H. M. LUCAS & J. B. GREEN.

GEARING FOR METAL WORKING MACHINES.

APPLICATION FILED JULY 31, 1909.

954,639.

Patented Apr. 12, 1910.

2 SHEETS—SHEET 1.

FIG. 2.

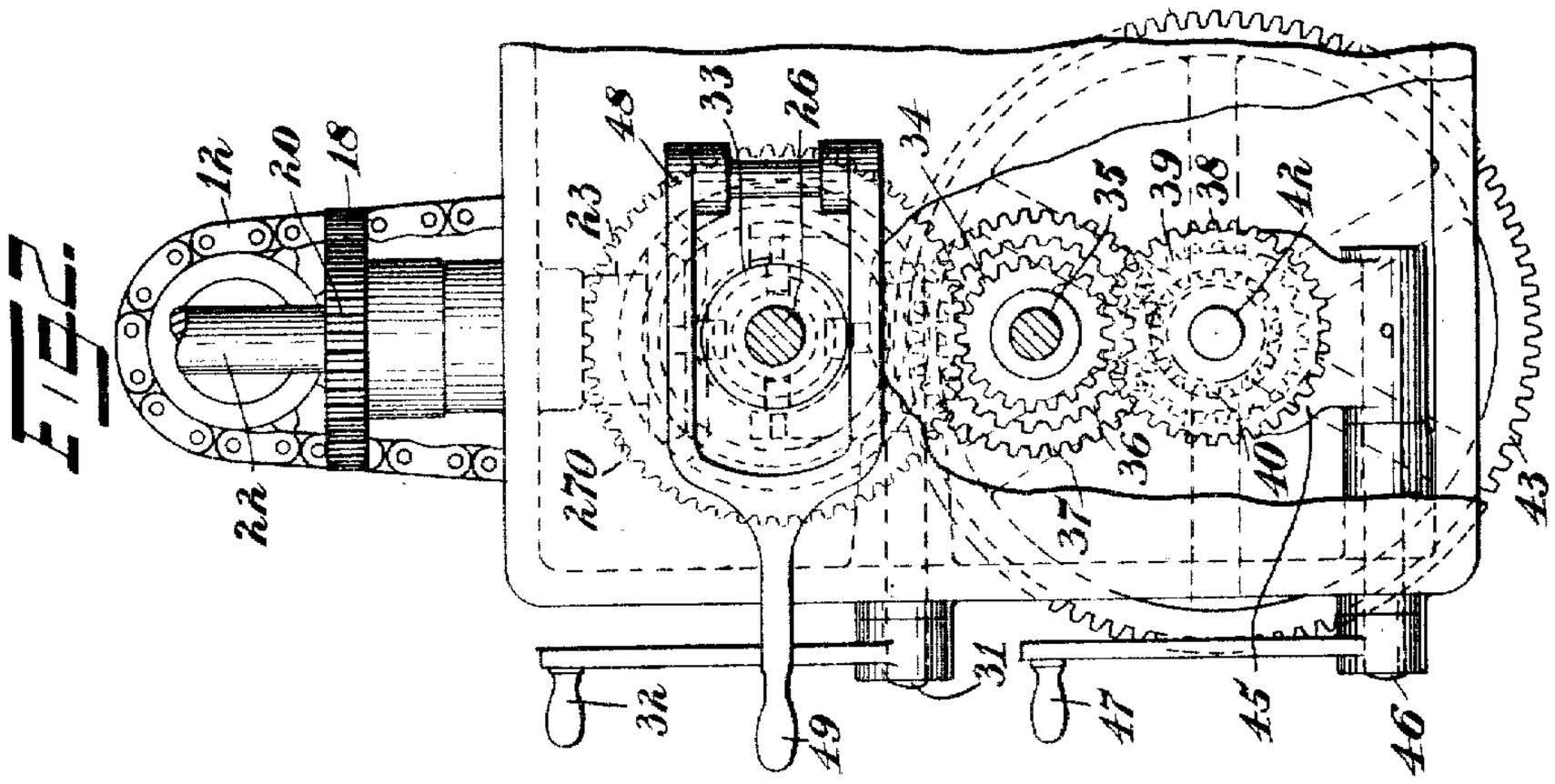
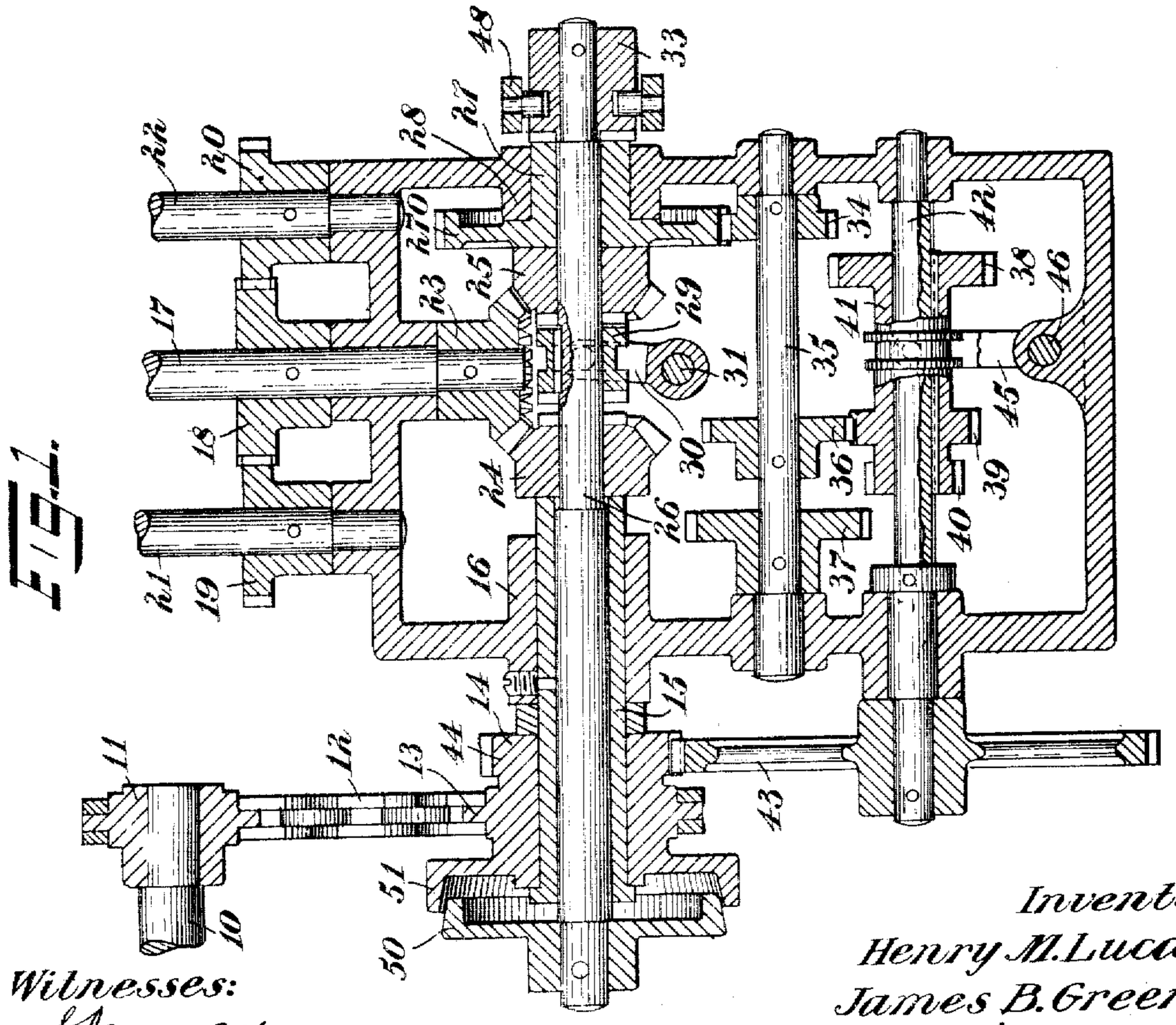


FIG. 1.



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2 SHEETS—SHEET 2.

FIG. 3.

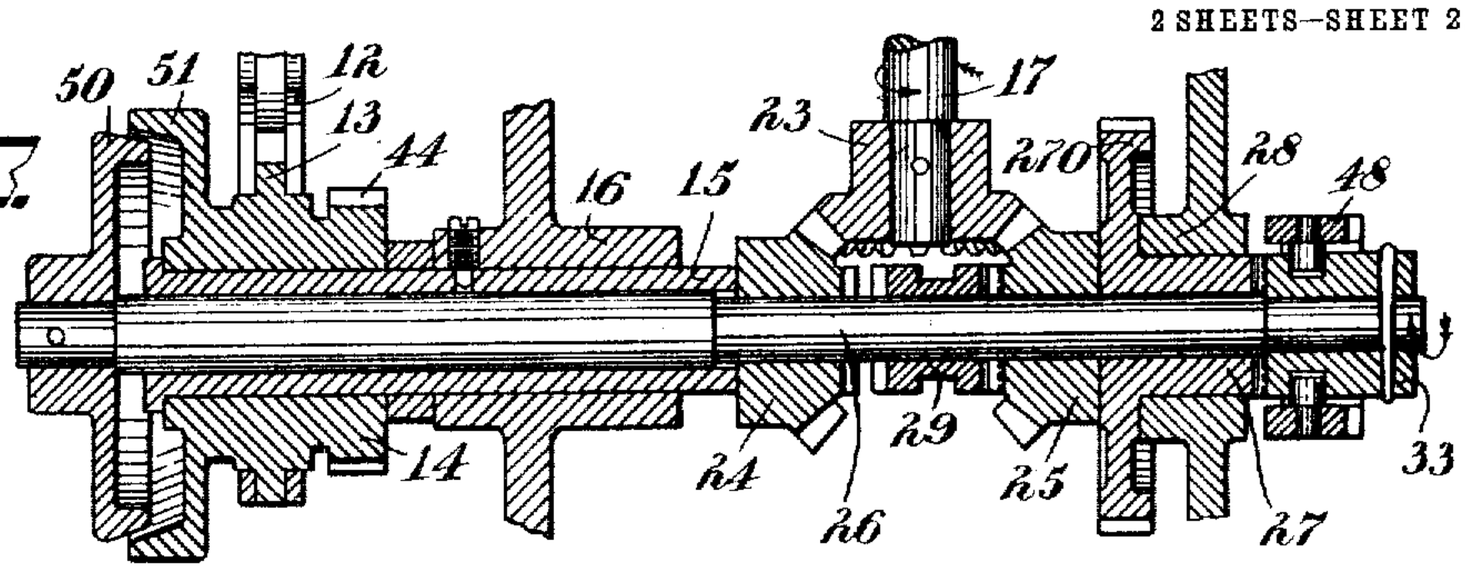


FIG. 4.

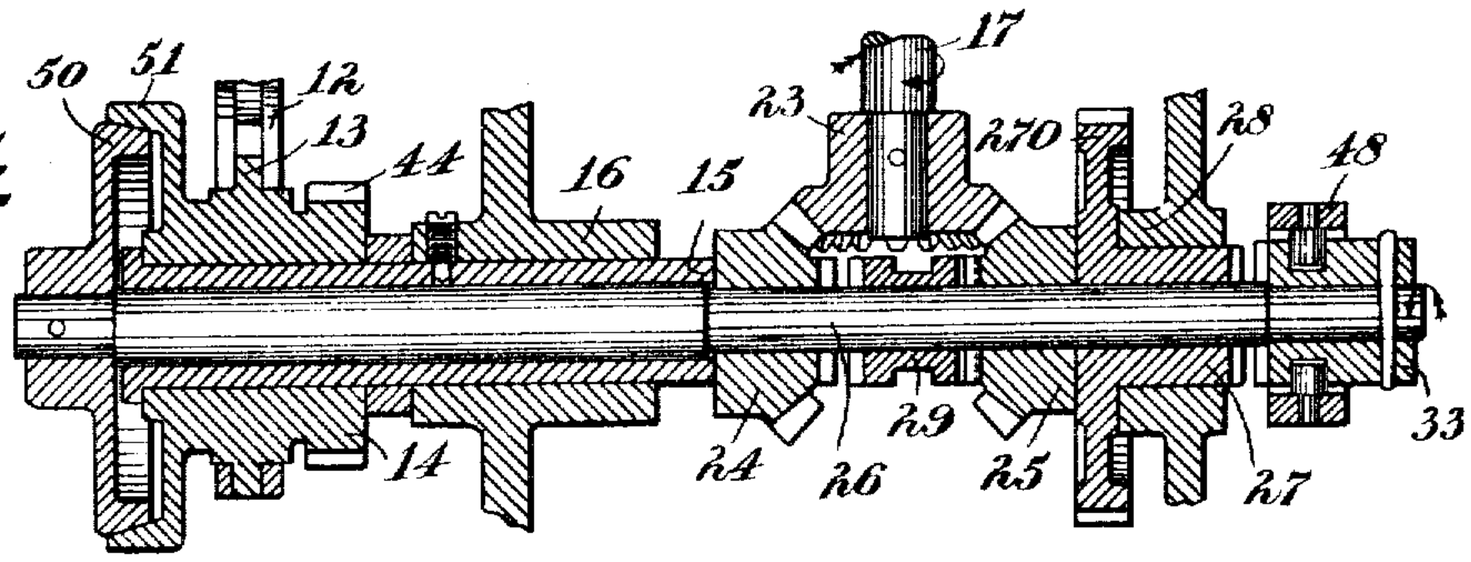


FIG. 5.

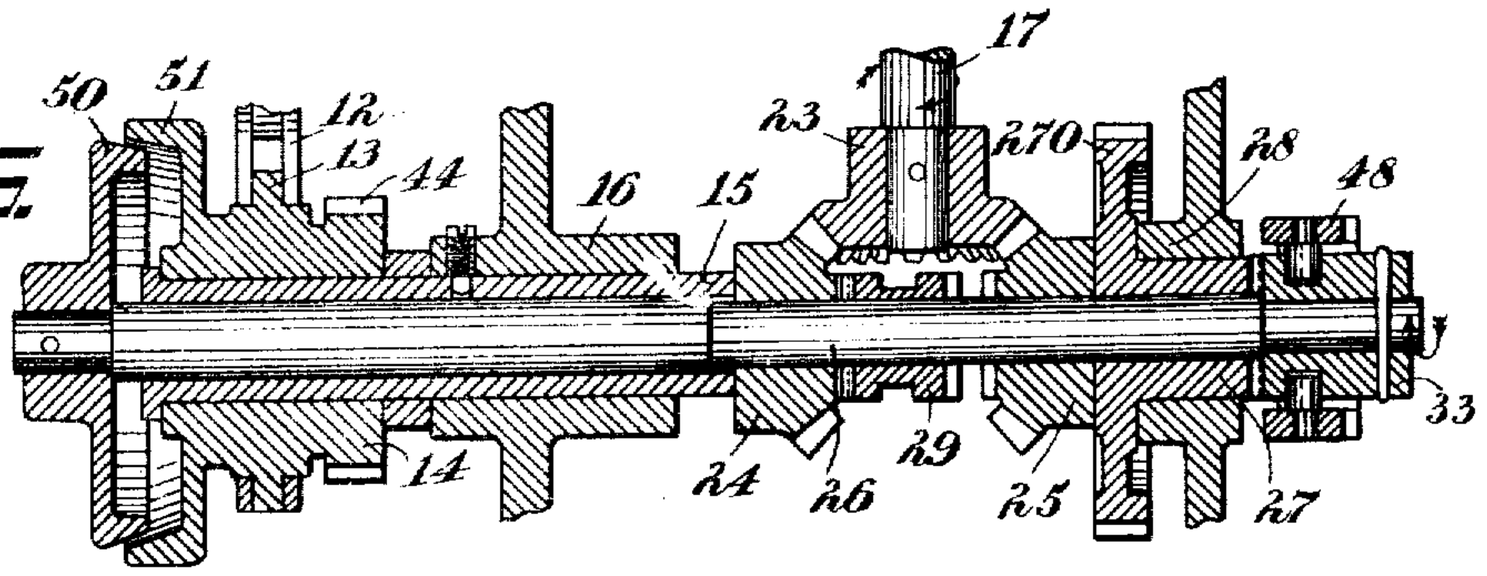
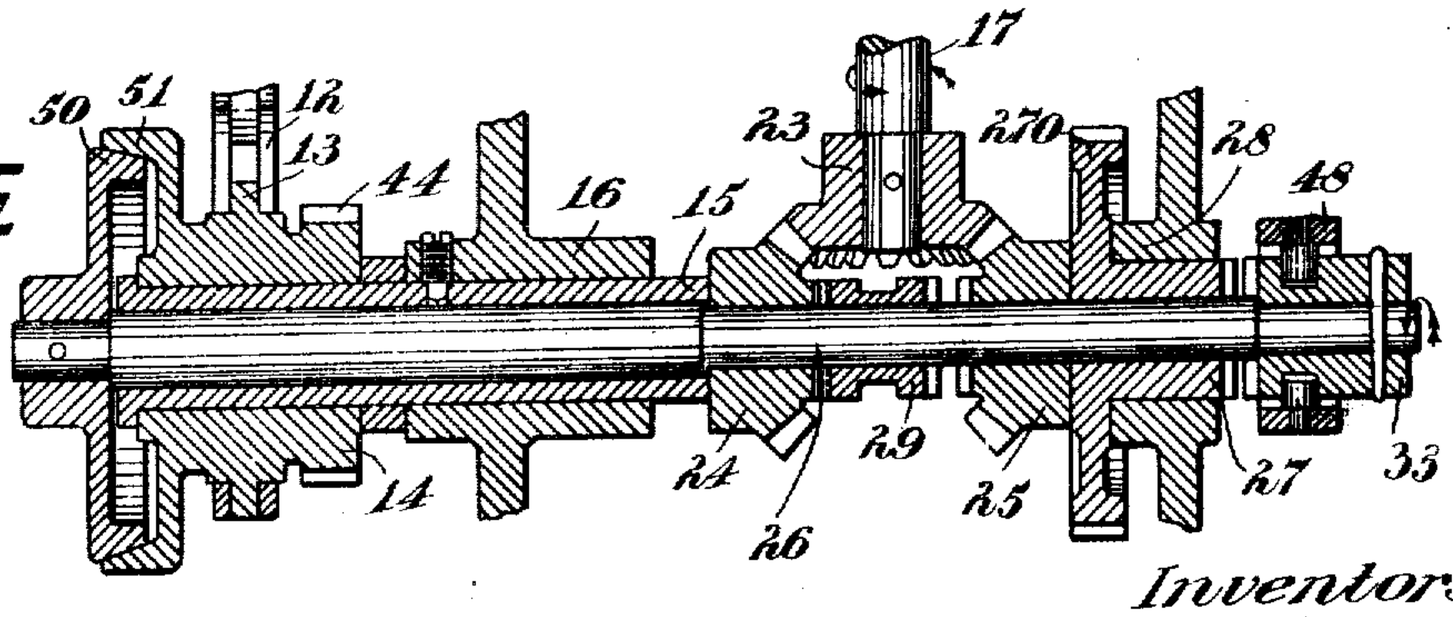


FIG. 6.



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UNITED STATES PATENT OFFICE.

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GEARING FOR METAL-WORKING MACHINES.

954,639. Specification of Letters Patent. Patented Apr. 12, 1910

Application filed July 31, 1909. Serial No. 510,577.

To all whom it may concern:

Be it known that we, HENRY M. LUCAS and JAMES B. GREEN, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Gearing for Metal-Working Machines, of which the following is a specification.

This improvement relates to feed mechanisms for imparting a variable speed feed motion forwardly or backwardly as may be desired, combined with means directly connected and operating with the devices through which the feeding is accomplished for effecting a quick return or reverse motion through said feed devices to any part or mechanism actuated therefrom, and to accomplish this quick return in either of the two feeding directions, according as the feed may be set for operating either forwardly or backwardly.

In the drawings accompanying and forming part of this specification a practicable embodiment of a form of our invention is illustrated, wherein Figure 1 is a central vertical section through the feed driving mechanism of a boring machine; Fig. 2 is an end view looking at Fig. 1 from the right hand end; and Figs. 3 to 6 inclusive illustrate four different settings of the reversing mechanism.

The power will be received from what will herein be termed the main driving shaft 10, which has upon it a sprocket wheel 11 imparting motion by means of a chain 12 to a sprocket wheel 13, the hub 14 of which wheel is mounted upon a sleeve 15 supported in a bearing 16 of the machine frame or housing. The sleeve will be held from rotation by some suitable means, as for instance a set-screw. The hub 14 will be prevented from longitudinal movement in one direction by means of a head upon the sleeve and from movement in the other direction by means of a suitable washer or collar. In this present construction the variable speed etc. is to be applied to a feed shaft or feed driver 17, which has a suitable bearing in the frame or housing and has fast upon it a gear wheel 18 in mesh with gear wheels 19 and 20 upon shafts 21 and 22, which, with the shaft 17, will impart various feed movements to a boring machine, if the invention is used in connection with a boring machine. The shaft 17 has fast upon it a miter gear 23 which is in continual mesh with miter wheels 24, 25, which are loose upon an intermediate driving shaft 26, which shaft has a bearing within the sleeve 15 at one end and within the hub 27 of a gear wheel 270, which hub has a bearing 28 in the frame of the machine. Between the miter gears 24 and 25 there is splined upon the shaft 26 a clutch member 29 which, by being moved to a position centrally of the miter gears 24, 25, will permit the shaft 26 to run idly with respect to the shaft 17. The clutch member 29 is provided at each of its ends with clutch-engaging faces adapted to mate with clutch-engaging faces upon the miter gears, so that upon movement toward either of these miter gears and into such a position that the clutch faces will engage, that particular miter gear which is so engaged will drive the miter gear 23 and consequently the shaft 17, thus controlling the direction of rotation of the shaft 17 relative to the shaft 26 without changing the relative speed, this portion of the mechanism being for the purpose of reversing the direction of rotation of the shaft 17 in respect to the shaft 26. The clutch member 29 is controlled by means of a rocker 30 mounted upon a shaft 31 which carries a handle 32 for its actuation. The handle 32 and rocker 30 when the clutch member is in active position will lean in the direction of clutch engaging movement and by gravity and inertia will hold the clutch member in the position into which these same parts have shifted it.

The shaft 26 carries at one end a clutch member 33 which has clutch-engaging faces adapted to mate with clutch-engaging faces upon the hub 27, and upon the longitudinal movement of the shaft 26 the clutching engagement between the member 33 and the hub 27 will be effected. In Figs. 1, 3 and 5 the shaft and clutch member 33 are shown as having been moved toward the left, which brings the intermediate driving shaft 26 into gear with the forward or feed driving train, which comprises gear wheel 270, the pinion 34 mounted upon the shaft 35, the change gears, including the gear 34, and gears 36 and 37, which gears 34, 36 and 37 will respectively mesh with the gears 38, 39 and 40 accordingly as the sleeve-like hub 41 carrying such latter gears is moved to one or another of its positions of adjustment, it being splined on the shaft 42, which shaft

has fast upon it a gear wheel 43 in mesh with a pinion 44, which is integral in the present instance with the hub 14 and thus is driven by means of the chain 12. The hub 41 is moved into its various positions of adjustment by means of a rock arm 45 fast to the shaft 46, which carries a handle 47 for its actuation.

The change gearing, comprising the gears 34, 36 and 37 respectively operative with the gears 38, 39 and 40, is for effecting various speeds of feed. The reversal from the slow forward feed to the quick return is effected by moving the shaft 26 longitudinally toward the right. In the present instance this is done by means of a fork 48 having antifriction rollers running in a groove in the clutch member 33, and which fork has a handle 49 for its actuation. By moving the shaft 26 toward the right the gear wheel 270 is made inoperative in respect of such shaft and at the same time a conical friction clutch member 50 carried at the opposite end of such shaft 26 will be drawn into engagement with a mating conical friction clutch member 51 which is fast with the hub 14, so that the unreduced speed of such hub will be applied directly to the intermediate driving shaft 26 and in the reverse direction, so that the quick return feed will be effected. When the handle 49 is moved in one direction it will cause the slow feed movement, and when it is moved in the opposite direction it will cause the quick return or reverse movement irrespective of whether the connection between the intermediate driving shaft 26 and the feed driving shaft 17 is set for imparting a forward or a backward feed to said shaft.

The four views illustrating the settings of the reversing mechanism show the respective movements and the corresponding settings thereof as follows: In Figs. 3 and 5 the clutch on the right hand is engaged for positively driving the shaft 26 in the direction indicated by the arrow. For reversing this movement for the quick return, the intermediate driving shaft 26 is shifted toward the right hand, thereby bringing into engagement the quick return frictional drive mechanism at the left hand side, but without changing the position of the central clutch 29 by which the feed direction had been previously determined, as shown by the setting in Fig. 3. In the third view the clutch for selecting the feed direction is shown engaged toward the left hand, while the intermediate driving shaft is shown shifted to the left hand for positive operation through the clutch at the extreme right. In Fig. 6, with the keyed selecting clutch in the same position as in the third view of this sheet, the intermediate driving shaft is again shown, as in the second view, shifted toward the right hand, bringing into action the quick return driving mechanism at the extreme left hand. By this means, as indicated by the arrow on shaft 17, this shaft is reversed in its direction as compared with the positively driven movement indicated in the third view. Thus, this series of views shows the same kind of driving action in the first and third views, but with the direction reversed in the third view as compared with that indicated in the first, and in the other views,—the second and fourth, respectively,—the quick return reverse directions of the shaft 17. Thus, in whichever direction the shaft 17 may have been turned through the operation of the positively driven mechanism its direction is reversed on throwing into action the quick return mechanism.

Having thus described our invention, we claim:

1. In a feed mechanism, the combination with a feed driver, of a driving shaft therefor, reversing mechanism between said shaft and feed driver, a driver, two trains of gearing between said driver and driving shaft for respectively imparting opposite directions of rotation at different speeds from the driver to the driving shaft, each of said trains comprising a clutch, said clutches being connected for successively disconnecting either of said clutches and connecting the other.

2. In a feed mechanism, the combination with a feed-shaft, of a longitudinally shiftable driving-shaft therefor, reversing mechanism between said shafts, a driver, two trains of gearing between said driver and driving-shaft for respectively imparting different speeds and opposite directions of rotation from the driver to the driving-shaft, each of said trains comprising a clutch, a member of each of said clutches being mounted on said driving-shaft and being located thereon in position to successively disconnect one of said clutches and connect the other when said driving shaft is moved in one direction and to successively reverse the disconnection and connection when said driving shaft is moved in the opposite direction.

3. In a feed mechanism, the combination with a feed-shaft and a miter gear mounted thereon, of a driving-shaft mounted for longitudinal movement, a pair of miter gears loose on said driving-shaft and meshing with the gear on the feed shaft, a clutch splined on the driving shaft for engagement with either of the gears of said pair, a driver, two trains of gearing between said driver and driving-shaft for respectively imparting different speeds and opposite directions of rotation from the driven to the driving-shaft, each of said trains compris-

ing a clutch, said train clutches being connected to successively disconnect either of said clutches and connect the other.

4. In a feed mechanism, the combination with a feed-shaft, and a miter gear mounted thereon, of a driving-shaft mounted for longitudinal movement, a pair of miter gears loose on said driving-shaft and meshing with the gear on the feed shaft, a clutch splined on the driving-shaft for engagement with either of the gears of said pair, a driver, two trains of gearing between said driver and driving-shaft for respectively imparting different speeds and opposite directions of rotation from the driver to the driving-shaft, each of said trains comprising a clutch, said train clutches being fast with the driving-shaft and located for successively disconnecting either one of said clutches and connecting the other upon the longitudinal movement of the driving-shaft in one or the other direction.

5. In a feed mechanism, the combination with a feed-shaft and a miter gear mounted thereon, of a driving-shaft mounted transversely of the feed-shaft for longitudinal movement, a pair of miter gears loose on said driving-shaft and in continuous mesh with the gear on the feed-shaft, a clutch splined on the driving shaft between said pair of miter gears for engagement with either of said gears, means for shifting the clutch and holding the same in its shifted position, two trains of gearing for respectively imparting different speeds and opposite directions of rotation to the driving shaft, each of said trains comprising a clutch, said train clutches being operatively connected with the driving shaft and located for successively disconnecting either of said clutches and connecting the other.

6. In a feed mechanism, the combination of a feed-driver, a main-driver and an intermediate-driver, connections between said intermediate-driver and feed-driver for rotating the feed-driver in reverse directions at the same speed, and means for controlling the direction of rotation of the feed driver, connections between said main-driver and the intermediate-driver for rotating the intermediate driver in reverse directions at different speeds and means for controlling the direction of rotation of the intermediate driver, substantially as specified.

7. In a feed mechanism, the combination of a feed-driver, change and reverse gearing connected to the feed-driver for driving the same in opposite directions respectively at different speeds, and reverse gearing for changing the directions of the respective speeds.

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