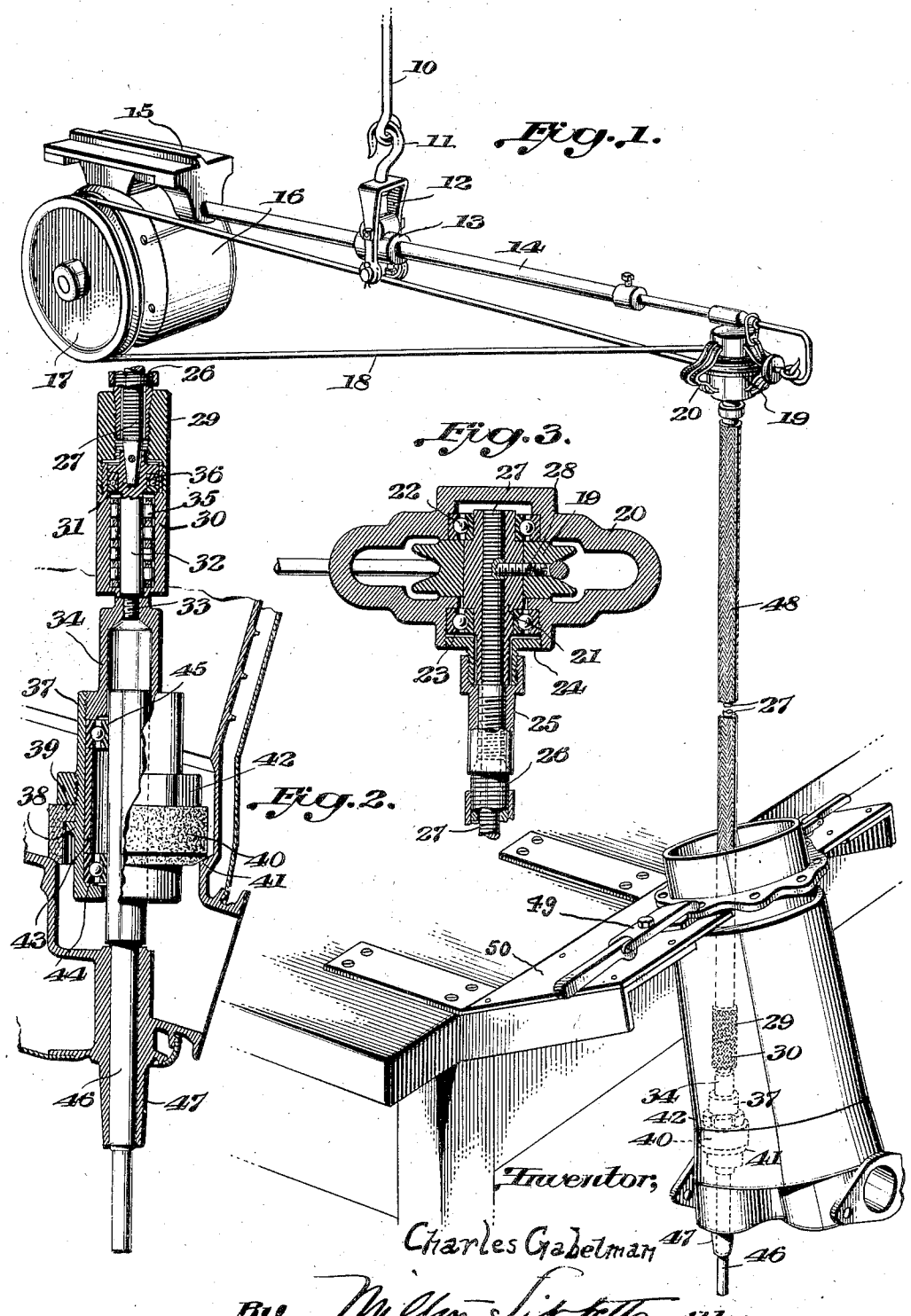
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GRINDING MACHINE.

APPLICATION FILED JAN. 8, 1919.

1,345,919. Patented July 6, 1920.



UNITED STATES PATENT OFFICE.

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GRINDING-MACHINE.

1,345,919. Specification of Letters Patent. Patented July 6, 1920.

Application filed January 8, 1919. Serial No. 270,241.

To all whom it may concern:

Be it known that I, CHARLES GABELMAN, a citizen of the United States, and resident of Detroit, Wayne county, State of Michigan, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

This invention relates to valve grinding machines.

One object of the invention is to provide effective means of a simple character for centering the grinding wheel or other member adapted to perform suitable operations upon the valve seat of an internal combustion motor, and in accomplishing this function to utilize the guide socket of the valve stem.

A further object of the invention is to provide means to enable the tool mounting head to adjust itself to the centering member in obtaining the centering action.

Another object of the invention is to provide effective anti-friction and thrust taking bearings for the driving mechanism and the driving wheel.

Another object of the invention is to provide means for connecting the power element, the grinding element or other tool and the driving mechanism in an assembly capable of being suspended from the ceiling and moved by hand to any desired position, whereby the wheel may be readily inserted within a hollow member, such as the cylinder, for effecting the grinding operation and be guided in such operation by the hand of the operator and readily removed from the cylinder or other hollow body, and in which, in such manipulation of the mechanism, the power element serves as a balancing weight for the grinding wheel and its connected parts.

With these objects and others in view, the invention is embodied in preferable form in the construction and arrangement hereinafter described and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a perspective view showing the complete mechanism applied in grinding position to the valve seat of a cylinder of an internal combustion engine.

Fig. 2 is an enlarged vertical section of the grinding wheel, its holder and the pilot spindle therefor in connection with part of a cylinder; and

Fig. 3 is a vertical detail section through the pulley to which the flexible shaft for the grinding wheel is connected, and the brackets supporting said pulley.

Referring to the drawings, 10 is a supporting rod preferably hung from the ceiling, to which is loosely connected a hook 11 carrying a bracket 12 in which is pivotally hung a socket sleeve 13 carrying a rod 14. At one end this rod is provided with a housing frame 15 in which is mounted an electric motor 16 constituting the power element for the mechanism. A pulley 17 is mounted on the shaft of this power element and is connected by means of a crossed belt 18 with a pulley 19 having a vertical axis and mounted in a bracket 20 which is fixed to the rod 14 at the end thereof opposite to that at which the power element 16 is mounted. Fixed to the pulley is a hollow hub sleeve 21 extending beyond the pulley on each side thereof and which is mounted in bearings 22 and 23 on opposite sides of said hub, and the outer members of which bearings are located in recesses in the bracket 20. A flanged coupling sleeve 24 is fixed to the pulley bracket and depends therefrom and is provided with an exteriorly threaded stem with which engages a sleeve 25 provided on its interior with screw threads adapted to receive the threaded end of a flexible tubular casing 26.

A flexible shaft 27 extends through the part 26 and is fixed to the hollow shaft 21 by means of a set screw 28. The shaft 27 constitutes the driving shaft for the wheel. The lower end of the tube 26 enters a sleeve 29 and is threaded thereto and this sleeve in turn is threaded to a hollow barrel 30. The lower end of the shaft 27 enters the head 31 of a shaft section 32, the lower end of which terminates in a threaded stem 33 adapted to engage the upper end of a hollow coupling member 34. Between the shaft section 32 and the member 30 are mounted roller bearings 35 and thrust ball bearings 36 are mounted between said sleeve 30 and the head 31. The shaft 27 is brazed or otherwise fixed to the head 31 whereby section 32 is made a rigid continuation of the flexible shaft whereby rotation is imparted to

the coupling member 34 as the shaft is turned. The coupling 34 is threaded into a hollow wheel mounting hub member 37 which has a flange 38 on which is adapted to be supported a shoulder 39 of an emery wheel 40 which serves as the grinding element of the mechanism. This wheel in the form here shown is provided with a lower beveled edge 41. On the hollow hub member 37 is threaded a locking ring 42 which is adapted to bear against the upper face of the emery wheel to hold the latter firmly clamped to its seat.

In the member 37 is mounted an annular spacer member 43 and between one end of the same and the lower closed head of the hub member is mounted one part of a ball bearing 44, the other race member of which projects inwardly beyond the inner surface of the spacer. A similar set of bearings is provided at the upper end of the hub between the spacer and the coupling member 34, such bearings being indicated by the numeral 45.

46 is a pilot member consisting of a solid spindle having three stepped and shouldered sections, one of which is adapted to fit within the guide or socket 47 for the valve stem of the cylinder of an internal combustion motor. The upper section of this spindle is preferably larger and is adapted to fit closely within the bore of the hollow hub member 37 and the hollow coupling member 34, such fitting taking place against the ball bearings 44 and 45.

In the operation of the device when it is desired to grind the valve seat the valve is first removed and then the pilot spindle 46 is placed within the valve stem guide 47 and the hollow grinding wheel holder slipped over the upper end of this spindle whereby the wheel will be exactly centered with respect to the valve seat. Power then being applied to the driving belt from the power element 16, the pulley 19 will be driven so as to turn the shaft 27 and through the various connections above described rotate the grinding wheel holder so as to carry the lower beveled surface of the grinding wheel against the surface of the valve seat. The wheel is held in contact with the seat and lowered and raised on the pilot and manipulated to grind all parts of the seat by the hand of the operator as applied to the flexible shaft 27. The shaft 27 and the tube 28 are adapted to be inclosed in a covering 48.

The pilot spindle enters the inner races of the vertically spaced ball bearings 44 and 45, and the grinding wheel and its mounting are thereby centered accurately and without binding action, with respect to the pilot so as to rotate accurately about the same.

The roller bearings 35 take up angular bearing strains between the parts 32 and 30, while the bearings 36 take up end thrust.

A clamp 49 serves as means for holding the cylinder upon a supporting ledge 50. The cylinder is shown in vertically reversed position.

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

1. In valve seat grinding means, an operating member, a support for the operating member and a pilot member for centering said operating member with respect to the valve seat having means slidably fitting said operating member and the valve stem guide.

2. A valve seat grinding machine having a grinding wheel and means for centering the wheel with respect to the valve seat, said wheel being movable longitudinally and rotatably with respect to said centering means.

3. A valve seat grinding machine having a grinding wheel and means centered by the valve stem guide for centering the wheel with respect to the valve seat, said wheel being movable longitudinally and rotatably with respect to said centering means.

4. A valve seat grinding machine having a grinding wheel, means operative from one side of the wheel for driving the same, and means adapted to center the wheel relative to the valve seat from the other side of the wheel, said wheel being freely rotatable with respect to said centering means.

5. A valve seat grinding machine having a grinding wheel, a member for centering said wheel with respect to the seat and permitting free movement of the wheel longitudinally of said member.

6. A valve seat grinding machine having a grinding wheel, supporting means for the wheel, and a guiding and centering member for said support adapted for removable engagement with a valve stem guide, said wheel support being longitudinally and rotatably movable on said centering member.

7. A valve seat grinding machine having a hollow grinding wheel, means for rotating the wheel, a centering spindle having a section adapted to fully enter within the wheel body and a section adapted to enter a socket centered relatively to the valve seat.

8. A valve seat grinding machine having a grinding wheel, a hollow member on which the same is mounted, a pilot spindle having shouldered sections one of which is adapted to extend beyond the seat on one side to fit a valve stem guide and the other of which sections is adapted to project beyond the valve seat on the other side thereof and receive said hollow member.

9. A valve seat grinding machine, a centering pilot member, a grinding wheel, a rotatable hollow member on which said wheel is fixed and anti-friction bearings in said

hollow member spaced apart longitudinally of the latter and adapted to bear against the pilot member when the hollow member is slipped over the same.

10. A valve seat grinding machine having a grinding wheel, a rotatable member, a hollow cylindrical member on which said wheel is fixed, longitudinally spaced anti-friction bearings in said member, means to retain said bearings and a pilot spindle adapted to enter said member, the ends of said shaft and casing and said rotatable member comprising exterior sleeves adjustably joined, a shaft section permanently joined at one end to the flexible shaft and having means at the other end to detachably connect it to said rotatable member, roller bearings between said shaft section and one of said sleeves and thrust bearings for said shaft section.

11. A valve seat grinding machine having a grinding wheel, a rotatable member on which the wheel is fixed, a flexible shaft for driving said member, a supporting and coupling member for said shaft having roller bearings between the same and the shaft and end thrust bearings between said parts.

12. A valve seat grinding machine having a grinding wheel, a rotatable hollow member carrying the same, a flexible shaft for driving said member, a tubular casing surrounding said shaft and coupling means connecting said shaft and said hollow member.

13. A valve seat grinding machine having a grinding wheel, a rotatable wheel carrier, a flexible shaft for driving said carrier, a freely swinging suspended member, a shaft driving pulley at one end of said member, and a power element at the other end of said member adapted to balance the driven parts, and means of connection between said element and pulley.

14. A valve seat grinding machine having a flexible driving saft, a rotatable shaft driving member, a bracket for supporting the same, an elongated hub sleeve on which said member is mounted, and anti-friction bearings in the extended parts of the sleeve on each side of said member.

In testimony whereof I affix my signature.

CHARLES GABELMAN.

Witnesses:
CALEB E. NORRIS,
RUBY M. LA BERGE.