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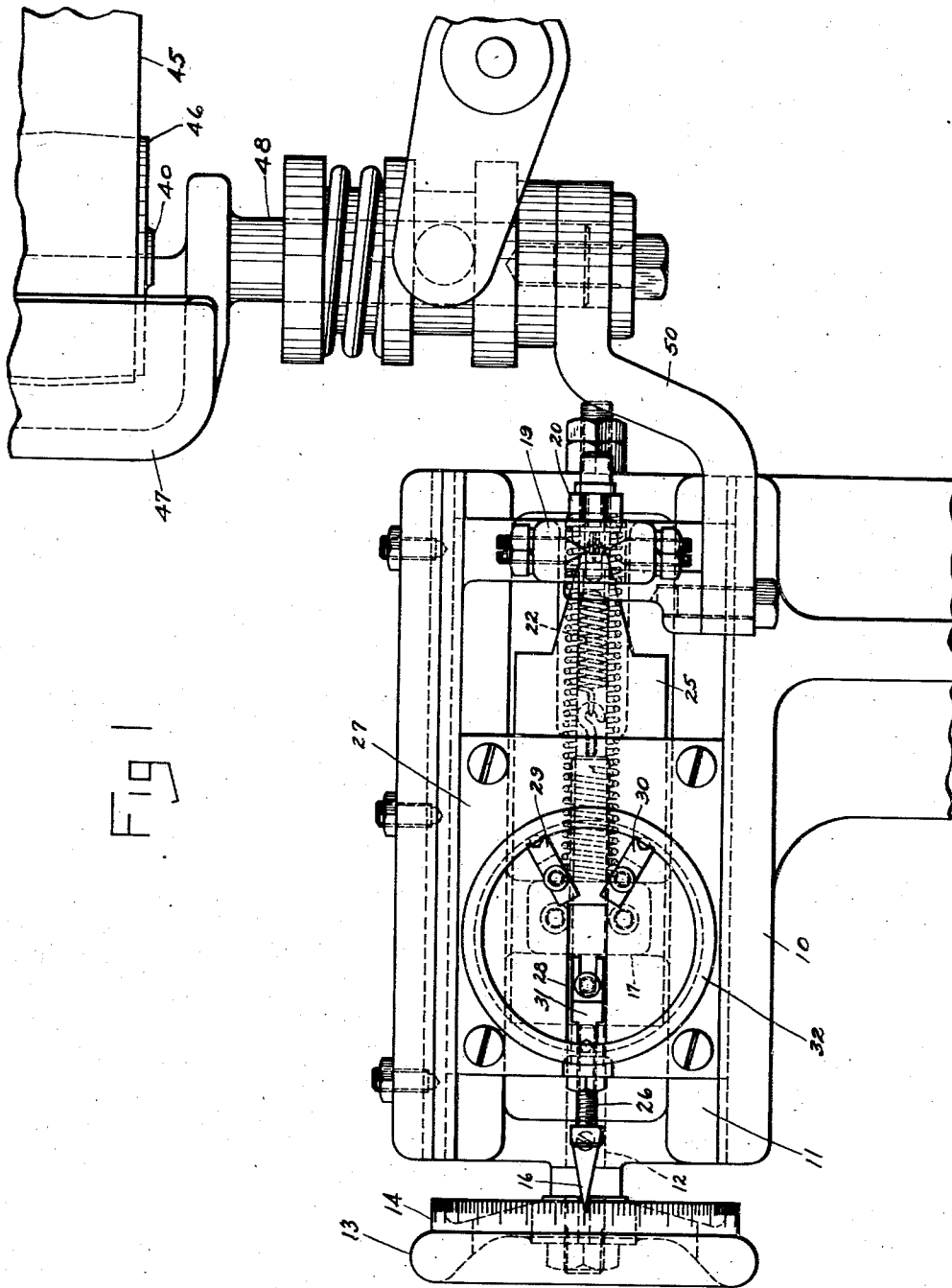
D. GURNEY ET AL

2,275,141

SIZE REGULATOR

Filed Dec. 30, 1939

3 Sheets-Sheet 1



Inventor

DANIEL GURNEY
MILBURN A. HOLLENGREEN

Hugh W. Rock
Attorney

March 3, 1942.

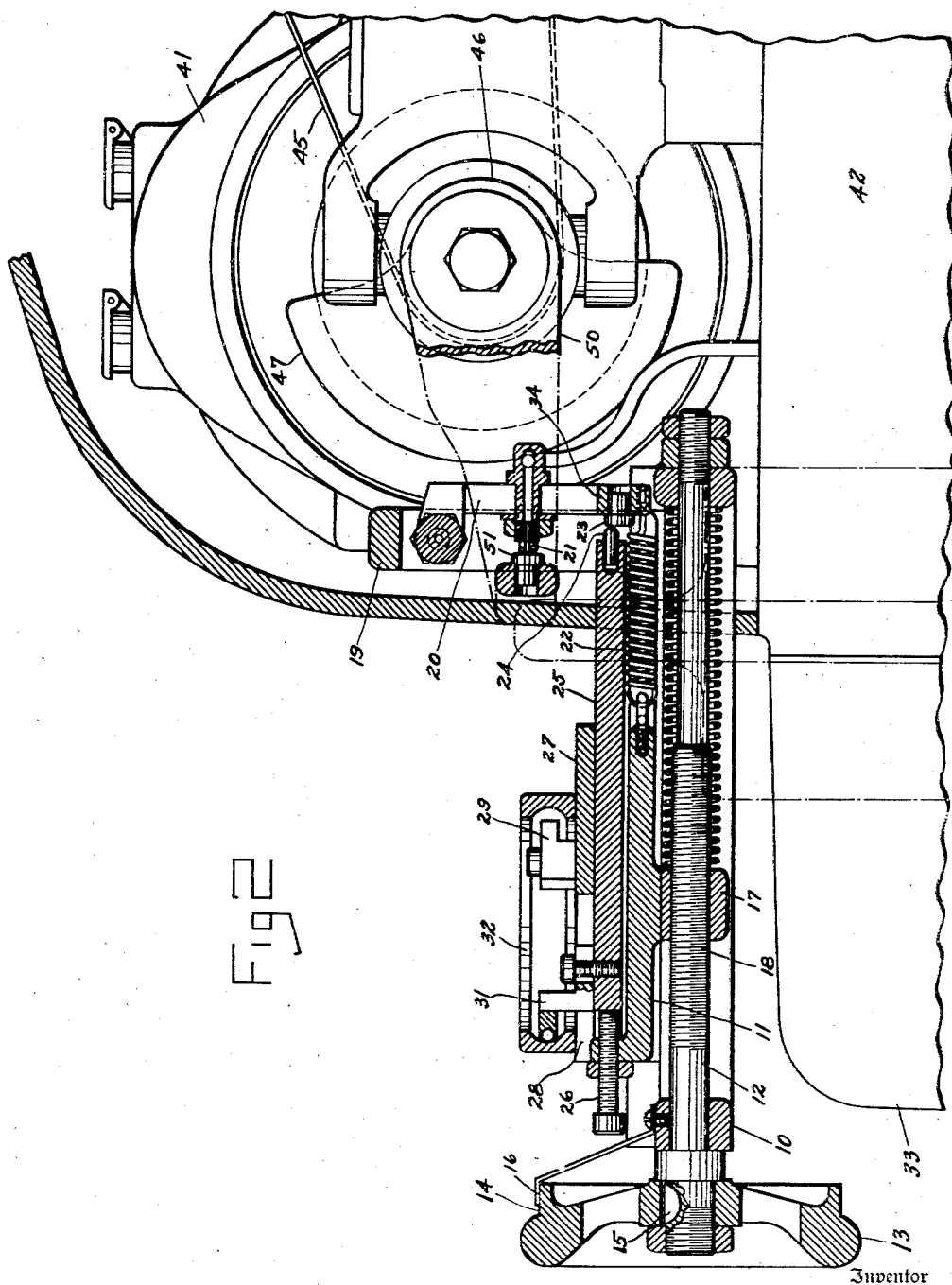
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Inventor

DANIEL GURNEY

MILBURN A. HOLLENGREEN

Hugh D. Rocks
Attorney

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March 3, 1942.

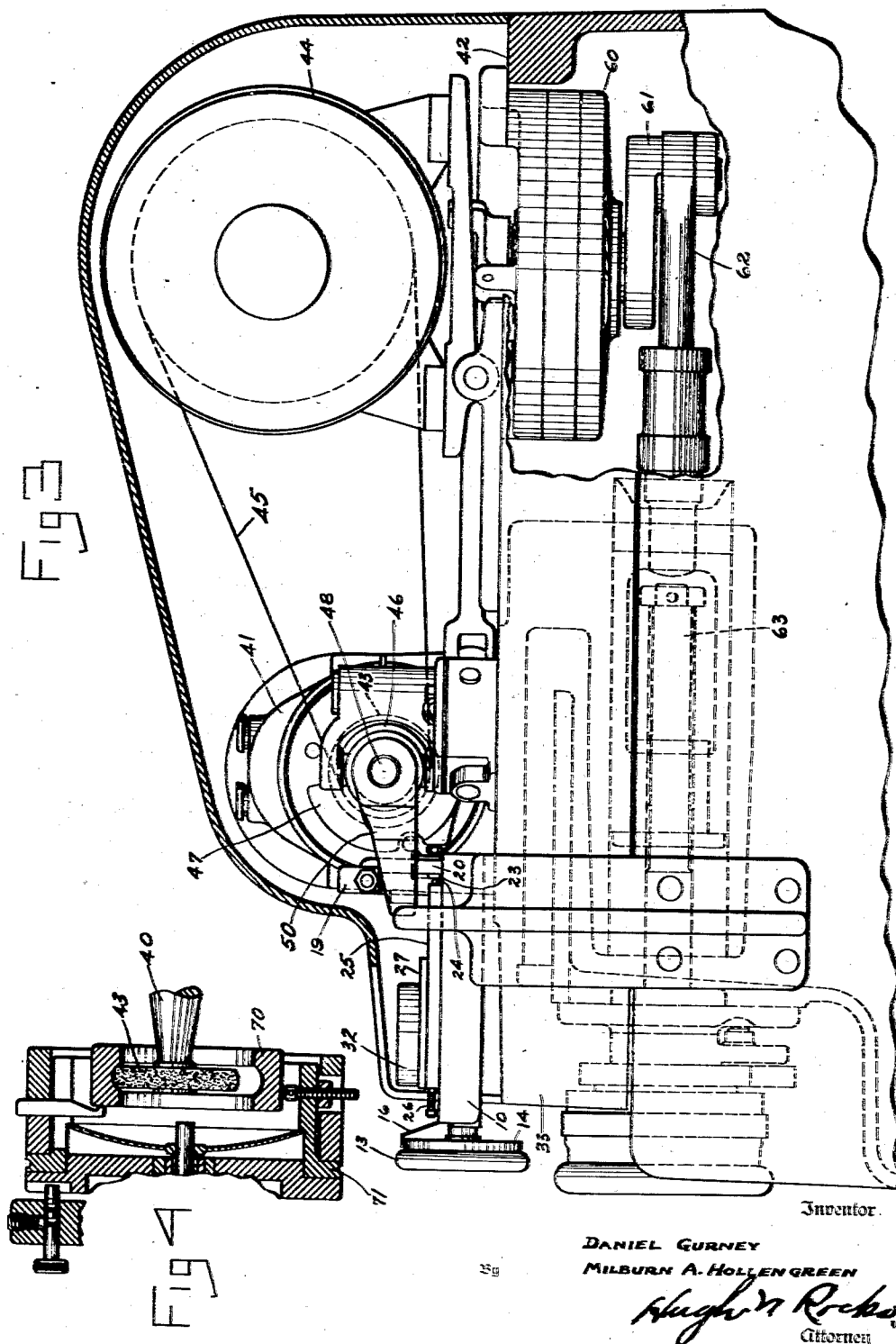
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UNITED STATES PATENT OFFICE

2,275,141

SIZE REGULATOR

Daniel Gurney, Jamestown, N. Y., and Milburn A. Hollengreen, Waynesboro, Pa., assignors to Landis Tool Company, Waynesboro, Pa., a corporation of Pennsylvania

Application December 30, 1939, Serial No. 311,750

2 Claims. (Cl. 51-165)

Our invention relates to size regulators for grinding machines, particularly for machines grinding small internal work such as ball races where the internal diameter is not great enough to permit the entrance of a sizing device feeler as well as the grinding wheel.

It is an object of our invention to provide means for controlling a grinding operation from a finished work piece.

A further object is to provide means to compensate for variation in work size and in wheel wear.

A further object is to provide means for effecting said compensation after each grinding operation.

In the drawings, Figure 1 is a plan view of our device.

Figure 2 is a right hand end elevation partly in section.

Figure 3 is an end elevation of a wheel support and feed mechanism.

Figure 4 is a partial plan view of a grinding wheel and work piece in operative position.

Numeral 10 indicates a base member upon which is mounted a slide member 11. Said base member is supported on a machine bed 33. A threaded shaft 12 is rotatably supported in end portions of said base member. A handwheel 13 having a calibrated surface 14 is keyed to one end of said shaft by a key 15. A pointer 16 attached to said base member extends to a position in operative relation to said calibrated surface. A nut 17 on the threaded portion 18 of shaft 12 is secured to slide 11 so that rotation of said shaft effects movement of said slide. An upright member 19 at one end of said base member supports a pivoted member 20. A nozzle 21 having connection to a suitable supply of fluid under pressure is mounted for vertical adjustment in a slot 34 in said pivoted member.

On slide 11 is mounted a second slide 25. A spring 22 has one end attached to slide 11 and the other end to pivoted member 20, thus urging said member to the left. Movement of said pivoted member to the left is limited by a hardened button 23 thereon engaging a hardened pin 24 in the slide 25. Thus spring 22 also urges slide 25 to the left. Movement of said slide is limited by an adjustable stop 26. A plate 27 having a longitudinal slot 28 therein is secured to slide 25. On said slide are mounted two angularly spaced feeler members 29 and 30. Secured to slide 11 and extending thru slot 28 is a third feeler member 31. Said feeler 31 is movable with slide 25 so that a work piece 32 may be placed thereon. With a

work piece so positioned, feeler 31 determines the limit of movement of slide 25.

A grinding wheel 43 is mounted on a spindle 40 which is movable axially in a support 41 on a wheel base 42. This structure is shown in detail in co-pending application Serial No. 214,358 filed June 17, 1938. Said spindle is driven by a belt 45 thru a pulley 46 by motor 44. A pulley guard 47 has a shaft member 48 formed thereon in axial alignment with pulley 46. Mechanism described in detail in the above mentioned co-pending application, is attached to said shaft for effecting axial movement thereof and also of the wheel spindle. Attached to said shaft also is a curved arm 50 having a button 51 therein, which, when the grinding wheel is in contact with a work piece, is positioned in the path of nozzle 21. The function and operation of the air nozzle is similar to that described in Balsiger Patent 2,001,447 granted May 14, 1935. The means for feeding the grinding wheel 43 toward and from the work consists of an oscillating hydraulic motor 60 which is connected by a crankarm 61 and connecting rod 62 to a feed screw 63 rotatably mounted in the bed of the machine. This is identical with the feed mechanism disclosed in the above mentioned application 214,358. The means for holding and rotating the work piece 70 consists of a chuck 71 rotatably mounted on a headstock spindle (not shown). This structure is also shown and described in greater detail in the co-pending application 214,358.

Operation

In setting our device for grinding a number of identical work pieces, one piece is first ground exactly to size and is then placed on the caliper formed by the plate 27 and the feelers 29, 30, and 31. The feeler 31 thus positioned, also positions the slide 25 and to the pivoted member 20. The nozzle 21 on said pivoted member is also positioned relative to the button 51.

The vertical position of said nozzle must also be determined. Theoretically, it would be half way between the pivot point and the point of contact between button 23 and pin 24. However, this is not always true and the exact position for a given combination of work piece and grinding wheel must be determined experimentally. The operator then estimates the wheel wear for the particular wheel used, and by means of handwheel 13 adjusts the slide 11 and all the parts carried thereby including the upright 19 and nozzle 21. An unground piece of work is then placed in the machine and the grinding operation started.

As the grinding proceeds, the arm 50 and button 51, which are carried by the wheel support 42, approach nozzle 21, and at a predetermined point the pressure of the air to the nozzle is such as to actuate a mercury column to close one or a series of electrical contacts and bring the grinding operation to an end, as described in the above mentioned application 214,358 and Patent 2,001,447. The finished work piece is placed on the caliper, thus resetting the slide 25 and hence the nozzle 21 by an amount equal to the difference between the size of the piece just ground and the size of the preceding piece. The operator then turns handwheel 13 to effect a further adjustment of the entire slide including nozzle 21 by an amount corresponding to what he thinks the grinding wheel will wear. The device is then ready for another grinding operation. It is to be understood that handwheel 13 could be turned just as well by a suitable ratchet mechanism actuated or initiated automatically by the withdrawal movement of the wheel support for example.

We claim:

1. In a grinding machine having a tool support, a tool mounted thereon, a work support, means for effecting a relative feeding movement between said supports, a size control mechanism compris-

ing a pair of cooperating elements movable relatively toward and from one another, a pivoted support for one of said elements, means for adjusting said support an amount corresponding to variation in size of a work piece, and means for adjusting the radial position of said size control element on said pivoted support whereby to modify said first mentioned adjustment.

2. In a grinding machine, a wheel support, a grinding wheel rotatably mounted thereon, a work support, means for effecting a relative feeding movement between said supports, a size control mechanism, including a pair of cooperating elements one of which is movable toward the other in response to said relative movement between work and wheel during a grinding operation for controlling same, a pivoted support for one of said elements, a caliper device having means for engaging the ground surface of a finished work piece, means actuated by said work engaging member for determining the position of said pivoted support, and means for adjusting the position of said size control element on said pivoted support.

DANIEL GURNEY.
MILBURN A. HOLLENGREEN.