May 8, 1951 M. H. EMRICK 2,551,659

GEARING FOR VARIABLE MULTIPLE HEADS

Filed Oct. 22, 1948

Fig. 1.

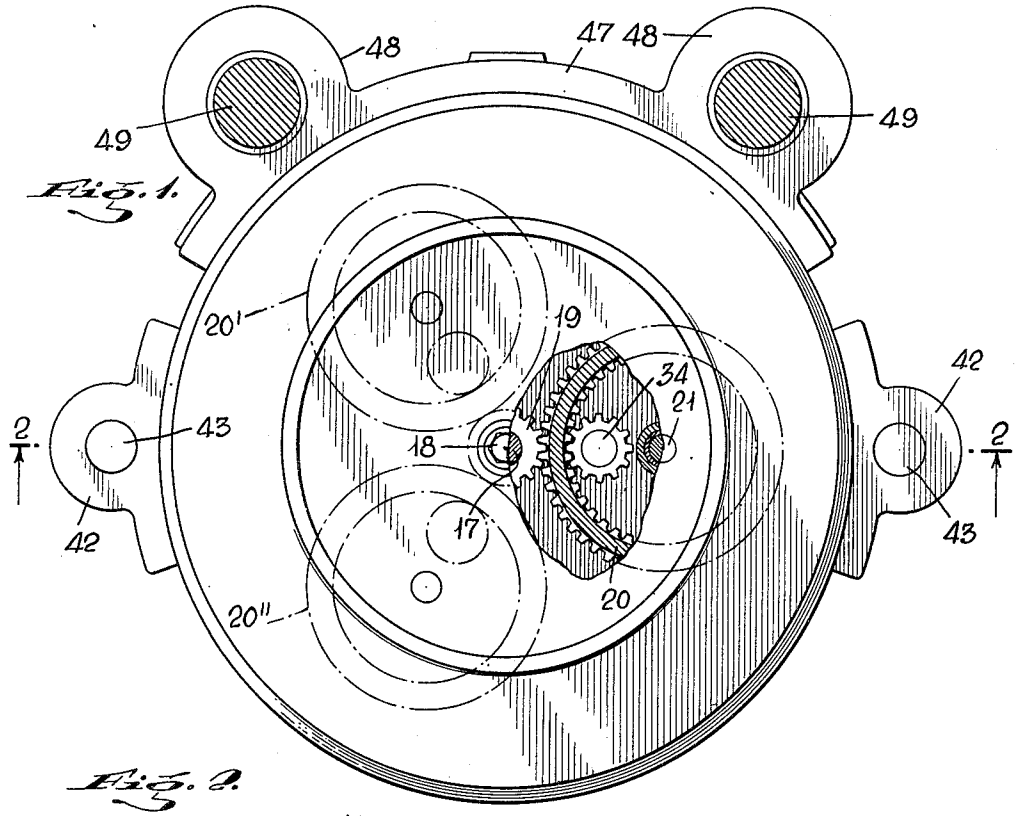
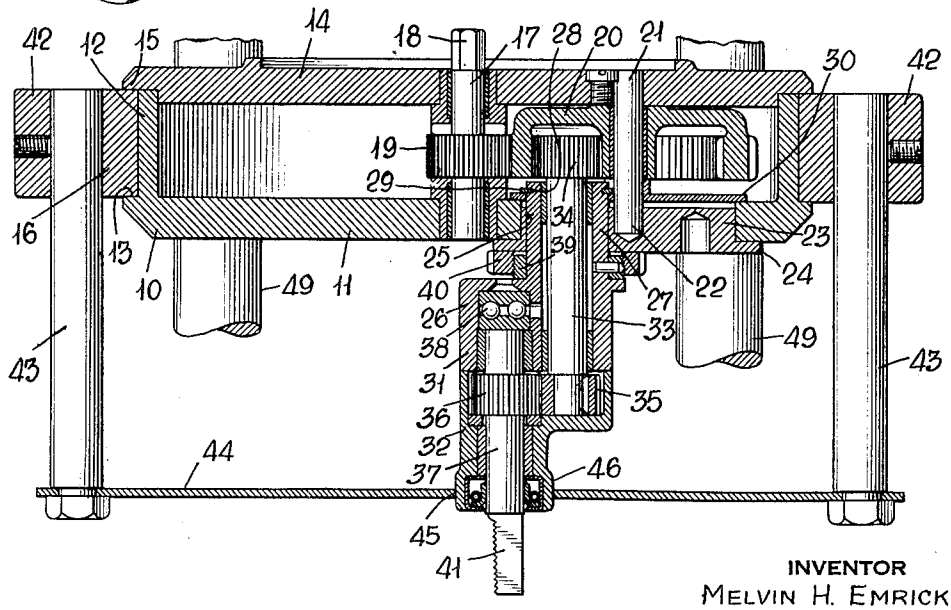


Fig. 2.



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Patented May 8, 1951

2,551,659

UNITED STATES PATENT OFFICE

2,551,659

GEARING FOR VARIABLE MULTIPLE HEADS

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Application October 22, 1948, Serial No. 55,851

6 Claims. (Cl. 74—665)

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This invention relates to variable multiple heads wherein a plurality of tools are so rotatably and adjustably mounted with respect to the head that the several tools can be positioned to reach positions on a workpiece substantially within boundaries of the head. More particularly, the invention deals with a device of the character described wherein a number of parts, such as the gears and the like are materially reduced in number, and further wherein the means retaining the parts of each unit in a predetermined position of adjustment provides a substantial support and one which is readily accessible for accomplishment of the desired result.

The novel features of the invention will be best understood from the following descriptions when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed, and in which the separate parts are designated by suitable reference characters in each of the views; and in which:

Fig. 1 is a plan view of a device made according to my invention, diagrammatically illustrating the units of the device, part of the construction being broken away and in section; and

Fig. 2 is a section on the line 2—2 of Fig. 1, showing only one unit of the device and omitting illustration of the other units for purpose of simplifying the illustration.

My present invention deals with variable multiple heads of the type and kind disclosed in my prior application Ser. No. 31,252 of June 5, 1948, and the present disclosure distinguishes from the showing in said earlier application from the standpoint of simplifying structure of the parts, reducing the number thereof and in providing a readily accessible and more secure locking means for retaining the separate parts of each unit in adjusted position.

In the construction shown, my improved head comprises a casing 10 having a bottom wall 11 and a circumferential upstanding wall 12 set inwardly from the bottom wall to form a shoulder 13. Mounted upon the casing 10 is a cover plate 14, the peripheral edge of which extends to form a projecting flange 15 which in conjunction with the shoulder 13 forms an annular recess 16.

Supported centrally of the casing, including the cover part thereof, in suitable bearings, is a main drive shaft 17 for the head, the shaft having an outwardly etxending angular or hexagon coupling end 18 for reception of a drive spindle or adaptor head, depending upon the use of the device. On the shaft 17 is a drive gear 19. Meshing with the gear 19 are a plurality of internal-

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external gear members, one of which is shown at 20 in Fig. 2 and partially shown in section in Fig. 1, the other members being indicated by dot and dash lines at 20' and 20'' in Fig. 1. The member 20 forms part of an adjustable drive unit and in that each member is of the same construction, only one of such members is shown in detail in Fig. 2 and this member alone will be specifically described.

The member 20 is rotatable about an axis 21 fixed in the cover part 14 and having a bearing, as at 22, in a rotatably adjustable disc 23. The disc 23 is flanged, as seen at 24, to bear against the lower surface of the bottom wall 11 of the casing. Mounted in a large aperture 25 of the disc 23, is a gear housing 26, constituting one of the adjustable units, which by virtue of its mounting in the rotatably adjustable disc 23, provides the wide range positioning of a tool, as will later appear.

The housing 26 includes a sleeve portion 27 which is disposed in the aperture 25 and extends above the upper surface of the disc 23. This extended portion has a groove 28 formed therein for the reception of a lock-ring 29, which ring engages a plate 30 disposed upon the upper surface of the wall 11 in retaining the disc against displacement from the wall, the ring also supporting the housing in conjunction with said disc. Secured to the lower enlarged portion 31 of the housing, is a supplemental housing 32.

Mounted in the housing 26, in suitable bearings, is a spindle 33 having its upper end, a gear 34 meshing with the internal portion of the gear 20 and secured to the lower end of the spindle 33 is a gear 35 which meshes with a gear 36 secured to a tool clutching and supporting spindle 37, the latter having suitable bearings in the housing parts 31 and 32. The spindle 37 also operates in conjunction with a roller thrust bearing 38 at its upper end.

Secured to the sleeve portion 27 is an externally threaded supplemental sleeve 39 in conjunction with which a knurled or other lock or clamping nut 40 is mounted. The nut 40 is adapted to retain the housing 26 in different positions of adjustment around the spindle axis 33, as well as retaining the disc 23 in positions of rotary adjustment about the axis 21. In other words, upon loosening the nut 40, the disc 23 is free to rotate about the axis 21 to position the gear 34 in any position about said axis 21 and simultaneously the axis 37 is free to rotate about the axis 33. It will thus be apparent that a tool, such as a tap 41 can be positioned from

a point in close proximity to the axis 17 to anywhere within the area defined by the greatest radius of the combined axes 33—37 about the axis 21.

Supported in the groove 16 of the casing, are a pair of blocks 42, having downwardly extending rods 43, upon which a templet plate 44 is supported. This plate will be formed with the desired positioning of three openings therein to properly position three tools, such for example, as the tool 41, with respect to a workpiece. One of these holes is indicated at 45, for reception of the lower enlarged end 46 of the supplemental housing 32.

Considering Fig. 1 of the drawing, here is shown a bracket or bearing block 47, having two cylindrical portions 48, in which guide rods 49 are arranged, these rods serving to guide the head 10 in its up and down movement as the tools are moved relatively to a workpiece, as is well known in the art.

With my improved construction, it will be apparent that each unit simply comprises three gears, or what may be termed pinions, as at 34, 35 and 36, which operating in conjunction with the combined external-internal gear 20, produces a very simple gear drive, for each unit from the main drive gear 19. Furthermore. adjustment of each unit is simplified by providing the readily accessible lock nut 40, which can be quickly loosened and tightened in adjusting the respective units, and here it should be kept in mind that relatively large bearing surfaces are provided between the parts which are clamped together in insuring firm support of the parts in their adjusted positions.

For purposes of description, the shaft 17 of the head may be termed the main drive shaft, whereas each unit comprises the drive member in the form of the internal-external gear 20 and the spindle 33 may be termed the idler shaft which rotates about the axis 21 within the member 20, the spindle or shaft 37 comprising a tool supporting shaft which rotates about the idler 33.

With my improved head construction and by reason of the fact that most of the gears are housed within the chamber of the casing, the over-all vertical dimensions of the head is materially reduced and further, the problem of lubrication simplified.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In multiple heads of the character described, a casing, a main drive shaft centrally of the casing, a plurality of adjustable tool supporting and operating units on said casing, each unit comprising a fixed shaft, an internal and external gear member rotatable on the fixed shaft and driven from said main shaft, a disc adjustably rotatable about said fixed axis in said casing, means comprising a ring maintaining the disc against displacement from the casing, a housing carried by said disc, an idler shaft in said housing and extending into the casing and said member, a gear on the idler shaft engaging the internal gear of said member, said housing being rotatable in the disc about said idler shaft, means retaining the housing against displacement from said disc, a tool shaft supported in said housing, means driving the tool shaft from said idler shaft, said tool shaft being rotatable about the idler shaft in rotation of the housing in said disc, and means adjustably supported on the housing and operatively engaging said disc for retaining the disc in predetermined adjusted position in said casing and the housing in said disc.

2. In multiple heads of the character described, a casing, a main drive shaft centrally of the casing, a plurality of adjustable tool supporting and operating units on said casing, each unit comprising a fixed shaft, an internal and external gear member rotatable on the fixed shaft and driven from said main shaft, a disc adjustably rotatable about said fixed axis in said casing, means comprising a ring maintaining the disc against displacement from the casing, a housing carried by said disc, an idler shaft in said housing and extending into the casing and said member, a gear on the idler shaft engaging the internal gear of said member, said housing being rotatable in the disc about said idler shaft, means retaining the housing against displacement from said disc, a tool shaft supported in said housing, means driving the tool shaft from said idler shaft, said tool shaft being rotatable about the idler shaft in rotation of the housing in said disc, means adjustably supported on the housing and operatively engaging said disc for retaining the disc in predetermined adjusted position in said casing and the housing in said disc, and said means comprising a large diameter sleeve nut providing large surface frictional engagement with said disc.

3. In multiple heads of the character described, a casing having a chamber therein, a main drive shaft in the casing having a drive gear exposed in the chamber of the casing, a plurality of adjustable tool supporting and operating units on the casing, each unit comprising an axis having a fixed position in the casing, an idler shaft rotatably adjustable about said fixed axis and a tool supporting axis rotatably adjustable about said idler axis, the idler shaft having a gear within said chamber means within the chamber of said casing providing a drive from said main drive gear to said gear on said idler shaft, and a gear drive between said idler and said tool supporting shaft outwardly of said casing.

4. In multiple heads of the character described, a casing having a chamber therein, a main drive shaft in the casing having a drive gear exposed in the chamber of the casing, a plurality of adjustable tool supporting and operating units on the casing, each unit comprising an axis having a fixed position in the casing, an idler shaft rotatably adjustable about said fixed axis and a tool supporting axis rotatably adjustable about said idler axis, the idler shaft having a gear within said chamber means within the chamber or said casing providing a drive from said main drive gear to said gear on said idler shaft, a gear drive between said idler and said tool supporting shaft outwardly of said casing, said idler shaft and said tool supporting shaft being arranged in a housing rotatable about the idler shaft, part of said housing extending into the chamber of said casing, and means in said casing supporting the housing for rotatable adjustment around said fixed shaft.

5. In multiple heads of the character described, a casing having a chamber therein, a main drive shaft in the casing having a drive gear exposed in the chamber of the casing, a plurality of adjustable tool supporting and operating units on the casing, each unit comprising an axis having a fixed position in the casing, an idler shaft ro-

tatably adjustable about said fixed axis and a tool supporting axis rotatably adjustable about said idler axis, means within the chamber of said casing providing a drive from said main drive gear to a gear on said idler shaft within said chamber, a gear drive between said idler and said tool supporting shaft outwardly of said casing, said idler shaft and said tool supporting shaft being arranged in a housing rotatable about the idler shaft, part of said housing extending into the chamber of said casing, means in said casing supporting the housing for rotatable adjustment around said fixed shaft, and means including a sleeve nut adjustable on said housing and operatively engaging the last named means for retaining the idler and tool shafts in predetermined adjusted position with respect to each other and the fixed shaft of each unit.

6. A variable multiple head of the class described comprising a casing defined by spaced upper and lower wall portions with a chamber therebetween, a main drive shaft centrally of the casing having a drive gear disposed within said chamber, a plurality of adjustable tool supporting units, each unit comprising an axis disposed within the confines of the upper and lower wall portions of said casing, a disc rotatably adjusted in one wall of the casing around said fixed axis, means retaining the disc against displacement from said casing wall, a housing carried by said disc, means on said part for retaining the housing against displacement from the disc while permitting rotatable adjustment of the housing in

the disc around an idler shaft, said idler shaft extending into the chamber of said casing and having a gear thereon, another gear on the idler shaft within said housing, a tool operating shaft in said housing with a gear thereon meshing with said last named gear, adjustable means on said housing engaging said disc for retaining said disc and housing in fixed position with respect to each other and to said casing, means in the chamber of the casing for placing the drive gear of said drive shaft in operative engagement with the first named gear on said idler shaft, said last named means comprising an internal-external gear rotatable about said fixed axis, and means on said casing and operatively engaging the housing of each unit for gauging position of the tool supporting shaft of each unit one with respect to the other.

MELVIN H. EMRICK.

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