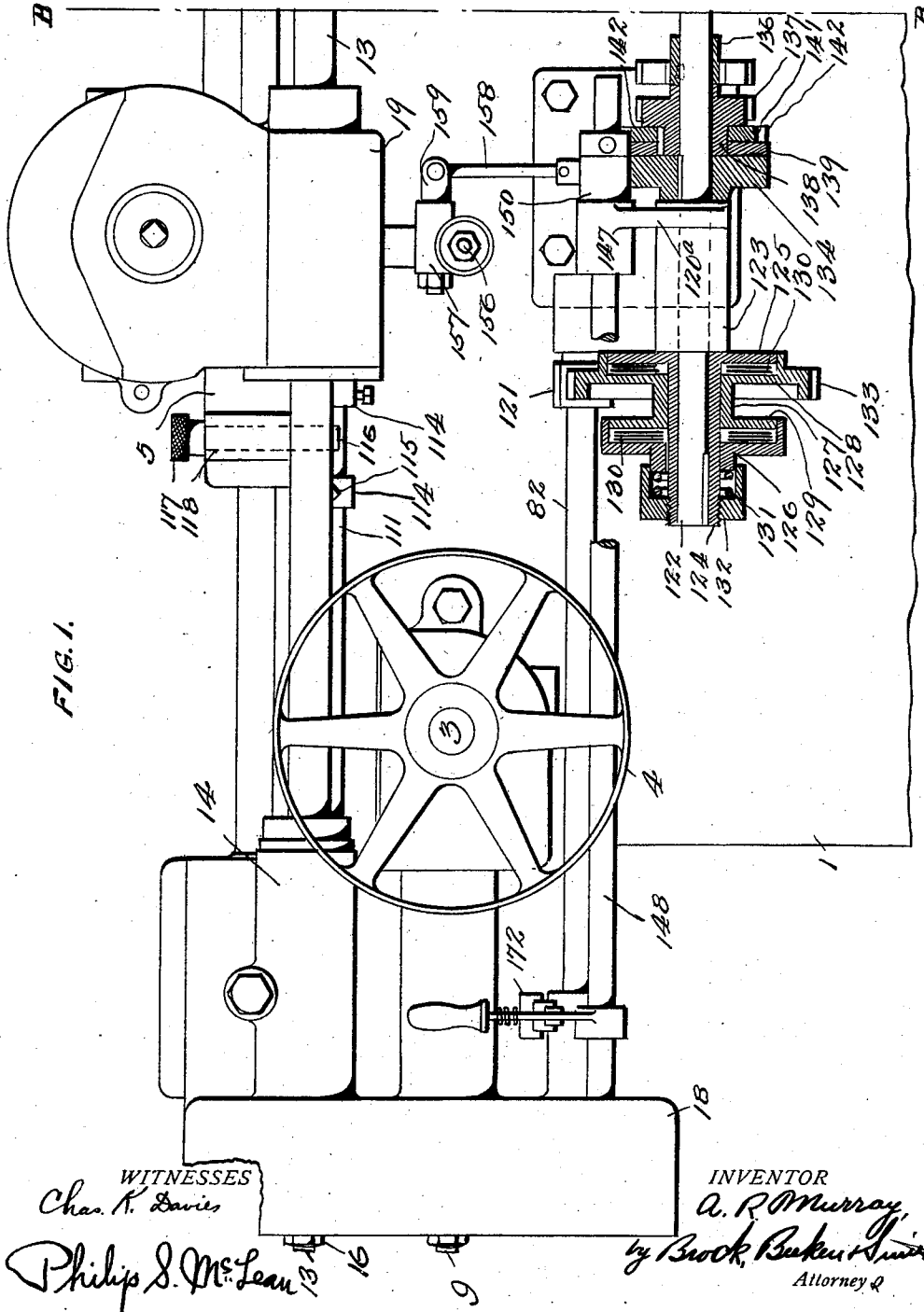


A. R. MURRAY.
DRIVING MECHANISM.
APPLICATION FILED JAN. 13, 1908.

1,028,771.

Patented June 4, 1912.

2 SHEETS—SHEET 1.



A. R. MURRAY.
DRIVING MECHANISM.
APPLICATION FILED JAN. 13, 1908.

1,028,771.

Patented June 4, 1912.

2 SHEETS—SHEET 2.

FIG. 2.

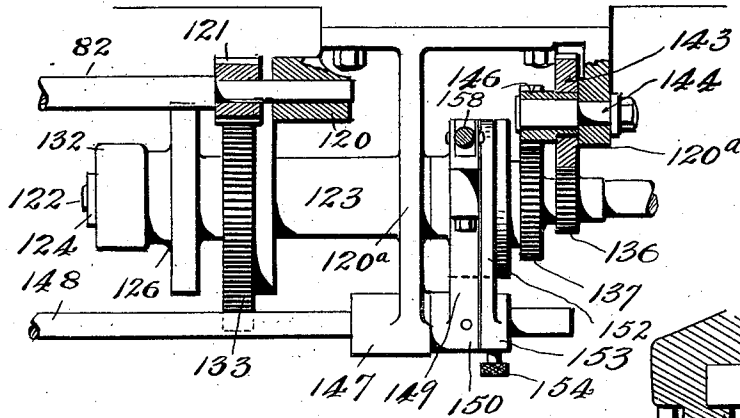


FIG. 4.

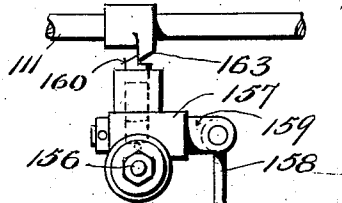


FIG. 5.

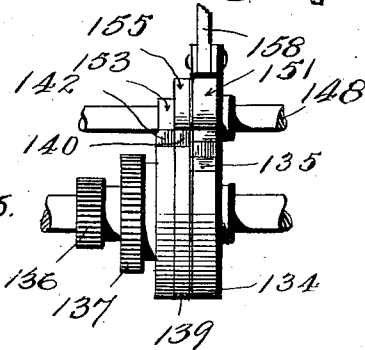
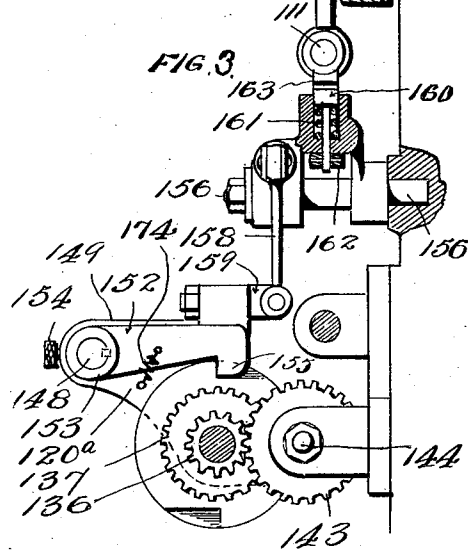


FIG. 3.



WITNESSES
Chas. H. Davies
Philip S. McLean.

INVENTOR
A. R. Murray
By Brock, Becken & Smith
Attorney

UNITED STATES PATENT OFFICE.

ARISTIDES REYNOLDS MURRAY, OF CINCINNATI, OHIO, ASSIGNOR TO THE CINCINNATI SHAPER CO., OF CINCINNATI, OHIO.

DRIVING MECHANISM.

1,028,771.

Specification of Letters Patent.

Patented June 4, 1912.

Application filed January 13, 1908. Serial No. 410,676.

To all whom it may concern:

Be it known that I, ARISTIDES REYNOLDS MURRAY, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented new and useful Improvements in Driving Mechanism, of which the following is a specification.

My invention relates to indexing mechanism for spacing and has been especially designed for use in gear cutting machines; but some or all of the features of the invention may be advantageously used in other metal working machines, such as milling machines.

The indexing mechanism proper is adapted in the exemplifying structure shown to rotate by successive steps, a fractional part of a revolution at each step, a blank which is acted on at each of its stops by a tool—usually a rotary milling cutter.

An important feature of the indexing mechanism is the provision of means by which the spacing, that is the proportion of a revolution covered by the blank at each step, may be easily and quickly varied without disturbing any parts of the mechanism, such as gearing, which require considerable time and trouble to alter.

I preferably employ a friction drive to impel the indexing mechanism. A driven member which rotates or stops in unison with the blank is normally held stationary by a latch while the cut is being made and at the completion of the cut while the cutter is free from the blank this latch is temporarily retracted from the driven member and the blank is thereupon rotated until the latch again checks the driven member. I provide readily adjustable means by which the extent of rotation of the driven member may be controlled and thus the degree of rotation of the blank at each step regulated.

The preferred method of carrying out the invention includes additional driven members and one or more additional adjustable latches arranged to co-act with the additional driven members, as will be more particularly pointed out hereafter.

The drawing illustrates the best exemplification of the invention which I have at this time devised, but it is to be understood that other constructions are contemplated within the scope of the invention.

Figure 1 is a side view partly in elevation and partly in section of the front portion of a gear cutting machine embodying the invention. Fig. 2 is a detail view partly in plan and partly in section of the indexing mechanism. Fig. 3 is a rear elevation of the mechanism of Fig. 7, some parts being shown in section. Fig. 4 is a fragmentary side view of means for raising the stop disks and the latches looking away from the base of the machine.

Fig. 1 shows principally in elevation and partly in section a view of a gear cutting machine. The base 1 carries slide 5 which is reciprocated by any suitable mechanism and carries the rotary cutter or other suitable tool for cutting the blank. The indexing mechanism, including the friction drive, stop disks and latches, is shown partly in elevation and partly in section in Fig. 1 mounted on the base. Pulley 4 impels through suitable gearing (not shown) shaft 82 which is the driving member of the indexing mechanism. The pulley 4 may also be arranged to drive all other parts of the machine. Shaft 82 has its forward bearing in gear box 18 and extends alongside the base of the machine to rear bearing 120. Near the bearing the shaft bears the pinion 121. Rear or driven indexing shaft 122 is mounted in its forward end in bearing 123, carried by a bracket 120^a secured to the base, and carries a sleeve 124 keyed to it. The sleeve has an annular flange 125 at its rear end, and a flanged sleeve 126 is splined to sleeve 124 near its forward end so that it has longitudinal movement. A sleeve 127 is mounted revolubly on sleeve 124 between flanges 125 and 126 and constitutes the driving member of the friction driving mechanism. Sleeve 127 carries flanges 128, 129, facing flanges 125, 126, respectively, and friction disks 130, of leather, raw hide, or other suitable material are placed between the driving and driven disks. Spring 131 confined between adjustable nut 132 and the end of the sleeve of disk 126 applies suitable pressure to the frictionally driven member. Disk 128 carries a gear 133 engaging pinion 121 by which the driving member of the friction group is rotated. To the rear of bearing 123, fast stop disk 134 is keyed to shaft 122. This disk is provided with one or more notches 135 as may be re-

quired, one being used in the present exemplification. A little to the rear of the disk 134, pinion 136 is keyed to shaft 122 and between the pinion and the disk a loose gear 137 having an extended hub 138, is journaled on the shaft. Keyed to this hub between gear 137 and the fast stop disk 134 are a first loose stop disk 139 having in the present exemplification one notch 140 and a second loose stop disk 141 having in this exemplification two notches 142. Pinion 136 engages a larger gear 143 revoluble about a stud 144, which is equivalent to a counter-shaft, carried by an extension of bracket 120^a secured to the base and gear 143 is keyed to the hub of smaller pinion 146 which in turn engages gear 137 on shaft 122, serving to drive the last-named gear and stop disks 139, 141 keyed to it at a reduced speed in relation to that of shaft 122.

To the right of shaft 122 a continuation of bracket 120^a provides a rear bearing 147 for rock shaft 148 sometimes called the latch shaft. This shaft carries fixed latch 149, whose hub 150 is keyed to the rock shaft and which has a tooth 151 adapted to enter notch 135 in fast stop disk 134. To the rear of fixed latch 149 is a movable latch 152 of which the hub 153 is mounted on rock shaft 148 and splined thereto in the same plane as latch 149 so that it has longitudinal movement on the shaft. A set screw 154, with knurled head, serves to lock latch 152 in adjusted position on its shaft. Latch 152 has a tooth 155 adapted to enter the notches in loose stop disks 139, 141, depending on the position of the latch. Rock shaft 148 is urged to rotate in a clockwise direction as seen in Fig. 3, and thus urges the teeth 151, 155 of latches 149, 152 to engage the peripheries of the stop disks and to enter the notches in the disks when the notches come opposite the teeth, by a spring which may be placed at any convenient point as at 174.

Above the latches, a stud 156 is fixed to the base and on the stud bell crank 157 is pivoted. One arm of the bell crank is connected by a link 158 and swiveled fork 159 to fast latch 149. The bell crank bears in a socket, in its other arm, a catch 160 urged outwardly by spring 161 until checked by collar 162 pinned to the stem of the catch 160 below the upper arm of the bell crank. A hook 163 shaped complementally to catch 160 is fastened to clutch shifting rod 111 to the rear of dogs 114.

During the retraction of the cutter slide, parts are in the position shown in Figs. 3 and 4. Toward the end of the retracting movement tappet 116 strikes forward dog 114 and moves shifting rod 111 forward and hook 163, engaging catch 160 rotates bell crank 157 counter-clockwise as seen in Fig. 1 through a partial arc of a circle, un-

til, by reason of the angular movement of the catch, it becomes free from the hook. When the bell crank is moved through link 158, the latches 149, 152 are withdrawn from the notches in stop disks 134, 139, 141 in which they rest. For the moment it will be assumed that movable latch 152 is toward the rear end of its shaft and entirely free from the stop disks so that only the fast latch is operative. This latch being momentarily pulled up, its tooth 151 is freed from the notch 135 in fast stop disk 134 and the disk which is being constantly urged to rotate by the friction driver, immediately rotates clockwise as seen in Fig. 3. As soon as the bell crank is freed from hook 163, it and the latch return toward their normal positions under the influence of the spring acting on rod 148 and the lower end of tooth 151 encounters the periphery of disk 134 upon which it rests until the notch again approaches the tooth whereupon the tooth again enters the notch and stops the disk. Rear indexing shaft 122 rotates or stops with the fast disk which is keyed to it and through other gearing which will later be described each time the tooth is removed from the notch in fast disk, the gear blank is rotated one space. Toward the end of the feeding movement of the cutter slide tappet 116 strikes rear dog 114 and moves clutch shifting rod 111 to the rear, causing hook 163 to pass catch 160 which it depresses as it moves past, bringing the hook and catch again into operative relation ready for another indexing action.

The indexing gearing is preferably provided with change speed elements, which I find it convenient to locate intermediate the indexing mechanism and the gear blank, in order to provide for all possible degrees of indexing movement, but the loose stop disks and movable latch, as will now be shown, provide convenient means for varying the movement of the blank arbor without disturbing the main change speed gearing. For purposes of illustration, it will be assumed that the ratio of gears on shaft 122 and counter-shaft-stud 144 is such that gear 137 rotates at one-quarter the speed of pinion 136. Loose stop disks 139, 141, therefore, rotate with gear 137 once while fast stop disk 134 rotates four times. The disks are originally adjusted so that the notch in disk 139 is in line with notch in disk 134, and one of the notches of disk 141 is in line with the notches in the other disks, the other notch in disk 141 being diametrically opposite the first. Thus, during the indexing rotation of shaft 122, the notch in the first loose disk will coincide with that in the fast disk once in four revolutions, and one of the notches in the second loose disk will coincide with that in the fast disk at 130

every second revolution. In order to obtain a relatively small indexing movement, the movable latch 152 is placed, as has been described, free from the loose disks. The fast latch then enters the notch in the fast stop disk at every revolution of the latter. To secure double this indexing movement, thumb screw 154 is loosened and movable latch 152 moved on shaft 148 until it is above the second loose disk 141. Then, at the first revolution of the shaft, tooth 151 of fast latch 149 is opposite its notch and ready to enter, but tooth 155 of the movable latch rests on a portion of the circular periphery of the loose disk, and since the fast latch moves in unison with the movable latch, no tooth is permitted to enter a notch, and the indexing movement continues during another revolution of shaft 122, when the notch 142 in the second loose disk other than the notch which has recently left the tooth of the movable latch comes in line with the notch in the fast disk, the teeth of both latches enter their notches and indexing is stopped. To secure four times the minimum indexing movement, the latch is shifted on its shaft until it is over the first loose disk. Indexing shaft 122 must then rotate four times before it is stopped in a manner which will be obvious from the foregoing description of the action of the second loose disk.

Obviously the ratios in gearing between pinion 136 and gear 137 may be varied, the number of loose stop disks may be increased or diminished, and instead of all of the loose stop disks rotating in unison with one gear, such as 137, these loose stop disks may be driven by separate gears at different angular speeds. The different indexing effects obtainable by these variations should be apparent to those versed in the art, without further detailed description.

I claim:—

1. In an indexing mechanism a driving-shaft, a driven-shaft frictionally impelled by the driving-shaft, a stop disk on the driven shaft having a notch, a rock-shaft, a latch fixed to the rock-shaft and adapted to engage the notch, a second stop disk impelled at a different speed from the first and having a notch, and a second latch adjustable on the rock-shaft adapted to engage the notch of the second disk.

2. In indexing mechanism a shaft frictionally driven, a stop disk fixed thereon having a notch, a rock-shaft, a latch fixed to the rock-shaft and adapted to enter the notch, a second stop disk loosely mounted on the shaft and having a notch, gearing impelling the second disk at a different speed from that of the first, and means for preventing the latch from entering except when the notches in the disks coincide.

3. In indexing mechanism a shaft frictionally driven, a stop disk thereon having a notch, a rock-shaft, a latch fixed thereon adapted to enter the notch, a plurality of stop disks loosely mounted on the shaft and having a different number of notches, gearing intermediate the shaft and the loose disks impelling the latter at a reduced speed in relation to the shaft, and a second latch adjustable on the rock-shaft adapted to engage the notches of either of the loose disks.

4. In indexing mechanism, the combination of a friction driver, a driven shaft, a plurality of disks thereon driven at different speeds and provided with notches, a detent adapted to engage the notches and means for momentarily retracting the detent.

5. In indexing mechanism, the combination of a friction driver, a driven shaft, a disk thereon rotating at the shaft speed, another disk thereon, means for rotating said other disk at a speed different from the shaft speed, each of the disks being provided with a notch and a retractable detent adapted to engage the notches.

6. In indexing mechanism, the combination of a friction driver, a driven shaft, a disk fixed thereon, and provided with a notch, a disk loose thereon and provided with one or more notches, gearing intermediate the shaft and loose disk for rotating the latter at a speed different from that of the shaft, a latch adapted to engage the notch of the fixed disk, a movable latch adapted to engage the loose disk or to be disengaged therefrom at will, and means for momentarily retracting the latches.

ARISTIDES REYNOLDS MURRAY.

Witnesses:

SAML. WHITE,
JOHN F. BOWMAN.