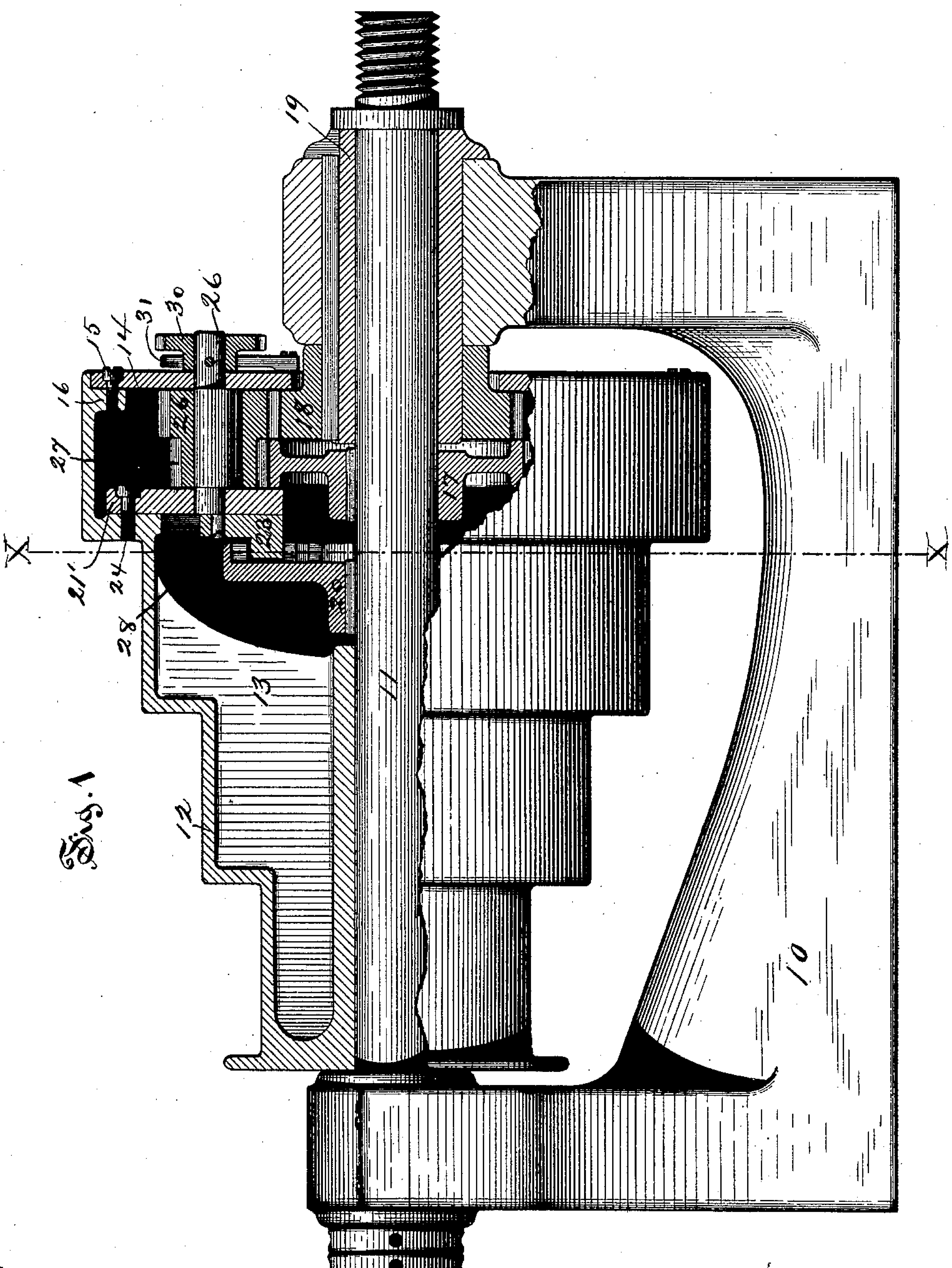
(No Model.)

2 Sheets—Sheet 1.

L. E. WHITON.

SPEED CHANGING MECHANISM FOR LATHES.

No. 437,068. Patented Sept. 23, 1890.



Witnesses:

W. M. Bjorkman.

Henry A. Kingsbury

Alonzo M. Luther

Inventor:

Lucius E. Whiton

By his Attorney

Frank H. Allen.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2

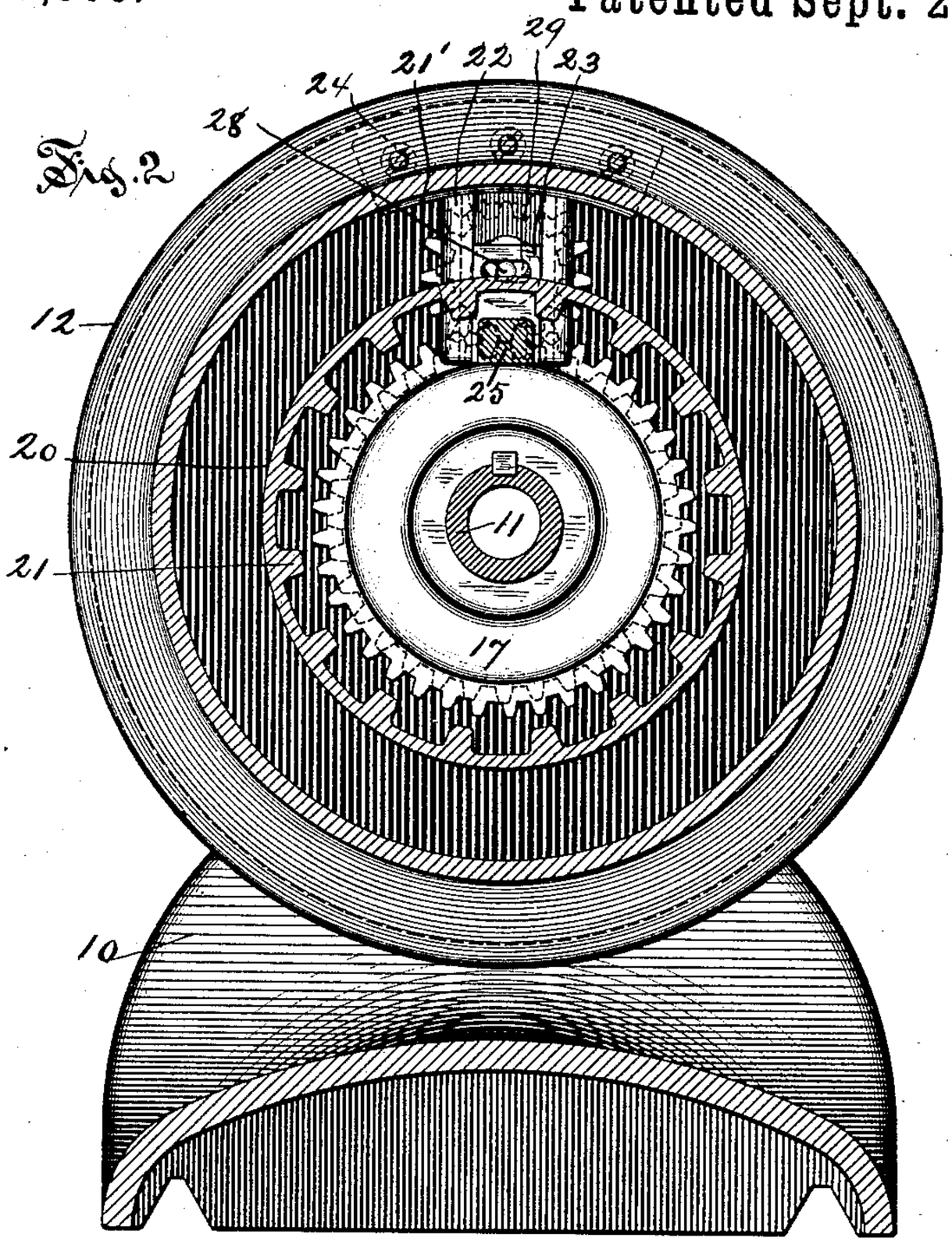


Fig. 3

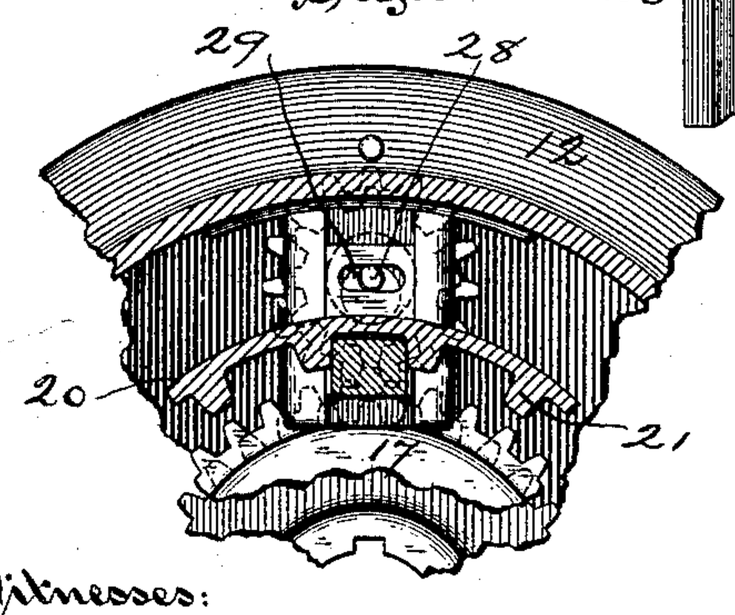


Fig. 5

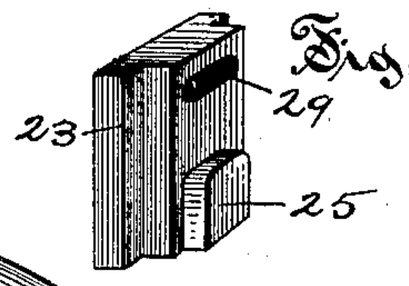
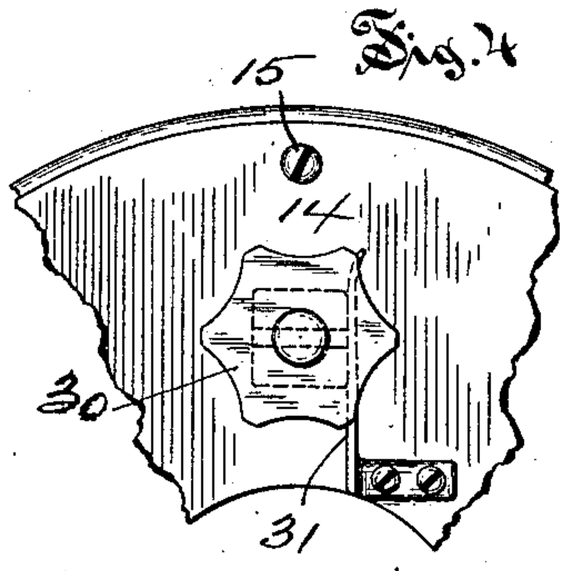


Fig. 4



Witnesses:

W. M. Dyorkman.

Henry A. Knigsbury

Inventor:

Lucius E. Whiton

By his Attorney

Frank H. Allen.

UNITED STATES PATENT OFFICE.

LUCIUS E. WHITON, OF NEW LONDON, CONNECTICUT.

SPEED-CHANGING MECHANISM FOR LATHES.

SPECIFICATION forming part of Letters Patent No. 437,068, dated September 23, 1890.

Application filed September 19, 1889. Serial No. 324,460. (No model.)

To all whom it may concern:

Be it known that I, LUCIUS E. WHITON, a citizen of the United States, residing in the city and county of New London, and State of Connecticut, have invented certain new and useful Improvements in Speed-Changing Mechanism for Lathes, which improvements are fully set forth and described in the following specification, reference being had to the accompanying two sheets of drawings.

This invention has special relation to so-called "back-gearing," used commonly in engine-lathes, drill-presses, and the like machines for increasing power, and seeks to improve the construction of such mechanisms without adding materially to their cost.

Heretofore, with few exceptions, the said gearing for the increase of power has consisted of a shaft located in the rear of the cone-spindle and bearing gears that may be thrown into or out of mesh with the fixed and loose gears on said spindle.

One object of my present invention is to conceal the several elementary parts of such gearing within the cone that receives the driving-belt. My new construction is also such that the change from quick to slow speed, or vice versa, may be effected by a single movement after the stoppage of the lathe or other machine to which said gearing is applied.

The drawings which I have annexed hereto illustrate my invention, Figure 1 being a front side elevation of a lathe-head, part of the cone and other operative parts being shown in section. Fig. 2 is a cross-section of the same on line *x*, looking from the left-hand end. Fig. 3 is a similar view of the upper portion of Fig. 2, showing the clutch mechanism (hereinafter described in detail) adjusted to interlock the cone and spindle. Fig. 4 is a view of a portion of the plate 14, that covers the otherwise open end of the cone, and illustrates the hand-wheel by means of which the said clutch is operated. Fig. 5 is a detached perspective view of the movable section of said clutch.

In the drawings, the reference-figure 10 denotes a lathe-head having journaled therein in the usual manner a spindle 11, that carries a cone-pulley 12. This cone-pulley is not secured fixedly to said spindle; but under certain conditions hereinafter recited may be connected thereto or disconnected therefrom. The larger end of said cone is open when cast, and within the smaller end are, preferably, a series of webs 13, which serve to strengthen and support the perimeter of said cone. The larger (open) end of the cone is closed when the complete device is ready for use by a plate 14, that is secured in place by screws 15, tapped into lugs 16, cast on the inside of the cone.

17 and 18 indicate gears of different diameters, the larger 17 being keyed directly to the spindle 11, and the smaller keyed to a thimble 19, secured in the lathe-head and forming the bearing in which one end of the spindle runs. This thimble 19 is keyed within the lathe-head, so that it cannot by any accident or undue strain become displaced, and it also projects within the end of the cone a considerable distance, so that its attached gear 18 is concealed in the rear of the plate 14, above referred to. It is intended that the smaller gear 18 of the pair above referred to should remain fixed, and it may obviously be attached to the journal-bearing by other equivalent means within the scope of my invention, the construction shown being simply a convenient mode of securing it in position.

Within the cone, beyond gear 17, is a disk 20, that is also keyed to the spindle 11. This disk is formed with a series of inwardly-projecting lugs or teeth 21, providing a corresponding series of intermediate spaces, whose office I shall explain hereinafter.

The figure 21′ refers to a segment of a circular disk having projecting inward a plate 22, whose outer face is recessed and cut under at its sides, thus providing guideways in which may slide a piece 23, which I shall term a "locking-plate." The segmental section 21′ is secured to the cone by screws 24, as is clearly illustrated in Figs. 1 and 2 of the drawings, and should be so located relative to the notched disk 20 that when the said locking-plate 23 is moved outward—*i. e.*, away from the spindle—a projection 25 on its inner face will enter one of the spaces between the described teeth or lugs 21, thus connecting the cone and the spindle and compelling them to rotate together.

26 denotes a short shaft that is journaled

eccentrically in the plate 14 at one end and in the segmental section 21′ at the other end. Loosely fitted on the body of said shaft are gears of different sizes 26 and 27, either secured together or formed integral. The larger of these gears 26 meshes with the fixed gear 18, while the companion gear 27 meshes with the spindle-gear 17. The inner end of shaft 26 has a small projecting stud 28, that is eccentric to the bearings that support said shaft, and which extends into a transverse slot 29 in the locking-plate 23. The outer end of shaft 26 bears an operating-lever or hand-wheel 30. By grasping said hand-wheel and partially rotating it the gears carried by shaft 26 may be thrown out of mesh with their respective companions, and by the same movement the eccentric-stud 28, working in slot 29, slides the locking-plate 23 in its ways and brings the projection 25 into one of the spaces between the teeth 21, thus locking together the cone and spindle and compelling them to rotate as a single element.

While for the sake of convenience I have shown the locking-plate 23 as operated by an eccentric-stud 28, formed integral with and extending from shaft 26, I do not wish to be confined to this construction, as a separate shaft and eccentric-stud for operating the locking-plate would be equally effective to connect the cone and disk and is properly within the scope of my invention.

To retain the shaft 26 in any desired position, I prefer to square the inner side of the hand-wheel 30 and provide a flat spring 31, whose free end may bear with considerable force against the edges of said squared portion, as will be best understood by referring to Figs. 1 and 4 of the drawings.

Assuming now that we have a complete lathe-head supplied with mechanism, as described, and that the hand-wheel 30 is partially rotated to throw gears 26 27 into mesh with their companions, and also to throw the projection 25 out of engagemen with the disk 20, as in Fig. 1, if the cone be set in rotation motion will be transmitted through the described train of gearing to spindle 11, the speed of said spindle relative to the speed of the cone being governed by the size of the several gears of the train. To change from slow to fast speed, or vice versa, it is only necessary to grasp the hand-wheel 30 and partially rotate it, as above explained.

If it is desired to counterbalance the eccentric-shaft 26 and its connected parts, another similar system may be provided at the opposite side of the cone or the cone casting may be weighted.

Gearing of the form specified, being concealed, does not expose the attendant or the driving-belt to the danger of becoming caught in the gears. It also permits the use of a larger driving-cone and greater initial velocity of the driving-belt than heretofore without interfering with the regular gradation of changes in the speed of the spindle.

Having described my invention, I claim—

1. In combination with a spindle suitably journaled and a pulley loosely fitted thereon, a fixed gear arranged concentrically with said spindle, a larger gear fastened to said spindle adjacent to said fixed gear, and gears journaled eccentrically upon said pulley and arranged to be thrown into and out of mesh with the said fixed and spindle gears by the partial rotation of said eccentric-journal, substantially as described.

2. In combination with a spindle and a pulley loosely fitted thereon, a system of gearing of the construction set forth for varying the speed of said spindle, and mechanism for connecting and disconnecting the cone and spindle, consisting of a notched disk secured to the spindle and a locking-plate of the form described that may be moved radially to engage said notched disk.

3. In combination with a spindle and a pulley loosely fitted thereon, a system of gearing, as set forth, for varying the speed of said spindle, a notched disk fastened to the spindle, and a radially-movable locking-plate actuated by an eccentric-shaft carried by the pulley and rotated by a convenient handle, said locking-plate being arranged to be thrown into or out of engagement with said notched disk by the same movement which disengages or engages the system of gearing, all being substantially as and for the objects specified.

LUCIUS E. WHITON.

Witnesses:
DAVID E. WHITON,
ALONZO M. LUTHER.