April 10, 1962

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GRINDING WHEEL DRESSING FIXTURE FOR SURFACE GRINDERS

3,028,853

Filed Oct. 6, 1958

3 Sheets-Sheet 1

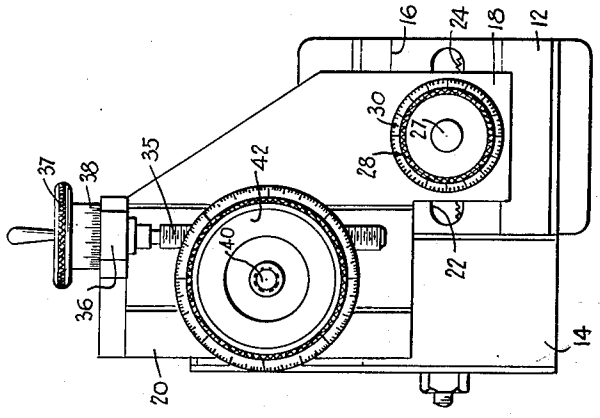


FIG.2.

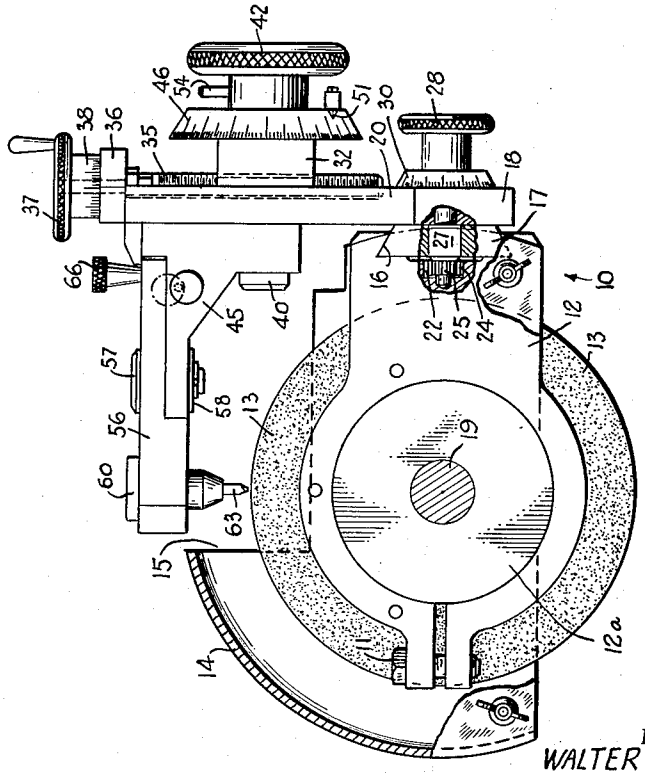


FIG.1.

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3 Sheets-Sheet 2

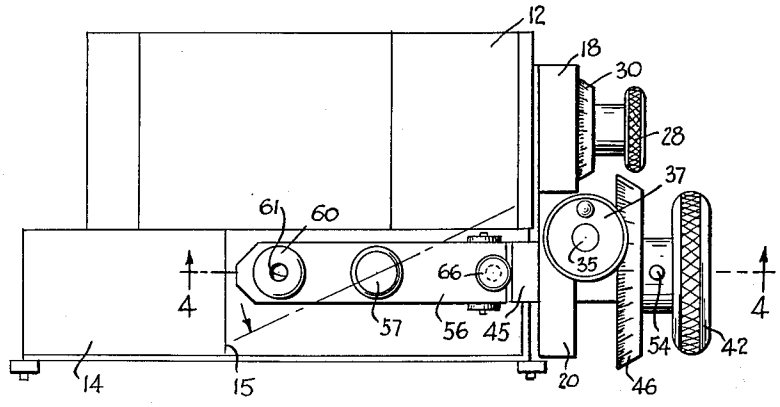


FIG. 3.

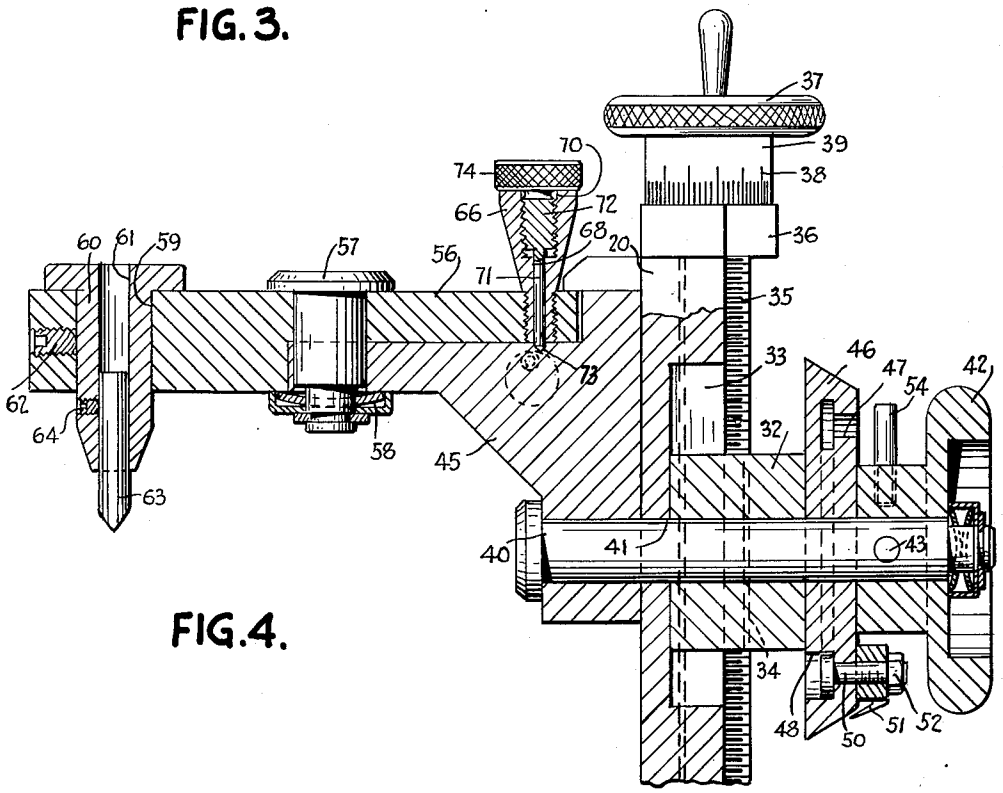


FIG. 4.

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April 10, 1962 W. MILLER 3,028,853

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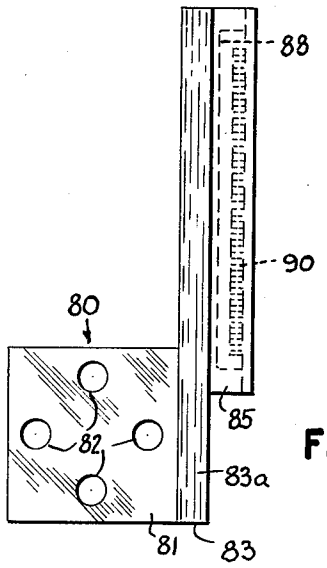


FIG.6.

FIG.5.

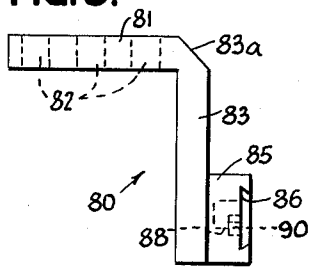
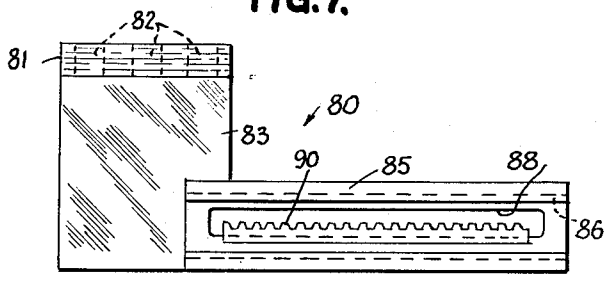


FIG.7.



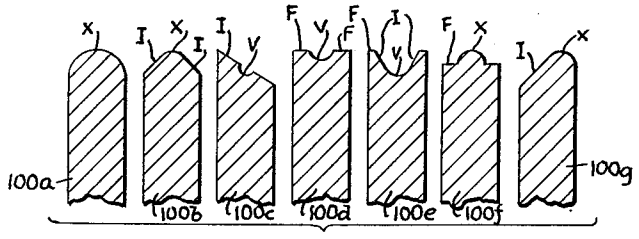


FIG.8.

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GRINDING WHEEL DRESSING FIXTURE FOR SURFACE GRINDERS

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Filed Oct. 6, 1958, Ser. No. 765,487
10 Claims. (Cl. 125—11)

This invention relates to power tools and, more particularly, to grinding machines.

Since it is difficult, if not impossible, to remove a work piece from the bed of a grinding machine, and then later replace it in exactly the same position, it has been difficult to dress the grinding wheel of the grinding machine during a particular job run. On the other hand, some jobs run for an extended period of time whereby it becomes an absolute necessity to dress the grinding wheel before the completion of the entire run. Ordinarily, when such is done, a substantial amount of time is required to align the parts after the dressing operation so that the grinding operation can be resumed without sacrifice of accuracy or finish of the workpiece. In accordance with one object of the present invention, a dressing fixture for grinding machines has been provided that is at all times mounted upon a fixed part of the grinding machine so as to enable the grinding wheel to be dressed at any desired time without requiring any adjustment or removal of the workpiece from the bed of the machine.

Another object of the present invention is to provide a grinding wheel dressing fixture for grinding machines which will allow the grinding surface of the grinding wheel to be dressed at substantially any angle or curve relative to the plane of the grinding wheel for special purposes.

Still another object of the present invention is to provide a grinding wheel dressing fixture of the type described, which has individual adjustment means for setting the dressing angle and for traversing the grinding surface of the wheel independently of the adjustment elements.

Still a further object of the present invention is to provide a grinding wheel dressing fixture of the above type that is extremely simple in construction, efficient in operation, accurate, and which can be installed on conventional grinding machines without interfering with the normal operation thereof.

Still another object of the present invention is to provide a combined safety wheel guard and dressing fixture for grinding machines that is mountable as a unit upon the spindle of the machine.

All of the foregoing and still further objects and advantages of this invention will become apparent from a study of the following specification, taken in connection with the accompanying drawing, wherein:

FIG. 1 is a side elevational view of a combined wheel guard and dressing fixture for grinding machines made in accordance with the present invention in operative use.

FIG. 2 is a side elevational view of the apparatus shown in FIG. 1.

FIG. 3 is a top plan view of the apparatus shown in FIG. 1.

FIG. 4 is an enlarged fragmentary longitudinal cross-sectional view taken along line 4—4 of FIG. 3.

FIG. 5 is an end view of a mounting bracket forming another part of the present invention.

FIG. 6 is a top plan view of the bracket shown in FIG. 5.

FIG. 7 is a front plan view of the bracket shown in FIG. 5.

FIG. 8 is a fragmentary cross-sectional view of a plurality of different grinding wheels dressed by a fixture made in accordance with the present invention.

Referring now to the drawing, and more particularly to FIGS. 1 and 2 thereof, a combined mounting bracket and wheel guard **10** for use with a grinding wheel dressing fixture for grinding machines made in accordance with the present invention, is shown to include a clamp sleeve **12** that is adapted to be secured to the bearing housing **12***a* of the spindle **19** of the grinding machine. By tightening the clamp bolt **11**, the mounting sleeve **12** can be securely attached to the bearing housing **12***a* in predetermined relationship with the grinding wheel **13**. This wheel **13** is partially enclosed within the cover **14** which has a segmental cutout portion **15** into which the dressing apparatus projects, for purposes hereinafter described.

The sleeve **12** has a longitudinally extending dovetail shaped groove **16** that is substantially parallel to the longitudinal axis of the spindle bearing of the grinding machine. A similarly shaped dovetailed extension **17** of a support arm **18** is slidably received within the groove **16** for reciprocating longitudinal movement. A longitudinal slot **22** in the sleeve member **12** which is parallel with the slot **16** defines a housing for a rack gear **24** with which a pinion **25** is meshingly engaged. This pinion **25** is secured to the outer end of the shaft **27** that is rotatably supported within a transverse bore in the arm **18** that extends upwardly into a main body member **20**. A handle **28** secured to the outer free end of the shaft **27** provides means for effecting rotation of the pinion **25** to thus adjust the position of the arm **18** and main body member **20** longitudinally of the rack gear **24**. It will thus be recognized that in response to rotation of the handle **28** a prescribed amount, which amount can be determined by the scale **30**, it is possible to effect longitudinal movement of the main body member **20** of the dressing fixture transversely across the grinding face of the grinding wheel **12**.

With further reference now to FIG. 4 of the drawing, the main body member **20** of the dressing fixture is also shown to have a vertical slot **33** into which a block **32** is slidably extended. An internally threaded vertical bore **34** through the slide block **32** threadedly receives a threaded shaft **35** which is rotatably mounted upon a bracket **36** at the top of the fixture. As a result, rotation of the handle **37** is operative to effect vertical adjustment of the slide block **32** within a plane that is parallel to the plane of the grinding wheel **13**. Graduations **38** on the hub **39** of the shaft **35** provide means for accurately determining the adjustment of the slide block **32** in this direction.

Through the transverse bore **41** in the slide block **32** extends a shaft **40** that is secured at one end to a handle **42** by means of a pin **43**. The opposite end of this shaft **40** that is rotatably received within the bore **41** is secured to a bridge member **45** for rotation therewith. A dial plate **46** is integral with the slide block **32** and has a circular groove **47** on the face side thereof in communication with a counter groove **48** on the rear face thereof. These grooves **47**, **48** slidably receive a bolt **50** that supports a pointer **51** which can be secured at any desired position around the periphery of the dial plate **46** by means of a clamping nut **52**. This pointer **51** may be set with reference to the scale on the dial plate **46** to function as a protractor for controlling the extent of rotation of the handle **42** and connected bridge **45**. A radially outwardly extending stop pin **54** integral with the handle **42** will abut the pointer **51** in response to rotation of the handle **42** the prescribed amount, all for purposes hereinafter more fully explained.

An arm **56** is pivotally connected to the bridge member **45** by means of an enlarged pivot pin **57** having a friction spring type washer **58** at the terminal end thereof. The outer end of the arm **56** has a transverse bore

59 into which a replaceable bushing 60 is releasably secured by means of a set screw 62. This bushing 60 also has a longitudinal bore 61 within which the diamond point dressing tool 63 is clamped by means of another set screw 64. The opposite end of the arm 56 threadedly supports a handle 66 that has a longitudinal bore 68 through which a pin 71 extends for reception within an indent 73 in the bridge 45. This pin 71 has a threaded shank 72 which may be selectively rotated within a recess 70 to extend and withdraw the pin, respectively, into and out of engagement with the indent 73 of the bridge to selectively lock and unlock the arm 56 for rotation about the mounting pin 57. The shank 72 has a knurled head 74 to facilitate the manual actuation thereof.

With reference now to FIGS. 5 to 7 of the drawing, a modified form of mounting bracket 80 for securing the grinding wheel dressing fixture unit to any fixed part of a grinding machine is shown to include a rigid plate 81 having a plurality of apertures 82 for receiving fastening bolts therethrough. A depending web 83 supports a slide guide bar 85 which mounts the dressing fixture for movement relative to the grinding wheel. This slide guide bar 85 includes a longitudinally extending dovetail slot 86 which slidably receives the extension 17 of the dressing fixture for relative longitudinal movement therewithin. A countersunk recess 88 accommodates the inwardly extending end of the pinion shaft 27 upon which the pinion 25 is secured. A rack gear 90 integral with the slide guide bar 85, intermediate the dovetail slot 86 and countersunk recess 88 meshingly engages the operating pinion 25 of the fixture to facilitate the selective longitudinal adjustment of the fixture therewithin. Thus, by rotating the handle 28 of the fixture, it is possible to adjust the position of the fixture in a direction normal to the plane of the grinding wheel in a manner similar to the adjustment provided by the engagement of the pinion 25 with the rack gear 24 of the combined mounting bracket and wheel guard 10 hereinbefore described.

In actual use, the grinding wheel dressing fixture is assembled with the wheel guard bracket mounting 10 and mounted upon the spindle bearing of the grinding machine in a manner illustrated in FIG. 1 of the drawing, or is assembled with the mounting bracket 80 and secured to any fixed part of the machine adjacent to the grinding wheel. With the dressing tool 63 out of engagement with the grinding wheel 13, the grinding wheel 13 may be used in a conventional manner to grind a workpiece mounted upon the bed of the machine. However, whenever it is desired to dress the grinding wheel 13, it is only necessary to move the dressing tool 63 into contact with the cutting surface of the grinding wheel in a prescribed manner.

By rotating the handle 28 of the fixture, the main body portion 20 can be brought into substantial alignment with the plane of the grinding wheel 13. Rotation of the other handle 37 enables the dressing tool 63 to be moved in a direction normal to the longitudinal axis of and parallel to the center plane of the grinding wheel 13 toward engagement with the peripheral grinding surface thereof. By then unlocking the pin 71 for the indent 73, and with the pointer 51 set at the zero position on the dial 46, the arm 56 can be pivoted about the pin 57 to traverse the dressing tool 63 back and forth across the grinding surface of the grinding wheel to dress it so that it defines a surface that is perpendicular to the central plane of the grinding wheel, such as one of the flat surfaces F of the grinding wheels 100*d, e, f* in FIG. 8. The grinding wheel can also be dressed so that the grinding surface defines an acute angle with the longitudinal center plane of the grinding wheel by setting the pointer 51 on the dial 46 to the proper angle setting, and rotating the handle 42 until the stop pin 54 engages the pointer 51. This will automatically rotate the longitudinal axis of the dressing tool 63 relative to the center plane of the grinding wheel to the prescribed angle, whereby traversing movement of the arm 56 in the aforementioned manner will dress the grinding surface of the grinding wheel to the prescribed angle, such as the inclined surfaces I of the grinding wheels 100*b, c, e, g* of FIG 8.

It will now be recognized that the particular setting of the pointer 51 will control the extent of movement of the stop pin 54 and the arm 56 to thereby control the angle of inclination of the dressed surface relative to the center plane of the grinding wheel.

A convex or concave grinding surface can be dressed by engaging the lock pin 71 to lock the arm 56 against movement relative to the bridge member 45, and by rotating the handle 42 back and forth to cause the point of the cutting tool to prescribe an arc relative to the grinding wheel. The radius of this arc may be adjusted by adjusting the position of the point of the tool relative to the longitudinal axis of rotation of the shaft 40 as by adjusting the length or position of the tool within the bushing 60. Concave surfaces V, such as on wheels 100*c, d, e* are made when the position of the cutting point of the tool is on the side of the longitudinal axis of the shaft 40 closest to the longitudinal axis of the grinding wheel. Convex surfaces X, such as on wheels 100*a, b, f, g,* may be made when the position of the tool point is on the side of the longitudinal axis of the shaft 40 furthest away from the longitudinal axis of the grinding wheel. In all cases, the position of the point of the cutting tool is controlled by the length of the cutting tool and the replaceable bushing 60.

As soon as the dressing operation has been completed, the dressing tool 63 may be moved slightly upwardly and toward one side, out of the immediate vicinity of the grinding wheel, whereby the grinding operation can be resumed. It is to be noted that throughout the entire dressing operation it is completely unnecessary to adjust, move, or in any way disturb the mounting of the work piece upon the bed of the grinder.

It will now be recognized that there are many possible radii and angles which can be combined to adjust the fixture so as accurately to dress the grinding wheel to substantially any desired contour. Also, any one of a group of pre-set bushings of predetermined length may be interchangeably inserted into the bore 59 of the arm 56, to position the point of the tool 63 accurately with respect to the axis of rotation of the shaft 40. This permits many different radii to be dressed on the same job, without having to re-set the tool 63 relative to the bushing 60 for each radius, simply by insertion the proper one of the pre-set bushings into the bore of the arm 56.

Another feature of the present invention is the portability and interchangeability of the fixture for use on various machines. Thus, the fixture may be permanently mounted upon a single machine, or may be conveniently used on several machines of a group merely by providing the proper mounting therefor on each machine with which the fixture may be used.

While this invention has been described with particular reference to the construction shown in the drawing, it is to be understood that such is not to be construed as imparting limitations upon the invention, which is best defined by the claims appended hereto.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent, is:

1. In a grinding machine having a spindle housing, a bearing carried by said housing rotatably supporting a spindle to which a grinding wheel is secured, a fixture for dressing said grinding wheel comprising, in combination, a bracket for attachment directly to and concentrically around said spindle housing, a dressing tool for said grinding wheel, a first adjustment means for changing the position of said cutting tool in a direction normal to the center plane of the grinding wheel, and a second adjustment means for changing the position of said cutting tool in a direction parallel to the center plane of the grinding wheel.

2. In a grinding machine having a spindle housing, a

bearing carried by said housing rotatably supporting a spindle to which a grinding wheel is secured, a fixture for dressing the grinding wheel comprising, in combination, a clamp sleeve for attachment directly to and concentrically around said spindle housing, a dressing tool for said grinding wheel, a first adjustment means for changing the position of said dressing tool in a direction normal to the center plane of the grinding wheel, a second adjustment means for changing the position of said dressing tool in a direction parallel to the center plane of the grinding wheel, and a third adjustment means for changing the angular position of the dressing portion of said dressing tool relative to the center plane of the grinding wheel.

3. In a grinding machine having a spindle housing, a bearing carried by said housing rotatably supporting a spindle to which a grinding wheel is secured, a fixture for dressing the grinding wheel comprising in combination a clamp sleeve for attachment directly to and concentrically around said spindle housing, a dressing tool for said grinding wheel, a first adjustment means for changing the position of said dressing tool in a direction normal to the center plane of the grinding wheel, a second adjustment means for changing the position of said dressing tool in a direction parallel to the center plane of the grinding wheel, a third adjustment means for changing the angular position of the dressing portion of said dressing tool relative to the center plane of the grinding wheel, an additional traversing means independent of said first, second and third adjustment means but pivotally carried by said third adjustment means for oscillating said dressing tool across the peripheral surface of the grinding wheel at an angle to the center plane of said grinding wheel for varying the profile of the circumferential surface of the grinding wheel.

4. In a grinding machine as set forth in claim 3, wherein said first adjustment means comprises an arm having a main body portion supporting said dressing tool, guide means slidably supporting said arm for movement in a direction normal to the center plane of the grinding wheel, and gear means acting between said arm and said clamp sleeve selectively effecting said sliding movement of said arm upon said clamp sleeve.

5. In a grinding machine as set forth in claim 4, wherein said second adjustment means comprises a block supporting said dressing tool, guide means acting between said main body portion and said block slidably directing the movement of said block in a direction normal to the direction of sliding movement of said arm upon said clamp sleeve.

6. In a grinding machine as set forth in claim 5, further comprising rotatable threaded shaft means selectively effecting said movement of said block upon said main body portion.

7. In a grinding machine as set forth in claim 6, wherein said third adjustment means comprises a bridge supporting said dressing tool, a shaft extending perpendicularly rotatably through said block, said bridge being secured to one end of said shaft, and a handle secured to the opposite end of said shaft for effecting selective rotation about the longitudinal axis thereof.

8. In a grinding machine as set forth in claim 7, wherein said traversing means comprises a dressing tool holder pivotally supported upon said bridge for selective rotation about an axis normal to the longitudinal axis of said shaft.

9. In a grinding machine as set forth in claim 8, further comprising releasable lock means normally maintaining said tool holder in fixed relationship with said bridge.

10. In a grinding machine as set forth in claim 9, further comprising protractor means associated with said shaft for limiting the angular movement of said bridge about the longitudinal axis of said shaft.

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