F. F. CLARKE.

CLUTCH GEARING FOR MACHINE TOOLS.

APPLICATION FILED DEC. 3, 1914.

1,185,064.

Patented May 30, 1916.

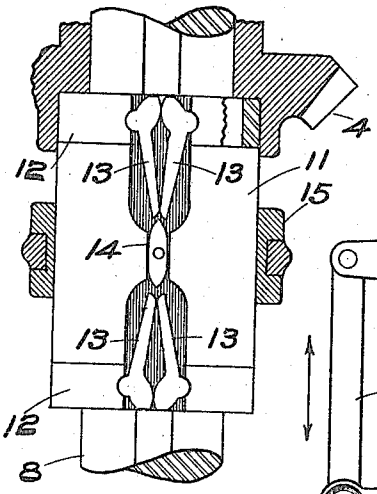


FIG. 4.

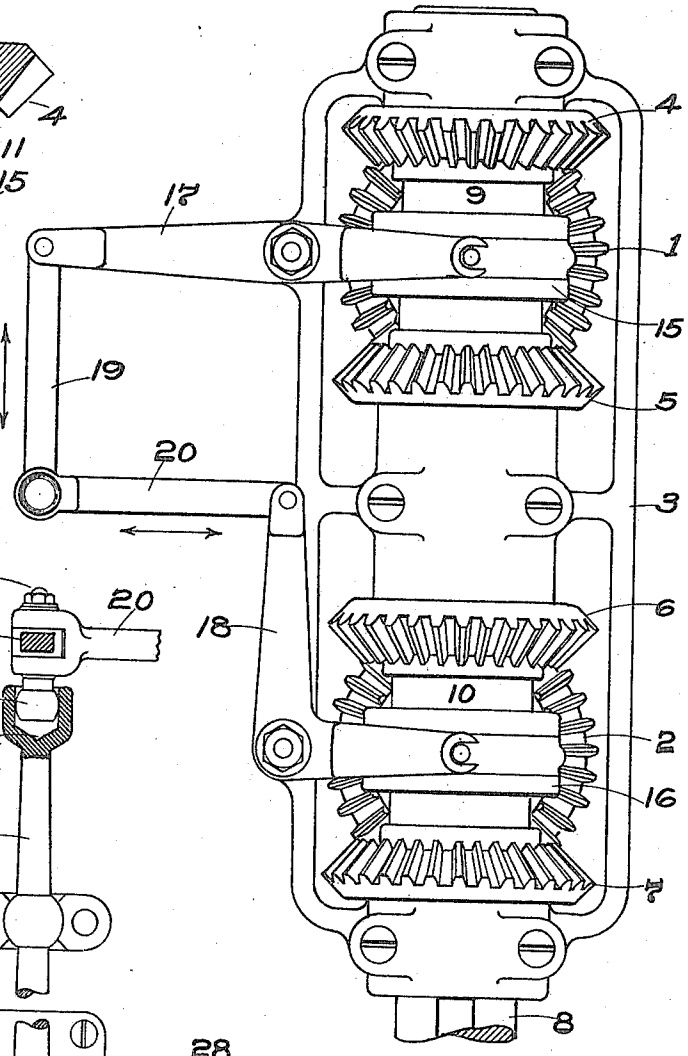


FIG. 1.

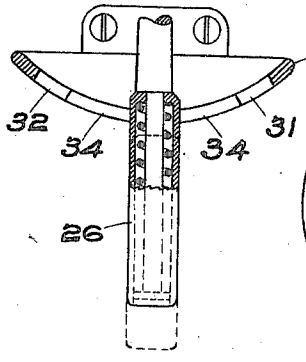


FIG. 2.

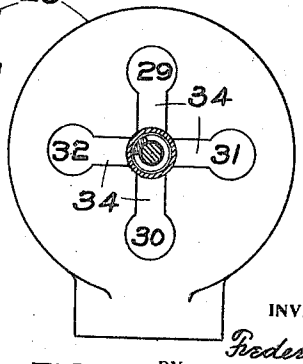


FIG. 3.

WITNESSES

C. V. Colburn

L. W. Breckenridge

INVENTOR

Frederick F. Clarke

BY Edward R. Inman

ATTORNEY

UNITED STATES PATENT OFFICE.

FREDERICK F. CLARKE, OF FRANKLIN, PENNSYLVANIA, ASSIGNOR TO COLBURN MACHINE TOOL COMPANY, OF FRANKLIN, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CLUTCH-GEARING FOR MACHINE-TOOLS.

1,185,064. Specification of Letters Patent. Patented May 30, 1916.

Application filed December 3, 1914. Serial No. 875,331.

To all whom it may concern:

Be it known that I, FREDERICK F. CLARKE, citizen of the United States, residing at Franklin, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Clutch-Gearing for Machine-Tools, of which the following is a specification.

The object, construction and utility of my improved clutch gearing are herein set forth with sufficient clearness to enable those skilled in the art of machine-tool construction, to make and use the same.

The gearing here shown is intended, especially, to be applied to boring mills, and more particularly to the feed-screw which actuates the saddle, and to the feed-shaft which actuates the head or ram, which screw and shaft, as is well known, are mounted in close proximity to each other in the cross-rail of the mill. It is necessary to so construct the driving gear for said screw and shaft, that either may be selected, at will, to be driven, also that either may be driven in either direction. As heretofore constructed, two levers have been employed for this purpose,—one to select the element to be driven, the other to select the direction of drive. I have found it to be expeditious, convenient, and conducive to simplicity of construction to employ a single lever for this purpose.

It is, therefore, the object of this invention to supply such single-lever actuation. The construction whereby I attain said object is clearly shown in the drawings which form a part hereof, the various figures of which are as follows:

Figure 1 is an elevation of said gearing, Fig. 2 is a plan view of the actuating-lever for same, Fig. 3 is a front elevation of the lever-keeper, Fig. 4 is an elevation, with portions broken away, of the clutches which I employ in this gearing.

The construction as illustrated in said drawings, is substantially as follows:—To the end of the feed-rod (not shown) which actuates the ram of a boring mill, which end projects from the end of the cross-rail, is secured a primary bevel or miter gear 1, and to the end of the feed-screw which actuates the saddle, and which also projects from the end of said cross-rail, in proximity to said end of said rod, is likewise secured an additional primary bevel gear 2. Within a suitable frame 3, which is attached to said cross-rail, four secondary gears, 4, 5, 6 and 7 are revolubly mounted, upon a vertical driving shaft 8. Gears 4 and 5 mesh with the gear 1, and gears 6 and 7 mesh with the gear 2. Between the gears 4 and 5 a clutch 9 is mounted, and is adapted to engage and to actuate said gears selectively, and as desired. Between the gears 6 and 7 a clutch 10 is mounted and is adapted to engage and to actuate said gears 6 and 7 selectively and as desired.

Clutches 9 and 10 are identical in construction and are shown in Fig. 4. Said clutches are a commercial article, and of a type quite generally employed in the art of machine-tool construction. Said clutches are splined to and are driven by shaft 8 and are movable longitudinally thereon. Referring to Fig. 4, the particular adaptation of said clutches to the mechanism here shown is as follows: The clutch-body 11 is supplied at either end with an expandible friction ring 12, one of which rings is positioned in the bore of the hub of each of said gears 4 and 5, 6 and 7; levers 13 are provided for expanding said rings, and a wedge 14, which is carried by the shipper-sleeve 15, is adapted to be thrust between the adjacent ends of said levers thus expanding said rings 12, which causes them to operatively engage the respective gear with which each coöperates.

It will be readily understood that, when gear 4 is engaged and actuated by clutch 9, it will cause gear 1 to revolve in one direction, and when gear 5 is engaged and actuated by said clutch, it will drive said gear 1 in the opposite direction; also that when gear 6 is engaged and actuated by clutch 10, gear 2 will be driven in one direction, and oppositely-driven when gear 7 is so engaged and actuated.

Each shipper-sleeve 15 and 16, is provided with a shifting-lever, that for the sleeve 15 being in the form of a straight, horizontally-extending lever 17, and that for the sleeve 16 being in the form of a bell-crank 18, the arms of which form substantially a right angle, with the actuation arm vertically-positioned.

To the outer end of lever 17 is attached one end of a vertically-disposed link 19, and to the outer end of bell-crank 18 is attached one end of a horizontally-disposed link 20: the other end of said links 19 and 20 are joined

together by means of a pin 21, and by means of such joining the levers 17 and 18 are adapted to be independently actuated by a single lever 22, the construction, arrangement and operation of which is as follows: The fulcrum point of said lever consists of a ball-and-socket 23, which adapts said lever to have a universal movement. Pin 21 is provided upon its extending end with a ball 24 which is engaged by the socket 25 upon the adjacent end of said lever 22. The free, or manipulation end of said lever 22 is provided with a longitudinally-movable handle-piece, 26, which is spring-retained in the inward position shown by the full lines in Fig. 2, by means of the spring 27. A keeper 28 is provided for said lever, through which said hand-piece extends, and formed therethrough are four sockets 29, 30, 31 and 32, for the reception of said hand-piece 26. Said sockets are connected with a central socket 33 by the radial slots 34, as shown in Fig. 3. When the lever 22 is to be actuated, the hand-piece 26 is drawn outwardly until it is free from the keeper, when it can be moved in any of the radial slots to the desired position, and when so positioned said hand piece is released and the spring 27 causes it to move into the adjacent socket, which retains it and the lever 22 in the desired position. As will be readily understood from an inspection of Fig. 1, a horizontal movement of said lever 22, will actuate the bell-crank 18, and operate clutch 10, but will cause no movement of lever 17 for the reason that link 19 will simply swing without moving said lever 17; that, on the other hand, a vertical movement of lever 22 will actuate lever 17 and operate clutch 9 but will not actuate said bell-crank, because of the swinging movement of link 20. Hence it will also be easily understood that a horizontal movement of lever 22 operates clutch 10 only and a vertical movement of said lever operates clutch 9 only. Now, if gear 4 is to be engaged and rendered operative, lever 22 is moved so that its hand-piece 26 moves upwardly and inserted in the socket 29; if gear 5 is to be engaged and made operative said hand-piece is moved downward and inserted in socket 30; if gear 6 is to be made operative said hand-piece is moved to the right and inserted in socket 31, and if gear 7 is to be made operative, said hand-piece is moved to the left and inserted in socket 32. When hand piece 26 occupies the central socket, lever 22 is in a neutral position, in which there is no engagement of either clutch with its respective gears.

As previously stated the clutch bodies 11 are splined upon the shaft 8 and positively driven thereby, but are free to slide longitudinally upon said shaft.

One application of my improved clutch-gearing is further illustrated in my co-pending application for a patent for improvements in feed gearing for boring mills, Serial No. 875,330, filed in the United States Patent Office at even date herewith.

I claim the following:—

1. Clutch gearing comprising a plurality of independent primary gears, an independent driven element for each of said gears, secondary gears arranged in mesh with each of said primary gears, said secondary gears being adapted to impart motion to their respective primary gears, separate means cooperating with each of said secondary gears respectively and adapted to drive any one thereof selectively, in combination with a single element arranged to selectively cause the operative action of any one of said secondary gears, as desired.

2. Clutch gearing comprising two independent primary gears adapted to be applied to separate elements of a machine tool, four secondary gears, two of which are in mesh with one of said primary gears, and the other two in mesh with the other primary gear, one of said secondary gears being adapted to drive its related primary gear in one direction, and the other secondary gear being adapted to drive its related primary gear in the opposite direction, separate means coöperating with each related pair of secondary gears and adapted to drive either one thereof selectively and as desired, in combination with a single element arranged to selectively cause the operative action of any one of said secondary gears, as desired.

3. Clutch mechanism comprising two independent primary, bevel gears, adapted to be operatively applied to separate elements of a machine tool, four secondary bevel gears, two of which are arranged in mesh with one of said primary gears and diametrically positioned relative thereto, means adapted to render either of said secondary gears operative to drive its respective primary gear, the other two of said secondary gears arranged in mesh with said other primary gear and diametrically positioned relative thereto, means adapted to render either one of said last-mentioned secondary gears operative to drive its primary gear, in combination with a single actuating element, adapted to render operative, as stated, any one of said secondary gears as desired.

4. Clutch gearing comprising two primary bevel gears adapted to be applied to separate elements of a machine tool, four secondary bevel gears, two of which are arranged in mesh with one of said primary gears and diametrically positioned relative thereto, a double clutch coöperating with said two gears and arranged to operatively engage either one of same as desired, the other two of said secondary gears arranged in mesh with the other of said primary

gears, and diametrically positioned relative thereto, a double clutch coöperating with said last-mentioned two gears and arranged to operatively engage either one of same as desired, in combination with a single element adapted to selectively actuate said clutches in such manner as to operatively engage any one of said secondary gears, as desired.

5. Clutch gearing comprising two primary bevel gears adapted to be operatively connected to separate elements of a machine tool, four secondary bevel gears, two of which are arranged in mesh with one of said primary gears and diametrically positioned relative thereto, a double clutch cooperating with said two gears and arranged to selectively operatively engage either one of same, a horizontally-disposed lever arranged to actuate said clutch, the other two of said secondary gears arranged in mesh with said other primary gear and diametrically positioned relative thereto, an additional double clutch coöperating with said last-mentioned secondary gears and arranged to selectively operatively engage either one of same, a bell-crank arranged to actuate said last-mentioned clutch and having its free arm extending at a right angle to the free arm of said lever, a link connected at one end to the free end of said lever, an additional link connected at one end to the free end of said bell-crank, the other ends of said links being joined together, in combination with a universally-movable actuating lever engaging said links at the junctional point thereof, whereby any one of said secondary gears may be selectively operatively engaged by its respective clutch, as and for the purpose set forth.

6. An actuating element for clutch and other gearing, consisting of the combination of a straight lever, an element arranged to be actuated by said lever, a link attached to said lever, a bell crank, an element arranged to be actuated by said bell crank, a link attached to said bell crank, and an actuating lever to which said links are attached, operable to selectively, separately actuate said lever and said bell crank.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK F. CLARKE.

Witnesses:
MARY B. ECKERT,
RAY S. CLARKE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."