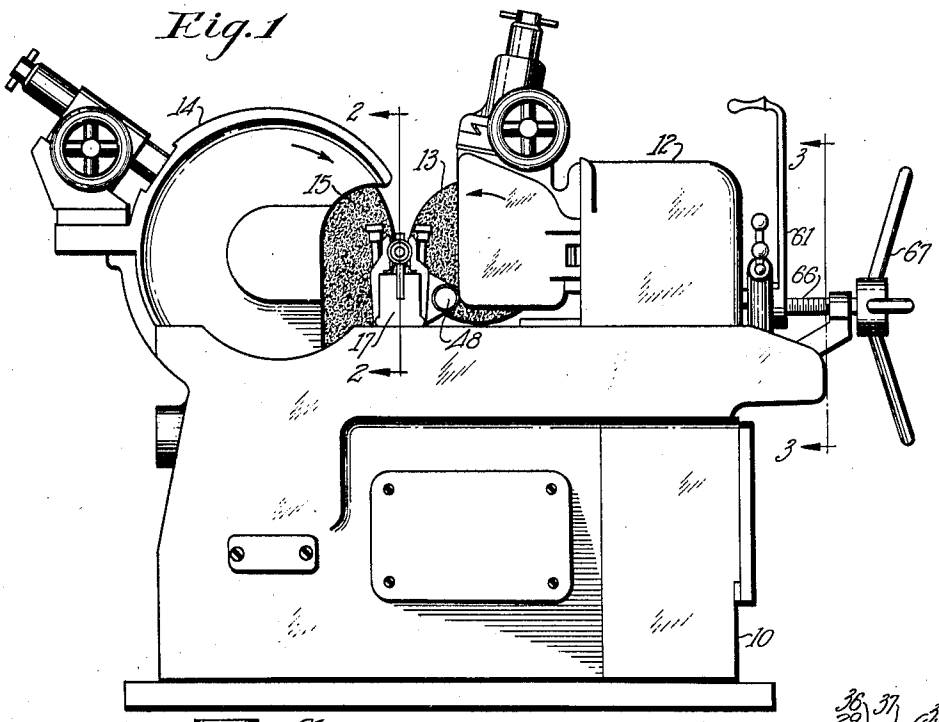
Oct. 6, 1931. C. W. HOPKINS 1,825,797

GRINDING MACHINE

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Fig. 1



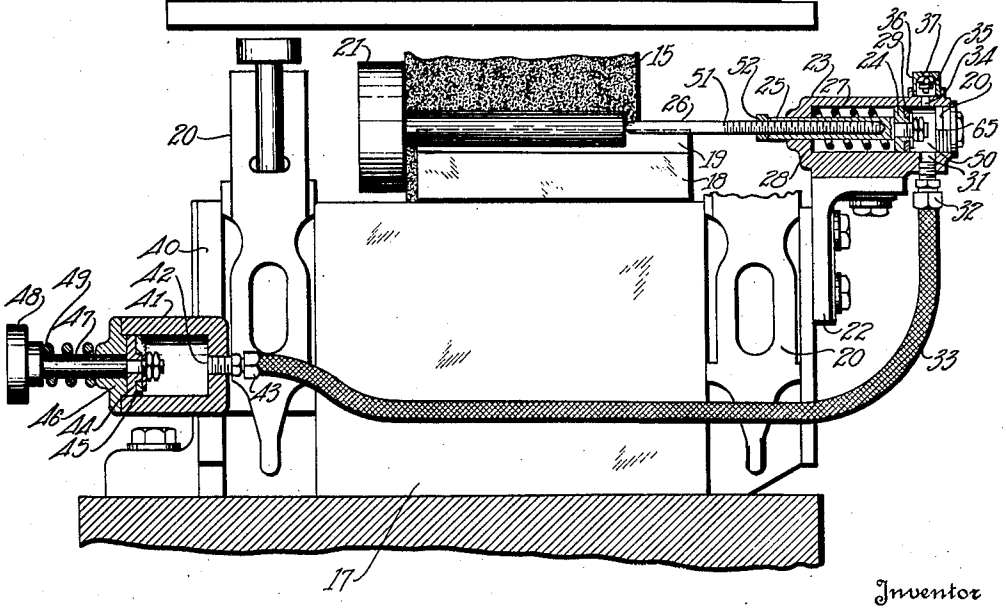


Fig. 2

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Fig. 3

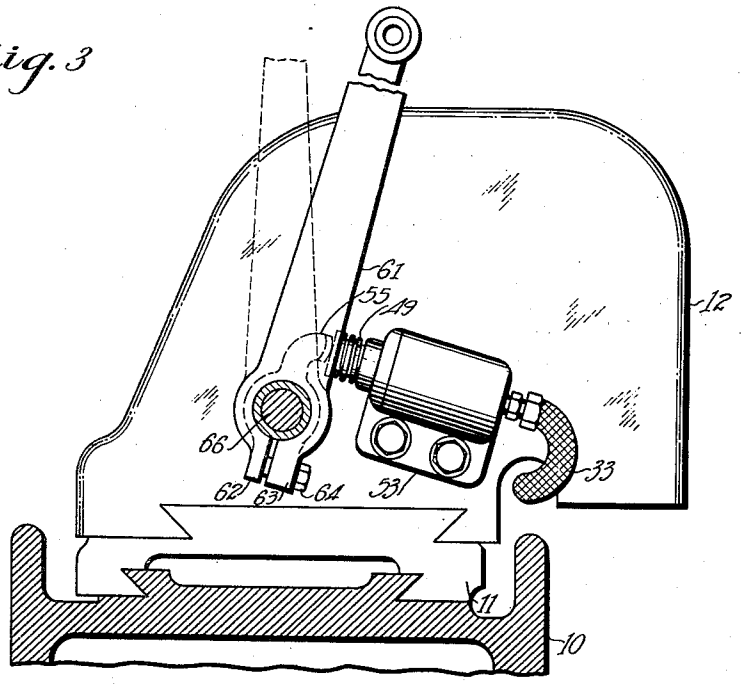
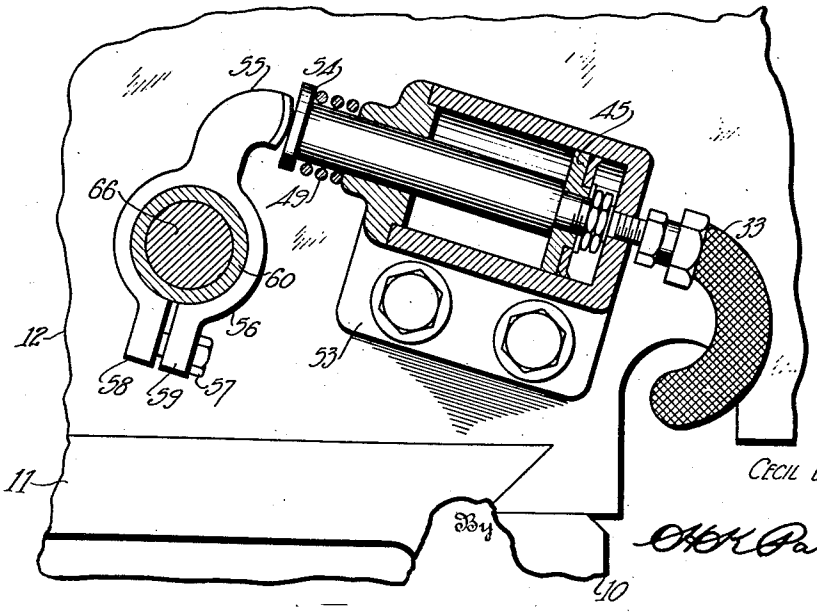


Fig. 4



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UNITED STATES PATENT OFFICE

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GRINDING MACHINE

Application filed February 13, 1930. Serial No. 428,172.

This invention relates to improvements in machine tools and especially to improvements in grinding machines of the centerless type.

An object of the invention is to provide improved means for effecting an ejection of the work piece from the grinding throat of a centerless grinder.

Another object of the invention is to provide an improved positioning member combined with an hydraulic ejector for initially positioning and subsequently ejecting a work piece from the grinding throat of a centerless grinder that may be manually operated for independently ejecting work pieces or may be coupled up with a movable member of the assembly to automatically eject the work pieces.

Other objects and advantages of the present invention should be readily understood by reference to the following specification considered in conjunction with the appended drawings forming a part thereof and it is to be understood that any modifications may be made in the specific structural details without departing from or exceeding the spirit of the invention.

Figure 1 is an elevational view of a machine embodying the improvements of this invention.

Figure 2 is a sectional view taken on line 2—2 of Figure 1.

Figure 3 is a fragmentary rear elevational view showing a modification of the invention as seen from line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional view of certain parts shown in Figure 3.

Throughout the several views of the drawings similar reference characters are employed to denote the same or similar parts.

A device embodying the improvements of this invention may comprise a bed 10 having mounted thereon a slide 11 supporting the regulating wheel unit 12 rotatably supporting regulating wheel 13. The bed 10 in addition supports the grinding wheel unit 14 having the grinding wheel 15 carried thereby. The grinding wheel is adapted to be rotated in a clockwise direction as indicated by the arrow on its housing at a high or grinding rate of speed. The regulating wheel is likewise rotated in a clockwise direction at a relatively slow or work controlling rate of speed. The opposed active surfaces of the grinding and regulating wheels travel in opposite directions and form a grinding throat therebetween. The inner end of the lower slide 11 has secured thereto a block 17 supporting a work rest blade 18 having an active inclined top 19 inclining in the direction of the regulating wheel. The block 17 has mounted on opposite sides thereof suitable guide brackets 20 for guiding a work piece when being introduced into the grinding throat.

Heretofore mechanical means have been provided for positioning the work piece 21 relative to the grinding and regulating wheels and for ejecting same from the grinding throat. It is one of the purposes of this application to provide hydraulic means for effecting the ejection of the work piece and cooperating with a positioning member to properly position a work piece within the grinding throat. To this end block 17 has secured to its rear face a bracket 22 supporting an hydraulic cylinder 23 in which a piston 24 is adapted to be reciprocated. A piston rod 25 extends from the piston and has a threaded bore centrally thereof receiving the positioning and ejecting pin 26. A spring 27 is enclosed within the cylinder 23 and abuts on one end with the forward wall 28 of the cylinder and on the other end with the piston 24. The piston 24 may be of any desired construction but as here shown is of the cup leather type having the flexible head 29 to hug the walls of the cylinder and prevent leakage. The end of the cylinder 23 is closed by a sleeve plug 30 and the cylinder is provided with a port 31 receiving a flexible hose coupling 32 from which the flexible hose or conduit 33 extends. A filling port 34 is provided in the cylinder opposite to the port 31 and is controlled by spring loaded check valve 35 enclosed within the valve cage 36 carried by the cylinder 23 and the cage 36 is provided with a filling port or opening 37 through which an hydraulic medium such as oil or the like may be introduced within the chamber 50 of the cylinder 23 behind the piston 24 the sleeve plug 20 and flexible

hose or conduit 33. The block 17 carries on its forward face a bracket 40 supporting a pump cylinder 41 having a port 42 therein in which a coupling 43 is secured. The coupling 43 connects the flexible hose or conduit 33 with the interior of the cylinder 41. A pump piston 44 similar to piston 24 is enclosed within the cylinder 41 and has secured thereto flexible cup leather valve member 45 adapted to hug the inner wall of the said cylinder 41 and prevent leakage therein. A cap 46 is carried by the outer end of the cylinder 41 and provides a bearing through which piston rod 47 slides. The piston rod 47 is secured to the pump piston 44 on one end and carries on its other end a suitable knob or the like 48 forming one abutment for a spring 49 which abuts on its opposite end with cap 46. With the parts shown in Figure 2 the interior of piston 41 is filled with the same hydraulic medium within the chamber 50 of cylinder 23 and flexible hose of conduit 33. The operation of the structure this far described is as follows:

Assuming that a work piece has been completed and it is desired to remove same from the grinding throat the regulating wheel is retracted from its operative position and a push exerted on the knob 48 causing piston 44 to travel through the cylinder 41 to discharge the hydraulic medium therein through the port 42 through the conduit 33 into chamber 50 for forwardly urging piston 24. Piston 24 forceably actuates ejector pin 26 to rapidly and forcefully eject a work piece from the grinding throat. This movement of knob 48 and piston 24 compresses springs 49 and 27 so that as soon as the urge is removed from knob 48 these springs expand to return the parts to their normal position as shown in Figure 2. While in this position the pin 26 acts as a stop to limit the insertion of a work piece within the grinding throat. The end of the sleeve 65 of sleeve plug 20 acts as a stop to limit the reverse movement of piston 24 and insures the active point of stop or positioning member 26 returning at all times to the same position so that successive work pieces are properly positioned relative to the grinding and regulating wheels. To vary the effective position of the end of pin 26 it is provided with threads 51 received within the thread bore of piston rod 25 and locking in this position by lock nut 52.

In the modification disclosed in Figures 3 and 4 the pump mechanism is mounted on the rear of the regulating unit 12 and comprises a bracket 53 containing the piston pump 45 and associated mechanisms terminating in the knob 54. This knob instead of being actuated manually as is the knob 48 is adapted to be engaged by actuator 55 having a split collar 56 integral therewith and clamped in position by clamp screw 57 extending between ears 58 and 59. The actuator 55 is secured to the hub 60 of a sleeve nut to which the infeed lever 61 is secured by a similar clamping means comprising lugs 62 and 63 through which clamp bolt 64 extends. The sleeve nut 60 engages the threads of screw 66 having on the end thereof hand or pilot wheel 67 normally used to adjust the position of regulating wheel unit 12 and regulating wheel 13 relative to the grinding wheel.

When it is desired to actuate the regulating wheel toward the grinding wheel to feed a work piece against the grinding wheel and to retract the same the lever 61 is actuated from the position shown in dotted lines in Figure 3 through an arc of substantially 90° and returned whereupon the lever is further actuated to the position shown in full lines in Figure 3. During the last part of the movement of the handle after the regulating wheel unit has been retracted a sufficient distance from the grinding wheel to release the work the actuator 55 engages the knob 54 of pump piston to actuate the piston thereon through the cylinder to expel the hydraulic medium therein and eject a work piece from the grinding throat as was above described. Springs 27 and 49 are thereby compressed and upon release of the actuating pressure from the lever 61 they expand to return the said lever to its normal position shown in dotted lines in Figure 3 and return the pump piston and ejector piston to their normal positions.

What is claimed is:

1. In a device of the class described the combination of a pair of opposed grinding and regulating wheels forming a grinding throat therebetween, a work rest blade within the throat, a positioning and ejecting member within the throat for limiting the insertion of the work piece therein and for axially ejecting same therefrom and hydraulic means for actuating the said member including an intermittently operable pump.

2. In a device of the class described the combination of a pair of opposed grinding and regulating wheels forming a grinding throat therebetween, a work rest blade within the grinding throat, a positioning and ejecting member within the throat for limiting the insertion of a work piece therein and for axially ejecting same therefrom, a piston carried by the member, a cylinder for the piston and hydraulic means including a manually operable pump for actuating the piston to correspondingly actuate the member for ejecting the work piece from the throat.

3. In a device of the class described the combination of a pair of opposed grinding and regulating wheels forming grinding throat therebetween, a work rest blade within the grinding throat, a positioning and ejecting member within the throat for limiting the insertion of a work piece therein and for axially ejecting same therefrom, a piston

carried by the member, a cylinder for the piston, hydraulic means including a manually actuable pump for actuating the piston to correspondingly actuate the member for ejecting the work piece from the throat and yielding means for returning the member and piston to their normal position.

4. In a device of the class described the combination of a pair of opposed grinding and regulating wheels forming a grinding throat therebetween, a work rest blade within the grinding throat, a positioning and ejecting member within the throat for limiting the insertion of a work piece therein and ejecting same therefrom, a piston carried by the member, a cylinder for the piston, hydraulic means for actuating the piston to correspondingly actuate the member for ejecting the work piece from the throat, yielding means for returning the member and piston to their normal position, and positive means abutting the piston in opposition to the yielding means to limit the movement of the member under the influence of the yielding means.

5. In a device of the class described the combination with a work support, of means for ejecting the work from the support comprising a member, a piston carried thereby, a cylinder for the piston, a plunger pump, a conduit between the plunger pump and cylinder, an hydraulic medium contained within the conduit and plunger pump, and means to actuate the pump discharging medium from the pump into the cylinder to actuate the ejector member.

6. In a centerless grinder the combination of opposed grinding and regulating wheels forming a grinding throat therebetween, a support block beneath the grinding throat, a work rest blade carried by the support block sub-tending the grinding throat, a cylinder carried by the support block, a piston within the cylinder, an ejector member secured to the piston, a second cylinder remote from the first cylinder, a conduit connecting the cylinders, an hydraulic medium within the second cylinder and conduit and means for actuating the pump piston to discharge the hydraulic medium in its cylinder through the conduit into the first cylinder to actuate the piston therein and the jector member carried thereby.

7. In a centerless grinder the combination of opposed grinding and regulating wheels forming a grinding throat therebetween, a support block beneath the grinding throat, a work rest blade carried by the support block sub-tending the grinding throat, a piston within the cylinder, an ejector member secured to the piston, a second cylinder remote from the first cylinder, a pump piston within the second cylinder, a conduit connecting the cylinders, an hydraulic medium within the pump cylinder and conduit means for actuating the pump piston to discharge the hydraulic medium in its cylinder through the conduit into the first cylinder to actuate the piston therein and the ejector member carried thereby, yielding means returning the pump piston to its original position creating a vacuum sucking into the cylinder thereof the hydraulic medium and yielding means returning the piston in the first cylinder to its original position.

8. In a centerless grinder, the combination of opposed grinding and regulating wheels forming a grinding throat therebetween, a support block beneath the grinding throat, a work rest blade carried by the support block sub-tending the grinding throat, a cylinder carried by the support block, a piston within the cylinder, an ejector member secured to the piston, a second cylinder remote from the first cylinder, a pump piston within the second cylinder, a conduit connecting the cylinders, an hydraulic medium within the pump cylinder and conduit, means for actuating the pump piston to discharge the hydraulic medium therein through the conduit into the first cylinder to actuate the piston therein and the ejector member carried thereby and means permitting the replenishing of the hydraulic medium within the pump cylinder and the conduit.

9. In a centerless grinder, the combination of opposed grinding and regulating wheels forming a grinding throat therebetween, a work rest blade within the throat supporting the work piece during grinding, means operable for causing a relative approach of the grinding and regulating wheels to effect a stock removal from the work piece, a shiftable positioning and ejector member, hydraulic means for actuating the member to eject a work piece, yielding means for returning the member to its initial position, means limiting the movement of the member under the influence of the yielding means to definitely position the member, and a reciprocable pump associated with hydraulic means positively operable in one direction and yielding means for returning the pump to its initial position.

10. In a centerless grinder, the combination of opposed grinding and regulating wheels forming a grinding throat therebetween, a work rest blade within the throat supporting the work piece during grinding, means operable for causing a relative approach of the grinding and regulating wheels to effect a stock removal from the work piece, a shiftable positioning and ejector member, hydraulic means for actuating the member to eject a work piece, yielding means for returning the member to its initial position, means limiting the movement of the member under the influence of the yielding means to definitely position the member, a reciprocable pump associated with hydraulic means positively operable in one direction, yielding means for

returning the pump to its initial position in the hydraulic circuit and means for replenishing the medium.

11. In a device of the class described the combination of a work support, means positioning a work piece on and relative to the work support, an hydraulic plunger pump, a closed hydraulic circuit between the plunger pump and work positioning means, and means for actuating the pump to energize the hydraulic circuit for correspondingly actuating positioning means to eject the work piece from the support.

12. In a device of the class described, the combination of a work support, means positioning a work piece on and relative to the work support, an hydraulic plunger pump, a closed hydraulic circuit between the plunger pump and work positioning means, and means for actuating the pump to energize the hydraulic circuit for correspondingly actuating positioning means to eject the work piece from the support and yielding means for returning the positioning means to its initial position after ejection of the work piece.

13. In a device of the class described, the combination of a work support, means positioning a work piece on and relative to the work support, an hydraulic plunger pump, a closed hydraulic circuit between the plunger pump and work positioning means, and means for actuating the pump to energize the hydraulic circuit for correspondingly actuating positioning means to eject the work piece from the support and yielding means for returning the positioning means to its initial position after ejection of the work piece and means adjusting the initial position of the positioning means.

In testimony whereof I affix my signature.

CECIL W. HOPKINS.