

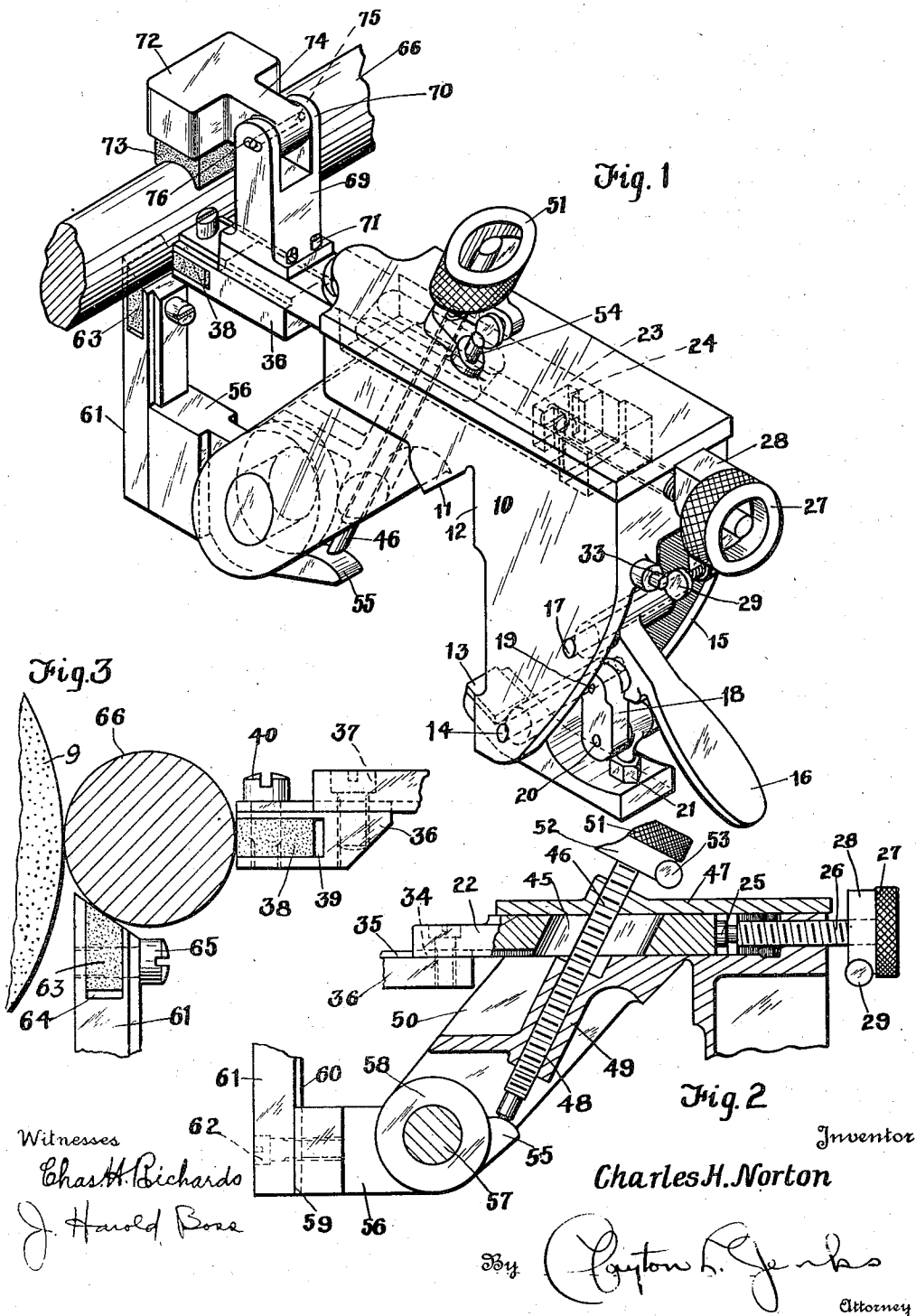
Nov. 19, 1929.

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1,736,167

GRINDING MACHINE

Filed June 26, 1926



UNITED STATES PATENT OFFICE

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GRINDING MACHINE

Application filed June 26, 1926. Serial No. 118,625.

This invention relates to the provision of means in combination with a grinding machine for automatically polishing or abrading the work, and more particularly to the provision of such means in a steadyrest whereby a piece of work may be steadied against the grinding wheel thrust and simultaneously polished, or honed while it is being ground by the grinding wheel.

Heretofore, in precision grinding when it is desired to put a high polish upon the work it has been necessary to grind the work to size in a precision grinding machine and then transfer the work to another machine for the purpose of polishing its surface as desired. Furthermore, in grinding certain types of work, such as a pin of a crankshaft, it is necessary to hold the work rigidly so as to prevent springing and vibration of the work during grinding. For this purpose it has been common practice to employ a work steadying member or steadyrest appropriately positioned against the work so as to resist the thrust of the grinding wheel upon the work.

It is an object of the present invention to provide means whereby the work may be ground accurately to size and be given a high polish in a single operation.

It is a further object of the invention to provide means for polishing or, honing or abrading the work during the grinding operation whereby the work may be given a high polish as the work is being ground without increasing the time required for the grinding operation and without appreciable additional effort upon the part of the operator beyond his usual duties in grinding.

In accordance with the present invention a non-rotatable abrading member is provided which is so constructed that it may be brought into contact with the surface of the work at some time during the normal grinding operation to exert the desired abrading, polishing or honing action upon the work. As specifically illustrating the invention, a specially constructed abrading block may be arranged upon some nearby portion of the mechanism to engage the work and operable to exert an appropriate abrading action upon the work. As illustrated in the drawing, a mechanism

is provided for straight in-feed or plunge cut grinding in which the grinding wheel is of substantially the same width as the surface being ground. With this arrangement, the abrasive polishing blocks are preferably formed as bearing shoes on the steadyrest and are of a width equal to the portion of the work being ground or may be pivotally mounted as a separate member on the steadyrest and arranged to engage the surface of the work in such a manner that the action of gravity thereupon will press the block into operative engagement with the work.

If it is desirable to apply this invention to a machine arranged for traverse grinding, that is, where either the work or grinding wheel is reciprocated longitudinally relative to each other, the abrasive member might be mounted in a fixed relation with the grinding wheel. Thus, any relative movement between the grinding wheel and work will produce a similar relative movement between the work and abrasive block.

The invention will be more clearly understood from the following description in conjunction with the accompanying drawing: in which,

Fig. 1 is an isometric view of a work steadyrest embodying the invention and arranged in engagement with the work;

Fig. 2 is an elevational view partly in section of a portion of the steadyrest of Fig. 1; and

Fig. 3 is an elevational view of a portion of the work rest.

In the drawing, the invention is illustrated as embodied in a steadyrest, but it will be understood that the invention is not so limited and that other embodiments will be apparent to those skilled in the art. This steadyrest comprises a stand 10 provided with suitable slideways 11 and 12 adapted to engage similarly shaped slideways upon a grinding machine of the usual construction, such as is shown in my prior Patents 762,550 and 762,838, which embody a grinding wheel and means for rotatively supporting work in contact therewith. A clamp 13 is pivotally mounted on a shaft 14 mounted in and extending between downwardly depending side walls 15 of the

stand 10. A clamping lever 16 pivotally mounted upon a shaft 17 mounted in and extending between the sidewalls 15 is operatively connected to the clamp 13 by a toggle connection, comprising a bifurcated link 18 pivotally mounted at its upper end upon a shaft 19 in the lever 16 and at its lower end upon a shaft 20 passing through an eye bolt 21 secured in one end of the clamp 13.

10 A slide 22 is movably mounted within a groove 23 in the stand 10 and is provided at one end with a T-shaped slot 24 adapted to engage the flanged end 25 of a screw 26 threaded in the stand 10 and provided at its
15 outer end with a knurled knob 27. A split nut 28 may be clamped at any point upon the screw 26 by a stop screw 29. A stop 33 is mounted in the stand 10 within the path circumscribed by the screw 29 so as to limit the
20 movement of the screw 26. The other end of the slide 22 is provided with a groove 34 adapted to receive a tongue 35 upon a shoe holding member 36 which is securely held upon the slide 22 by means of a screw 37. A
25 work engaging shoe 38 is held within a groove 39 in the holder 36 by a screw 40.

The slide 22 is provided with a hole 45 so that it may be moved without interfering with a screw 46 passing through a cover 47 upon
30 the stand 10 and engaging a threaded hole 48 in a rib 49 joining the downwardly and rearwardly extending side walls 50 of the stand 10. The screw 46 is provided at its upper end with a knurled knob 51 and passes through
35 a split nut 52 which may be clamped thereon at any point by a stop screw 53 adapted to engage a stop 54 mounted in the cover 47. The other end of the screw 46 is adapted to engage a projection 55 on one end of an arm
40 56 pivotally mounted on a shaft 57 extending between bosses 58 upon the lower surface of the sidewalls 50. A groove 59 is provided in the other end of the arm 56 and is adapted to receive a tongue 60 upon a shoe holding member 61 which is held rigidly upon the
45 arm by a screw 62 passing through the holding member. A work engaging shoe 63 is held securely within a groove 64 in the holding member 61 by means of a screw 65. The
50 work engaging shoes 38 and 63 are arranged to engage the work 66 and hold it against the thrust of the grinding wheel.

The work engaging shoes 38 and 63 are preferably constructed of an abrasive material as
55 shown in Fig. 3. During use, the shoes may be brought in contact with the surface of the work with sufficient force to produce a lapping or polishing effect upon the work by actuation of the screws 46 and 29. In this
60 manner the work pieces are not only ground to finished size but are highly polished or burnished in a single operation in a most efficient and economical manner whereby the labor and trouble of dismounting the work
65 and remounting it upon a spindle in another

machine is entirely eliminated and avoided. These shoes serve to smooth the work during grinding and so aid the grinding wheel. Their action is particularly effective when the wheel cut is dying out, at the end of the
70 operation.

If desired, a freely movable abrading or honing block may be mounted on the steadyrest in such a position as to rest upon the work while the latter rotates and so polish
75 the work irrespective of the action of the adjustable shoes 38 and 63. To this end, a support 69 having a pair of parallel upwardly extending ears 70 is mounted upon the slide 22 and is rigidly secured thereto by bolts 71. A relatively heavy weight 72, in which an
80 abrading block 73 adapted to engage the work is mounted, is provided with a forwardly extending arm 74 having a shaft 75 therein movably mounted in the elongated slots 76 in
85 the ears 70.

The steadyrest illustrated in the drawing is mounted upon a grinding machine, as is well understood by those skilled in the art, by placing the slideways 11 and 12 upon similar
90 slideways upon the grinding machine and then tightening the clamp 13 by pressing the lever 16 downward to actuate the toggle connection. The shoes 38 and 63 are then brought
95 into contact with the surface of the work 66 by turning the knurled knobs 27 and 51 upon the ends of the screws 26 and 46 respectively, these knobs being turned at desired intervals to maintain the shoes 38 and 63 in contact with
100 the surface of the work as grinding proceeds. The abrading block 73 is brought into contact with the top surface of the work by moving or turning the shaft 75, with which it is operatively connected, within the slots 76, the
105 slots 76 being elongated so that the block 73 may be moved appropriately for different diameters of work being ground. Thereafter the block 73 will be moved forward with the shoe 38 as the work is reduced in size.

The block 73 may be brought into contact
110 with the work either at the beginning of the grinding operation or during the grinding operation when the work has been brought to near its finished size. The weight 72 is such that the action of gravity thereupon forces the
115 abrading block 73 against the surface of the work with sufficient force to exert a polishing action upon the work. Preferably, the abrading block 73 is constructed of a very fine size of abrasive grains united by a vitrified
120 ceramic bond.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A steadyrest for a grinding machine comprising a stand, a movably mounted work
125 steadying member thereon having an abrading surface adapted to engage the work, and means operable to maintain the desired contact between said surface and the work.
130

2. A steadyrest comprising a stand, a work
steadying member mounted thereon, an abra-
sive shoe on said member, a relatively station-
ary abrading member mounted on the stand
5 and arranged to contact with the rotatable
work and means to move the steadying and
abrading members to proper position relative
to the work.

3. A steadyrest comprising a stand, a work
10 steadying member movably mounted thereon,
an abrasive shoe on said member, an abrading
member on the stand movable into contact
with the work and means to move the steady-
ing member as the work is reduced in size
15 which maintains the abrading member in
proper contact with the work.

4. A steadyrest for a grinding machine
comprising a stand, a movable mounted work
steadying member, an abrasive shoe on said
20 member, a relatively heavy abrading member
pivotally mounted to engage the work under
the influence of gravity, and means for mov-
ing said steadying member into contact with
the work.

25 5. A steadyrest for grinding machines com-
prising a stand, a work steadying member,
means for adjusting said member toward and
from the work and an abrasive work polish-
ing shoe detachably mounted on said stand.

30 6. A steadyrest for grinding machines com-
prising a stand, shoe supporting members
thereon, means for simultaneously adjusting
said members toward and from the work and
an abrasive work steadying shoe detachably
35 mounted on each of said members.

7. A steadyrest for grinding machines com-
prising a stand, a movable shoe support
thereon, a work steadying shoe on the sup-
port which has an abrading surface arranged
40 to steady and abrade the work, and means for
finely adjusting said shoe support to position
the shoe.

8. A steadyrest for grinding machines com-
prising a stand, a work steadying member,
45 means for adjusting said member toward and
from the work, and a freely movable abrasive
work polishing shoe mounted on said member
to contact with and abrade the work as the
latter rotates.

50 Signed at Plainville, Connecticut, this 24th
day of June, 1926.

CHARLES H. NORTON.