Sept. 20, 1960 L. LIVINGSTON 2,952,953

WORK SUPPORT FOR CENTERLESS GRINDER

Filed June 22, 1959 2 Sheets-Sheet 1

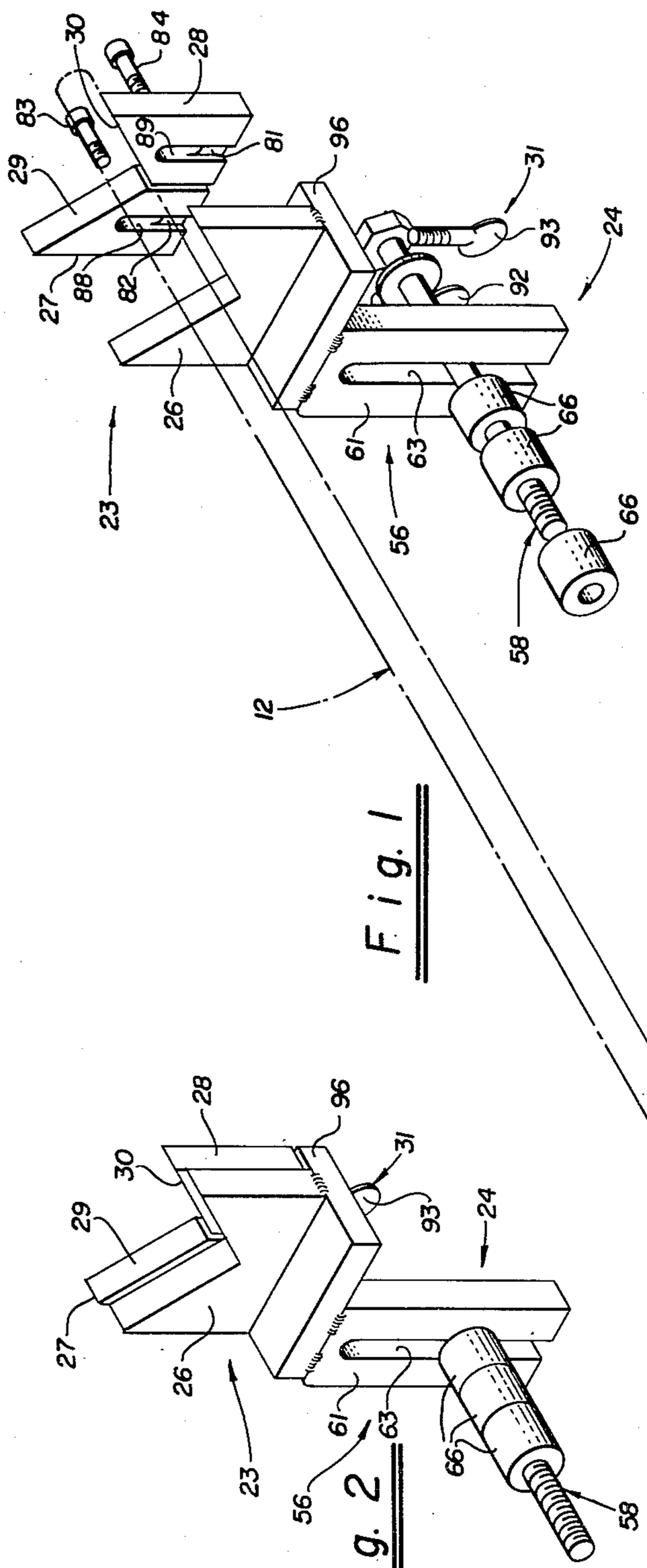

Fig. 1

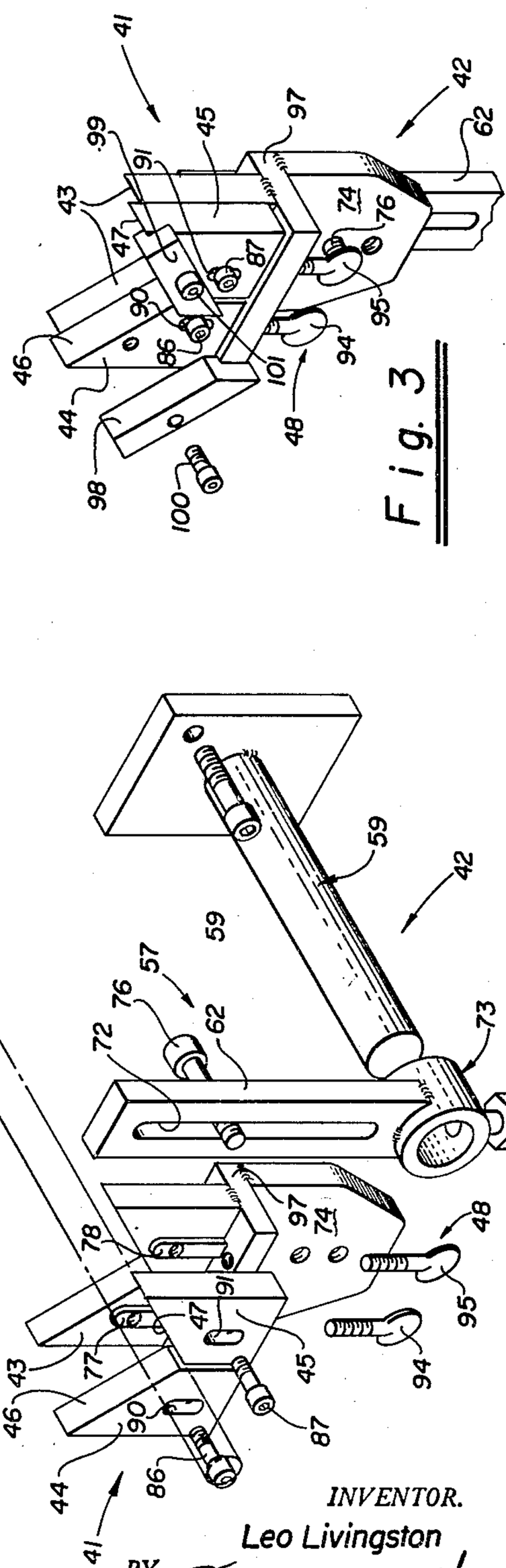

Fig. 3

Fig. 2

INVENTOR.
Leo Livingston
BY Manfred Hattan
His Attorney

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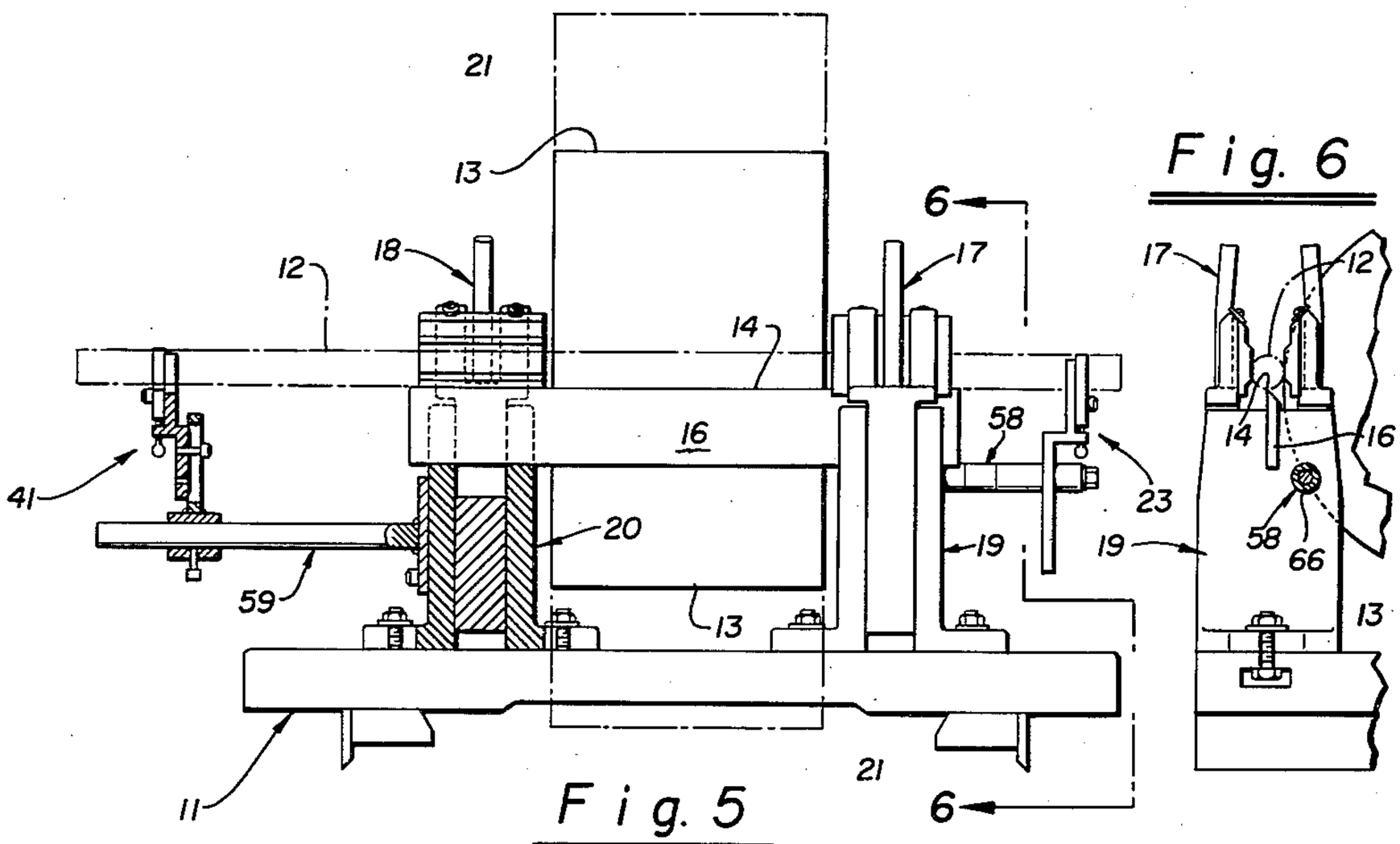

Fig. 5

Fig. 6

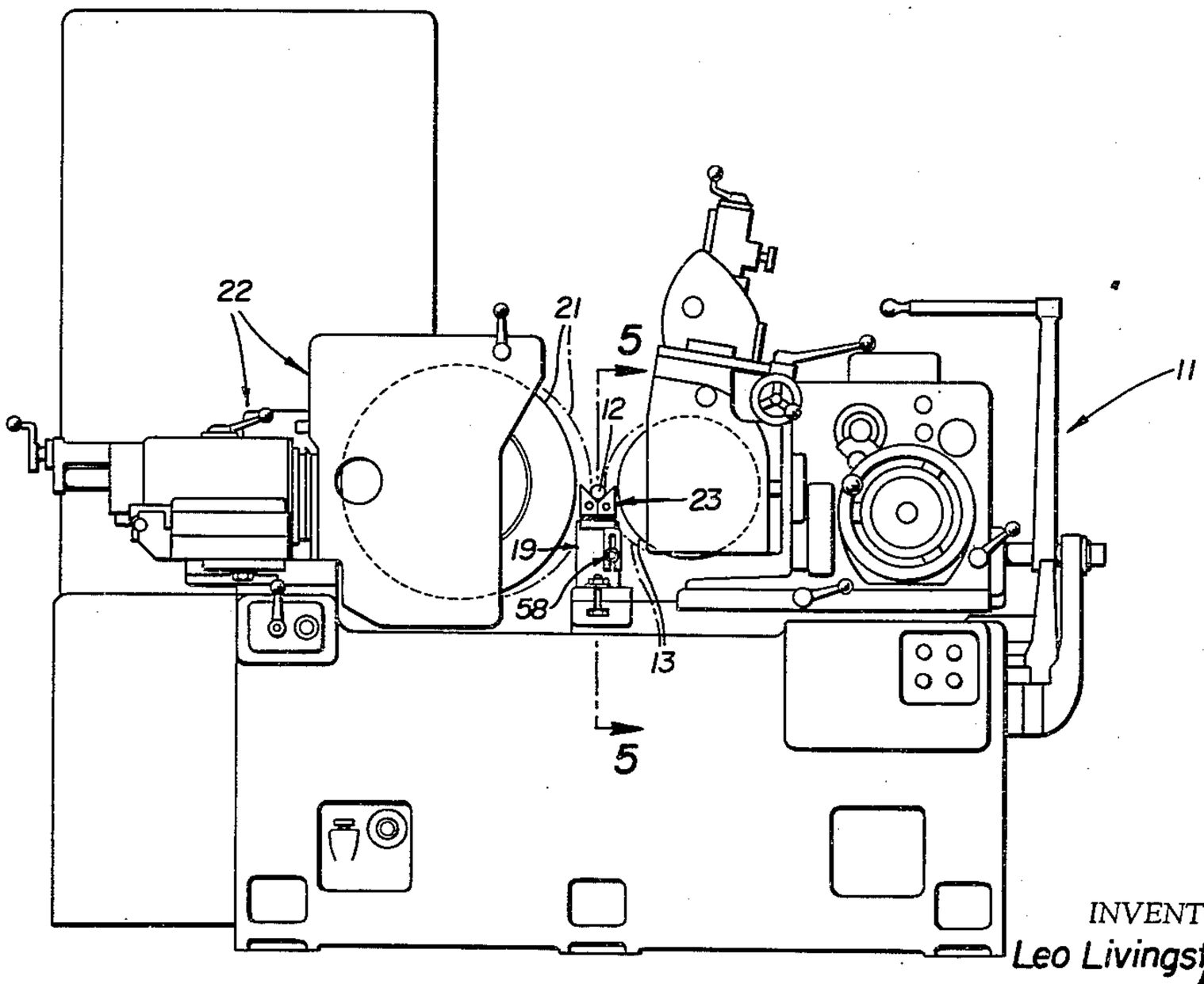

Fig. 4

INVENTOR.
Leo Livingston
BY
Manfred D. Harman
His Attorney

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WORK SUPPORT FOR CENTERLESS GRINDER

Leo Livingston, 2217 Ewell Road, Belmont, Calif.

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4 Claims. (Cl. 51—238)

This invention relates to work supports for centerless grinding machines and particularly to supports for outboard disposition to support the ends of long work pieces.

An object of the present invention is to provide an outboard support for one or both ends of a long workpiece in a centerless grinding machine, the support being subsidiary to and functioning in conjunction with the inboard support of the machine, to provide easy handling and very accurate grinding of the work.

It is another object of the invention to provide a work support for a centerless grinder of the character above, which is adaptable for use with and mounting on the several makes and types of centerless grinding machines presently available, and which, when so installed, may be quickly and easily adjusted by the operator to afford a micrometric truing in of the work for grinding with very high precision.

A further object of the invention is to provide a work support of the character described which is composed of a few simple and rugged parts capable of giving a long and useful life.

The invention possesses other objects and features of advantage, some of which of the foregoing will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of this specification. It is to be understood however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings (two sheets):

Figure 1 is an exploded perspective view of a work support for centerless grinders constructed in accordance with the present invention.

Figure 2 is a perspective view of a portion of the support in assembled state.

Figure 3 is a partly exploded perspective view of another portion of the support of the invention.

Figure 4 is a side elevation view on a reduced scale of the work-input side of a centerless grinding machine with the support of the present invention applied thereto.

Figure 5 is a fragmentary, partly cut-away view, on an enlarged scale, of the machine and the support substantially on the plane of lines 5—5 of Figure 4.

Figure 6 is a fragmentary side view partly in section of a portion of the machine and support and is taken along lines 6—6 of Figure 5.

The work support of the invention is shown above in Figure 1 and in Figures 4–6 it is shown mounted on a typical centerless grinding machine **11** for support of a workpiece **12**, it being understood that the workpiece **12** is primarily supported for rotation by a rotating regulating wheel **13** of the machine and the upper edge **16** of a work-supporting blade **14** (Figure 6), the regulating wheel being slightly axially inclined to drive the workpiece from the input side (Figure 4) to the output side of the machine **11**. Also shown (Figures 5–6) are conventional guide brackets **17** and **18** mounted on bases

19 and **20** of the machine **11** to help guide the ends of the workpiece into and out of the machine, and a conventional abrasive grinding wheel **21** mounted on a sliding carriage **22**.

The work support for centerless grinder of the present invention consists briefly of a work supporting unit **23**; means **24** for mounting the unit **23** on a centerless grinding machine **11** in an outboard position with respect to and in general alignment with the upper edge **16** of the work supporting blade **14** and the adjacent periphery of the regulating wheel **13** of the machine; the unit **23** includes a supporting member **26** (see particularly Figures 1 and 2) and a pair of jaw members **27** and **28** mounted for individual relative movement thereon; adjacent faces of the jaw members being bevelled from an intermediate vertical plane to provide upwardly diverging V-shaped work supporting surfaces **29** and **30**; and micrometer adjustment means **31** connecting the supporting member **26** and each of the jaw members **27** and **28** to afford micrometric lateral and vertical displacement of the points of support provided by the work supporting surfaces **29** and **30** for displacing the points of support into precise alignment with the lines of support provided by the top edge **16** of the work supporting blade **14** and the periphery of the regulating wheel **13**.

Preferably, and as here shown, the jaw members **27** and **28** are mounted in side-by-side relation and are retained for individual vertical movement relative to the supporting member **26** by the micrometer adjustment means **31**. It will be seen that, since the surfaces **29** and **30** form a V-shaped, upwardly diverging cradle, the relative vertical movement of the surfaces **29** and **30** provide a full desired range of transverse and vertical displacement of the work.

Further and important advantages are obtained in use of a pair of work supporting units of the character described on the opposite sides of the centerless grinding machine as here shown, work supporting unit **23** is mounted on the input side of the machine **11**, and a second unit **41** is mounted on the opposite (output) side of the machine to perform a similar supporting function for the workpiece as it is discharged therefrom. The work supporting unit **41** has a mounting means **42**, a supporting member **43**, and a pair of jaw members **44** and **45** similarly mounted side-by-side for individual vertical movement on the member **43**, the upper faces of the jaw members being similarly bevelled to form work supporting surfaces **46** and **47**. A similar micrometer adjustment means **48** is also provided for controlling the individual vertical movements of the jaw members, to afford micrometric lateral and vertical displacement of the points of support provided by the surfaces **46** and **47** relative to the cylindrical workpiece.

Mounting means **24** and **42** here include mounting brackets **56** and **57**, respectively, connected to the respective work supporting units **23** and **41** and each having a base member **58**, **59** and a vertical arm **61**, **62** mounted on the respective base member for adjustable movement parallel with the work supporting blade **14** of the machine for adjustably spacing the work supporting units **23** and **41** for the ends of the blade **14**. Base member **58** is here fashioned as a bolt for convenient threading into an existing or specially provided mounting opening in the base **19** of the machine. A plurality of spacers **66** cofunction with the mounting arm **61** and vertical slot **63** therein, as depicted in Figure 1, to provide accurate spacing of the unit **23** away from the end of the blade **14**, so as to accommodate various lengths of work. By loosening the bolt **58**, the operator may raise or lower the unit **23** to provide the rough or general adjustment of the work support. Bracket **57** is of alternative design, in which the base member **59** is formed as a cy-

lindrical shaft **71** fastened to the machine base **20**, and the arm **62** has a vertical slot **72** and terminates at the bottom in a collar and set-screw assembly **73** fitting the shaft **71**. Supporting member **43** has a downwardly extending plate **74** fastened for relative vertical and rotational movement to arm **62** by a bolt **76** inserted through the slot **72** and threaded into the plate **74**. It will be seen that the brackets **56** and **57** each have some degree of horizontal or rotational adjustment around the bolt **64** and shaft **71**, and are capable of adjustment lengthwise of the shaft and bolt as well.

Referring now to the work supporting units **23** and **41**, the jaw members **27**, **28**, **44** and **45** are preferably keyed to their respective supporting members **26** and **43** for individual vertical sliding motion. As here shown, vertically-elongated raised key portions **77** and **78** are formed on each of the supporting members **26** and **43**, and matching vertical channels **81** and **82** are formed in the respective jaw members to provide the keying structure. Locking means **83**, **84**, **86** and **87** are provided for securing the jaw members in adjusted position, and here consist of bolts mounted through elongated vertical slots **88**, **89**, **90** and **91** in the respective jaw members and threaded into the respective supporting members. The micrometer adjusting means **31** and **48** here include manually engageable screws **92**, **93**, **94** and **95** connecting each of the supporting members **26** and **43** and the respective jaw members **27**, **28**, **44** and **45** for controlling the individual vertical movements of the jaw members. In particular, the screws **92–95** are threaded upwardly through extensions **96** and **97** of the supporting members **26** and **43** and bearing against the bottoms of the respective jaw members.

As shown in Figure 3, the work supporting surfaces **46** and **47** (and the surfaces **29** and **30** as well) may be faced with replaceable bearing facings **98** and **99** secured by fasteners **100** and **101**.

By way of further explanation, centerless grinders of the general type to which the present invention relates are made in various sizes to accommodate work of various lengths and dimensions and with varying grinding capacities. Perhaps the most common machine in present use is known as the #2 Cincinnati, which is generally illustrated in the drawings. This machine will handle work of various lengths, from a fraction of an inch in length to 2 ft., 3 ft., 4 ft., and on up, 12 ft. not being uncommon. The work supports of the present invention should be mounted, in so far as practical to support the work, particularly at the outgoing end of the machine, in proper alignment, until the work is fed through by the regulating wheel to its final grinding position. At this point the work will be supported by the internal blade **14** and the outbound work support **23**. The grinding wheels used in the machine will vary in widths up to about 8 inches, and the machine as illustrated will furnish a further outboard support for about another 4 inches, so that the support of the present invention has an important function in handling lengths in excess of about 8 inches, that is, in the type and size of machine above described. In a somewhat similar manner, the work support **23** at the input side of the machine is spaced in an outboard position to support properly the work going in to the machine and for ease of feeding.

In use, the work support of the invention is first brought into very close alignment with the blade **14** and regulating wheel **13**, as described above, by adjustment of the brackets **56** and **57** (the blade and regulating wheel having been already perfectly aligned and dressed for the particular workpiece to be ground). This first alignment is about as close as the operator can see and feel with a length of a sample workpiece spanning the upper edge **16** of the blade and the outboard work supports. The micrometer means **31** and **48** are then used to make the best possible first-approximation adjustment

and a sample length of work is sent through on a first pilot pass or run.

Inaccuracies of alignment are now readily discernible by examining the sample work moreover; and as an important feature of the present invention, the telltale defects in the work sample can be readily translated into required adjustment of the individual jaw members, so that on subsequent passes of the sample workpiece and adjustment of the jaw members, very high precision grinding of the work can be obtained. The telltale signs on the work and the correlating correcting adjustment are soon mastered by a skilled workman. Normally the workpiece is measured with a micrometer at both ends and at its middle to detect the presence of differences in diameter. If the going-in end of the work is too large, jaw **27** is to be lowered. If the going-in end of the work is too small, jaw **28** is to be lowered. If the going-out end of the work is too large, jaw **44** is to be lowered. If the going-out end of the work is too small, jaw **45** is to be lowered. Other telltale signs include spiral markings on the workpiece and the presence of flats on the coming out end, and these likewise may be co-related into required adjustment of the jaw members and of the blade **14** and regulating wheel.

I claim:

1. A work support for a centerless grinding machine comprising, a work supporting unit, means for mounting said unit on a centerless grinding machine in an outboard position with respect to and in general alignment with the upper edge of the work supporting blade and the adjacent periphery of the regulating wheel of the machine, said unit including a supporting member and a pair of jaw members mounted for individual relative movement thereon, adjacent faces of said jaw members being bevelled from an intermediate vertical plane to provide upwardly diverging V-shaped work supporting surfaces, and micrometer adjustment means connecting said supporting member and each of said jaw members to afford micrometric lateral and vertical displacement of the points of support provided by the work supporting surfaces for displacing said points of support into precise alignment with the lines of support provided by the top edge of the work supporting blade and the periphery of the regulating wheel of the machine.

2. A work support for a centerless grinding machine comprising, a work supporting unit, means for mounting said unit on a centerless grinding machine in an outboard position with respect to and in general alignment with the upper edge of the work supporting blade and the adjacent periphery of the regulating wheel of the machine, said unit including a supporting member and a pair of jaw members mounted side-by-side for individual vertical movement thereon, the upper faces of said jaw members being bevelled from an intermediate vertical plane to provide upwardly diverging V-shaped work supporting surfaces, and micrometer adjustment means connecting said supporting member and each of said jaw members for controlling said individual vertical movements thereof and to afford micrometric lateral and vertical displacement of the points of support provided by the work supporting surfaces for displacing said points of support into precise alignment with the lines of support provided by the top edge of the work supporting blade and the periphery of the regulating wheel of the machine.

3. A work support for a centerless grinding machine comprising, a pair of work supporting units, means for mounting said units on opposite sides of a centerless grinding machine in outboard positions with respect to and in general alignment with the upper edge of the work supporting blade and the adjacent periphery of the regulating wheel of the machine, each of said units including a supporting member and a pair of jaw members mounted side-by-side for individual vertical movement thereon, adjacent faces of each pair of jaw members being bevelled from an intermediate vertical plane to provide upwardly

diverging V-shaped work supporting surfaces, and micrometer adjustment means connecting each of said supporting members and each of the respective jaw members for controlling said individual vertical movements thereof and to afford micrometric lateral and vertical displacement of the points of support provided by the work supporting surfaces for displacing said points of support into precise alignment with the lines of support provided by the top edge of the work supporting blade and the periphery of the regulating wheel of the machine.

4. A work support for a centerless grinding machine comprising, a pair of work supporting units, mounting brackets connected to said units for mounting said units on a centerless grinding machine in outboard positions with respect to and in general alignment with the upper edge of the work supporting blade and the adjacent periphery of the regulating wheel of the machine, each of said mounting brackets having a base member and a bracket member mounted thereon for adjustable movement parallel with the work supporting blade of said machine for adjustably spacing said work supporting units from the contiguous ends of said blade, each of said work supporting units including a supporting member and a pair of jaw members mounted side-by-side and keyed to said

supporting member for individual vertical sliding movement thereon, and locking means connecting each of said supporting members and the respective jaws for setting the vertical positions of said jaws thereon, the upper faces of each pair of jaw members being bevelled from an intermediate vertical plane to provide upwardly diverging V-shaped work supporting surfaces, manually engageable screws connecting each of said supporting members and the respective jaw members for controlling the individual vertical movements thereof and to afford micrometric lateral and vertical displacement of the points of support provided by the work supporting surfaces for displacing said points of support into precise alignment with the lines of support provided by the top edge of the work supporting blade and the periphery of the regulating wheel of the machine.

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