Aug. 5, 1941. H. S. INDGE 2,251,885

GRINDING MACHINE FOOTSTOCK

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Fig. 3

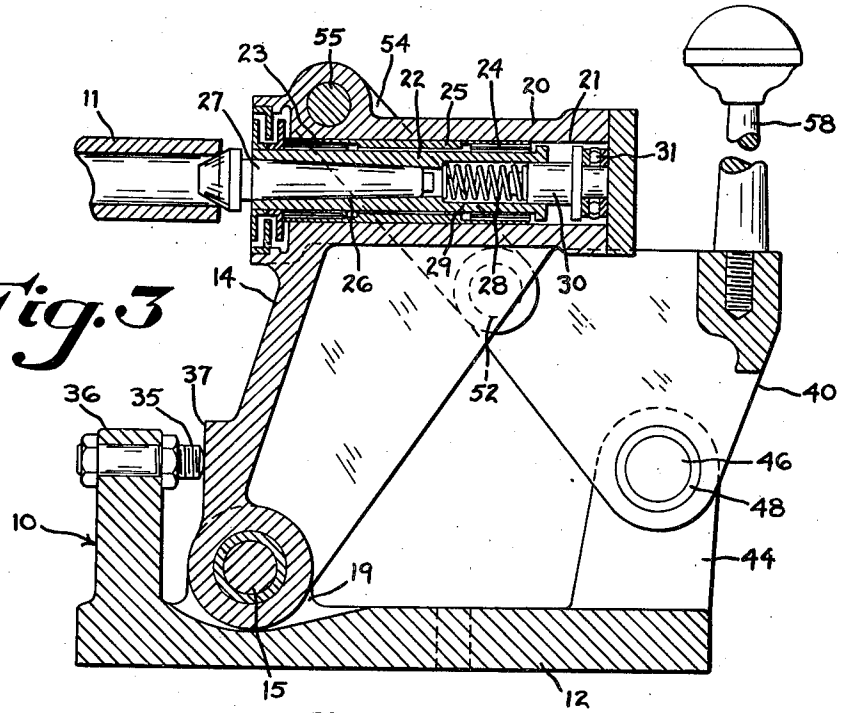
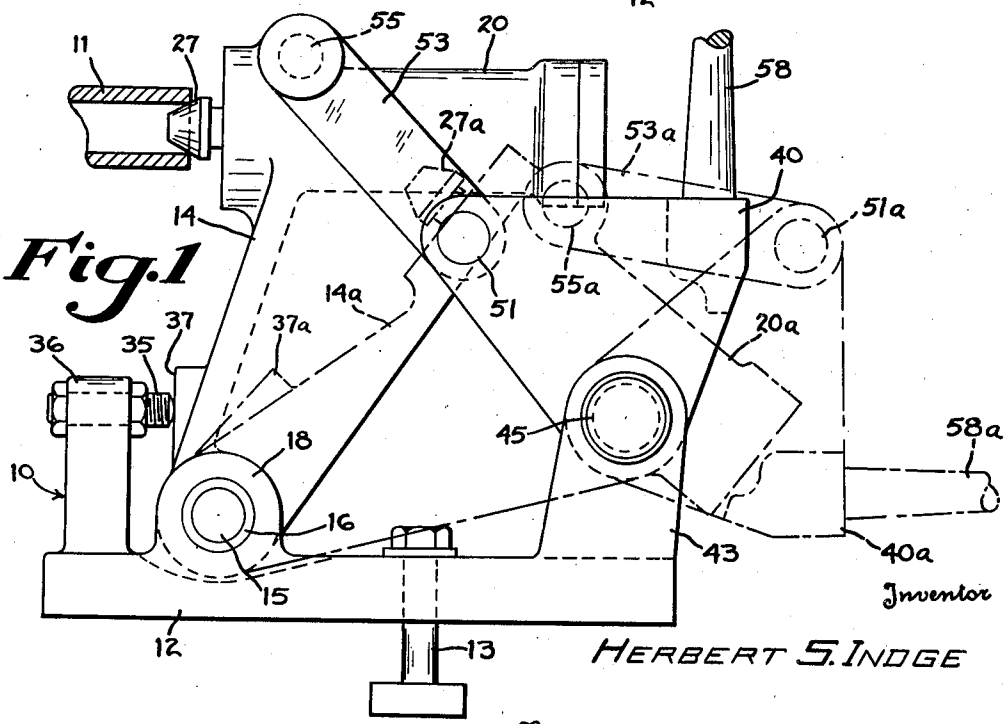


Fig. 1



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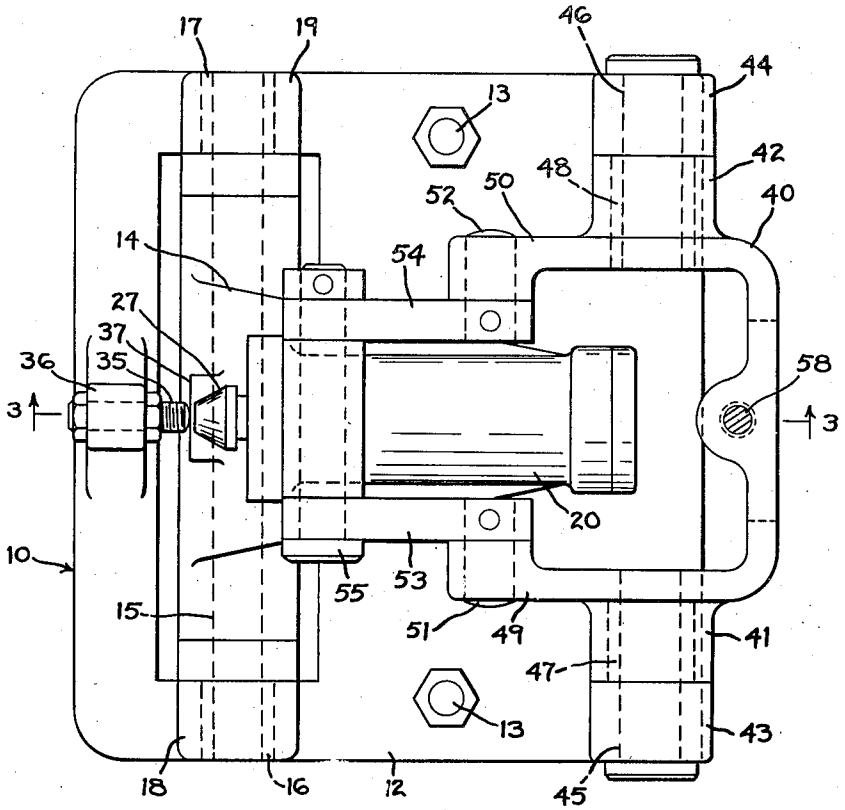


Fig. 2

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GRINDING MACHINE FOOTSTOCK

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6 Claims. (Cl. 51—237)

The invention relates to grinding and abrading machines, and more particularly to a footstock for supporting a rotatable work piece.

One object of the invention is to provide a simple and thoroughly practical footstock for supporting a cylindrical work piece in an abrading machine. Another object of the invention is to provide a footstock which is readily movable to and from an operative position to facilitate loading of work pieces into the machine. Another object of the invention is to provide a pivotally mounted footstock which is arranged to be swung to and from an operative position. A further object of the invention is to provide a toggle actuated, pivotally mounted footstock which may be readily and rapidly moved to and from an operative position. Other objects will be in part obvious or in part pointed out hereinafter.

The 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 front elevation of the improved footstock;

Fig. 2 is a plan view of the footstock; and

Fig. 3 is a vertical sectional view, taken approximately on the line 3—3 of Fig. 1.

The improved footstock 10 has been illustrated in the drawings for rotatably supporting a work piece 11 in a grinding or lapping machine. The footstock 10 comprises a base 12 which is adjustably clamped in position on a work supporting table (not shown) by means of clamping bolts 13, the heads of which mate with T-slots (not shown) formed in the upper surface of the table. The base 12 serves as a support for a pivotally mounted steadyrest frame 14 which is pivotally supported on a rock shaft 15. The rock shaft 15 is journalled in suitable bearings 16 and 17 which are in turn fixedly supported in upwardly extending bosses 18 and 19. The bosses 18 and 19 are formed integral with the base 12.

The steadyrest frame 14 is provided at its upper end with a cylindrically shaped portion 20 having a central aperture 21 which serves as a rotatable support for a footstock spindle 22. The footstock spindle 22 is rotatably journalled in anti-friction needle bearings 23 and 24 which are interposed between a sleeve 25 which fits within the aperture 21 and the peripheral surface of the footstock spindle 22. The spindle 22 is hollow and is provided at its left-hand end with a frusto-conically shaped aperture 26 which is arranged to support a footstock center 27.

In order that the footstock center 27 may be maintained in yielding engagement with the work piece 11 during an abrading operation, a compression spring 28 is contained within a central aperture 29 in the footstock spindle 22. The spring 28 is interposed between a shoulder at the left-hand end of the aperture 29 and a rotatable stud 30 which is rotatably supported by an end thrust bearing 31.

An adjustable stop screw 35 is supported in an upwardly extending lug 36 formed integral with the base 12. The stop screw 35 is arranged to be engaged by a stop abutment 37 formed on the pivotally mounted steadyrest frame 14 and serves to limit the swinging movement of the frame 14 in a counterclockwise direction so that the axis of rotation of the footstock spindle 22 is in alignment with the axis of the headstock spindle.

In some types of grinding or lapping, it is desirable to move the footstock out of the way during a loading operation to facilitate loading of work pieces into the machine. To accomplish this result, the steadyrest frame 14 is arranged so that it may swing in a clockwise direction into the broken line position 14*a* (Fig. 1) so that its upper cylindrical portion 20 supporting the footstock spindle 22 and center 27 assumes the broken line positions 20*a* and 27*a* (Fig. 1).

A toggle lever mechanism is provided for rapidly moving the steadyrest to and from an operative position and for maintaining it in an operative position during an abrading operation. The toggle lever mechanism comprises a pivotally mounted frame 40 which is provided with oppositely extending hubs 41 and 42 (Fig. 2). The base 12 is provided with oppositely extending hubs 41 and 42 (Fig. 2). The base 12 is provided with a pair of spaced upwardly extending bosses 43 and 44 which in turn support a pair of pivot studs 45 and 46. The hubs 41 and 42 are provided with sleeve bearings 47 and 48, respectively, which are rotatably supported on the studs 45 and 46, respectively. It will be readily apparent from the foregoing disclosure that the frame 40 may be readily rocked about the axis of the aligned supporting studs 45 and 46. The frame 40 is preferably formed as a hollow frame

so that the cylindrical portion 20 of the pivotally mounted footstock frame 14 may readily swing to and from an operative position. The frame 40 is provided with a pair of spaced arms 49 and 50 which are pivotally connected by studs 51 and 52 with the ends of a pair of toggle levers 53 and 54, respectively. The other ends of the toggle levers 53 and 54 are pivotally connected by a stud 55 with the upper portion of the pivotally mounted steadyrest frame 14. A manually operable handle 58 is mounted on the frame 40 to facilitate moving the steadyrest frame to and from an operative position.

It will be readily apparent from the foregoing disclosure that when the handle 58 is rocked in a clockwise direction into broken line position 58*a*, the frame 40 will also be rocked in a clockwise direction into position 40*a* (Fig. 1), in which position the link 53 shifts into position 53*a* and the corresponding parts of the footstock assume the positions indicated in broken lines and designated by the reference numerals suffixed with the letter *a*.

Similarly, when it is desired to support a work pieces 11 in operative position in the machine, the control lever 58 is moved in a counterclockwise direction from the broken line position 58*a* into the full line position, which movement serves through the toggle lever frame 40 and the toggle levers 53 and 54 to swing the steadyrest frame 14 into the full line position as shown in Fig. 1 with the stop abutment 37 in operative engagement with the stop screw 35. When the footstock frame 14 is in an operative position, the axes of the studs 45, 51 and 55 are substantially in the same plane, so that the toggle levers lock the steadyrest in an operative position during the abrading operation.

The steadyrest base 12 is adjusted longitudinally of the supporting table, not shown, so that when the footstock center 27 together with the footstock frame 14 are in an operative position, the spring 28 will be compressed so as to maintain the center 27 in yielding engagement with the work piece 11 during an abrading operation.

The operation of this improved footstock 10 is readily apparent from the foregoing disclosure. The footstock frame 12 is clamped in position on an abrading machine by means of clamping bolts 13. A work piece 11 is inserted in position on the machine and the footstock control lever 58 is shifted from broken line position 58*a* into full line position 58 (Fig. 1) to swing the steadyrest frame 14 into an operative position with the footstock center 27 in supporting engagement with the work piece 11. Due to the toggle lever actuating mechanism, the footstock frame 14 is maintained in an operative position with the stop abutment 37 engaging the stop screw 35 by means of a locked toggle lever actuating mechanism. After an abrading operation has taken place, the footstock control lever 58 may be moved in a clockwise direction into position 58*a* to brake the toggle lever and shift the parts including the footstock center 27*a* into the broken line position shown in Fig. 1, thus removing the footstock parts to facilitate removal of the finished work piece and the loading of a new work piece in position thereinstead.

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 footstock for an abrading machine comprising a footstock base, a frame pivotally supported on said base, a footstock center, a rotatable sleeve in said frame to support said center, and manually operable means to swing said frame to either an operative or inoperative position.

2. A footstock for an abrading machine comprising a footstock base, a frame pivotally supported on said base, a footstock center, a rotatable sleeve in said frame to support said center, and manually operable means including a toggle lever mechanism to swing said frame to either an operative or inoperative position.

3. In a footstock for abrading machines having a steadyrest base, a frame pivotally supported on said base, a rotatable spindle, bearings for said spindle in said frame, a footstock center supported by said spindle, an adjustable stop screw on said base and a stop abutment on said frame to locate said frame in an operative position with the axis of the spindle and center in a predetermined position, and manually operable means to swing said frame to or from an operative position to facilitate loading and unloading of work pieces.

4. In a footstock for abrading machines having a steadyrest base, a frame pivotally supported on said base, a rotatable spindle, bearings for said spindle in said frame, a footstock center supported by said spindle, an adjustable stop screw on said base and a stop abutment on said frame to locate said frame in an operative position with the axis of the spindle and center in a predetermined position, and a manually operable toggle lever mechanism connected between the footstock base and frame to swing said footstock frame and center either to an operative or inoperative position.

5. In a footstock for abrading machines having a steadyrest base, means adjustably to clamp said base on a machine, a frame pivotally supported on said base, a rotatable spindle, a footstock center supported thereby, bearings for said spindle in said frame, yieldable means normally to exert an axial pressure on said spindle in one direction to maintain said center in yielding engagement with a work piece, and a manually operable means to swing said frame and center to and from an operative position.

6. In a footstock for abrading machines having a steadyrest base, means adjustably to clamp said base on a machine, a frame pivotally supported on said base, a rotatable spindle, a footstock center thereon, bearings for said spindle in said frame, a spring normally to exert a pressure on said spindle in a direction to maintain said center in yielding engagement with a work piece, and a manually operable toggle lever mechanism to swing said frame and center to or from an operative position, said toggle lever mechanism being arranged to hold said frame in an operative position.

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