J. G. BELLINGER.

MECHANISM FOR CONTROLLING A LONGITUDINALLY MOVABLE ELEMENT.

APPLICATION FILED DEC. 26, 1908.

951,901. Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

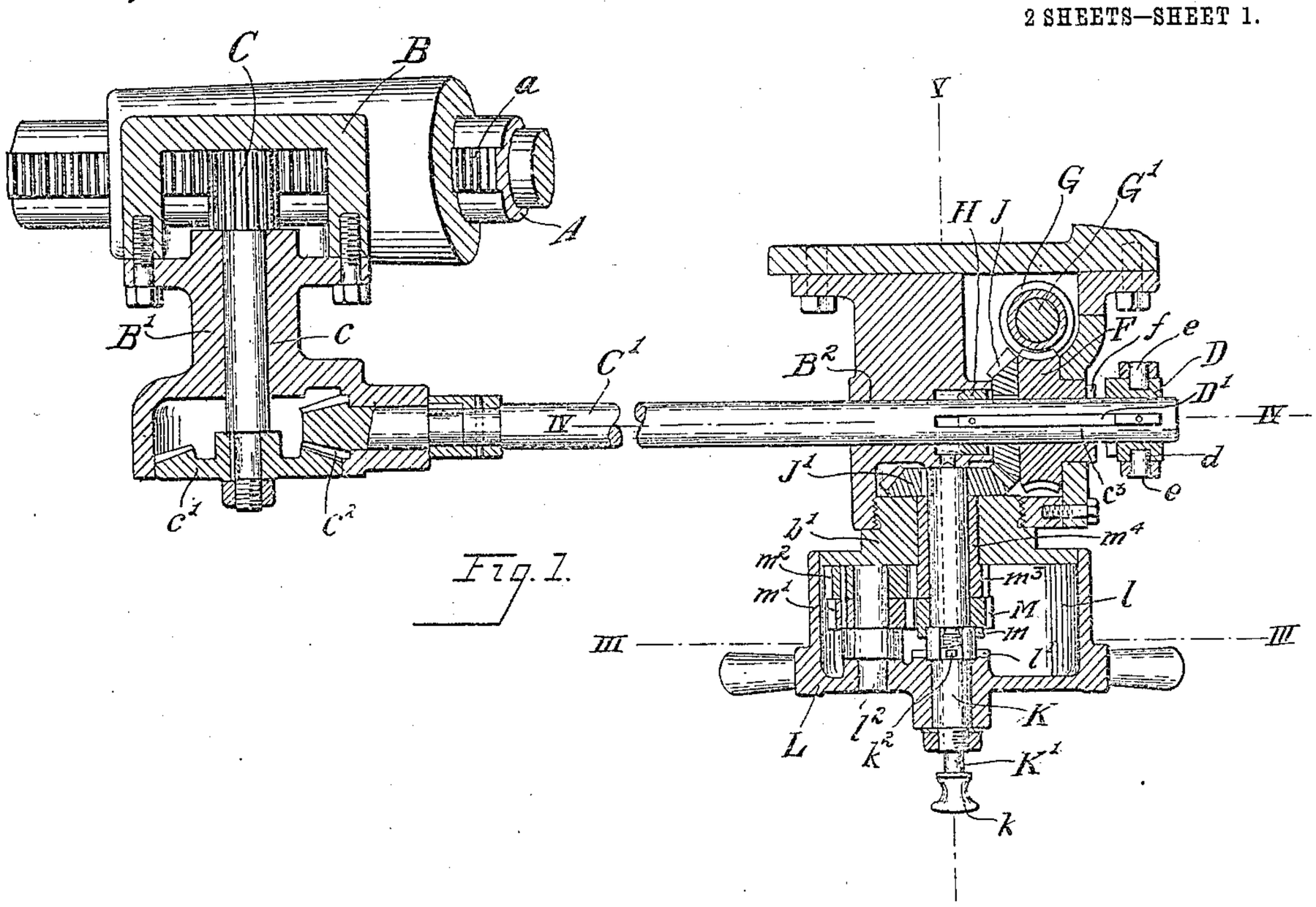

Fig. 1.

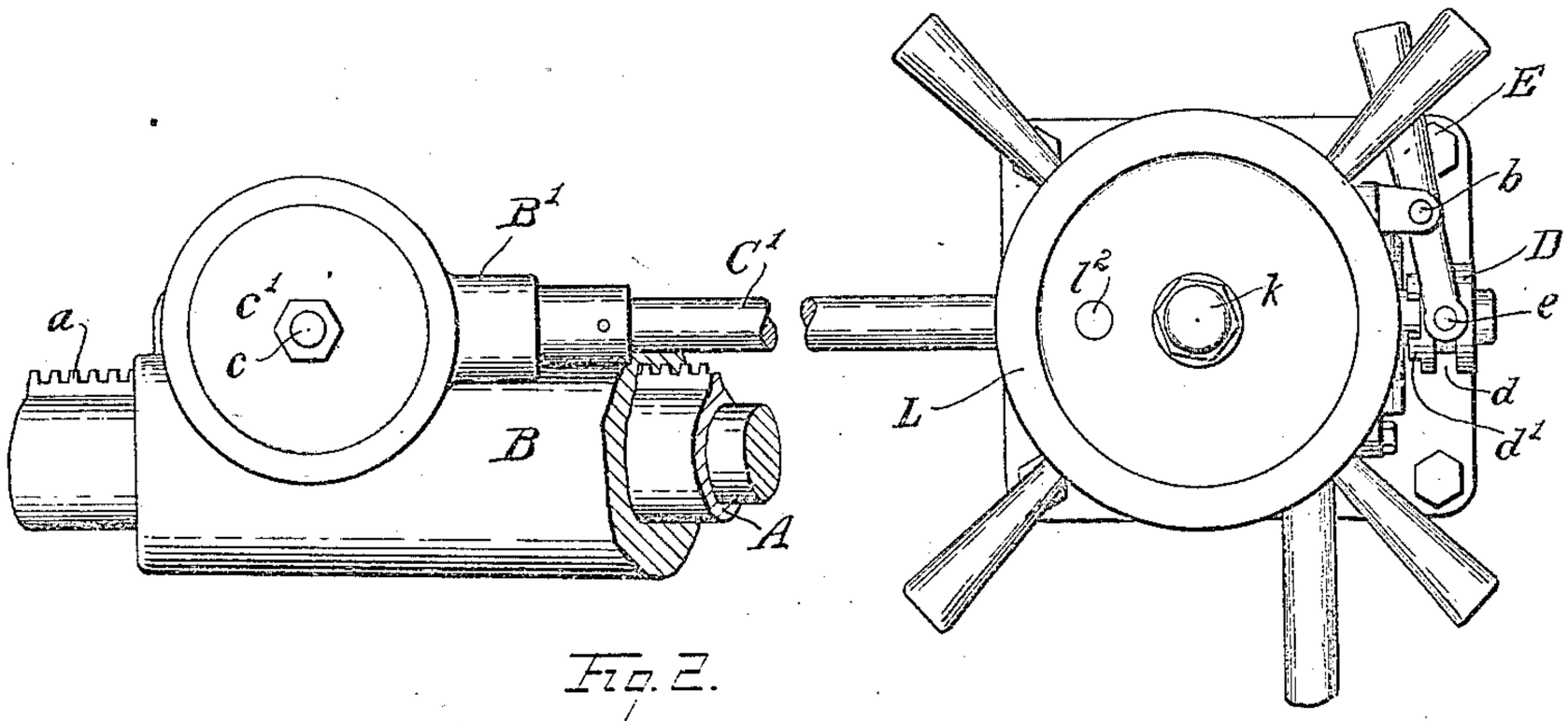

Fig. 2.

Witnesses

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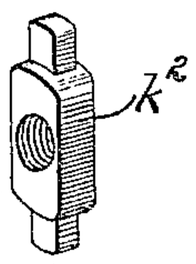

Fig. 6.

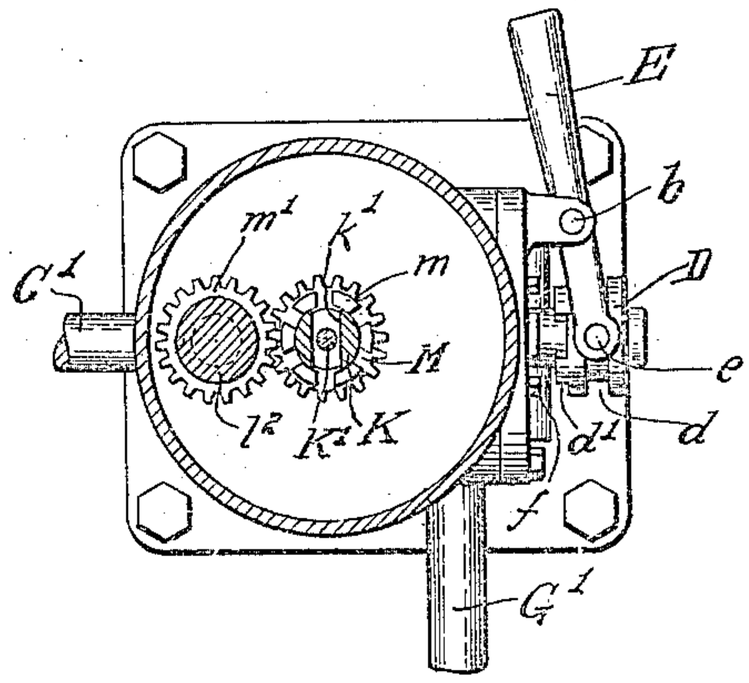

Fig. 3.

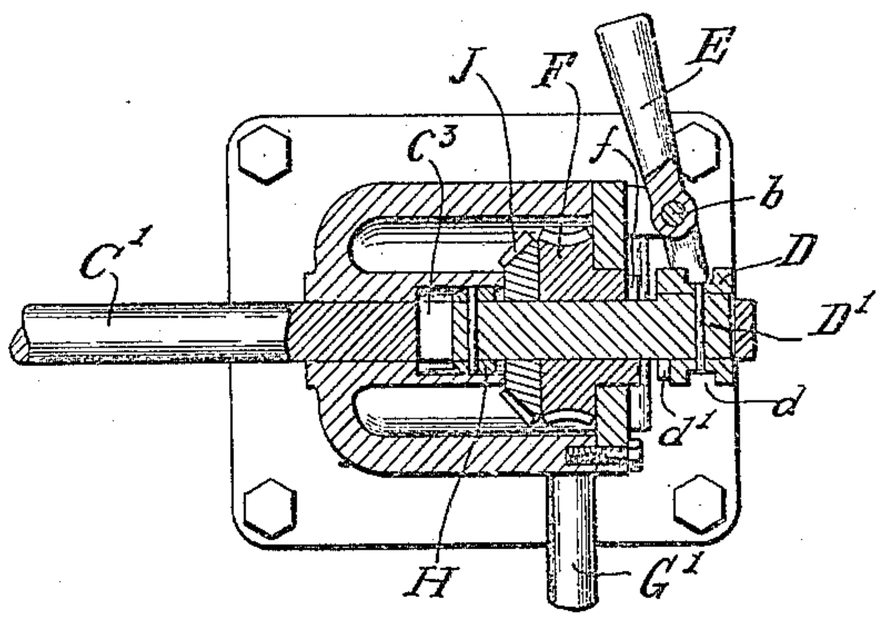

Fig. 4.

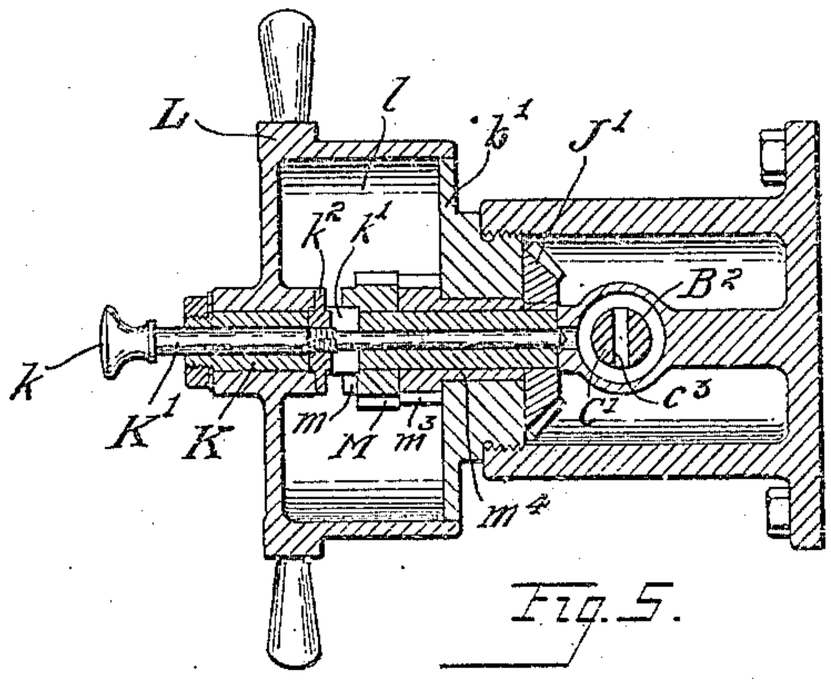

Fig. 5.

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR CONTROLLING A LONGITUDINALLY-MOVABLE ELEMENT.

951,901. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed December 26, 1908. Serial No. 469,500.

To all whom it may concern:

Be it known that I, JAMES G. BELLINGER, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Mechanism for Controlling a Longitudinally-Movable Element, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to mechanism for controlling a longitudinally movable element such as for instance the boring bar of a boring machine. Its object is to provide mechanism of the foregoing description whereby it will be possible to impart to such longitudinally movable element an automatic, continuous, slow feeding movement, together with a manually imparted quick traverse and a manually imparted slow traverse, in either direction, and at the same time arrange the mechanism in a manner such that the parts may be readily adjusted to effect the previously described movement with safety thereto.

The said invention consists of means hereinafter fully described and particularly set forth in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, the disclosed means, however, constituting but one of various forms in which the principle of the invention may be applied.

In said annexed drawings: Figure 1 is a horizontal section of the feeding mechanism of a boring machine embodying my invention, showing a fragmentary portion of the boring bar in connection therewith and other parts, and showing the driven spindle broken. Fig. 2 is a front elevation of the mechanism shown in Fig. 1. Fig. 3 is a vertical section taken upon the plane indicated by line III—III in Fig. 1. Fig. 4 is a vertical section taken upon the plane indicated by line IV—IV in Fig. 1. Fig. 5 is a vertical section taken upon the plane indicated by line V—V in Fig. 1. Fig. 6 is an enlarged detail view of one element of the mechanism.

Referring to the drawings, A, Fig. 1, is a longitudinally movable element whose movement it is desired to control in the previously specified manner. In this instance, this element is shown to be the quill of a boring bar of a boring machine. This quill is provided on one side with a rack *a* and is suitably mounted in a fixed portion B of the frame of the machine so as to be longitudinally slidable therein.

A pinion C engages the rack and is mounted upon a short spindle *c* mounted in a suitable fixed bearing B′ forming part of the machine. Upon this spindle is fixed a bevel gear *c′* which engages a bevel pinion c^2 fixed upon the end of the driven spindle C′. This mechanism just described forms no part of my invention and constitutes merely a wellknown and convenient means of connecting the longitudinally movable element or quill for moving the boring bar with my improved controlling mechanism which I will now proceed to describe. The other end of the spindle C′ is mounted in a suitable fixed bearing B^2 of the machine and projects laterally from the housing, as shown in Fig. 1. Upon this projecting end of this spindle and mounted so as to be slidable longitudinally thereof is a collar D which is provided with a peripheral groove *d* into which project pins *e e* mounted in the fork of a hand lever E fulcrumed at *b* in a suitable manner upon the frame adjacent thereto, as shown in Figs. 2 and 3. The inner face of this collar is formed with projections *d′* which make of the collar a clutch jaw. Adjacent to this jaw and mounted upon the spindle C′ so as to rotate loosely thereon is a worm wheel F. That face of this wheel adjacent to the collar is also formed with projections *f* which make of this worm wheel a second clutch jaw. It will therefore be seen that by shifting the collar D longitudinally upon the spindle the worm wheel F may be rotatably fixed relatively to or disconnected from the spindle C′. A worm G engages the worm wheel F and is fixed upon the driving shaft G′ which is suitably connected with the feed changing mechanism in the usual manner.

The end of the shaft C′ is formed with a longitudinally extending slot c^3 which passes completely therethrough, as shown in Fig. 4. In this slot is seated a bar D′, Figs. 1 and 4, which is of less length than the slot c^3 and may therefore be moved longitudinally therein. This bar has its outer end pinned to and hence fixed to the collar D and its inner end

is pinned to a collar H which surrounds and slides upon the spindle C′. The inner face of this collar is tapered as is shown and for a purpose hereinafter described. It will therefore be seen that when the collar D is shifted the bar D′ and hence collar H are likewise shifted.

Rotatably fixed upon the spindle C′ is a bevel gear J which meshes with a second bevel gear J′ fixed upon a hollow spindle K having its axis at right angles to that of spindle C′. Seated in the interior bore of spindle K is a longitudinally shiftable rod K′ having a hand knob k upon the outer end thereof. The inner end of this rod is tapered as shown in Figs. 1 and 5 and the rod's length is such that it may be pushed inwardly a distance such that such inner end will intersect the path of movement of the collar H. This arrangement therefore permits the said collar H to engage the tapered inner end of the rod K′ and push same outwardly when the clutch jaw D is thrown into engagement with the worm wheel F.

Rotatably mounted upon the outer end of the spindle K is a hand wheel L formed with a hollow body or barrel l as shown in Figs. 1 and 5. The inner side of the hub of this wheel is formed with projections l' whereby a clutch jaw is formed of this hub and adjacent to this clutch jaw is a pinion M loosely mounted in the spindle K. This pinion has that face which is adjacent to the projections l' formed with projections m which convert this pinion into a similar clutch jaw. Rotatably mounted upon a stud l^2 in the interior of the barrel l is a pinion m' which is fixed to a pinion m^2 of somewhat larger diameter. This latter pinion engages a fixed gear m^3 forming part of a sleeve m^4 which is driven into and fixed to a stationary portion b' of the frame.

That portion of the spindle K lying intermediately of the pinion M and the barrel of the hand wheel is provided with a slot k', Fig. 5, in which is seated a clutch member k^2 adapted to engage the clutch jaws of the hand wheel L or pinion M, Figs. 5 and 6. This clutch member is fixedly mounted upon the rod K, as shown. The distance between the two clutch jaws is made such that this clutch member k^2 may be made to occupy a central or neutral position in which it engages neither the one nor the other.

When the parts are in the position shown in Fig. 5, it will be noted that the wheel is directly connected with the spindle K and that the bevel gear F may be therefore driven directly by such hand wheel and at a given rate of speed. The arrangement of the parts is such that such hand rotation will rotate the spindle C′ at a rate of speed such as will impart to the boring bar quill A a longitudinal movement at a comparatively high rate of speed. When it is desired to actuate the boring bar quill at this rate of speed the clutch D is thrown out of engagement with the worm wheel G and the automatic feed thereby stopped. After this is done the described movement may be imparted at will by turning the hand wheel.

When it is desired to impart to the boring bar quill a slow hand feed, the rod K is pushed inwardly, the clutch D being out of engagement with the worm wheel F, and the clutch member k^2 thereby thrown into engagement with the pinion M. This action connects the hand wheel L indirectly with the spindle K through the medium of the differential gears M, m', m^2, m^3, and the rotation of the hand wheel will therefore effect a relatively slow movement of the spindle K. This slow rotative movement is therefore followed by a slow rotative movement of the spindle C′ and hence a slow longitudinal feeding movement of the boring bar quill A.

Assuming the parts to be in the last named position, and that it is desired to impart to the boring bar quill A, the slow automatic feed effected by the driving shaft G, it will be seen that when the clutch jaw D is thrown into engagement with the worm wheel F, clutch member k^2 being in the position last described, the said jaw D through collar H, automatically moves the rod K′ outwardly and thereby throws the clutch member k^2 out of engagement with pinion M into its neutral position. This action prevents breakage of parts which would otherwise occur as a result of the attempted driving of the wheel L through the medium of the differential gears.

By means of the above described construction, therefore, I obtain a slow or fast hand traverse of the boring bar quill A and am enabled to connect up the automatic slow feed without breakage of the parts.

What I claim therefore, and desire to secure by Letters Patent is:

1. In mechanism of the class described, the combination of a hand wheel; a spindle coaxial therewith; speed reducing means interposed between said hand-wheel and spindle; means for connecting said spindle directly with said hand wheel or connecting same indirectly therewith through said speed-reducing means; a driven member connected with said spindle; means independent of said hand wheel for driving said driven member; and means for connecting the latter with or disconnecting it from said independent driving means.

2. In mechanism of the class described, the combination of a hand wheel; a spindle coaxial therewith; speed-reducing means interposed between said hand wheel and spindle; a longitudinally shiftable rod and clutch member carried thereby; a driven

member connected with said spindle; means independent of said hand wheel for driving said driven member; means for connecting the latter with or disconnecting it from said independent driving means, and adapted to actuate said longitudinally shiftable rod to throw said clutch out of engagement with said speed-reducing means, when said connecting and disconnecting means are actuated to connect said driven member with said independent driving means.

3. In mechanism of the class described, the combination of a hand-wheel; a spindle co-axial therewith; speed reducing means interposed between said hand wheel and spindle; means for connecting said spindle directly with said hand wheel or connecting same indirectly therewith through said speed reducing means and including a longitudinally shiftable rod; a driven spindle having its axis transverse with relation to the direction of movement of said shiftable rod, and connected with said spindle so as to be capable of being driven thereby; means independent of said hand wheel for driving said driven member; a clutch for connecting or disconnecting said driven spindle with said independent driving means; and means connected with said clutch and movable thereby, the path of movement of said rod intersecting the path of movement of the last named means.

4. In mechanism of the class described, the combination of a hand wheel; a hollow spindle coaxial therewith; differential speed reducing means interposed between said hand wheel and spindle; a longitudinally and manually shiftable rod mounted in said hollow spindle and carrying a clutch member adapted to engage either said differential gear or said hand wheel, said rod being rotatably fixed with relation to said spindle; a driven spindle having its axis transverse with relation to the axis of said first named spindle, and connected with the latter to be driven thereby; means independent of said hand wheel for driving said driven member, a clutch mounted upon said driven spindle and arranged to connect or disconnect the latter with said independent driving means; a taper collar surrounding said driven spindle, connected with said clutch and having a path of movement intersecting that of said manually shiftable rod.

5. In mechanism of the class described, the combination of a hand wheel; a hollow spindle co-axial therewith; a rod mounted in said spindle; speed-reducing means interposed between said hand wheel and spindle; means comprising said rod for connecting said spindle directly with said hand wheel or connecting same indirectly therewith through said speed reducing means; and a driven member connected with and adapted to be actuated by said spindle.

6. In mechanism of the class described, the combination of a hand wheel; a hollow spindle co-axial therewith and rotatable independently thereof; differential gear members mounted upon said hand wheel; differential gear members mounted co-axially with said spindle; means comprising a longitudinally shiftable rod mounted in said hollow spindle for connecting said spindle directly with said hand wheel or with said differential gearing; and a driven member connected with and adapted to be actuated by said spindle.

7. In mechanism of the class described, the combination with a hand wheel formed with a hollow barrel; a hollow spindle mounted co-axially with said hand wheel and capable of being rotated independently thereof; differential gear members mounted upon said hand wheel and upon the interior of said barrel; differential gear members mounted co-axially with said spindle; a driven member connected with and adapted to be actuated by said spindle; one of the differential gears which is co-axial with said spindle and the adjacent portion of the interior of the hand wheel each being arranged to form a clutch jaw; a longitudinally shiftable rod mounted in said hollow spindle, the latter being formed with a slotted portion intermediately of said clutch jaws; and a clutch member secured to said rod, projecting from said slot and adapted upon the longitudinal movement of said rod, to engage one or the other of said clutch jaws; said slot being of a length such that said clutch member may be caused to occupy a neutral position in which it is free from engagement with either of said jaws.

Signed by me, this 22d day of December, 1908.

JAMES G. BELLINGER.

Attested by—
A. E. MERKEL,
WM. R. MILLER.