

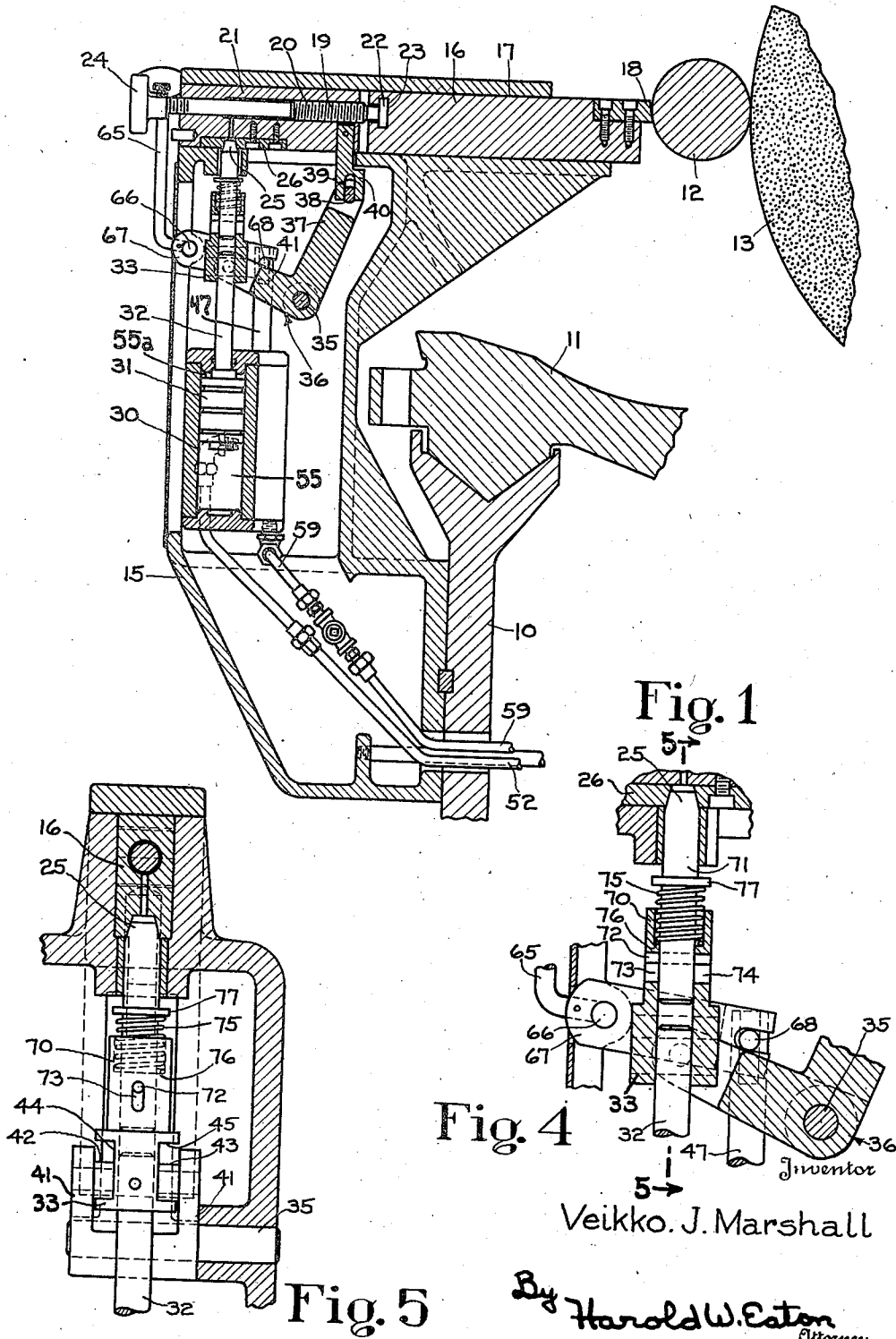
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V. J. MARSHALL
GRINDING MACHINE STEADY REST

2,436,587

Filed April 6, 1946

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2 Sheets-Sheet 2

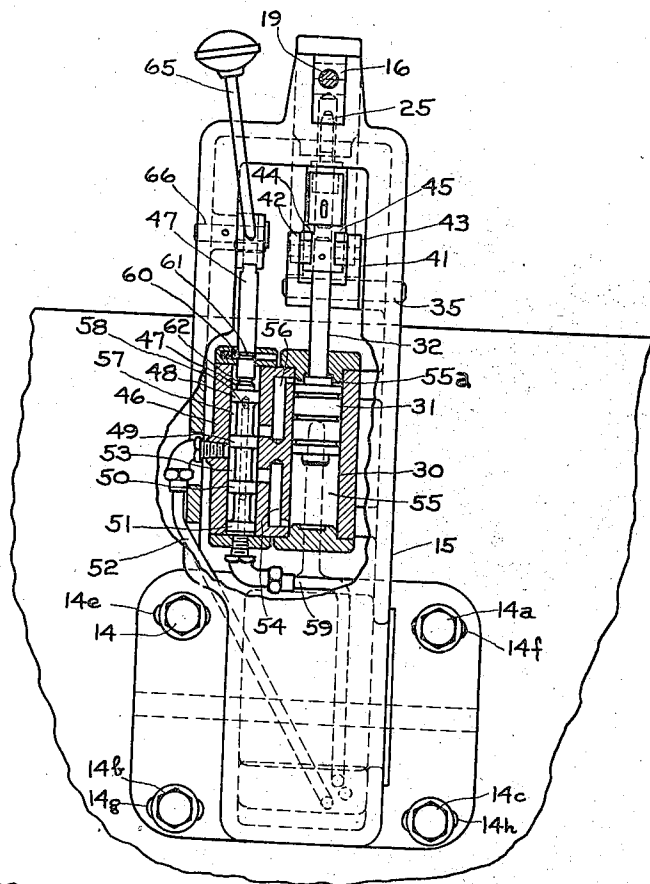


Fig. 2

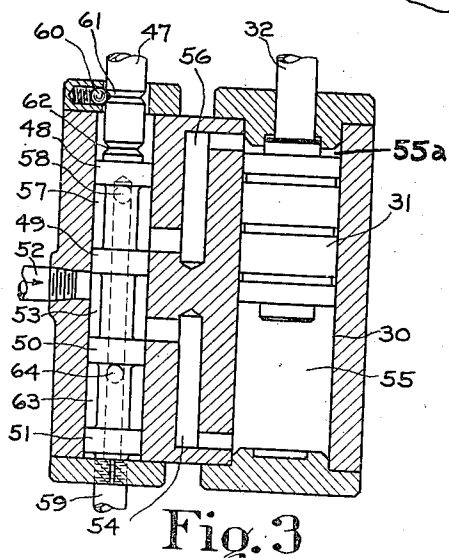


Fig. 3

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GRINDING MACHINE STEADY REST

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This invention relates to grinding machines and more particularly to a steadyrest for supporting and steadying a workpiece during the grinding operation.

One object of this invention is to provide a simple and thoroughly practical steadyrest. Another object is to provide a steadyrest, simple and rugged in construction, which is simple in operation and adjustment. Another object of the invention is to provide a steadyrest with a work steadying shoe which may be rapidly withdrawn to an inoperative position. Another object of the invention is to provide a steadyrest shoe which may be latched in an operative position and manually fed during a grinding operation to maintain the shoe in operative supporting engagement with the work during a grinding operation.

A further object of the invention is to provide a fluid pressure mechanism for moving the steadyrest shoe to and from an operative position and actuating a latching detent which is arranged to move the shoe first to an operative position and then automatically latch the same. Another object of the invention is to provide connections between a fluid pressure piston and cylinder whereby the latch detent is first automatically withdrawn after which the steadyrest shoe automatically moves to an inoperative position. Other objects will be in part obvious or in part pointed out hereinafter.

This invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, as will be exemplified in the structure to be hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is shown one of various possible embodiments of the mechanical features of this invention,

Fig. 1 is a sectional view through the steadyrest and actuating mechanism, showing the steadyrest shoe in an operative position,

Fig. 2 is a front elevation of the steadyrest having parts broken away and shown in section to show the hydraulic actuating mechanism therefor;

Fig. 3 is a fragmentary sectional view, on an enlarged scale, showing the hydraulic piston and cylinder and control valve therefor;

Fig. 4 is a fragmentary sectional view, on an enlarged scale, showing the shoe locking detent and the actuating mechanism therefor; and

Fig. 5 is a fragmentary sectional view taken ap-

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proximately on the line 5—5 of Fig. 4 showing the locking detent for the steady rest shoe.

A grinding machine has been illustrated in the drawings comprising a base 10 having a longitudinally movable work table 11 mounted thereon. The work table 11 is provided with work heads (not shown) rotatable to support a workpiece 12. A rotatable grinding wheel 13 is supported on a transversely movable wheel slide (not shown) which is arranged to move transversely relative to the base 10 to feed the grinding wheel into the workpiece 12 to grind the same to the desired and predetermined size.

The improved steadyrest comprises a frame 15 which is secured to the front of the machine base 10 by means of a plurality of cap screws 14, 14a, 14b, and 14c which pass through elongated slots 14e, 14f, 14g, and 14h formed in the frame 15 and are screw threaded into the base 10.

A slidably mounted steadyrest shoe support 16 is slidably mounted within a rectangularly shaped aperture 17 in the frame 15. The slide 16 is provided at its forward end with a work steadying shoe 18 which is arranged to engage and steady the workpiece 12 during a grinding operation.

In order to maintain the shoe 18 in operative engagement with the workpiece 12 as it is reduced in size during grinding, a suitable nut and screw mechanism is provided comprising a screw 19 which is screw threaded into a threaded aperture 20 formed in a slide block 21. The slide block 21 is also slidably mounted in the aperture 17 in the frame 15. The adjusting screw 19 is provided with a head 22 which engages a T-shaped slot 23 formed in the steadyrest shoe slide 16. The other end of the screw 19 is provided with an actuating knob 24 by means of which the screw 19 may be adjusted so as to adjust the position of the shoe slide 16 relative to the sliding block 21.

In order to facilitate moving the slide to and from an operative position, a spring pressed detent or locating plunger 25 is provided, the upper end of which is frusto conical in shape. This detent 25 is arranged to mate with a correspondingly shaped aperture formed in a block 26 which is mounted on the underside of the slide block 21.

A suitable fluid pressure mechanism is provided for actuating the detent 25 and also for moving the steadyrest shoe 18 to and from an operative position in a manner to be hereinafter described. This mechanism comprises a fluid pressure cylinder 30 which is mounted within the frame 15. A piston 31 is slidably mounted

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within the cylinder 30 and is fixedly connected to the lower end of a piston rod 32. A collar 33 is pinned to the upper end of the piston rod 32.

In order to move the steadyrest shoe to and from an operative position a suitable lever mechanism is provided comprising a bell crank lever 36 which is pivotally mounted on a stud 35. An upwardly extending arm 37 of the bell crank lever 36 is provided with a yoked end portion carrying a stud 38 which rides in an elongated slot 39 formed in a block 40 which is fixedly mounted on the underside of the slide block 21. The other arm 41 of the bell crank lever 36 is yoked-shaped and is provided with a pair of diametrically opposed rollers 42 and 43 which engage clearance slots 44 and 45 respectively formed in the collar 33. It will be readily apparent from the foregoing disclosure that movement of the collar 33 first takes up the lost motion between the rollers 42 and 43 and the slots 44 and 45 before transmitting a rocking motion to the bell crank lever 36 so as to delay movement of the work steadyrest shoe 18 until the detent 25 may be withdrawn in a manner to be hereinafter described.

A suitable control valve is provided for controlling the admission to and exhaust of fluid from the cylinder 33. This valve is preferably a piston type valve comprising a valve stem 47 having valve pistons 48, 49, 50, and 51 formed integrally therewith. When fluid under pressure is passed through a pipe 52 it enters a valve chamber 53 located between the valve pistons 49 and 50 and passes through a passage 54 into a cylinder chamber 55 to move the piston 31 upwardly to move the steadyrest shoe 18 into an operative position. During this movement, fluid within the cylinder chamber 55a above the piston 31 may exhaust through the passage 56, through a valve chamber 57 located between the valve piston 43 and 49 and passes out through a passage 58 and an exhaust pipe 59. The valve stem 47 as illustrated in Fig. 3 is maintained in this position by means of a spring pressed ball 60 which engages a V-groove 61 formed in the valve stem 47. A similar V-groove 62 is provided on the valve stem 47 to locate the valve stem when the valve is shifted into its reverse position.

A manually operable control lever 65 is pivotally mounted on a stud 66 which is carried by the steadyrest frame 15. The control lever 65 is connected to actuate a rock arm 67. The other end of the rock arm 67 is yoke shaped and is provided with an elongated slot which engages a stud 68 carried by the valve stem 47. It will be readily apparent from the foregoing disclosure that when the control lever 65 is rocked in a counter-clockwise direction (Fig. 1) the valve stem 47 will be moved upwardly to shift the control valve into the reverse position. When the valve stem is moved into the reverse position fluid under pressure passing through the pipe 52 into valve chamber 53 will pass through the passage 56 into the cylinder chamber 55a to cause a downward movement of the piston 31. During the downward movement of the piston 31, the sleeve 3 is moved downwardly until the rollers 42 and 43 engage the upper end surface of the slots 44 and 45 before transmitting a rocking motion to the bell crank lever 36. This delayed action of the bell crank lever serving to facilitate withdrawing of the locking detent 25 in a manner to be hereinafter described.

The sleeve 33 is provided with an upwardly extending portion 70. The detent 25 is provided with a downwardly extending rod 71 which is

slidably mounted within the upper end portion 70 of the sleeve 33. The rod 71 is provided with a stud 72 which extends through elongated slots 73 and 74 formed in the portion 70 of the sleeve 33. These elongated slots 73 and 74 serve to provide a lost motion connection between the sleeve 33 and the locking detent 25. A compression spring 75 surrounds the rod 71 and is located between a shoulder 76 formed in the extension 70 of the sleeve 33 and a flange 77 formed integral with the rod 71. It will be readily apparent from the foregoing disclosure that the compression of the spring 75 normally holds the detent 25 in locked engagement with the slide block 21.

When it is desired to withdraw the work steadyrest shoe to an inoperative position the valve stem 47 is shifted upwardly in a manner previously described so as to move the piston 31 downwardly. During the initial downward movement of the piston 31, the pin 72 engages the upper end of the elongated slots 73 and 74 and the downward movement of the piston rod 32 will move the collar 33 together with the rod 71 and detent 25 downwardly to unlock the slide block 21. When the downward movement of the sleeve 33 moves downwardly so that the upper ends of the elongated slots 44 and 45 engage the rollers 42 and 43 respectively, the bell crank lever 36 will be rocked in a counter-clockwise direction to slide the block 21 and the shoe slide 16 and the work shoe 18 toward the left to an inoperative position. It will be readily apparent from the foregoing disclosure that the detent 25 is first automatically withdrawn after which the shoe is automatically and positively withdrawn to an inoperative position.

Similarly when the piston 31 is moved upwardly the sleeve 33 first rocks the bell crank lever 36 in a counter-clockwise direction to move the slide block 21, the slide 16 and steadyrest shoe 18 toward the right into an operative position after which the released compression of the spring 75 engages the locking detent 25 with the aperture formed in the slide block 21 to lock the parts in an operating position.

The operation of this improved steadyrest will be readily apparent from the foregoing disclosure. A workpiece 12 is positioned in the machine in a supporting engagement with the work heads. The control lever 65 is rocked in a clockwise direction into the position illustrated in Fig. 1 to shift the valve stem 47 upwardly. This movement of the valve stem 47 causes the piston 31 to move upwardly and thereby to rock the bell crank lever 36 in a clockwise direction to shift the slide block 21, the shoe slide 16 and steadyrest shoe 18 toward the right into the position illustrated in Fig. 1. When the parts are in an operative position, the detent 25 actuated by the compression of the spring 75 locks the slide block 21 in an operative position. As the grinding operation proceeds, the work steadyrest shoe 18 is maintained in operative engagement with the workpiece 12 by manipulation of the knob 24. The knob 24 serving through a screw 19 to adjust the shoe slide 16 and work shoe 18 relative to the slide block 21 thus maintaining the steadyrest shoe 18 in steadyrest and supporting engagement with the workpiece 12. After a workpiece has been ground to the desired and predetermined size, the control lever 65 is rocked in a counter-clockwise direction (Fig. 1) so as to shift the valve stem 47 upwardly and thereby to admit fluid to cause a downward movement

of the piston 31 and piston rod 32. This movement as above described serves to first withdraw the locking detent 25 after which the bell crank lever 35 is rocked in a counter-clockwise direction to withdraw the work steadying shoe 18 to an inoperative position to facilitate indexing of the workpiece 12 or to facilitate loading a new piece of work into the machine.

It will thus be seen that there has been provided by this invention apparatus in which the various objects hereinabove set forth together with many thoroughly practical advantages are successfully achieved. As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A grinding machine steadyrest having a frame, a movable slide on said frame, a slidably mounted work steadying shoe on said frame, manually operable means to facilitate adjusting said shoe relative to said slide to maintain the shoe in operative engagement with a workpiece during a grinding operation, a locking device to lock said slide in an operative position, and a power operated mechanism operatively connected to control the actuation of both the locking device and the slide in either direction, said mechanism being arranged to actuate the locking device to unlock said slide and thereafter positively to move the slide and shoe to an inoperative position.

2. In a grinding machine steadyrest having a frame, a movable slide on said frame, a slidably mounted steadyrest shoe on said frame, manually operable means to facilitate adjusting said shoe relative to said slide to maintain the shoe in operative engagement with a work piece during a grinding operation, a locking device to lock said slide in an operative position, a power operated mechanism operatively connected positively to move said slide to an operative position, and connections between said mechanism and said locking device automatically to release said locking device so as to lock said slide and shoe in an operative position.

3. A grinding machine steadyrest having a frame, a movable slide on said frame, a slidably mounted work steadying shoe on said frame, manually operable means to facilitate adjusting said shoe relative to the slide to maintain the shoe in operative engagement with a workpiece during a grinding operation, a locking device to lock said slide in an operative position, a power operated mechanism operatively connected to actuate both the locking device and the slide, lost motion connections between said latter mechanism and the locking device to unlock said locking device and lost motion connections between said latter means and said slide to move the slide and shoe to and from an inoperative position.

4. A grinding machine steadyrest having a frame, a movable slide on said frame, a slidably mounted work steadying shoe on said frame, a manually operable nut and screw to facilitate adjusting said shoe relative to said slide to maintain the shoe in operative engagement with a workpiece during a grinding operation, a spring pressed detent normally to lock said slide in an operative position, and means including a piston and cylinder operatively connected to actuate both the detent and slide, said connections being arranged to move the detent to an inoperative position and thereafter to move the slide and shoe to an inoperative position.

5. A steadyrest for grinding machines comprising a frame, a movable slide on said frame, a work steadying shoe slidably mounted on said frame, means including a spring pressed detent to locate and hold said slide and shoe in an operative position, a nut and screw mechanism to feed said slide relative to said frame so as to maintain the shoe in operative engagement with a workpiece during grinding, a bell crank lever operatively connected to move said slide to and from an operative position, a fluid pressure piston and cylinder operatively connected to actuate said bell crank lever, a manually operable control valve to control the admission to and exhaust of fluid from said cylinder, and operative connections between said bell crank lever and said detent to first withdraw said detent after which said bell crank lever is rocked to move said slide and shoe to an inoperative position.

6. A grinding machine steadyrest having a frame, a movable slide on said frame, a work steadying shoe slidably mounted on said frame, a locking device to lock said slide in an operative position relative to said frame, a nut and screw mechanism to feed said shoe relative to said slide to maintain the shoe in operative engagement with a workpiece during grinding, means including a lever to actuate said slide and shoe, a fluid pressure piston and cylinder to actuate said locking device and said lever, lost motion connections between said piston and said locking device, and lost motion connections between said piston and said lever, said lost motion connections being arranged so that movement of said piston serves first to actuate said locking device to unlock said slide and thereafter to move said slide and shoe to an inoperative position.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,163,041	Shearer	Dec. 7, 1915
2,078,556	Belden	Apr. 27, 1937
2,261,903	La Fleur	Nov. 4, 1941