounted so that it will run perfectly true and have no tipping or wabbling motion, and further in strong rigid bearings so as to have the least vibration, and these bearings will be so arranged that if the operator accidentally puts a little extra pressure on the wheel it will not be pulled out of its bearings and forced out of true.

While the specific construction for effect-

ing this may be varied, there will be provided a driving spindle 12. This driving spindle will be provided with spaced bearings both located below the wheel so that oil or other lubricant will not get on the wheel from the bearings. This spindle furthermore, will be driven through driving connections which are independent of the spindle and so that what side pull there is on the spindle will come close to the upper end, so as to prevent as far as possible any wabbling or tipping. As illustrated, there is provided a sleeve 13 which forms the support for the wheel and to which the wheel is clamped or otherwise rigidly secured. To provide a wide bearing surface for the wheel and thus a firm support, the sleeve 13 is formed with a wide top in the form of a flange 14 on which the wheel seats, and this sleeve above the flange will be provided with a collar 15 which fits snugly in a central opening 16 formed in the wheel, this preventing displacement of the wheel from its seat on the sleeve.

The wheel is clamped or otherwise secured to this sleeve in any suitable manner, so that it may be put in position and removed without disturbing the spindle or bearings, thus obviating a readjustment of the bearings when a wheel is changed.

In the particular construction illustrated, the sleeve has a central tapered aperture, and the upper end of the spindle 12 is correspondingly tapered and driven into the sleeve, the spindle being thus rigidly secured thereto. The spindle is extended beyond the sleeve and has a reduced threaded end 17. The wheel is formed with a central boss 18 the ends of which take against shoulders 19 of a locking plate 20 which is provided with a central opening 21 so that the end of the spindle may pass therethrough. An internally threaded locking cap 22 is screwed on to the threaded end of the spindle and when screwed down, through the locking plate 20, rigidly locks the wheel against any displacement in its seat on the sleeve.

The spindle is, as before stated, supported in upper and lower bearings, and these bearings in the best constructions, will be adjustable so that any wear may be taken up. Furthermore, means will be provided for thoroughly lubricating both these bearings. While the particular bearing construction employed may be varied, as shown, there is provided a casing 23 closed at the bottom, which is tubular in shape and capacitated to form a support for the bearings and spindle and provides sufficient space for a required amount of oil or other lubricant. This casing is located below the top of the sleeve and extends loosely into a recess 24 in the sleeve and to a point near the top, this construction tending to keep dust and dirt out of the casing and away from the bearings. This casing near its top and bottom is formed with thickened portions 25, the inner walls of which are oppositely inclined, as indicated at 26 and 27. Coöperating with these inclined ends of the casing are bearings 28, 29, the outer walls of which are inclined or beveled corresponding to the incline of the parts 26 and 27, and these bearings are, as shown at 30, split so that the bearings can be wedged tight in position and adjusted to take up wear. These bearings may be adjusted in any suitable manner, as by the provision of upper and lower threaded rings 31, 31′, which are screwed into threaded portions 32 formed in the upper and lower ends of the casing and which abut against the ends of the bearings before referred to.

In the best constructions, an end thrust or step bearing will be provided on which the end of the spindle rests and on which it rotates. While the particular form of this bearing may be varied, as shown the spindle has a flat end 33 which rests on a block 34 of lignum vitæ or other hard wood, this block being seated in a closing cap 35 vertically adjustable in the end of the casing.

In constructions embodying the invention, means are provided for thoroughly oiling the upper and lower bearings, and in this construction, these means will preferably be such as to form a circulation of oil or other lubricant through the casing from the lower to the upper bearing and back. While this may be effected in various ways, in the particular construction shown, the spindle above the lower bearing is shown as provided with an upward taper indicated at 26, this taper causing the lubricant to rise up along the spindle and thus oil the upper bearing, the lower bearing being oiled by gravity from the fluid in the casing. The circulation of the oil through the casing is effected by the provision of grooves 37 formed in the bearings 28, 29, before referred to, and a groove 38 formed around the spindle above the bearing 28. As the spindle rotates the oil is drawn up between it and the blocks to the top of the bearing 28 where it is stopped by the groove and returned down through the casing through the grooves 37 in the bearing. Means are also provided for lubricating the end thrust bearing, which in the particular construction illustrated, comprises a channel 39 bored through the block, this channel communicating with the bottom of the casing.

In order that the spindle shall be driven with the least tendency to throw it out of line, in the best constructions, the spindle is driven indirectly, that is, there is no direct pull on the spindle. While this may be effected in various ways, as shown, the sleeve just below the bottom of the frame 1 is provided with a pulley 40 with which coöperates a belt 41 driven from any suitable source of

power, not shown, this having been found in practice to be a very effective way of driving the wheel.

With the construction and arrangement of parts shown, it will be seen that a very effective mounting for the wheel has been provided, and one which permits of the quick change of wheels, and in which the wheel is so supported as to be free from tip or wabble, and at the same time permitting thorough oiling of the wheel spindle bearings. While the construction shown and described is a preferred one, it will be understood that certain changes and variations may be made therein without departing from the invention as defined in the claims annexed hereto.

What I claim is—

1. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve located below the wheel, means for securing the wheel to the sleeve, a spindle fast to the sleeve, means for driving the sleeve, a lubricant holding casing below the wheel, upper and lower bearings in the casing in which the spindle rotates, and means for lubricating both bearings.

2. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve located below the wheel, means for securing the wheel to the sleeve, a spindle fast to the sleeve, means for driving the sleeve, a lubricant holding casing below the wheel, upper and lower spaced bearings in the casing in which the spindle rotates, and means for circulating lubricant through the beaings and casing.

3. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve having a wide supporting surface on which the wheel is supported, means for clamping the wheel to the surface, means for driving the sleeve, a lubricant holding casing below the wheel, a spindle fast to the sleeve, and bearings in the sleeve in which the spindle rotates, one of said members being provided with passages through which the lubricant may pass to the casing after lubricating both bearings.

4. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve having a flanged top on which the wheel is supported, a spindle fast to the sleeve and having a threaded portion above the flange, a screw cap coöperating with the spindle for clamping the wheel to the flange, a pulley on the sleeve below the wheel, a lubricant holding casing below the top of the sleeve, and upper and lower adjustable bearings provided with passages through which lubricant may pass to the casing after lubricating the bearings.

5. In a polishing machine, the combination of a horizontal polishing wheel, a spindle to which the wheel is secured, a lubricant holding casing below the wheel, upper and lower bearings spaced apart in the casing in which the spindle rotates, means for adjusting each bearing independently of the other in the casing, a sleeve surrounding the casing to which the spindle is secured, and means located between the bearings for driving the sleeve.

6. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve located below the wheel having a wide top flange on which the wheel is supported, means for clamping the wheel to the sleeve, a spindle having an upward taper fast to the sleeve, a pulley on the sleeve through which it is driven, a lubricant holding casing below the top of the sleeve, upper and lower tapered split bearings for the spindle in the casing having oil passages through which oil may be circulated for oiling the spindle, an end thrust bearing on which the spindle rotates, and a passage from the casing through the bearing for oiling it.

7. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve located below the wheel and having a wide top flange on which the wheel is supported, means for clamping the wheel to the flange, a spindle fast to the sleeve, means for driving the sleeve, a lubricant holding casing located below the top of the sleeve, upper and lower adjustable bearings in the casing in which the spindle rotates, and means for effecting a circulation of lubricant through the casing and both bearings for effecting the lubrication thereof.

8. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve located below the wheel and having a wide supporting surface on which the wheel rests, means for clamping the wheel to the sleeve, a spindle fast to the sleeve, means for driving the sleeve, a lubricant holding casing below the wheel, spaced bearings in the casing in which the spindle rotates, means for oiling both bearings, a frame, and a bracket depending from the frame in which the casing is adjustably mounted.

9. In a diamond polishing machine, the combination of a horizontal polishing wheel, a sleeve having a wide top on which the wheel is supported, a spindle fast to the sleeve, means for clamping the wheel to the sleeve, means for driving the sleeve, a lubricant holding casing below the top of the sleeve, and upper and lower adjustable bearings provided with passages through which lubricant may pass to the casing after lubricating the bearings.

10. In a diamond polishing machine, the combination of a sleeve having a wide top forming a support for a wheel, a flat polishing wheel secured to the sleeve, a lubricant holding casing having a closed bottom

and extending loosely into the sleeve close to the top, upper and lower spaced bearings in the casing, a spindle supported in the bearings and fast to the sleeve, and means for driving the sleeve.

11. In a diamond polishing machine, the combination of a sleeve having a wide top forming a support for a polishing wheel, a polishing wheel secured to the sleeve, a lubricant holding casing having a closed bottom and extending loosely into the sleeve close to the top, upper and lower bearings in the casing provided with passages through which lubricant may pass to the casing after lubricating the bearings, a spindle supported in the bearings and fast to the sleeve, and means for driving the sleeve.

12. In a diamond polishing machine, the combination of a sleeve having a closed wide top forming a support for a polishing wheel, a polishing wheel secured to the sleeve, a lubricant holding casing having a closed bottom and extending loosely into the sleeve close to the top, upper and lower adjustable bearings in the casing provided with passages through which lubricant may pass to the casing after lubricating the bearings, a spindle supported in the bearings and fast to the sleeve at its upper end, and a pulley on the sleeve for driving it.

13. In a polishing machine, the combination of a horizontal polishing wheel, a spindle to which the wheel is secured, a lubricant holding casing below the wheel, upper and lower bearings in the casing in which the spindle rotates, the outer surface of the bearings being tapered and the inner surface straight, said bearings being spaced apart to provide an oil reservoir therebetween and each bearing being adjustable independently of the other, a sleeve surrounding the casing to which the spindle is secured, and means located between the bearings for driving the sleeve.

14. In a polishing machine, the combination of a horizontal polishing wheel, a spindle to which the wheel is secured, a lubricant holding casing below the wheel, a frame, a split bracket extending below the frame in which the casing is adjustably mounted, spaced bearings in the casing in which the spindle rotates, means for adjusting each bearing independently of the other in the casing, a sleeve surrounding the casing to which the spindle is secured, and means located between the bearings for driving the sleeve.

15. In a polishing machine, the combination with a horizontal frame, a flat polishing wheel mounted closely adjacent the top of the frame, a spindle on which the wheel is secured, a lubricant holding casing below the frame, upper and lower bearings in the casing in which the spindle rotates, a sleeve by which the spindle is rotated, and a pulley on the sleeve for rotating it and located beneath the frame and between the bearings.

16. In a polishing machine, the combination of a horizontal polishing wheel, a spindle to which the wheel is secured, a lubricant holding casing below the wheel, spaced bearings in the casing in which the spindle rotates independently adjustable, a sleeve exterior of the casing, and means for driving the sleeve.

In testimony whereof I have hereunto set my hand.

GEORGE R. WHITEHEAD.