Dec. 17, 1935. M. DORMAN 2,024,914

CUTTER FOR BEVELED GEARS

Filed April 30, 1935

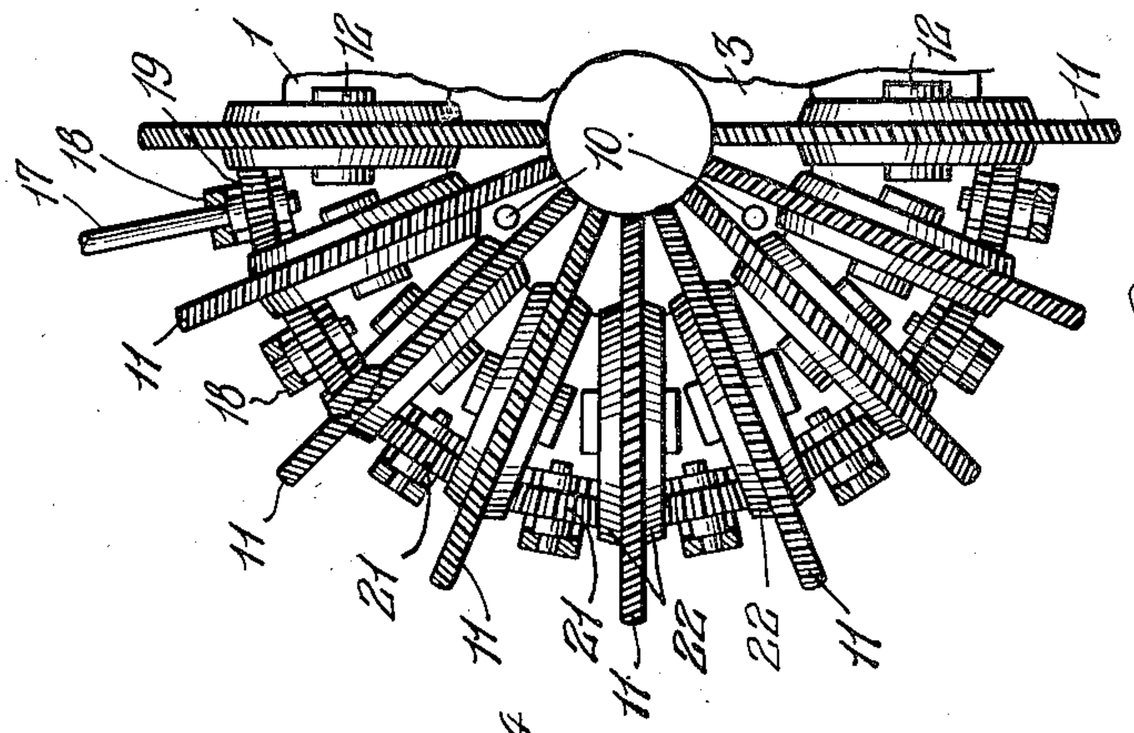


Fig. 2.

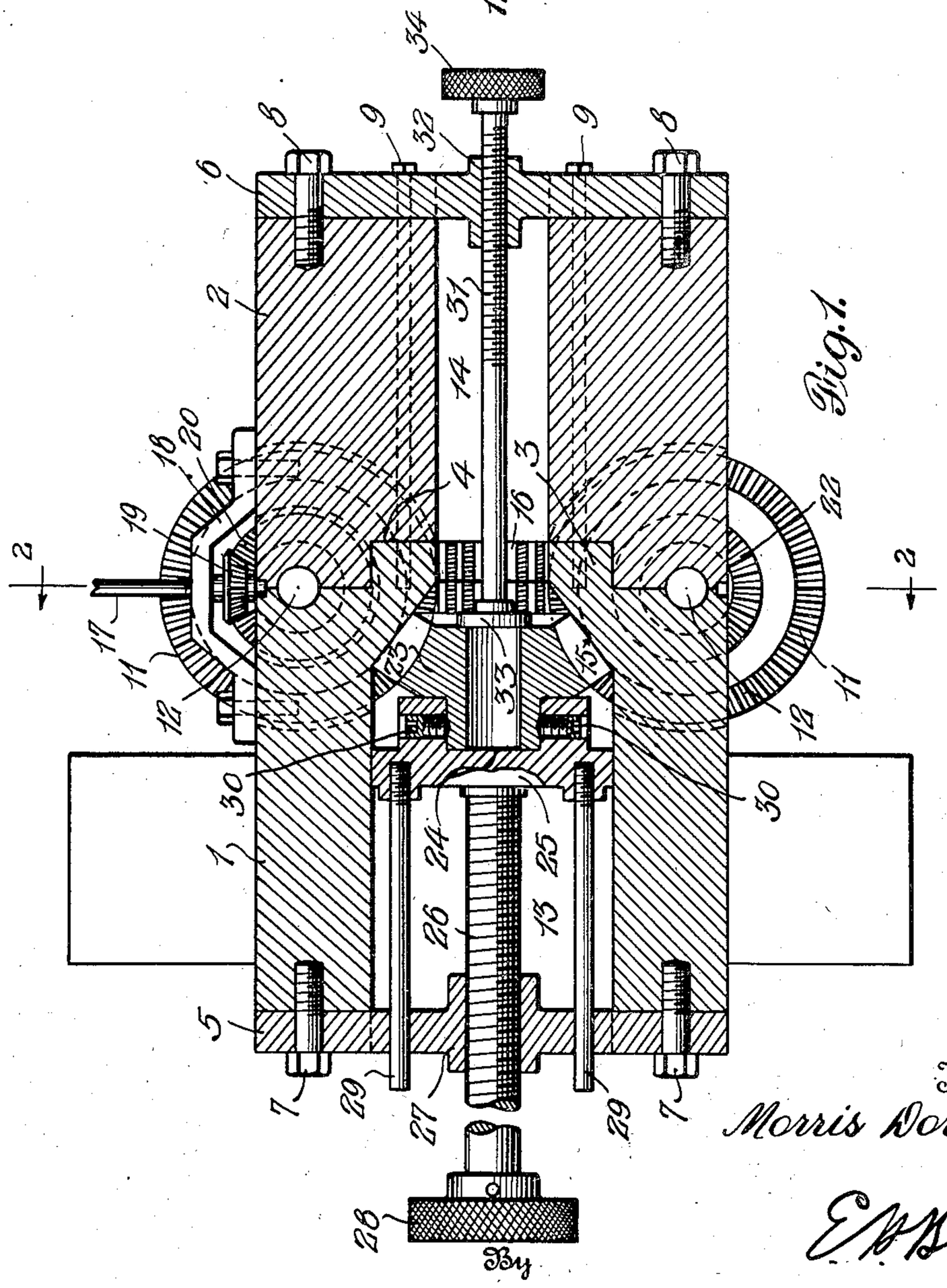


Fig. 1.

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Patented Dec. 17, 1935 2,024,914

UNITED STATES PATENT OFFICE

2,024,914

CUTTER FOR BEVELED GEARS

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Application April 30, 1935, Serial No. 19,085

3 Claims. (Cl. 90—5)

This invention relates to an improved device for cutting beveled gears and one object of the invention is to provide a device of this character which is so constructed that blanks may be fed into body or barrel of the device and a set of teeth of the same depth and pitch cut in the blank about margins thereof at the same time.

Another object of the invention is to provide improved means for carrying the blank and feeding the same towards cutters carried by the barrel and to also provide means for limiting movement of the blank towards the cutters which is adjustably mounted so that teeth of a desired depth may be formed.

Another object of the invention is to provide a gear cutter wherein the barrel is formed in separable sections between abutting ends of which the cutters are rotatably mounted, thereby allowing the cutters to be easily removed for sharpening or replacement and insuring retention of the cutters in their proper positions when the sections of the barrel are secured to each other.

Another object of the invention is to so mount the cutters that rotary motion imparted from a rotatably mounted power shaft may be transmitted from one cutter to another by gears interposed between the cutters, the gears being mounted in bearing brackets which serve not only as means for rotatably mounting the gears but also as means for holding the sections of the barrel in end to end relation to each other.

A further object of the invention is to provide a device of this character which is simple in construction, strong and durable, and not liable to get out of order.

The invention is illustrated in the accompanying drawing wherein:

Figure 1 is a longitudinal section through the improved gear cutter.

Figure 2 is a view in elevation with one section of the barrel removed.

This improved cutter has a body or barrel consisting of companion sections 1 and 2, which are disposed in end to end relation to each other, with the inner end of the section 1 extended about its center to form an axially extending annular extension 3, which is snugly received in a recess 4 formed in the inner end face of the section 2. Heads or closure disks 5 and 6 are provided for outer ends of the two sections, which are secured by machine screws 7 and 8. The head is also formed with openings registering with openings formed through the section 2 whereby bolts 9 may be passed through the section 2 and threaded into sockets 10 formed in the hub or extension 3 of the section 1 and securely but detachably hold the sections in engagement with each other.

Radially extending slots or grooves are formed in the inner end portions of the sections 1 and 2 which register when the sections are secured in abutting engagement with each other and define pockets to receive milling cutters 11, the hubs or stub shafts 12 of which are journaled in recesses formed in the inner end faces of the sections between the radial grooves. Referring to Figure 1, it will be seen that the grooves of the section 1 open into the bore or central chamber 13 extending axially through the same, and that portions of the milling disks or cutters project into the chamber for cutting teeth in a gear blank. The section 2 is also formed with a bore or chamber 14 and it will be noted that the inner end portion of the chamber 13 is tapered as shown and 15 terminates in a reduced extension 16 which corresponds in diameter to the chamber 14 of the section 2 and registers with the inner end thereof.

Rotary motion is to be imparted to the cutters, and in order to do so there has been provided a drive shaft 17 which may be rotated from any suitable source of power. This drive shaft has one end rotatably mounted through a bearing bracket 18 extending longitudinally of the barrel in bridging relation to the sections thereof, and by referring to Figure 2, it will be seen that the bracket serves not only as means for rotatably mounting the shaft but also as means for connecting the sections of the barrel and retaining them in end to end relation to each other. A gear or pinion 19 is carried by the drive shaft and meshes with gear rings 20 formed upon side faces of cutters between which the gear is located. Other gears 21 are located between the remaining cutters in mesh with gear rings forming upon sides thereof, and referring to Figure 2, it will be seen that each gear is rotatably mounted in a bracket 22 having the same construction as the bracket 18. These brackets 22 are also secured in bridging relation to the sections of the barrel and when the brackets 18 and 22 are secured the two sections will be firmly held united and also the cutters will be retained in the pockets formed in the sections and be freely rotatable. It will be readily apparent from an inspection of Figure 2 that when the drive shaft is rotated, rotary motion will be imparted to the cutters with

which the gear 19 meshes and that rotary motion will be transmitted from one cutter to another through the gears 21. Therefore, all of the cutters will be positively driven.

The blank from which a gear 23 is to be formed is mounted in the chamber 13 of the section 1 of the barrel and is firmly secured in a socket 24 formed in a carrier 25 which is slidably received in the chamber. A threaded shank 26 for the carrier is swiveled at one end to the carrier and this shank is threaded through a bearing 27 formed at the center of the head or closure 5 so that when the knob 28 at the outer end of the shank is grasped and rotary motion imparted thereto, the carrier will be shifted longitudinally in the chamber according to the direction in which the shaft is rotated. Rods 29 which project from the carrier through openings formed in the head 5, prevent the carrier from turning with the shank. It will thus be seen that when the blank is fitted into the socket of the carrier and secured by tightening the set screws 30, the carrier and blank can be thrust into the chamber 13. The head 5 is then secured by its bolts 7 and the shank or shaft 26 then rotated to move the blank through the chamber towards the inwardly projecting portions of the cutters. As the blank is moved towards the cutters, they cut into the marginal portions thereof to form the teeth, the depth of which is controlled by the distance the blank is moved towards the inner end of the chamber. Means has been provided for controlling inward movement of the blank consisting of a shaft 31 threaded through a bearing 32 formed at the center of the head 6. This shaft, which may be referred to as an adjustable abutment, has a head 33 at its inner end for engagement by the central portion of the blank and at its outer end carries a turning knob 34, by means of which it can be rotated and shifted longitudinally in the chamber 14. Proper adjustment of the abutment shaft will cause it to project into the tapered inner end portion of the chamber 13 a predetermined distance and as the blank will be held against further inward movement when it engages the head 33 of the abutment shaft, the teeth formed in the blank will only be of a desired depth. After the teeth have been formed in the blank, it is merely necessary to turn the shank 26 in a direction to shift the carrier and blank away from the cutters and the bolts 7 can then be removed to release the head 5 and permit the carrier and blank to be withdrawn from the chamber and the formed gear removed from the carrier.

Gauge markings may be formed upon the shaft 31 to indicate the extent to which the head 33 projects into the chamber 13 and thereby permit the abutment to be accurately set. When it is necessary to clean the device or sharpen or replace any of the cutters, the bolts which secure the brackets are removed, thus allowing the section 2 to be shifted away from the section 1 and the cutters and gears may be removed, the cutters sharpened or other repairs made and the gears and cutters then replaced and the section 2 then again secured to the section 1.

I have therefore produced a gear cutter which is simple in construction, easy to operate, and very strong and durable.

While the gear cutter shown and described herein is particularly adapted for cutting beveled gears it is to be understood that by manipulating the proper gear blank it may be used for cutting straight gears and is not limited to use in cutting beveled gears.

Having thus described the invention, what is claimed is:

1. In a gear cutter, a barrel having companion sections disposed in end to end relation to each other and formed with registering bores defining aligned chambers in the sections, one of said chambers for receiving the blank to be operated upon and being formed at its inner part with a tapered portion terminating in a reduced portion of uniform diameter, the other of said chambers corresponding in diameter to and opening at its inner end in said reduced portion, adjoining ends of the sections being formed with registering grooves defining pockets opening into the said tapered portion, the opposed ends of said sections having registering recesses, cutters in said pockets having shafts rotatably mounted in said recesses and provided with gear rings at their sides and having successive parts extended into said tapered portion, brackets bridging the sections between the cutters and securing the sections to each other, gears rotatably carried by said brackets and meshing with gear rings for transmitting rotary motion from the cutters to each other, a carrier in the blank receiving chamber mounted for advancing a gear blank towards the successive parts of the cutters which project into the said tapered portion, and an abutment in the other of said chambers for limiting such movement of the carrier and blank.

2. In a gear cutter, a barrel having main and auxiliary sections disposed in end to end relation to each other, brackets detachably connecting the sections, gears carried by said brackets, cutters rotatably mounted between adjoining ends of said sections and having gear rings at their sides engaging said gears whereby the cutters will be driven one from another, means extended from said barrel and connected to one of said gears for driving it, said cutters projecting into the main section of the barrel in proximity to the inner end of said main section, adjustable means for supporting a gear blank in the main section in operative relation to the cutters, and adjustable means carried by the auxiliary section for limiting movement of the blank towards the cutters.

3. In a gear cutter, a barrel having a main chamber and an auxiliary chamber aligned therewith and opening thereinto, cutters rotatably mounted in and projecting through the body of the barrel into the main chamber, in proximity to the inner end of the latter, heads for outer ends of said chambers, an adjustable carrier slidable through the main chamber for presenting a blank to the cutters, a threaded shank for and swivelly connected to said carrier engaged through a threaded bearing on the head for the main chamber, stems extending from the carrier and through the head of the main chamber to prevent rotation of the carrier, and an adjustable rod threaded through an opening formed in the head of the auxiliary chamber and having its inner end portion projecting into the main chamber and constituting an adjustable abutment for engaging a blank held by the carrier for limiting movement of the blank towards the cutters.

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