(No Model.) 2 Sheets—Sheet 1.

J. E. SMITH.

SPEED CHANGING MECHANISM FOR LATHES, DRILLS, OR SIMILAR MACHINES.

No. 586,293. Patented July 13, 1897.

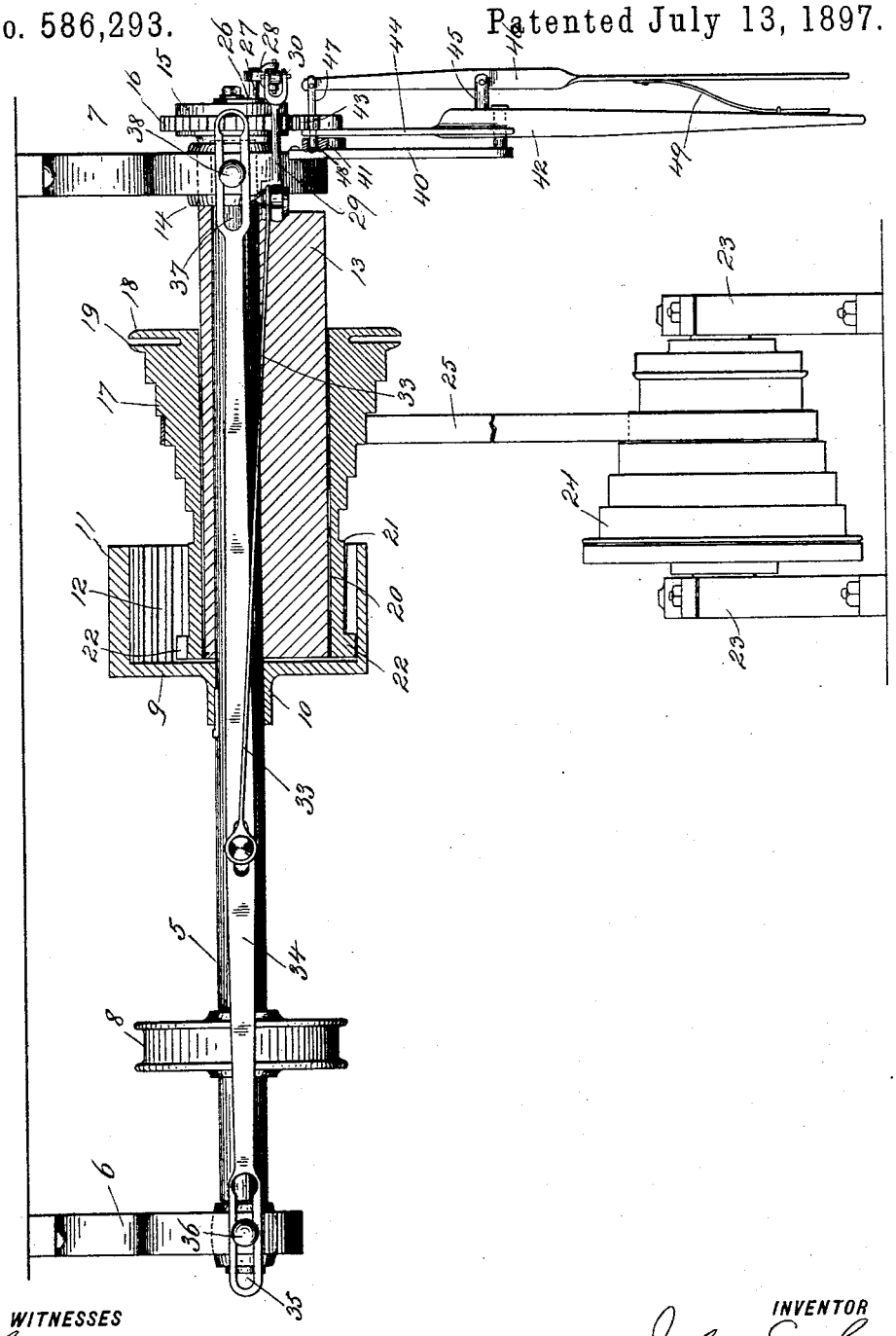

Fig. 1.

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Fig. 2

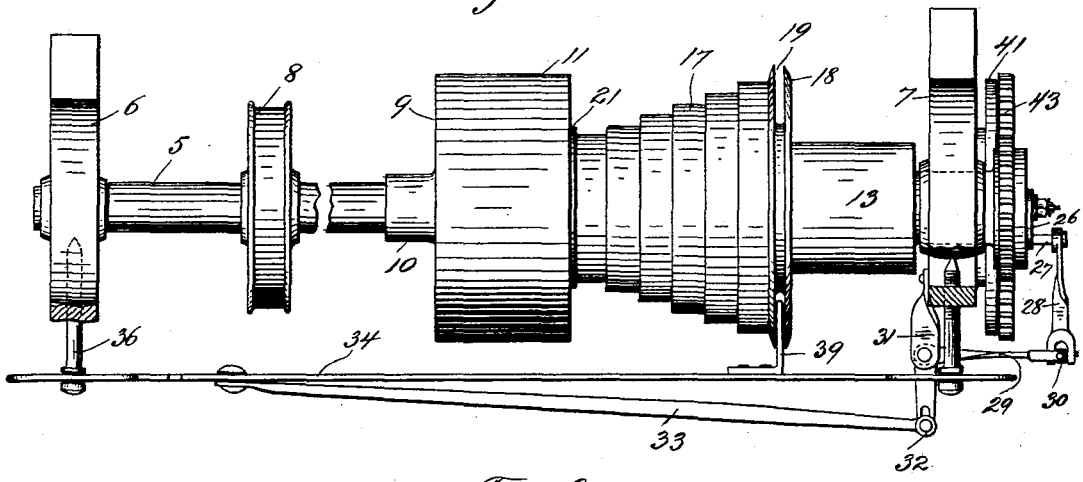
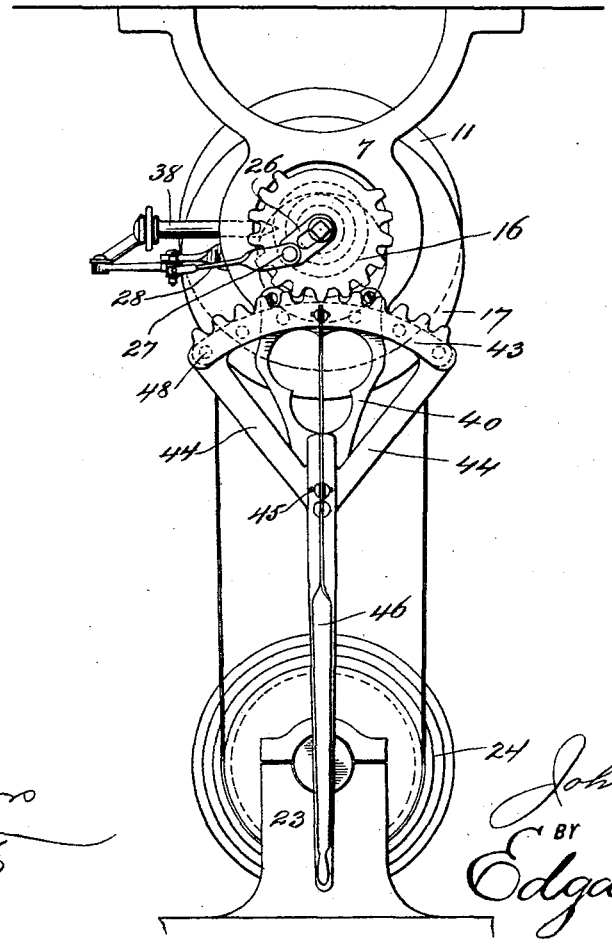


Fig. 3.



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SPEED-CHANGING MECHANISM FOR LATHES, DRILLS, OR SIMILAR MACHINES.

SPECIFICATION forming part of Letters Patent No. 586,293, dated July 13, 1897.

Application filed August 27, 1896. Serial No. 604,142. (No model.)

To all whom it may concern:

Be it known that I, JOHN EDWARD SMITH, a citizen of the United States, and a resident of Stafford, in the county of Tolland and State of Connecticut, have invented certain new and useful Improvements in Speed-Changing Mechanism for Lathes, Drills, or Similar Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which similar numerals of reference indicate corresponding parts wherever found throughout the several views.

This invention relates to speed-changing mechanism for lathes, drills, and similar machines which are run by a cone pulley or pulleys, and the object thereof is to provide improved mechanism for this purpose, whereby the speed of the lathe or other tool may be quickly and easily changed or increased or decreased at will without moving the belt on the cone-pulley or power-shaft; and with this and other objects in view the invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which—

Figure 1 is a sectional side view of my improved apparatus; Fig. 2, a plan view of the power-shaft and the parts connected therewith, and Fig. 3 an end view of said apparatus.

In the drawings forming part of this specification I have shown at 5 a power-shaft which may be of any desired size and length and which is suspended from a ceiling or other support by means of suitable hangers 6 and 7. The power-shaft is provided near one end with a pulley 8, which is adapted to receive a power-belt, and mounted thereon and keyed thereto is a hollow gear consisting of a circular plate or head 9, having a hub 10 and provided at its perimeter with an outwardly-directed open rim or flange 11 within which the gear-teeth 12 are formed. I also provide a sleeve-eccentric 13, through which the shaft 5 passes, and said shaft is revoluble in said sleeve-eccentric, and said eccentric is provided at its outer end with a reduced cylindrical extension which passes through a hub 14, formed in or connected with the hanger 7, and said power-shaft 5 also passes centrally through said extension, and secured to the outer end of the said extension of the sleeve-eccentric or formed thereon is a circular head 15, provided with a gear-wheel 16, which has gear-teeth only on about three-quarters of its perimeter, as shown in Fig. 3. I also provide the usual cone-gear 17, which is revolubly mounted on the sleeve-eccentric 13, and the base of which is directed outwardly and provided with an annular rim 18, in which is formed a deep annular groove 19, and the end of said cone-gear opposite the base thereof is provided with an enlarged extension 20, whereby an annular shoulder 21 is formed, and at the outer end of said extension are formed gear-teeth 22, which operate in connection with the gear-teeth 12 in the hollow gear which is secured to the power-shaft.

Mounted below the power-shaft 5 in any suitable standards, bearings, or supports 23 is a power-transmitting cone-pulley 24, which corresponds with the cone-pulley 17 on the power-shaft and which is connected therewith by a belt 25, and said power-transmitting cone-pulley 24 is arranged in a position the reverse of that of the cone-pulley 17 and it will be understood that said power-transmitting cone-pulley 24 is to be used for transmitting the power of the power-shaft 5 to the drill, lathe, or other tool or the supports thereof.

Secured to the outer side of the gear-wheel 16, and centrally thereof, is a crank 26, provided with an arm 27, with which is pivotally connected a crank-rod 28, the outer end of which is connected with one arm of a crank-lever 29 by means of a universal or other suitable coupling 30, and said crank-lever is pivotally connected with and supported by a bar 31, secured to the hanger 7, and the other arm of said crank-lever projects outwardly and is pivotally connected at 32 with a rod 33, which is secured to a sliding bar 34, one end of which is provided with a slot 35, through which passes a bolt or other support 36, connected with the hanger 6, and the opposite end thereof is provided with a similar longitudinal slot 37, through which passes a bolt or other support 38, secured to the hanger 7, and said sliding bar 34 is provided with an angular arm 39, which projects into the deep

annular groove 19, formed in the rim 18 of the cone-pulley 17.

The hanger 7 is provided with a downwardly-directed extension 40, at the upper end of which is an upwardly-curved segmental head 41, which is shown in full lines in Fig. 2, in dotted lines in Fig. 3, and in section in Fig. 1, and pivotally connected with the lower end of said extension 40 is a lever 42, the upper end of which carries a segmental gear 43, which is connected therewith by side arms 44, and said segmental gear 43 is adapted to operate the gear-wheel 16, as hereinafter described.

The lever 42, adjacent to its pivotal connection with the extension 40 of the hanger 7, is provided with an outwardly-directed shoulder or projection 45, with which is pivotally connected a lever 46, which is provided at its upper end with an inwardly-directed arm 47, which is adapted to pass through an opening in the central part of the segmental gear 43, as shown in Figs. 1 and 3, and to engage with cavities or openings 48, formed in the side of the segmental head 41, a number of said cavities or openings 48 being shown in dotted lines in Fig. 3 and one of them being shown in full lines in Fig. 1.

The lever 46 is provided at its lower end with a spring 49, which bears upon the lever 42, and in order to disconnect the arm 47 from the segmental gear 43 and the segmental head 41 the lower end of said lever 46 must be depressed.

The operation will be readily understood from the foregoing description when taken in connection with the accompanying drawings and the following statement thereof.

Suppose that the belt 25 is in the position shown in Fig. 1 and it is desired to increase the speed of the transmitting cone-pulley 24. All that is necessary with my improved construction is to shift the lower end of the belt 25 onto the next smallest pulley of the cone-pulley 24 and at the same time depress the lower end of the lever 46 and move the lower end of the lever 42 to the right. This operation will free the arm 47 of the lever 46 from the segmental gear 43 and the segmental head 41 and turn the eccentric-sleeve 13 on the power-shaft 5 to the left, and this operation will result in raising the cone-pulley 17, so as to take up the slack in the belt 25, and at the same time the sliding bar 34 will be operated by the crank 26, the crank-rod 28, the crank-lever 29, and the rod 33, to move the cone-pulley 17 outwardly, so as to retain the belt 25 in a vertical position; and it will be understood that the cone-pulley 17 may be lowered by reversing this operation or by moving the lower end of the lever 42 to the left, and in place of the cone-pulley 17 I may substitute other forms of pulleys or similar devices, such as friction or clutch pulleys, and two of the latter may be employed, as usual in this class of devices, for right and left work.

The limit of the movement of the cone-pulley 17 on the sleeve-eccentric 13 is the length of the gear-teeth 12 in the hollow gear which is secured to the power-shaft 5, or, in other words, said cone-pulley 17 cannot be moved outwardly on the shaft 5 far enough to disengage it from said hollow gear; and it will also be observed that in the construction shown in Fig. 1 the cone-pulley 17 is in its innermost position.

It will be apparent from the construction herein shown and described that the speed of the power-transmitting cone-pulley 24 may be varied or changed whenever desired without moving the belt 25 on the cone-pulley 17, and I thus remove one of the greatest objections to machinery of this class, and this I accomplish by means of a device which is simple in construction and operation and which is also comparatively inexpensive and which may be operated instantly whenever such operation is desired.

It is also a well-known fact that in machines of this class the speed is either too great or too slow and that differential speeds cannot be obtained. This results from the fact that a cone-pulley provided with but four cones will give only eight different speeds, whereas with my improved apparatus I can secure twenty-four different speeds with the same construction, and that too with an apparatus which takes up no more room and which is operated by a lever adjacent to or directly over the head of the operator and under his control at all times.

By means of my improved gearing I am also enabled to do work on machines of this class which has never before been accomplished, and as an illustration of this fact I can turn a piece two inches in diameter, and on the same arbor I can turn a diameter of three feet and provide the right speed for both operations.

My improved machine is simple in construction and operation and is not liable to get out of order or need repair, and it is evident that changes in and modifications of the construction herein described may be made without departing from the spirit of my invention or sacrificing its advantages.

Having fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a speed-changing mechanism, for lathes, drills, and similar tools, or devices, the combination with a suitably-supported power-shaft, of a hollow gear mounted thereon and secured thereto, a sleeve-eccentric mounted on said shaft and in which said shaft is revoluble, a cone-pulley mounted on said sleeve-eccentric, and revoluble thereon, and adapted to be operated by the hollow gear on the power-shaft, and means for turning said sleeve-eccentric on the power-shaft, substantially as shown and described.

2. In a speed-changing mechanism for lathes, drills, and similar tools or devices,

the combination with a suitably-supported power-shaft, of a hollow gear mounted thereon, and secured thereto, a sleeve-eccentric mounted on said shaft and in which said shaft is revoluble, a cone-pulley mounted on said sleeve-eccentric, and revoluble thereon, and adapted to be operated by the hollow gear on the power-shaft, and means for turning said sleeve-eccentric on the power-shaft, and devices connected therewith, for moving said pulley longitudinally on said sleeve-eccentric substantially as shown and described.

3. In a speed-changing mechanism for lathes, drills, and similar tools or devices, a power-shaft suitably supported, a hollow gear secured on said shaft, a sleeve-eccentric mounted on said shaft, and in which said shaft is revoluble, a cone-pulley eccentrically and revolubly mounted on said sleeve and engaging said hollow gear, means for turning said sleeve eccentrically on the said shaft, other means engaging said cone-pulley and moving the same longitudinally, and consisting of a gear-wheel engaging said sleeve-eccentric, a lever pivotally secured below the wheel, a segmental gear engaging said wheel, a crank secured to said wheel, a sliding bar engaging said crank, an arm on said bar operating in a deep annular groove formed in said cone-pulley, said parts being combined substantially as described.

4. In a speed-changing mechanism for lathes, drills, and similar tools, a suitably-supported power-shaft, a hollow gear secured thereon, gear-teeth formed therein, a sleeve-eccentric mounted on said shaft and in which the same revolves, a lever pivoted below said eccentric, a segmental gear in connection therewith and operating in connection with a gear-wheel on said eccentric, a crank on said wheel, a sliding bar, an arm thereon operating in a deep annular groove formed in said cone-pulley, said parts being combined substantially as described.

5. In a speed-changing mechanism for lathes, drills, and similar tools, the combination with a suitably-supported power-shaft, of a hollow gear mounted thereon and secured thereto, a sleeve-eccentric mounted on said shaft, and in which said shaft is revoluble, a cone-pulley mounted on said sleeve-eccentric and revoluble thereon, and provided with an extension which enters said hollow gear, and gear-teeth formed thereon, which operate in connection with said hollow gear, said sleeve-eccentric being provided with a cylindrical extension through which said power-shaft passes, a circular gear on said extension, and means for operating said circular gear to turn said sleeve-eccentric on said power-shaft, and means for moving said cone-pulley longitudinally on said sleeve-eccentric, substantially as shown and described.

6. In a speed-changing mechanism for lathes, drills, and similar tools, or devices, the combination with a suitably-supported power-shaft, of a sleeve-eccentric mounted on said shaft, and in which said shaft is revoluble, a pulley mounted on said sleeve-eccentric and revoluble thereon, and adapted to be revolved by said power-shaft, and means for turning said sleeve-eccentric on the power-shaft, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 17th day of August, 1896.

JOHN EDWARD SMITH.

Witnesses:
THOMAS JENKINS,
WILLIAM LEWIS.