

Dec. 3, 1929.

J. H. LITTLER

1,738,011

MACHINE FOR GRINDING VALVES AND ANALOGOUS OBJECTS

Original Filed Jan. 29, 1925

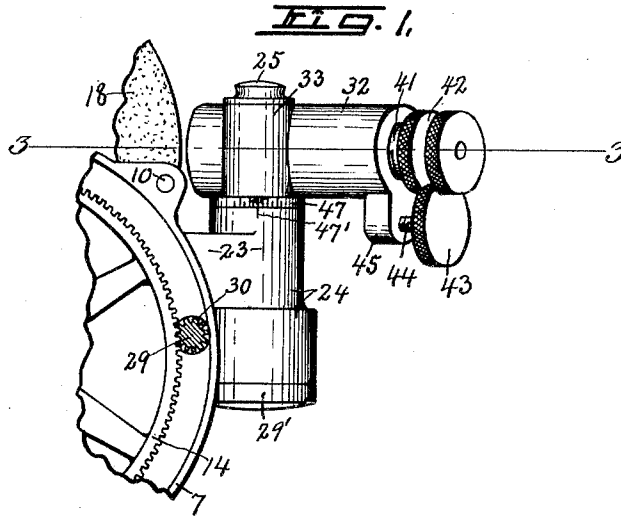


FIG. 2.

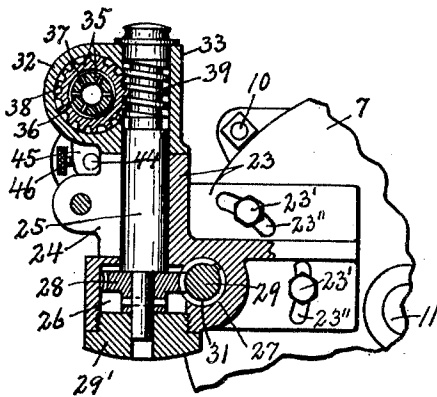
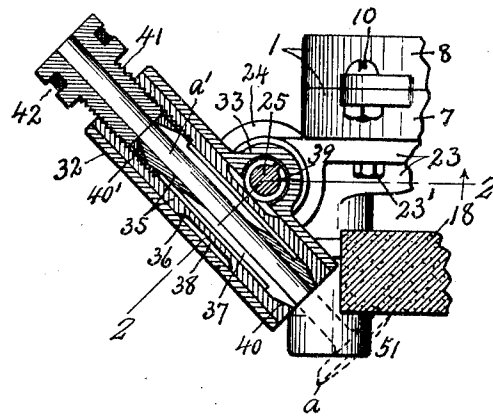


FIG. 3.



WITNESS
H. H. H. H.

INVENTOR
J. H. Littler
BY *Denison & Thompson*
ATTORNEYS

UNITED STATES PATENT OFFICE

JAMES HENRY LITTLER, OF MANLIUS, NEW YORK, ASSIGNOR TO S. CHENEY & SON, OF
MANLIUS, NEW YORK, A CORPORATION OF NEW YORK

MACHINE FOR GRINDING VALVES AND ANALOGOUS OBJECTS

Original application filed January 29, 1925, Serial No. 5,603. Divided and this application filed May 13, 1926. Serial No. 108,820.

This invention relates to a portable machine for grinding valves and analogous objects having stems or shanks and refers more particularly to the means for rotatably holding the work in grinding relation to a rotary grinder as a division of my Patent No. 1,664,693, April 3, 1928.

The main object is to provide means for firmly holding the work in the rotary holder in such manner as to reduce to a minimum the liability of vibration of the work when in contact with the rotary grinder.

In other words, I have sought to provide means for gripping a relatively long portion of the valve stem or analogous work to hold said stem against lateral springing or vibration when the valve is rotated against the grinder.

Another object is to enable the work-holder to be adjusted angularly about the axis of its driving means as may be required for grinding valves at different angles to their axes.

Other objects and uses relating to specific parts of the work-holder and supporting means will be brought out in the following description.

In the drawings:—

Figure 1 is a front face view of my improved work-holder and adjacent portions of its supporting case and rotary grinder together with a portion of the driving gear and pinion for transmitting motion from the gear to the work-holder, the pinion being shown in section.

Figure 2 is a sectional view taken in the plane of line 2—2, Figure 3.

Figure 3 is a sectional view taken in the plane of line 3—3, Figure 1, except that the parts are reversed.

As illustrated, this device comprises a main supporting frame consisting in this instance of a gear case —1— composed of sections —7— and —8— secured together end to end by clamping bolts —10— and provided with suitable bearings for receiving and supporting a driving shaft —11— to which is secured a relatively large driving gear —14— within the gear case.

A rotary grinder is mounted upon a suitable supporting shaft which is also journaled

in bearings in the gear case —1— and provided with a pinion meshing with the gear —14— as shown in my patent referred to for receiving rotary motion therefrom.

A bracket —23— is adjustably secured by bolts —23'— and slots —23''— to the outer end face of section —7— of the frame —1— and is provided with a split journal bearing —24— in which is journaled a rotary upright shaft —25— tangential to the shaft —29— and is also provided in its lower end with a gear chamber —26— and a laterally offset bearing —27— for receiving respectively a worm gear —28— and a rotary shaft —29—, said bracket and parts carried thereby being adjustable about the axis of the shaft —29— to permit the work, as —a— to be adjusted toward and from the axis of grinders of different diameters, or as the face of the grinder —18— is worn away.

The worm gear —28— is secured to the lower reduced end of the upright shaft —25—, said reduced end being extended downwardly and journaled in a suitable opening in a bushing —29'— which is screwed into the lower end of the gear chamber —26— to form an end thrust bearing for the lower end of the hub of the gear —28— and thereby to hold said gear and shaft —25— against downward movement relatively to the bracket —23—.

The shaft —29— extends horizontally parallel with the grinder shaft —11— and to opposite sides of the worm gear —28—, and also across the periphery of the relatively large gear —14— tangential to the shaft —25—, and is provided with a relatively small pinion —30— meshing with said gear to receive rotary motion therefrom and whereby the shaft —29— will be driven at a relatively high rate of speed as compared with that of the shaft —11—.

The intermediate portion of the shaft —29— is provided with a gear worm or pinion —31— meshing with the gear —28— for driving the upright shaft —25— at a considerably lower rate of speed than that of the shaft —29— for a purpose presently described.

A horizontal bearing member or head

—32— having an offset upright hub —33— is supported upon the upper end of the bearing —24— of the bracket —23— and also upon the upper end of the shaft —25— so as to extend partially across the face of the rotary grinder —18— and is adjustable angularly about the axis of the upright shaft —25— to different angles relatively to the axis of the grinder —18— as may be required to grind the valves to different angles.

This horizontal bearing —32— is adapted to receive and support a rotary work holder —35— which comprises a sleeve —36— and a collet chuck —37—, the latter being adapted to receive and support the work such, for example, as the stem —*a*'— of a poppet valve —*a*—.

The sleeve —36— is journaled in the bearing —32— tangential to the shaft 25 for relative rotation therein in said bearing and is provided intermediate its ends with a worm gear —38— formed by cutting the teeth in the periphery of the sleeve and adapted to mesh with a gear worm —39— on the upper end of the upright shaft —25—, Figure 2.

The chuck —37— preferably consists of a tube split longitudinally through portions of its length from both ends and having each end tapered for engaging similarly tapered end thrust bearings —40— and —40'— at corresponding ends of the chuck, the tapered bearing —40— being preferably formed on the adjacent end of the sleeve —36— while the other tapered bearing —40'— is movable axially within the sleeve and is adapted to be tightened and released for clamping and releasing the work by means of an adjusting screw —41— in the adjacent end of the sleeve.

The axially adjustable bearing —40'— and screw —41— are provided with registering openings co-axial with the axis of the tubular chuck —35— to permit the stem of the valve to extend thereinto when the head of the valve at the opposite end of the bearing —32— is in position for grinding.

When it is desired to clamp the stem of the valve in the chuck —35— the screw —41— will be turned to force the movable bearing —40'— toward the other bearing —40— thereby causing both ends of the split collet or chuck —35— to be compressed tightly upon the valve stem to more firmly hold the valve against springing or vibration during the grinding operation.

Reversing the direction of rotation of the screw —41— will release the conical bearing —40'— and thereby permit the jaws of the chuck —35— to open for releasing the valve stem and permitting the valve to be withdrawn after it has been properly ground.

The head of the screw —41— is provided with an annular groove —42— for receiving the peripheral portion of the head —43— of a stop screw —44— which is adjustable in

a threaded boss —45— on the under side of the bearing —32— and is frictionally held in its adjusted position by a friction screw —46— in one side of the lug —45—, Fig. 2.

The object of engaging the head —43— of the stop screw —44— in the grooved head of the screw —41— is to prevent accidental turning of said screw during the rotation of the work holder with the work therein particularly when the latter is engaged with the rotary grinder —18—.

The work holder is arranged in such manner as to support the part of the work to be ground, as, for example, the valve —*a*— in contact with the outer end face of the rotary grinder —18— in approximately the horizontal plane of the axis of said grinder so that when the grinder is rotated at a relatively high rate of speed the valve or other work held in the chuck —35— will be rotated at a relatively low rate of speed so as to produce a smooth finish on the work during one revolution of the work holder and at the same time reducing the liability of vibration of the work in the holder.

The angle of the seating faces of different valves varies and it, therefore, becomes necessary to adjust the bearing —32— and work holder therein to different angles relatively to the axis of the grinder or rather relatively to the outer end face of the grinder, the angles of the valves being known and in order that the operator may set the work holder at the desired angle the periphery of the base of the upright hub —33— of the bearing —32— is graduated circumferentially at —47— to register with a fixed mark —47'— on the adjacent upper end of the hub —24—, Figure 3.

Operation

The driving shaft —11— is adapted to be rotated by hand clockwise at any suitable speed for rotating the grinder in a reverse direction at a considerably higher rate of speed through the medium of the relatively large gear —14—.

This rotation of the gear —14— will impart a rotary motion to the shaft —29—, Figure 2, through the medium of the pinion —30— meshing therewith, which rotary motion will be again transmitted to the upright shaft —25—, Figure 2, through the medium of the worm —31— and gear —28— and thence through the worm —39— and gear —38— to the work holder —35— in which the work, such, for example, as the valve —*a*—, is held and rotated against the outer end face of the grindstone.

The angle of contact of the work in the holder —35— relatively to the grinding face of the grinder —18— may be changed at will by simply adjusting the bearing —32— about the axis of the shaft —25—.

The hand screw —41— and stop screw

—44— are conveniently available for adjustment and permit the double cone split collet —37— to be easily and quickly adjusted axially for tightening and releasing the work therein and therefrom, the cones at the ends of the collet being spaced some distance apart which, together with the fact that the collet is split inwardly from both ends beyond each other, permits the collet to be sprung into and out of engagement with the stem of the valve or other work throughout the length of the collet for firmly holding the stem against lateral springing or vibration during the grinding operation and thereby assuring a smooth and uniform grinding of the face of the valve.

What I claim is:

1. A work holder for rotary abrasive grinders comprising a rotary driving shaft, a rotary driven shaft tangential to the driving shaft and geared directly thereto to receive motion therefrom, a rotary sleeve tangential to the driven shaft and geared directly thereto to be rotated thereby, a chuck mounted within the sleeve to rotate therewith for receiving and engaging the work, and means for tightening and releasing the chuck upon and from the work.

2. A work holder for rotary abrasive grinders comprising a shaft, means for rotating the shaft, a rotary sleeve extending tangentially across one side of the shaft and geared directly thereto to receive motion therefrom, a chuck mounted within the sleeve to rotate therewith, and means for tightening and releasing the chuck upon and from the work.

3. A work holder for rotary abrasive grinders comprising a shaft, means for rotating the shaft, a rotary sleeve extending tangentially across one side of the shaft and geared directly thereto to receive motion therefrom, a chuck mounted within the sleeve to rotate therewith, means for tightening and releasing the chuck upon and from the work, and means for supporting the sleeve for angular movement about the axis of the shaft.

4. A work holder for rotary abrasive grinders comprising a rotary driving shaft, a rotary driven shaft tangential to the driving shaft and geared directly thereto to receive motion therefrom, a rotary sleeve tangential to the driven shaft and geared directly thereto to be rotated thereby, a chuck mounted within the sleeve to rotate therewith for receiving and engaging the work, means for tightening and releasing the chuck upon and from the work, and means for supporting the driven shaft for angular adjustment about the axis of the driving shaft.

5. A work holder for rotary abrasive grinders comprising a rotary driving shaft, a rotary driven shaft tangential to the driving shaft and geared directly thereto to receive motion therefrom, a rotary sleeve tangential

to the driven shaft and geared directly thereto to be rotated thereby, a chuck mounted within the sleeve to rotate therewith for receiving and engaging the work, means for tightening and releasing the chuck upon and from the work, means for supporting the driven shaft for angular adjustment about the axis of the driving shaft, and means for supporting the sleeve for angular adjustment about the axis of the driven shaft.

6. In a grinding machine having a gear case and a rotary shaft journaled therein and provided with a pinion, in combination with a bracket mounted on the gear case and adjustable angularly about the axis of said shaft, means for clamping the bracket in its adjusted position, an additional shaft journaled in the bracket and provided with a gear meshing with said pinion, a head mounted on the bracket and adjustable angularly about the axis of the additional shaft, a sleeve rotatably mounted in said head at one side of the additional shaft and geared directly thereto to receive motion therefrom, a chuck mounted within the sleeve to rotate therewith and means on the sleeve for tightening the chuck upon the work.

In witness whereof I have hereunto set my hand this 5th day of May, 1926.

JAMES HENRY LITTLER.