March 1, 1949. B. A. HOLOHAN 2,463,385

CENTER

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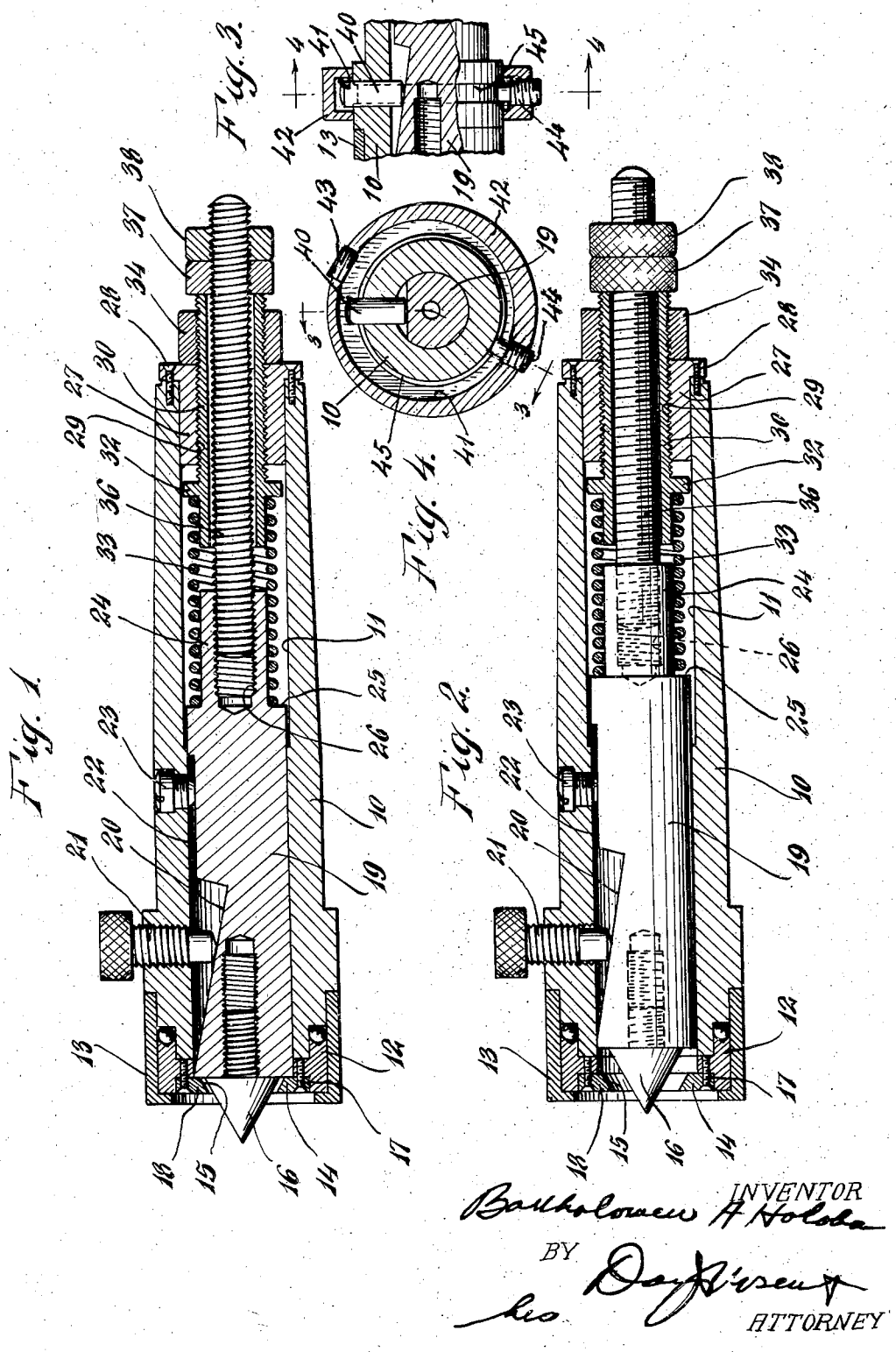

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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CENTER

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This invention generally relates to centers for supporting workpieces to be machined, and more specifically to a novel structure particularly adapted to function as a dead center for use in grinding machines and the like, though being capable of general use both as a dead and as a live center in various kinds of machines.

A device according to the invention belongs to that category of centers that comprise a flat end face, formed in an element of the structure in a plane perpendicular to the longitudinal axis of the center, adapted to be engaged by the end of the workpiece, and a spring pressed center pin projecting through said flat face and adapted to be received within the center hole of the end of the workpiece and longitudinally displaceable relative to the body of the center, to permit engagement of the flat face aforesaid by the workpiece irrespective of variations in the depth of the center hole.

The general object of the invention is to provide a novel and improved center of the character described adapted to be mounted in a supporting member in the manner of a conventional center, which is of sturdy and relatively simple construction, precise in operation, readily assembled and disassembled to permit substitution of parts whenever required, and capable of entirely satisfactory use with workpieces of considerably different sizes.

Another object is to provide a center wherein the flat face engageable by the workpiece is formed on an element of the structure mounted for rotation relative to the body of the center and independent of the center pin, said element being changeable to provide different areas of contact for the workpiece.

A further object is to provide adjustable means adapted to prevent inward displacement of the center pin after the workpiece has been brought into contact with the flat surface aforesaid, so as to lock the center pin in engagement with the work. The invention also contemplates the provision of further adjustable means for limiting the outward movement of the center pin.

Still another object is to provide means for varying the pressure exerted by the spring means acting on the center pin, so as to insure proper support for the workpiece without objectionable friction between associated surfaces. These and other related objects will become apparent in the following description of the invention illustrated in the drawings, wherein:

Fig. 1 is a vertical longitudinal section through a center according to the invention, showing the

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structure and the arrangement of the various elements thereof.

Fig. 2 is a similar vertical longitudinal section through the center, showing elements of the structure adjusted to a different position.

Fig. 3 is a fragmentary longitudinal sectional view of the center on line 3—3 of Fig. 4 illustrating a modified embodiment of the invention.

Fig. 4 is a cross sectional view on line 4—4 of Fig. 3.

Referring now in detail to the drawings, 10 indicates the body of the center which is provided with an externally tapered portion adapted to fit conventional center supporting devices, and with an axial bore 11 extending from end to end of the body.

The forward end of the center body is provided with a ball bearing 12 which is retained in position by means of a lock ring 13 mounted on a suitably threaded portion of the outer surface of the body. An annular element 14 having a center opening 15 for the center pin 16, is secured to the ball bearing by means of a plurality of small screws 17. The element 14 is formed with a front flat face 18 in a plane perpendicular to the axis of the body 10, which face is intended to be engaged by the end of the workpiece. The element 14 may have openings 15 of different diameter so as to define surfaces 18 engageable even by workpieces of small diameter, in which case of course the center pin 16 will project from the element 14 by a reduced amount. As hereafter described, means are provided for limiting the outward displacement of the center pin and thereby preventing this latter from bearing against and exerting an objectionable thrust on the element 14.

A cylindrical member 19 is mounted within the bore 11, the outer surface of this member as well as the inner surface of the body 10 being accurately machined to insure a close sliding fit. The forward end of the member 19 has threaded therein the shank of the center pin 16, the conical portion whereof is adapted to engage the usual center hole drilled in the workpiece. The periphery of member 19 is provided with a triangular cut to define an inclined surface 20 engageable by a screw 21, threaded through the body 10 and adjustable to limit the inward displacement of the member 19 and therefore of the center pin carried thereby. A longitudinal slot 22 is likewise provided at the periphery of the member 19, and the screw 23 threaded in the body 10 projects into said slot to prevent the rotation of the member 19 in the operation of the device.

The member 19 is formed at its rear end with an extension 24 of reduced diameter, defining a shoulder 25 and embodying a threaded axial bore 26 for the purpose that will become hereafter apparent.

A closure member 27 is mounted in the bore 11 at the rear end of the body 10, and is removably secured thereto by a plurality of small screws 28 passing through a flange portion of the member juxtaposed to the body end. The member 27 is provided with a threaded axial bore 29 for receiving an externally threaded longitudinally adjustable sleeve 30, which extends into the bore 11 to a point spaced from the extension 24 and is formed with a flange 32 within said bore.

A coil spring 33 is mounted on the extension 24 and the inner end portion of the sleeve 30, and bears against the aforementioned shoulder 25 and flange 32 so as to urge the slidable member 19 outwardly in the direction of the element 14 and thereby press the center pin into engagement with the surfaces of the center hole of a workpiece contacting the face 18 of the element 14 in the operation of the device. By virtue of the longitudinal adjustment of the sleeve 30, the pressure exerted by the spring 33 may be varied to maintain the thrust exerted by the center pin 17 on the workpiece within the limits required for a firm engagement yet avoiding excessive friction with the surfaces of the center hole. The sleeve 30 is locked in any desired adjusted position by a lock nut 34 abutting against the rear face of the member 27.

The sleeve 30 is also longitudinally bored to receive for longitudinal movement therein an externally threaded rod 36 which is fastened within the bore 26 of the aforementioned extension 24. Said rod 36 extends rearwardly beyond the lock nut 34 and carries at its rear end a knurled nut 37 which may be turned in one direction to displace the rod rearwardly and thereby move inwardly, in opposition to the spring 33, the member 19 rigidly connected therewith, to withdraw the center pin from the annular element 14. By rotating the nut 37 in the opposite direction, the spring 33 will of course move again the member 19 outwardly. A nut 38 is provided for locking the rod 36 and associated elements in any adjusted position. By means of this arrangement the outward movement of the member 19 carrying the center pin may be therefore variably limited.

In operation, the previously faced end of the workpiece is brought into contact with the flat outer face 18 of the annular element 14 secured to the ball bearing 12 (which latter functions as a thrust bearing) and is free to rotate relative to the stationary center pin 16. In the movement of the workpiece toward the element 14, the conical portion of the center pin is engaged by the surfaces of the center hole of the workpiece and displaced thereby inwardly together with the member 19, in opposition to the spring 33, until the end of the workpiece comes into contact with the element 14. The amount of inward displacement depends upon the adjustment of the means for limiting the outward movement of the member 19 hereinbefore described. The screw 21 which had been previously partially withdrawn from the bore 11, is then tightened to engage the inclined surface 20 of the member 19, thereby preventing further inward displacement of this latter member and locking the center pin within the center hole of the workpiece in supporting engagement therewith regardless of any axial thrust that might develop in the cutting operation and cause, in the absence of a locking device, disengagement or partial withdrawal of the pin from the center hole.

Figs. 3 and 4 illustrate a modified embodiment of the means for limiting the inward displacement of the member 19. In this embodiment, a pin 40 is substituted for the screw 21 and is freely mounted in a radial opening of the body 10 to rest on the inclined surface of the member 19, the outer end of said pin protruding from the body being received within an eccentric internal groove 41 of a ring 42 which is rotatably mounted on the body. The ring has an opening, at the deepest point of the groove, which may be brought into registration with the aforesaid radial opening in the body, to permit insertion of the pin 40 into this latter opening and then is closed by a removable plug 43. A further threaded opening is provided in the ring, at the shallowest portion of the groove, to receive a set screw 44 projecting into a groove 45 at the periphery of the body 10, said screw guiding the ring in its rotation and cooperating with the pin 40 to prevent lateral displacement of the ring. By rotating the ring 42, the bottom surface of the eccentric groove 41 is caused to exert a camming action on the pin 40 to lock the same in engagement with the inclined surface 20 of the member 29, thereby preventing inward displacement of this latter member.

While I have described my invention substantially with reference to a preferred embodiment thereof, it is to be understood that many changes and modifications may be made in the structures illustrated in the drawings without departing from the spirit of the invention or exceeding the scope of the claims.

I claim:

1. A center comprising a body, an axial bore extending throughout the length of said body, an annular element rotatably mounted at the forward end of said body and having a flat face, in a plane perpendicular to the axis of the body, engageable by a workpiece, a member slidably mounted in said bore and carrying a center pin adapted to project through said annular element, said slidable member having a shoulder, a member for closing the rear end of the body, a sleeve mounted in said closure member and extending into the body, a flange in said sleeve within the body, a spring mounted between said shoulder of the slidable member and said flange of the sleeve to urge the slidable member outwardly and the center pin into engagement with the workpiece, said sleeve being longitudinally adjustable to vary the pressure exerted by the spring, means for variably limiting the outward movement of the slidable member and means for limiting the inward movement of the slidable member.

2. A center comprising a body, an axial bore extending throughout the length of said body, a ball bearing mounted at the forward end of said body, an annular element secured to said ball bearing for rotation therewith and having a flat face, in a plane perpendicular to the axis of the body, engageable by a workpiece, a member slidably mounted in said bore and carrying a center pin adapted to project through said annular element, said slidable member having a shoulder at its rear end, a member for closing the rear end of the body, a sleeve mounted in said closure member and extending into the body, a flange on said sleeve within the body, a spring mounted between said shoulder of the slidable member and

said flange of the sleeve to urge the slidable member outwardly and the center pin into engagement with the workpiece, said sleeve being longitudinally adjustable to vary the pressure exerted by the spring, means for locking said sleeve in adjusted position, means for variably limiting the outward movement of the slidable member and means for variably limiting the inward movement of the slidable member.

3. A center comprising a body, an axial bore extending throughout the length of said body, a ball bearing mounted at the forward end of said body, an annular element secured to said ball bearing for rotation therewith and having a flat face, in a plane perpendicular to the axis of the body, engageable by a workpiece, a member slidably mounted in said bore and carrying a center pin adapted to project through said annular element, said member having an extension of reduced diameter defining a shoulder, a member for closing the rear end of body, a sleeve mounted in said closure member and extending into the body, a flange on said sleeve within the body, a spring mounted between said shoulder of the slidable member and said flange of the sleeve to urge the slidable member outwardly and

the center pin into engagement with the workpiece, said sleeve being longitudinally adjustable to vary the pressure exerted by the spring, a rod in the sleeve fastened to said extension of the slidable member and projecting rearwardly of the body, means adjustable on said rod externally of the body to variably limit the outward movement of the rod and therefore of the slidable member, and means for variably limiting the inward movement of the slidable member.

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