

No. 826,477.

PATENTED JULY 17, 1906.

W. L. CLOUSE.
SPEED CHANGING GEAR.
APPLICATION FILED NOV. 16, 1905.

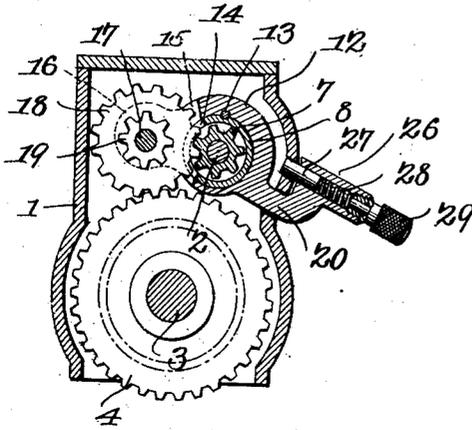


Fig. 4.

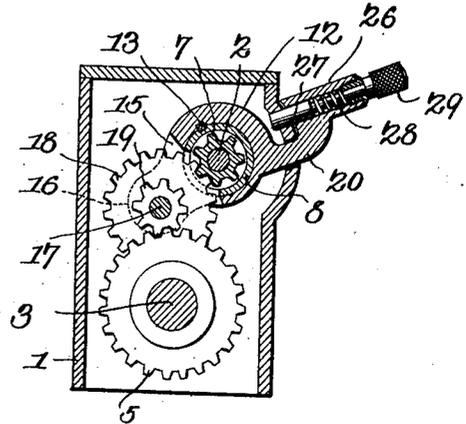


Fig. 3.

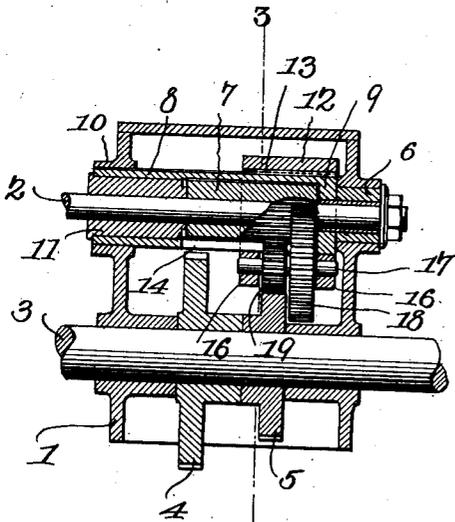


Fig. 2.

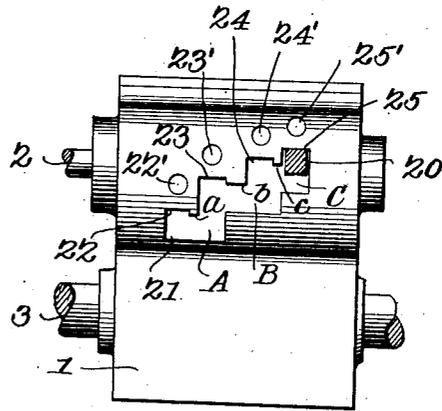


Fig. 1.

Witnesses

E. J. [Signature]
H. C. Shepard

William L. Clouse,

Inventor.

by

C. A. Snow & Co.

Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM L. CLOUSE, OF TIFFIN, OHIO, ASSIGNOR TO THE NATIONAL MACHINERY COMPANY, OF TIFFIN, OHIO.

SPEED-CHANGING GEAR.

No. 826,477.

Specification of Letters Patent.

Patented July 17, 1906.

Application filed November 16, 1905. Serial No. 287,704.

To all whom it may concern:

Be it known that I, WILLIAM L. CLOUSE, a citizen of the United States, residing at Tiffin, in the county of Seneca and State of Ohio, have invented a new and useful Speed-Changing Gear, of which the following is a specification.

This invention relates to feed and speed changing devices, and is particularly designed for use in connection with motor-driven tools.

Among the important objects of the invention it is proposed to reduce to a minimum the number of gears employed in the device, to arrange for controlling the device by a single handle, to enable the convenient changing from one gear to another without any possibility of two or more sets of gears being thrown into mesh, to obviate the use of gears or pinions moving on keys or feathers, to dispense with the use of bearing-clutches, and to employ only wide-faced gears for insuring long life to the device.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a front elevation of the case for housing the elements of the present speed-gearing. Fig. 2 is a longitudinal sectional view of the device. Fig. 3 is a cross-sectional view on the line 3-3 of Fig. 2. Fig. 4 is a view similar to Fig. 3, showing the device set for another speed.

Like characters of reference indicate corresponding parts in all of the figures of the drawings.

For housing the parts of the present invention there is a suitable case 1, the ends of which are pierced by parallel driving and driven shafts, (designated 2 and 3, respectively.) Keyed or otherwise suitably secured to the driven shaft 3 is a series of gears of different sizes, there being two such gears. (Shown in Fig. 2 of the drawings and designated 4 and 5, respectively.) Power is applied to either end of the shaft 2, preferably

that end of the shaft which is shown broken in the drawings, and the other end of the shaft has a bearing 6 in the adjacent end of the case. An elongated gear 7 is fixed to the drive-shaft 2 substantially midway between the ends of the case, and this gear turns in a cylinder 8, which is provided at its inner end with a head 9, pierced by the shaft 2 and operating as a spacing device between the gear 7 and the adjacent end of the case. The outer end of the cylinder 8 is open and has a bearing 10 in the other end of the case, there being a tubular plug 11 fitting within the open end of the cylinder, constituting a bearing for the shaft 2.

A gear-carrying sleeve 12 slidably embraces the cylinder 8 and is held against rotation thereon by means of a spline or feather 13, the cylinder and sleeve being provided with alined longitudinal slots 14 and 15, which are maintained in alinement by means of the spline or feather 13. Spaced bearing-arms 16 are provided upon the sleeve 12 and located at opposite ends of the sleeve 15, there being a counter-shaft 17 mounted in the bearing-arms and carrying a gear 18 and a smaller pinion 19, the gear 18 being always in mesh with the elongated gear 7 without regard to the position of the gear-carrying sleeve 12 upon the drive-gear 7.

For the control of the gear-carrying sleeve there is a handle 20 projecting from the sleeve and extending outwardly through a slot 21, formed in the case 1, made up of a stepped series of communicating branches, (designated in general A, B, and C.) The upper edges of the branches of the slot are provided with the depending shoulders *a*, *b*, and *c*, which produce a stepped series of seats 22, 23, 24, and 25. The case is furthermore pierced by a series of perforations (designated 22', 23', 24', and 25') located opposite the respective seats. The outer free end portion of the handle 20 is provided with an offset tubular portion 26, through which extends an endwise-movable pin 27, having its inner end projecting beyond the tube for engagement with any of the series of perforations in the case. A helical spring 28 is housed within the tube and bears against the forward end of the pin to yieldably project the same beyond the tube. A suitable head or finger-piece 29 is provided upon the outer end of the pin for convenience in withdraw-

ing the latter against the tension of the spring.

From the foregoing description it will be understood that the gear 18 is always in mesh with the gear 7, the gear-carrying sleeve 12 being shiftable endwise upon the cylinder 8 for the purpose of moving the gear 18 to any position upon the gear 7 for engagement with any gear upon the driven shaft 3. As shown in Figs. 2 and 3, the pinion 19 is in engagement with the gear 5, and it is of course apparent that by shifting the handle downwardly and then to the left, so as to move it from the seat 25 into the seat 24, the pinion 19 will be first moved radially outward from the gear 5 and then moved laterally until the gear 18 comes into the same plane with the gear 5, whereupon the handle is elevated to engage the same with the seat 24, which throws the gear 18 down into engagement with the gear 5, so as to change the speed of the driven shaft 3, while the speed of the drive-shaft 2 remains constant. By successively engaging the handle with the seats 23 and 22 the pinion 19 and the gear 18 may be successively engaged with the gear 4, so as to obtain two other speeds for the shaft 3. By the present arrangement of two gears upon the shaft 3, together with a gear and a pinion upon the counter-shaft 17, four different speeds may be obtained, and it is therefore apparent that by increasing the gears upon the driven shaft 3 and the counter-shaft 17 various rates of speed may be imparted to the shaft 3.

A very important feature of the invention resides in the fact that when the handle 20 is engaged with any of the seats it is positively held against movement, and therefore the gear-carrier cannot become accidentally shifted. Moreover, when changing the handle from one seat to another it is first necessary to depress the handle, thereby rotating the gear-carrier 12 and the cylinder 8 upon the drive-gear 7, which swings one or the other of the intermediate gears 18 and 19 radially out of engagement with one of the gears on the shaft 3, thereby insuring a prompt and effective disengagement of the intermediate gear from the gear on the shaft 3. This manner of engaging and disengaging the intermediate gears with the gears of the driven shaft has an important advantage over the usual manner of sliding one gear sidewise past the other gear, in that the engagement and disengagement is not gradual, but prompt and decisive, which prevents stripping of the teeth and consequent interruption of the operation of the device. Furthermore, as clearly indicated in Fig. 2 of the drawings, the gears on the shaft 3 are spaced at a greater interval than the gears 18 and 19, wherefore only one of the latter gears can be at any one time in mesh with one of the gears of the driven shaft, and therefore there

can be no damaging of the gears by reason of the simultaneous engagement of two or more sets of gears. All of the gears are wide-faced, wherefore they become promptly engaged and disengaged over their whole face, and thus prolong the life of the device.

The advantage of having the cylinder 8 rotate with the sleeve 12 is to keep the slots in cylinder 8 and sleeve 12 in alinement, and thus make the slot in cylinder 8 as narrow as possible and make the bearing of cylinder 8 and sleeve 12 as large a portion of the circumference of cylinder 8 as possible, and thus prevent cramping of the sleeve 12 when sliding endwise on cylinder 8, also to prevent tilting of the sleeve 12 and consequent tilting of the intermediate gears, which would give an ineffective meshing of the latter with the gears of the shaft 3 and would result in slipping of the gears and stripping of the teeth thereof.

While only two gears have been shown upon the counter-shaft 17, I contemplate employing any suitable number of gears or pinions, one only being in constant mesh with the elongated drive-gear 7, whereby a great number of speed changes may be obtained.

Having thus described the invention, what is claimed is—

1. In a speed-changing gear, the combination with a case, of a drive-shaft and a driven shaft, the drive-shaft being provided with an elongated drive-gear and the driven shaft having a plurality of drive-gears of different sizes, of a rotatable cylinder embracing the drive-gear and having one open end mounted in a side of the case, a tubular plug fitted in the open end of the cylinder and forming a bearing for the drive-shaft, a sleeve slidably splined upon the cylinder, the sleeve and the cylinder having alined longitudinal slots, and an intermediate gear carried by the sleeve and in constant mesh with the drive-gear through the slots of the sleeve and the cylinder, the sleeve being shiftable upon the cylinder to engage its gear with any of the gears of the driven shaft.

2. In a speed-changing gear, the combination with a case, of a drive-shaft and a driven shaft mounted in the same, an elongated drive-gear fixed upon the drive-shaft and terminating short of the ends of the case, a cylinder rotatably embracing the drive-gear, one end of the cylinder being open and mounted in an opening in the adjacent side of the case, the other end of the cylinder being closed and forming a spacing device between the adjacent end of the drive-gear and the case, a tubular plug fitted in the open end of the cylinder and forming a bearing for the drive-shaft, a plurality of driven gears of different sizes carried by the driven shaft, a sleeve slidably splined upon the cylinder, the sleeve and the cylinder having alined longi-

tudinal slots, and an intermediate gear carried by the sleeve in constant mesh with the drive-gear through the slots of the sleeve and the cylinder, the sleeve being shiftable
5 upon the cylinder to engage its gear with any of the gears of the driven shaft.

In testimony that I claim the foregoing as

my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM L. CLOUSE.

Witnesses:

H. W. CONRAD,
EARL C. KNAPP.