Jan. 23, 1962 A. J. JONES 3,017,875

FORM DRESSING DEVICE

Filed April 17, 1957 4 Sheets-Sheet 1

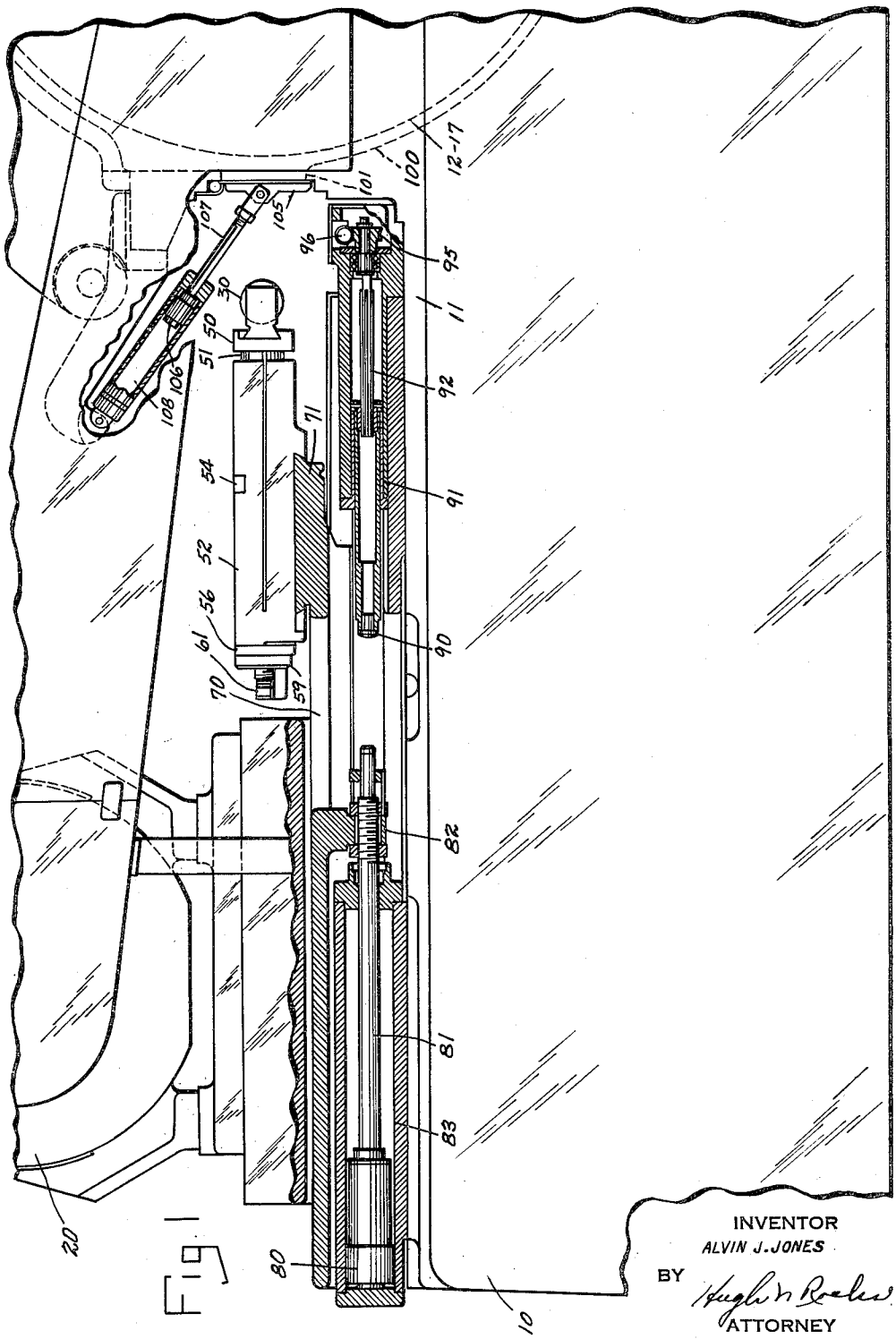


FIG. 1

INVENTOR
ALVIN J. JONES
BY Hughes & Rockey
ATTORNEY

Jan. 23, 1962 A. J. JONES 3,017,875

FORM DRESSING DEVICE

Filed April 17, 1957 4 Sheets-Sheet 2

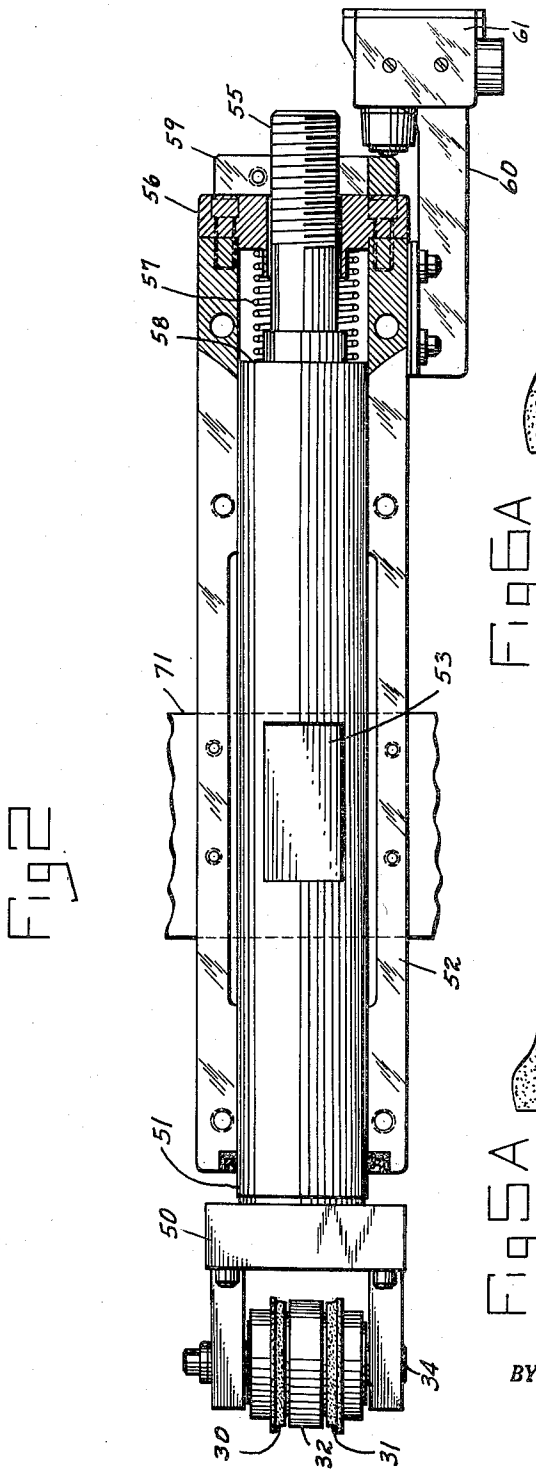


Fig 2

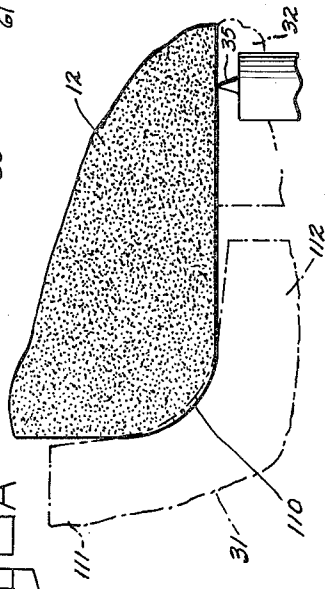


Fig 6A

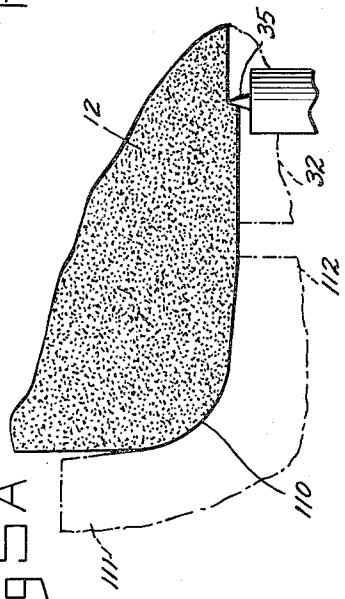


Fig 5A

INVENTOR.
ALVIN J. JONES

BY

Hugh D. Rocke

ATTORNEY

Jan. 23, 1962 A. J. JONES 3,017,875

FORM DRESSING DEVICE

Filed April 17, 1957 4 Sheets-Sheet 3

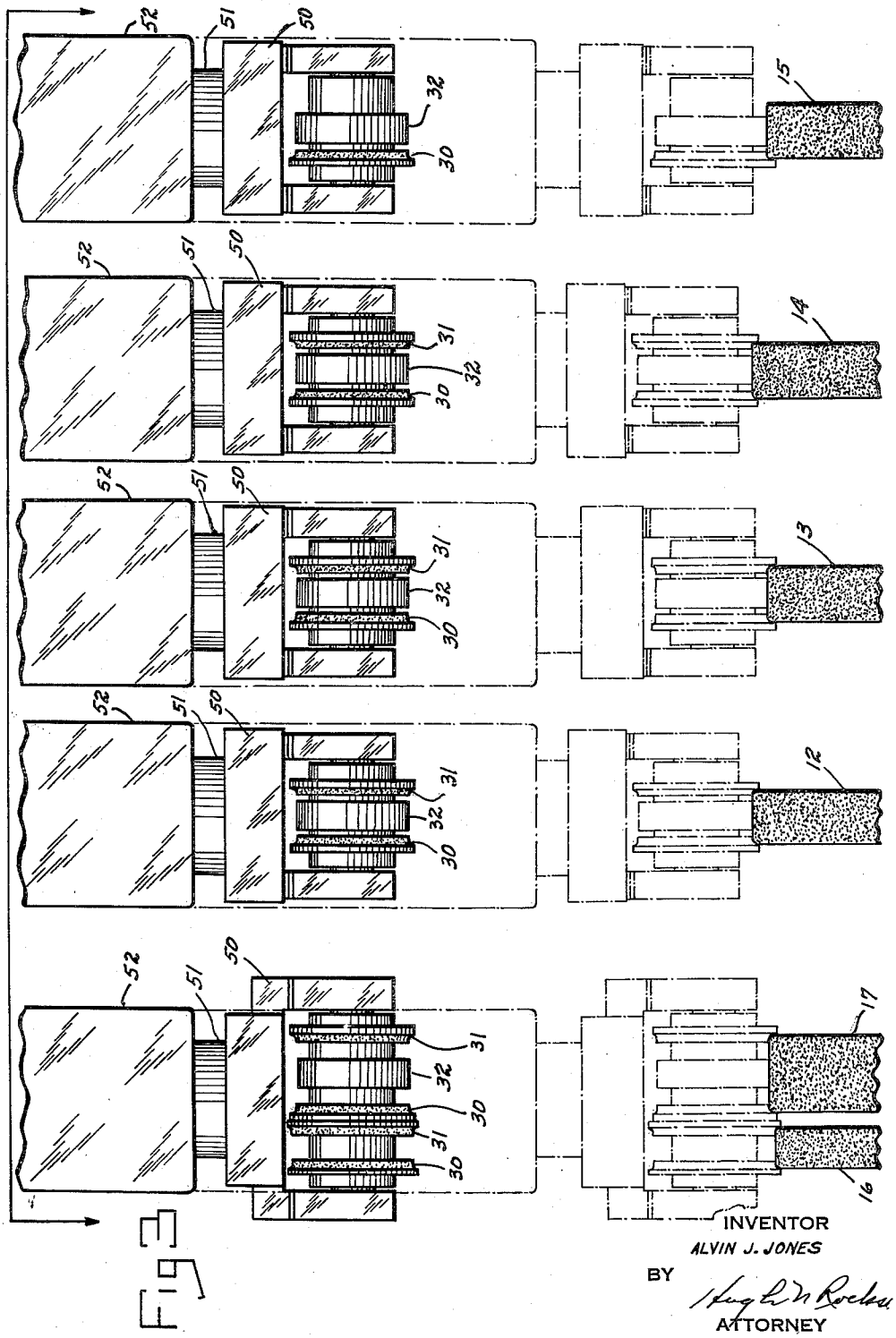


Fig. 3

INVENTOR
ALVIN J. JONES
BY
ATTORNEY

Jan. 23, 1962 A. J. JONES 3,017,875

FORM DRESSING DEVICE

Filed April 17, 1957 4 Sheets-Sheet 4

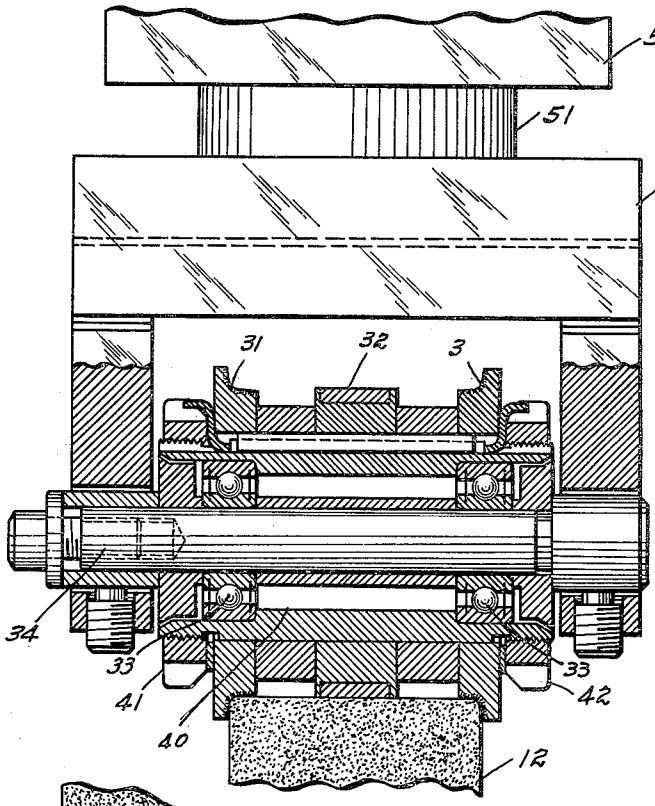


Fig 4

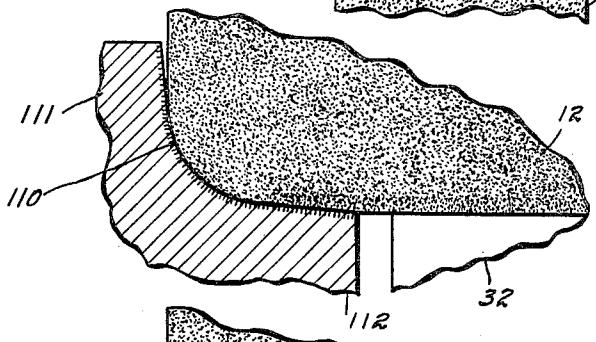


Fig 5

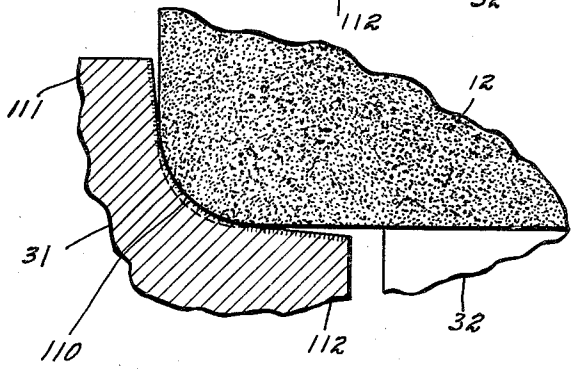


Fig 6

INVENTOR
ALVIN J. JONES
BY
ATTORNEY

United States Patent Office 3,017,875 Patented Jan. 23, 1962

3,017,875

FORM DRESSING DEVICE

Alvin J. Jones, Waynesboro, Pa., assignor to Landis Tool Company, Franklin, Pa.

Filed Apr. 17, 1957, Ser. No. 653,418
7 Claims. (Cl. 125—11)

This invention relates to forming and dressing apparatus for abrasive wheels.

For the grinding of work having spaced shoulder portions such as the crank pins and line bearings of an automotive crankshaft, the corners of the grinding wheel must be formed to a small radius. None of the devices used at present for this purpose is satisfactory. Perhaps the most commonly used means is a small piece of abrasive which the operator holds against the corner of a rotating wheel, testing the contour from time to time until an acceptable radius is formed.

It is an object of the present invention to provide means whereby corners of predetermined radii may be formed rapidly and accurately without interrupting the operating cycle of a grinding machine.

A further object is to provide axially spaced dressing members formed to dress wheel corners to a predetermined radius.

A further object is to provide means for limiting the penetration of the dressing members.

FIGURE 1 is a partial end elevation of a grinding machine showing the means for advancing and retracting a dressing device relative to the grinding wheel.

FIGURE 2 is a partial sectional plan view of a single dressing unit.

FIGURE 3 is a partial plan view of a plurality of dressing units arranged for simultaneously dressing a plurality of wheels of different diameters.

FIGURE 4 is a partial sectional plan view of a dressing tool for dressing the corners of a grinding wheel.

FIGURE 5 is an enlarged plan view of a corner of a grinding wheel showing the relation between the corner dresser and the locating roller when the corner dressing operation is performed *before* the face of the grinding wheel is dressed.

FIGURE 5A shows the relation between the wheel face, corner dresser and the face dresser when the corner dressing operation is performed before the face dressing operation.

FIGURE 6 is an enlarged plan view showing the relation between the corner dresser and the locating roller when the corner dressing operation is performed *after* the face of the grinding wheel is dressed.

FIGURE 6A shows the relation between the wheel face, corner dresser and the face dresser when the corner dressing operation is performed after the face dressing operation.

Numeral **10** indicates the bed of a grinding machine, **11** is a wheel base slidably mounted on said bed **10**. **12** to **17** inclusive are grinding wheels rotatably mounted on said wheel base **11**. These wheels are rotated through conventional means by a motor **20** mounted on wheel base **11**.

As shown in FIGURE 2, each dressing unit consists of one or two diamond impregnated rollers **30** and **31** with an intermediate or adjacent locating roller **32** all rotatably mounted on bearings **33** on a shaft **34**. Between said rollers and said bearings **33** is a sleeve **40** having threaded end portions on which nuts **41** and **42** are mounted to hold the rollers in proper axial position. A series of peripherally spaced teeth are formed on each of said nuts **41** and **42** so that the nuts may serve as impellers when acted upon by a stream of air or liquid to provide initial rotation of the dressing rollers before they engage the grinding wheel.

Shaft **34** is mounted on a yoke **50** on the end of shaft **51**. Shaft **51** is slidably mounted in a housing **52** and has a key way **53** in which a key **54** in the upper portion of housing **52** slides and prevents rotation of the shaft **51**. The other end of shaft **51** is reduced in diameter and has a threaded portion **55** which extends through the cap **56** on housing **52**. One end of spring **57** engages said cap **56** and the other end engages a shoulder **58** on shaft **51**. A nut **59** on said threaded portion **55** determines the extent to which shaft **51** may be moved in said housing **52** by spring **57**. A limit switch **61** is mounted on a bracket **60** attached to housing **52**. When said housing **52** is moved axially to position the dressing rollers against a grinding wheel, housing **52** may continue to move a slight distance after the dressing rollers engage the grinding wheel until locating roller **32** engages the wheel at which time the movement of the shaft is stopped while housing **52** may continue to advance against spring **57**. The result of the relative movement between the dresser shaft **51** and housing **52** causes switch **61** to engage nut **59** to close a circuit to put into operation the means for retracting the entire dressing assembly whether it consists of one or more than one dresser.

One or more dressing units may be mounted on wheel base **11** on a slide member **70** slidably mounted on suitable guide surfaces in wheel base **11**. Slide member **70** has a longitudinally extending dove-tail guide portion **71** on which each of the dressing units is mounted for axial adjustment relative to the grinding wheel. Means for moving slide member **70** toward and from operative position consists of a piston **80** having a piston rod **81** connected to a depending portion **82** of slide member **70**. Piston **80** is slidably mounted in a cylinder **83** in wheel base **11**. Forward movement of piston **80** and slide member **70** is limited by an adjustable stop member **90** having a threaded connection with sleeve **91**. Said stop member **90** is hollow and slidably mounted on a spline shaft **92** connected through suitable mechanisms including a worm wheel **95** and a worm gear **96** with means (not shown) for adjusting the wheel base **11** to compensate for wheel wear and dressing.

Wheel guard **100** has an opening **101** to commit the entrance of the dressing device into engagement with the wheel or wheels. Said opening **101** is provided with a pivoted cover member **105** connected to a piston **106** by means of piston rod **107**. Said piston **106** is mounted in cylinder **108** into which fluid under pressure may be introduced in timed relation with the movement of the dressing device in order to lift cover **105** when the dressing device is approaching the grinding wheel and to replace after the dressing device has been withdrawn.

In FIGURE 3, as shown, a plurality of dresser units mounted on slide member **70** and operable when advanced to the dot and dash line to engage and dress wheels of different diameters by virtue of the yielding mounting of each of the dresser units in the respective housing **52**. In the retracted position, the dresser units are in substantial axial alignment. The slide member **70** advances them to the operative position and continues to move forward until the wheel of the smallest diameter is engaged by its dresser.

FIGURE 5 shows the relation between the dressing roller **31** and the locating roller **32** when the corners are dressed first. When the dressing tool approaches the grinding wheel, the locating roller **32** engages the undressed wheel surface and limits the extent of the dressing operation of roller **31** on the corners of the wheel. The surface of locating roller **32** is advanced to a lesser extent relative to the dressing roller **31** shown in FIGURE 6 in which locating roller **32** engages the previously dressed wheel face. The face dressing may be effected

in the conventional manner by a diamond dressing tool **35** as shown in FIGURES 5A and 6A.

In FIGURE 6, the surface of the roller is substantially tangent to the radius formed on the wheel corner.

FIGURES 5 and 6 both show the dressing roller **31** to consist of an intermediate portion **110** extending through an arc slightly less than 90°. This portion of the roller is not necessarily a true arc. It may be any suitable curve on either of said portion **110** or end portions **111** and **112** respectively. The straight line surfaces of roller **31** are tangent to the intermediate portion at points less than 90° apart. The angle between the faces of the end portions adjacent to the grinding wheel are more than 90° apart. Rollers **30** and **31** may be of any material or composition suitable for renewing the cutting surface of a grinding wheel either by dressing or crushing.

Operation

The face of the grinding wheel may be dressed by single point diamond dressers as shown in Patent 2,248,463, granted July 8, 1941, and Patent 2,340,683, granted February 1, 1944. The dressing operations disclosed in these patents may be performed before or after the dressing of the corners.

When it is desired to perform a dressing operation, piston **80** is actuated to move slide member **70** toward the grinding wheel. Movement of slide member **70** is transmitted to the dressing roller **30** through housing **52**, spring **57** and dresser shaft **51**. When the rollers **30** and **31** engage the grinding wheel, their forward movement is retarded, but slide member **70** and housing **52** continue to move and the difference in movement of the two members is taken up by spring **57**. When roller **32** engages the peripheral surface of the grinding wheel, it serves as a stop to prevent further penetration of the grinding wheel by the rollers **30** and **31**. The continued forward movement of slide member **70** and housing **52** causes switch **61** to engage nut **59** and complete a circuit (not shown) to reverse the supply of fluid under pressure to cylinder **83** so that piston **80** will move to a rearward position and withdraw the dressing tool from the grinding wheel.

The above description of the operation is the same regardless of whether a single wheel is being dressed or whether a plurality of wheels are being dressed as shown in FIGURE 3. No previous adjustment or setting of the dresser mounting is required to adjust a dresser to the position of the grinding wheel surface. If a pluraltiy of wheels is being dressed, the respective dressers are advanced and the advance of the main slide continues until the smallest wheel has been engaged and dressed by its dresser. In retracted position, the dressers are all in axial or longitudinal alignment. When advanced, each dresser adapts itself to the diameter of a particular wheel regardless of the position of the other dressers on the same slide.

I claim:

1. A wheel dressing device for dressing a predetermined form on a grinding wheel comprising a holder, a dressing roller mounted for free rotation on said holder, said roller being formed to correspond to the shape to be produced on the grinding wheel, and means for effecting a preliminary rotation of said roller before it engages the grinding wheel.

2. A wheel dressing device for dressing a predetermined form on a grinding wheel comprising a holder, a dressing roller mounted for free rotation on said holder, said roller being formed to correspond to the shape to be produced on the grinding wheel, means for effecting a preliminary rotation of said roller before it engages the grinding wheel, and means on said roller mounting for engaging the grinding wheel and limiting the approach of said dressing roller relative to said grinding wheel.

3. A wheel dressing device for dressing a grinding wheel comprising a housing movable toward and from an operative relation with the grinding wheel, a shank slidably mounted in said housing and urged in one direction by a spring, a dresser holder on said shank, a dressing roller rotatably mounted for free rotation in said holder, and means adjacent said dressing roller for engaging the grinding wheel and limiting the approach of said dressing roller relative to said grinding wheel.

4. A wheel dressing device for dressing a predetermined form on a grinding wheel comprising a holder, a dressing roller mounted for free rotation on said holder, said roller being formed to have an arc of contact with said wheel of less than 90°, means for effecting a preliminary rotation of said roller before it engages the grinding wheel, and means on said roller mounting for engaging the grinding wheel and limiting the approach of said dressing roller relative to said grinding wheel.

5. A wheel dressing device for dressing predetermined forms on a plurality of axially spaced grinding wheels comprising a base member slidably mounted for movement toward and from the grinding wheels, a plurality of dressing tools each slidably mounted on said base member in spaced relation corresponding to the spacing of said grinding wheels, each of said dressing tools comprising a dressing roller mounted for free rotation and having a predetermined form corresponding to the form to be produced on the respective grinding wheels, each of said dressers being yieldingly held in a predetermined forward position, whereby when all of said dressers are advanced to engagement with the grinding wheels, each will accommodate itself to the diameter of the wheel which it is to dress.

6. A wheel dressing device for dressing predetermined forms on a plurality of axially spaced grinding wheels comprising a base member slidably mounted for movement toward and from the grinding wheels, a plurality of dressing tools each slidably mounted on said base member in spaced relation corresponding to the spacing of said grinding wheels, each of said dressing tools comprising a dressing roller mounted for free rotation and having a predetermined form corresponding to the form to be produced on the respective grinding wheels, each of said dressers being yieldingly held in a predetermined forward position, whereby when said base member is advanced toward the grinding wheels, it will continue to advance after the largest wheel is engaged by its dressing roller until the smallest wheel has been engaged by its dressing roller.

7. A wheel dressing device for dressing a predetermined form on a grinding wheel comprising a base member slidably mounted for movement toward and from said grinding wheel, a dressing tool slidably mounted on said base member for adjustment on said base member toward and from said grinding wheel, said dressing tool comprising a dressing roller mounted for free rotation and having a predetermined form corresponding to the form to be produced on the grinding wheel, said dresser being yieldingly held in a predetermined forward position, whereby to yieldingly engage a grinding wheel when advanced on said base member into engagement with said grinding wheel.

References Cited in the file of this patent

UNITED STATES PATENTS

1,687,252	Laessker	Oct. 9, 1928
1,877,505	Haas et al.	Sept. 13, 1932
2,170,389	Payne	Aug. 22, 1939
2,213,665	Brendel et al.	Sept. 3, 1940
2,360,127	Harley et al.	Oct. 10, 1944
2,393,463	Gottlieb	Jan. 22, 1946
2,586,673	Linxweiler et al.	Feb. 19, 1952
2,701,986	Petty	Feb. 15, 1955

FOREIGN PATENTS

183,614	Great Britain	Aug. 3, 1922
428,004	Great Britain	May 3, 1935

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,017,875 January 23, 1962

Alvin J. Jones

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, line 2, and in the heading to the printed specification, line 4, for "Franklin", each occurrence, read -- Waynesboro --.

Signed and sealed this 8th day of May 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents