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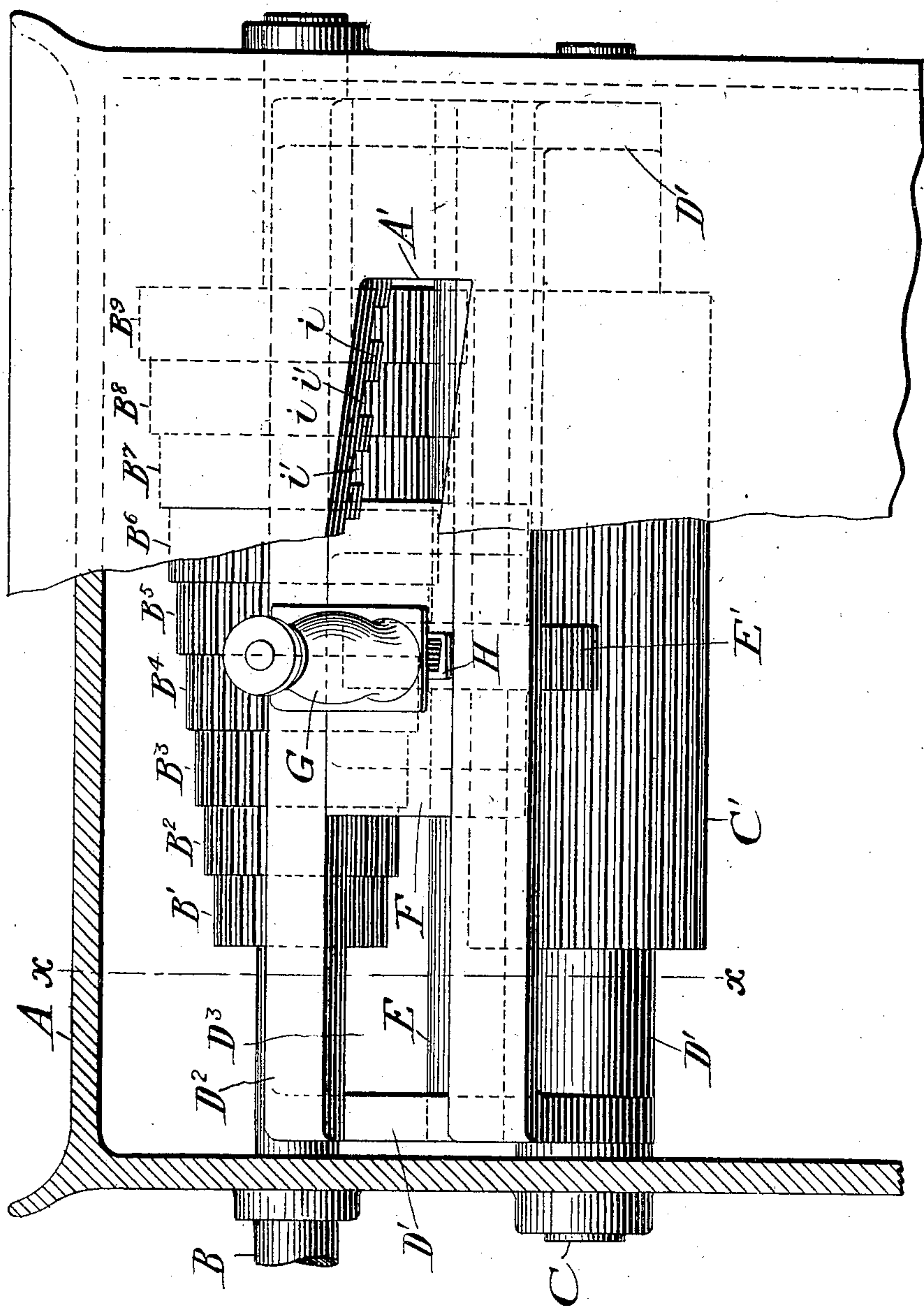
R. K. LE BLOND & W. F. GROENE.  
FEED AND SPEED CHANGING DEVICE FOR MACHINE TOOLS.

APPLICATION FILED APR. 2, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



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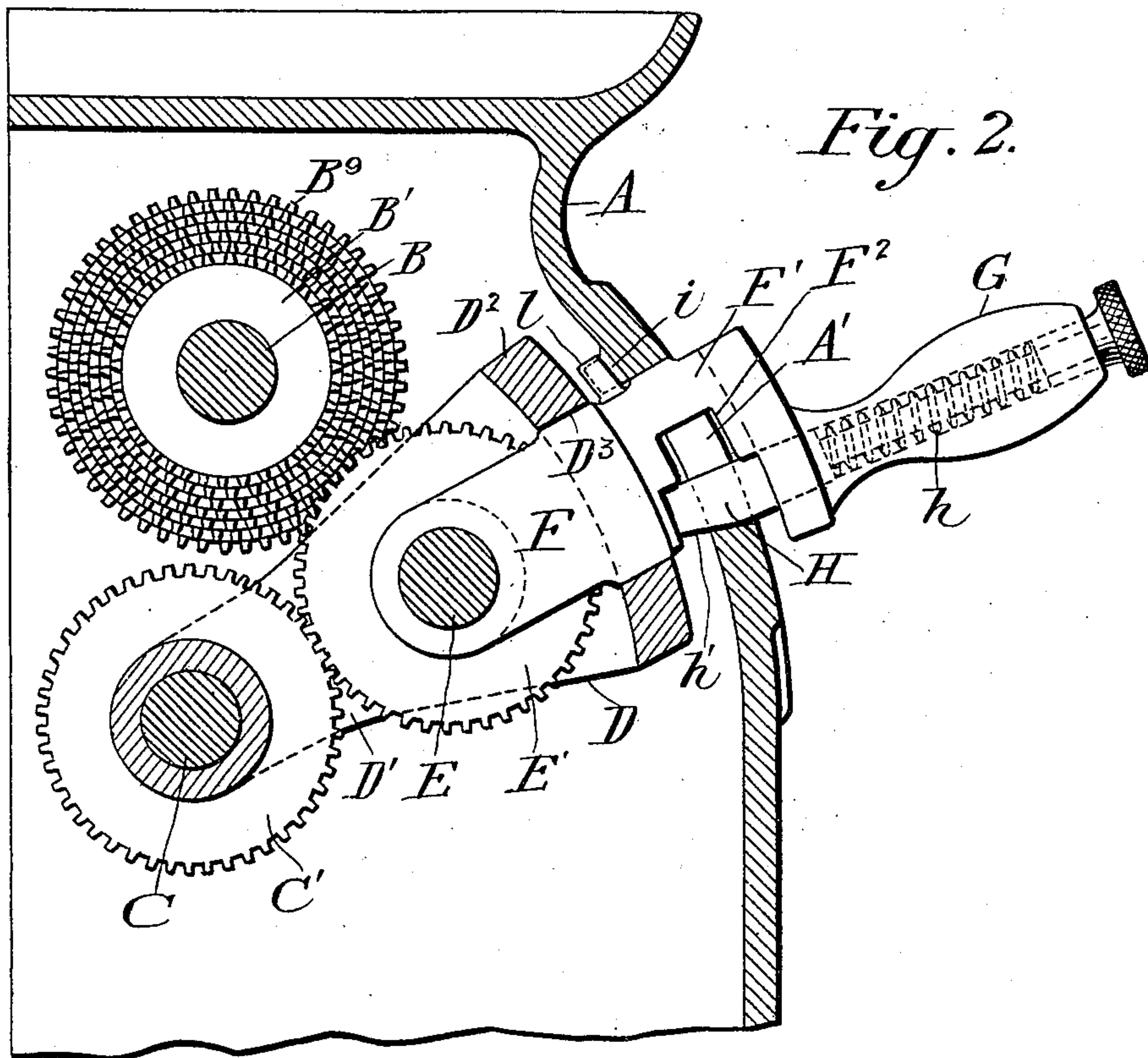
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3 SHEETS—SHEET 2.



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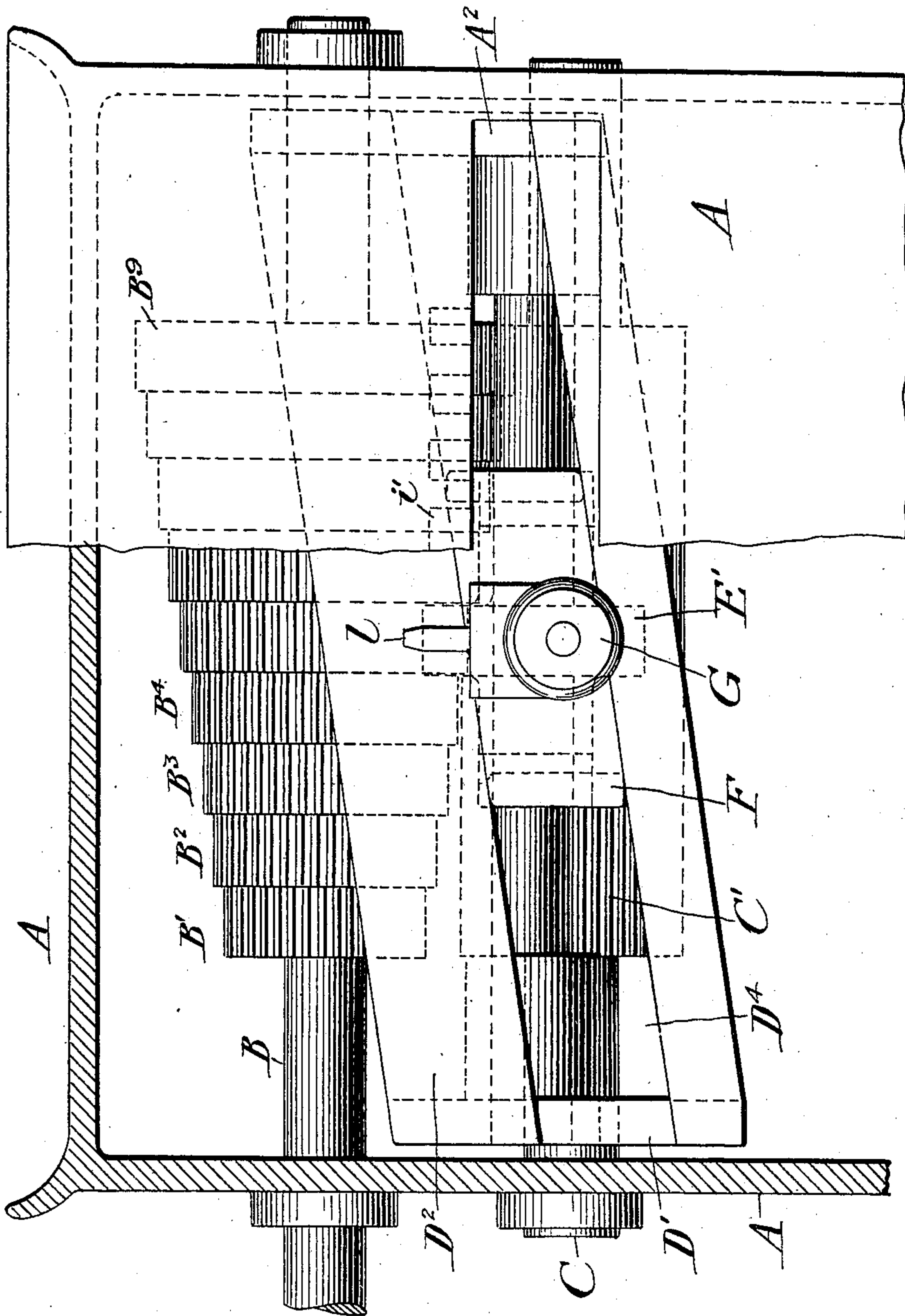
FEED AND SPEED CHANGING DEVICE FOR MACHINE TOOLS.

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NO MODEL.

3 SHEETS—SHEET 3.

Fig. 3.



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# UNITED STATES PATENT OFFICE.

RICHARD K. LE BLOND AND WILLIAM F. GROENE, OF CINCINNATI, OHIO.

FEED AND SPEED CHANGING DEVICE FOR MACHINE-TOOLS.

SPECIFICATION forming part of Letters Patent No. 763,912, dated June 28, 1904.

Application filed April 2, 1904. Serial No. 201,258. (No model.)

*To all whom it may concern:*

Be it known that we, RICHARD K. LE BLOND and WILLIAM F. GROENE, citizens of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Feed and Speed Changing Devices for Machine-Tools, of which the following is a specification.

The invention to be hereinafter described relates to feed and speed changing devices for machine-tools, and has for its general object to provide a device of this character which will be simple in construction, efficient in operation, capable of ready manipulation to effect the changes desired and wherein the parts movable to effect the change of feed or speed shall have great ease of movement and be more accurately guided.

With the above generally-stated objects in view the present invention comprises driving and driven gears, swinging and second yoke frames, and an intermediate gear operable by said frames to connect said driving and driven gears in desired order, all as will be hereinafter more fully set forth.

The invention further consists of the parts and combinations hereinafter described, and definitely pointed out in the claims.

In the drawings, Figure 1 is a front view of a feed and speed changing device, showing one embodiment of the present invention, certain parts being broken away to disclose the structure beneath. Fig. 2 is a cross-section of the parts represented in Fig. 1 on the line *xx*. Fig. 3 is a view similar to Fig. 1, showing a slightly-modified form of device.

Mounted in suitable bearings in the frame or casing A is the driven shaft B, suitably connected to the parts to be operated, and mounted on said driven shaft B are a series of gears B' to B<sup>9</sup>, which are of different diameters and, in effect, may constitute a cone of gears. Of course it is obvious that any number and size of gears may be used in place of those shown and described.

Suitably carried in the frame or casing A is the shaft C, having an elongated gear C' mounted thereon, which constitutes the driving-gear and which may derive its motion

from any suitable source of power through any convenient devices, the longitudinal length of the driving-gear C' being substantially the same as the cone of gears.

Suitably mounted so as to be capable of swinging about the axis of shaft C is the yoke D, having the arms D' D', which in the present form of the invention are shown as mounted on the shaft C; but this construction is not essential, and various modifications in details may be made so long as the yoke D is capable of swinging about the axis of shaft C, for a purpose that will appear hereinafter.

The swinging yoke D carries a support or intermediate shaft E, upon which is mounted the intermediate gear E', which is in constant engagement with the driving-gear C' on shaft C.

Also mounted on the intermediate shaft E is the second yoke F, the arms of which engage between them the intermediate gear E'. Both the intermediate gear E' and the second yoke F are capable of longitudinal movement on the intermediate shaft E, so that under conditions to be hereinafter described the intermediate gear E', while in constant engagement with the driving-gear C', may by movement of the second yoke F be moved longitudinally of the intermediate shaft E, carried by the swinging yoke D, so as to cause the intermediate gear E' to be brought into position for engagement with any one of the cone of gears.

In order that the second yoke F may control the swinging movement of the yoke D, it is essential that said yokes be so connected that the swinging movement of yoke D can occur only when the second yoke F is moved, and although various forms of connections between the two yokes may suggest themselves for this purpose we have shown as one embodiment of the invention the arms D' of the yoke D connected or joined by a wall or brace D<sup>2</sup>, having a straight longitudinal slot D<sup>3</sup>, (see Figs. 1 and 2,) through which slot the second yoke F projects, a handle G being provided for the second yoke, from which construction it will be seen that while the second yoke F and the intermediate gear E' may be moved longitudinally of the swinging yoke D the lat-



ter can swing on the shaft C only when the second yoke F is raised or lowered.

The casing A has formed therein an inclined slot A', through which the portion F' of the second yoke F, provided with the recess F<sup>2</sup>, projects, and the handle G has a spring-pressed locking device H mounted therein, the spring *h* of which serves to normally force the locking device forward into the position shown in Fig. 2, the locking device H in such position bearing on the smooth wall of the inclined slot in the casing, serving to hold the second yoke, and through it the swinging yoke, in raised position, with the intermediate gear E' in engagement with one of the cone of gears. From this construction it will be obvious that upon withdrawal of the locking device the second yoke, and with it the swinging yoke, may be turned about the shaft C to disengage the intermediate gear E' from the cone of gears, the lower edge of the slot A' in such movement being received into the recess F<sup>2</sup> of the second yoke, and while in this position the second yoke and intermediate gear may be moved longitudinally of the swinging yoke to bring the intermediate gear into position for engagement with any one of the cone of gears.

Formed on the inner side of the casing A, above the upper wall of the slot A', are a series of locking lugs or projections *i*, spaced a distance apart and providing between them the recesses *i'*, (more clearly shown in Fig. 1,) which recesses are adapted to be engaged by a projection or holding device *l*, secured to the second yoke F. It will be noticed in Fig. 1 that the recesses *i'* between the projections *i* are disposed substantially opposite the gears of the cone of gears and that the lugs or projections *i* are on a line between said gears, the effect of which is that the projections *l* will prevent the upward swinging of yokes until the intermediate gear E' is in position to properly engage one of the cone of gears.

In the locking construction described there are no holes or other locking-recesses formed by removing part of the material of the casing A, in which a locking device may be engaged; but the locking device in the present construction, which comprises the part H, rests when in locking position upon the lower wall of the inclined slot in the casing A and simply holds the yokes in their upper position, causing the intermediate gear E' to engage the cone of gears, and while in such position the projection *l* serves to prevent longitudinal movement of the second yoke and gear E'. It will also be obvious that by the disposition of the projections *i* the yokes cannot be raised into their upper position unless the intermediate gear E' is positioned to properly engage one of the cone of gears, the lugs *i* thus acting as safety devices in connection with the projection *l* on the second yoke. It will therefore be understood that the present

invention contemplates driving and driven gears and an intermediate gear, the latter being carried by the swinging yoke and mounted to move longitudinally of said yoke by virtue of a second yoke carried by the swinging yoke and movable longitudinally thereof, and while we have shown and described one embodiment of my invention it is to be understood that the invention is not limited to the particular character of devices and their specific construction as herein shown and described, but that the same may be varied within wide limits without departing from the sphere of the invention as hereinbefore set forth.

In the device disclosed by Figs. 1 and 2, as hereinbefore stated, the slot A' in the casing A is formed inclined and that in the wall D<sup>2</sup> of the swinging yoke straight, so that upon movement of the second yoke longitudinally of the shaft E the inclined slot in casing A constitutes a convenient means for turning the swinging yoke upon its bearings on shaft C; but it is evident that many variations of these details may suggest themselves, and in Fig. 3 one modification is disclosed, wherein the slot A<sup>2</sup> in the casing is formed straight and the slot D<sup>4</sup> in the wall D<sup>2</sup> of the swinging yoke D is formed inclined. Such modified construction may be desirable in some instances, while the construction in other respects is the same as in Figs. 1 and 2, and in this form of the device the straight longitudinal movement of the second yoke along the straight slot of the casing will, by reason of the inclined slot in the swinging yoke, cause said swinging yoke to be turned about the shaft C. It is to be understood, therefore, that the invention is not limited in these respects, the only essential being that the swinging yoke shall carry a second yoke longitudinally movable with respect thereto to carry the intermediate gear into proper position for ready engagement with the cone of gears.

Having thus described the invention, what we claim, and desire to secure by Letters Patent, is—

1. In a feed and speed changing device for machine-tools, the combination of a shaft, a driving-gear mounted thereon, a driven shaft, a series of gears of different diameters mounted thereon, a swinging yoke, a second yoke carried by the swinging yoke and longitudinally movable with respect thereto, and an intermediate gear movable with said second yoke.

2. In a feed and speed changing device for machine-tools, the combination of a shaft and driving-gear thereon, a driven shaft, a series of gears of different diameters mounted thereon, a swinging yoke mounted to swing about the axis of the first-mentioned shaft, an intermediate shaft carried by the swinging yoke, a second yoke mounted on the said intermediate shaft and movable longitudinally thereof,



and an intermediate gear movable with said second yoke.

3. In a feed and speed changing device for machine-tools, the combination of a driven shaft, a cone of gears mounted thereon, a shaft, and driving-gear mounted thereon said driving-gear being of a length substantially the same as the cone of gears, a swinging yoke mounted to swing about the said last-mentioned shaft, a second yoke carried by the swinging yoke and movable longitudinally thereof, and a gear movable with the second yoke and in constant engagement with the driving-gear.

4. In a feed and speed changing device for machine-tools, the combination of a shaft, an elongated driving-gear mounted thereon, a driven shaft, a series of gears of different diameters mounted thereon, a swinging yoke mounted on the first-named shaft, an intermediate shaft carried by said swinging yoke, a second yoke mounted on said intermediate shaft and movable longitudinally thereof, an intermediate gear mounted on the intermediate shaft and movable longitudinally thereof with said second yoke, said intermediate gear being in constant engagement with the driving-gear, and means to move said yokes to carry said intermediate gear into engagement with any of the series of driven gears.

5. In a feed and speed changing device for machine-tools, the combination of driving and driven gears, a swinging yoke, an intermediate gear carried by said yoke, a second yoke carried by the swinging yoke and movable longitudinally thereof, said intermediate gear being movable longitudinally with the second yoke.

6. In a feed and speed changing device for machine-tools, the combination of a shaft, an elongated driving-gear mounted thereon, a yoke mounted to swing about said shaft, an intermediate shaft carried by said yoke, an intermediate gear and second yoke mounted on said intermediate shaft and longitudinally movable thereon, a cone of gears with which the intermediate gear is adapted to engage and locking devices for holding the intermediate gear against swinging and longitudinal movement with respect to the cone of gears.

7. In a feed and speed changing device for machine-tools, the combination of a casing having a slot formed therein, driving and

driven gears, a swinging yoke the wall of which is provided with a longitudinal slot, a second yoke extending through said slots and movable longitudinally of said swinging yoke, an intermediate gear movable with said second yoke, and means for moving the second yoke and intermediate gear longitudinally of the swinging yoke, one of said slots being inclined.

8. In a feed and speed changing mechanism for machine-tools, the combination of a casing having an inclined slot, driving and driven gears, a swinging yoke, the wall of which is provided with a straight longitudinal slot, a second yoke carried by the swinging yoke and extending through the said slots of the swinging yoke and casing, an intermediate gear carried by the swinging yoke and movable longitudinally thereof with the second yoke, and means for locking the yokes against swinging and longitudinal movements.

9. In a feed and speed changing mechanism for machine-tools, the combination of a casing having a slot, driving and driven gears, a swinging yoke, an intermediate gear carried thereby, and a locking device to maintain the intermediate gear in driving connection with the driven gear, said locking device comprising lugs projecting from the wall of the casing, a projection movable with the swinging yoke to engage between said lugs, and a locking-pin adapted to engage the wall of the said slot to maintain the projection in locking position between the lugs.

10. In a feed and speed changing mechanism for machine-tools, the combination of a casing, having an inclined slot, driving and driven gears, a swinging yoke, an intermediate gear and second yoke carried by and longitudinally movable with respect to the swinging yoke, lugs projecting from the said casing, a projection or pin upon the second yoke adapted to engage between said lugs, and a locking-pin carried by the second yoke and engaging a wall of said slot to hold the pin or projection in locking position between the lugs.

In testimony whereof we affix our signatures in presence of two witnesses.

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Witnesses:

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