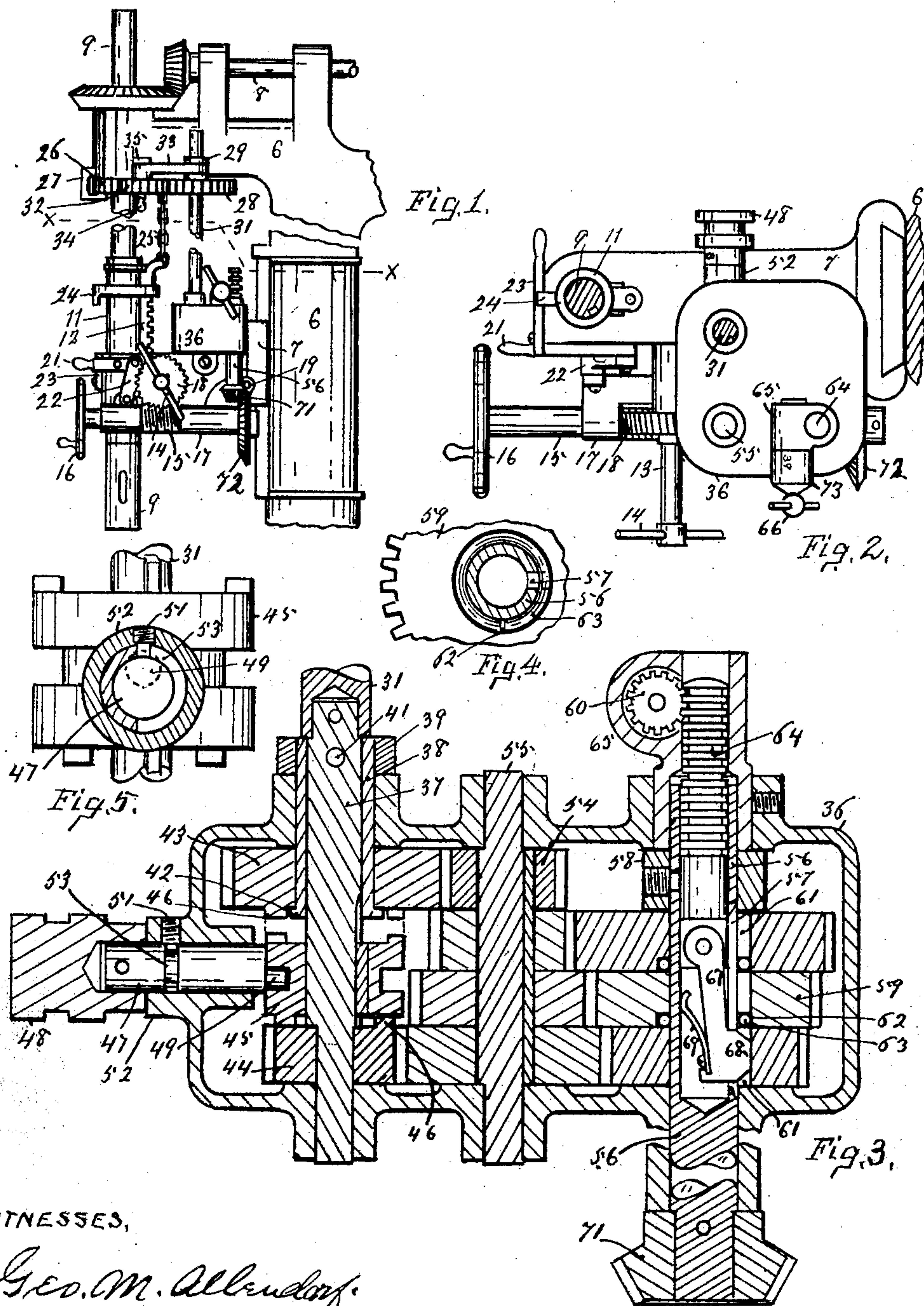


No. 803,627.

PATENTED NOV. 7, 1905.

S. C. SCHAUER.  
SPEED CHANGING DEVICE.  
APPLICATION FILED NOV. 11, 1904.



WITNESSES,

Geo. M. Allendorf.  
Mary Carr.

Sherman C. Schauer, INVENTOR.  
By Robert S. Carr, Atty.



# UNITED STATES PATENT OFFICE.

SHERMAN C. SCHAUER, OF CINCINNATI, OHIO, ASSIGNOR TO CINCINNATI MACHINE TOOL COMPANY, OF CINCINNATI, OHIO, A COPARTNERSHIP.

## SPEED-CHANGING DEVICE.

No. 803,627.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed November 11, 1904. Serial No. 232,373.

*To all whom it may concern:*

Be it known that I, SHERMAN C. SCHAUER, a citizen of the United States, residing at Cincinnati, Ohio, have invented a new and useful Improvement in Speed-Changing Devices, of which the following is a specification.

My invention relates to speed-changing devices of the class adapted to use on drill-presses, other machine-tools, or elsewhere; and the objects of my improvement are to mount the device in an adjustable position in relation to its driving-gears, whereby it is most accessible to the operator in changing the longitudinal movement of a spindle to different predetermined ratios from its constant rotative speed; to drive said device by gearing from the spindle that its action may be positive and accurate; to provide a plural number of means to discontinue the longitudinal movement of the spindle during its rotative movement, and in construction to especially adapt said device to best serve the purpose for which it is intended. These objects are attained in the following-described manner, as illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved device applied to portions of an upright drill-press; Fig. 2, a plan with parts in section on the dotted line *xx* of Fig. 1; Fig. 3, a vertical section of the speed-changing device unfolded in a plane through the axis of its shafts, and Figs. 4 and 5 details of construction.

In the drawings, 6 represents the column of a drill-press; 7, the sliding head, adjustably secured thereon in the usual manner by means of a rack-and-pinion mechanism, (not shown;) 8, the driving-shaft; 9, the spindle; 11, the spindle-sleeve, movable through the sliding head; 12, a toothed rack thereon, engaging with a spur-pinion concealed within head 7 and secured on shaft 13 and which may be actuated, by means of handle 14, to rapidly move the sleeve, together with the rotative spindle therein, in a longitudinal direction, all being constructed and arranged in the ordinary manner.

Worm-shaft 15, provided with hand-wheel 16 and journaled in housing 17, detachably engages with worm-wheel 18, which is secured on shaft 13 and serves to slowly move the sleeve and spindle.

The housing is hinged on head 7 by means of pivot 19 and is moved and maintained with

the worm-shaft 15 in engagement with wheel 18 by means of hand-lever 21, which is pivoted on the sliding head and connected to the housing by link 22. Latch 23 on the head 7 locks the hand-lever with the worm-shaft in engaged position until released by stop 24, which is adjustably secured on the sleeve, coming in contact with the latch in its descent with the sleeve. Chain 25 connects the sleeve with a balancing-weight (not shown) in the usual manner.

Spur-pinion 26 is splined on the spindle and retained in position by means of lip 27, and spur-gear 28 is journaled in bearing 29 on the column or frame and splined on shaft 31. Intermediate spur-gear 32 is carried by arm 33 in continuous engagement with gear 28 and is detachably engaged with pinion 26 by means of latch 34, engaging with catch 35 on the column. Shaft 31 is thus rotated by the spindle at a speed proportionate to the difference in the size of pinion 26 and gear 28.

Casing 36 is mounted on the sliding head, and vertical shaft 37, journaled therein, is connected to and forms a continuation of shaft 31. Sleeve 38 encircles the upper portion of shaft 37 and is secured thereto, together with supporting-collar 39, by means of pin 41. The lower extremity of sleeve 38 terminates in an annular flange 42, which serves as a support for idle spur-gear 43 thereon. Smaller spur-gear 44 turns idly on the lower portion of shaft 37. Clutch 45, formed with an annular groove and splined on shaft 37, is movable into engagement with either of the gears 43 or 44 by reason of the clutch-teeth 46 being formed on their adjacent ends.

Pin 47, provided with knob 48, terminates at one end in eccentric boss 49, which engages with the groove in the clutch, and whereby the clutch is movable into engagement with either of the adjacent gears to rotate it with shaft 37. Screw 51 in bearing 52 engages with groove 53, formed partially around said pin to maintain it in proper position within said bearing and to limit the throw of the clutch by contact with the ends of the groove, as indicated by the respective lines formed on opposite sides of the knob being in registration with a line formed on the contiguous bearing, as shown in Fig. 2.

A cone of spur-gears 54, secured on shaft 55, is journaled thereby within the casing, with the end gears thereof in mesh, respectively,



with gears 43 and 44, either of which serves to drive the cone when in engagement with the clutch, while the other is driven idly thereby. Hollow shaft 56, formed with slot 57 and  
 5 provided with supporting-collar 58, is journaled in the casing and carries a series of idle spur-gears 59, in mesh with corresponding gears of the cone. Each of said gears 59 is formed with a key-seat 61 and, excepting the  
 10 lower gear, with a counterbored seat 62 in one end for the reception of a wire ring 63. Cylindrical rack 64 is adjustable longitudinally within the hollow of shaft 56 by means of pinion 60 being mounted in housing 65 and actuated by handle 66. Key 67, formed with  
 15 projecting nose 68 with slanting edges, is pivotally secured to the lower end of the rack, and spring 69 serves to force said key, with its nose, through slot 57 and into engagement  
 20 with the key-seat 61 of either of gears 59, that shaft 56 may be rotated thereby. In the longitudinal adjustment of the key by the rack its nose rides over either of the rings 63 entirely out of engagement with one gear 59 and  
 25 into engagement with the contiguous gear by a further movement of the key.

Bevel-pinion 71, secured on shaft 56, actuates worm-shaft 15 by engagement with bevel-gear 72, secured thereon, and lines formed on  
 30 the cylindrical portion 73 of handle 66 register, respectively, with a line formed on housing 65 to indicate the gear of the series 59, with which the key 67 is engaged, and numbers on the said lines indicate the ratio of the  
 35 axial to the rotative speed of the spindle.

In operation the speed-changing device within the casing being secured on the sliding head is vertically adjustable therewith, owing to the splined driving-shaft therefor being  
 40 movable through the gear on the frame. Said shaft is driven positively from the spindle by means of the gears connecting it therewith. The axial movement imparted to the spindle from its rotary movement may be graduated  
 45 to different ratios in its transmission through the gears within the casing. The engagement of either of the adjacent gears with the clutch provides a different basis of speed which may be differentiated to finer graduations by the  
 50 successive engagement of the gears 59 with the hollow shaft by means of the key therein. The axial movement of the spindle may be discontinued by contact of the stop on the spindle-sleeve with the latch on the sliding  
 55 head, by the disengagement of the clutch from the contiguous gear by means of the knob, or by the movement of the key within the hollow shaft with its nose on one of the wire rings by means of the handle 66. All these  
 60 facilities for changing or stopping the feed of the spindle are conveniently accessible to the operator, and the different ratios of the feed to the rotation of the spindle are so positive and accurate that this device could be used  
 65 for chasing screw-threads.

Having fully described my improvement, what I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. In combination, a rotative spindle, an adjustable head, a speed-changing device mounted thereon, gear mechanism arranged to transmit rotary motion thereto from the spindle, rack-and-pinion mechanism arranged to move the spindle longitudinally, and gear mechanism arranged to transmit motion thereto from said device.

2. The combination of two rotative shafts, respective series of idle gears thereon, a clutch mechanism arranged to turn either gear of one series with its shaft, a rack-and-pinion mechanism, a key movable thereby to turn either gear of the other series with its shaft, and a cone of gears arranged to turn in unison one gear thereof meshing only with a corresponding idle gear in one series another gear thereof meshing only with a corresponding idle gear of the other series, and one gear thereof meshing with a corresponding idle gear in each series.

3. The combination of two shafts journaled in fixed bearings, a series of different-sized gears mounted idly on each shaft, an eccentric-pin, a clutch mechanism actuated thereby to turn with one shaft either gear thereon, a rack-and-pinion mechanism, a key actuated thereby to turn with the other shaft either gear thereon an intermediate shaft, different-sized gears thereon arranged to turn in unison and to mesh with corresponding gears in either of the said series.

4. The combination of two rotative shafts, a series of idle gears on each, an eccentric-pin, a clutch mechanism actuated thereby to turn either of one series of gears with its shaft, a rack-and-pinion mechanism, a key actuated thereby to turn either of the other series of gears with its shaft, an intermediate shaft, a series of gears thereon arranged to turn in unison and to mesh with corresponding gears in either of said series of idle gears.

5. The combination of two shafts journaled in fixed bearings, a series of idle gears on each shaft, an eccentric-pin, clutch mechanism actuated thereby to turn either gear of one series with its shaft, a rack-and-pinion mechanism, a key actuated thereby to turn either gear of the other series with its shaft, and means independent of either shaft arranged to transmit the motion to either gear of one series from either gear of the other series.

6. The combination of a rotative spindle, a gear mounted at a fixed point, a shaft splined therein, gear mechanism arranged to transmit motion to said gear from the spindle, a speed-changing device adjustable in relation to said gear and actuated by said shaft, rack-and-pinion mechanism arranged to move the spindle longitudinally, and means arranged to transmit motion thereto from said device.



7. The combination of a driven shaft, a series of idle gears thereon graduated in size, a rack-and-pinion mechanism provided with a handle, a key movable thereby to turn either  
5 gear with its shaft, a driving-shaft, a series of idle gears thereon, a knob, a clutch mechanism actuated thereby to turn either gear of the latter series with its shaft, an interme-

diate rotative shaft, gears secured thereon to turn in unison and mesh with corresponding idle gears of the series.

SHERMAN C. SCHAUER.

Witnesses:

AUG. H. TUECHTER,  
R. S. CARR.