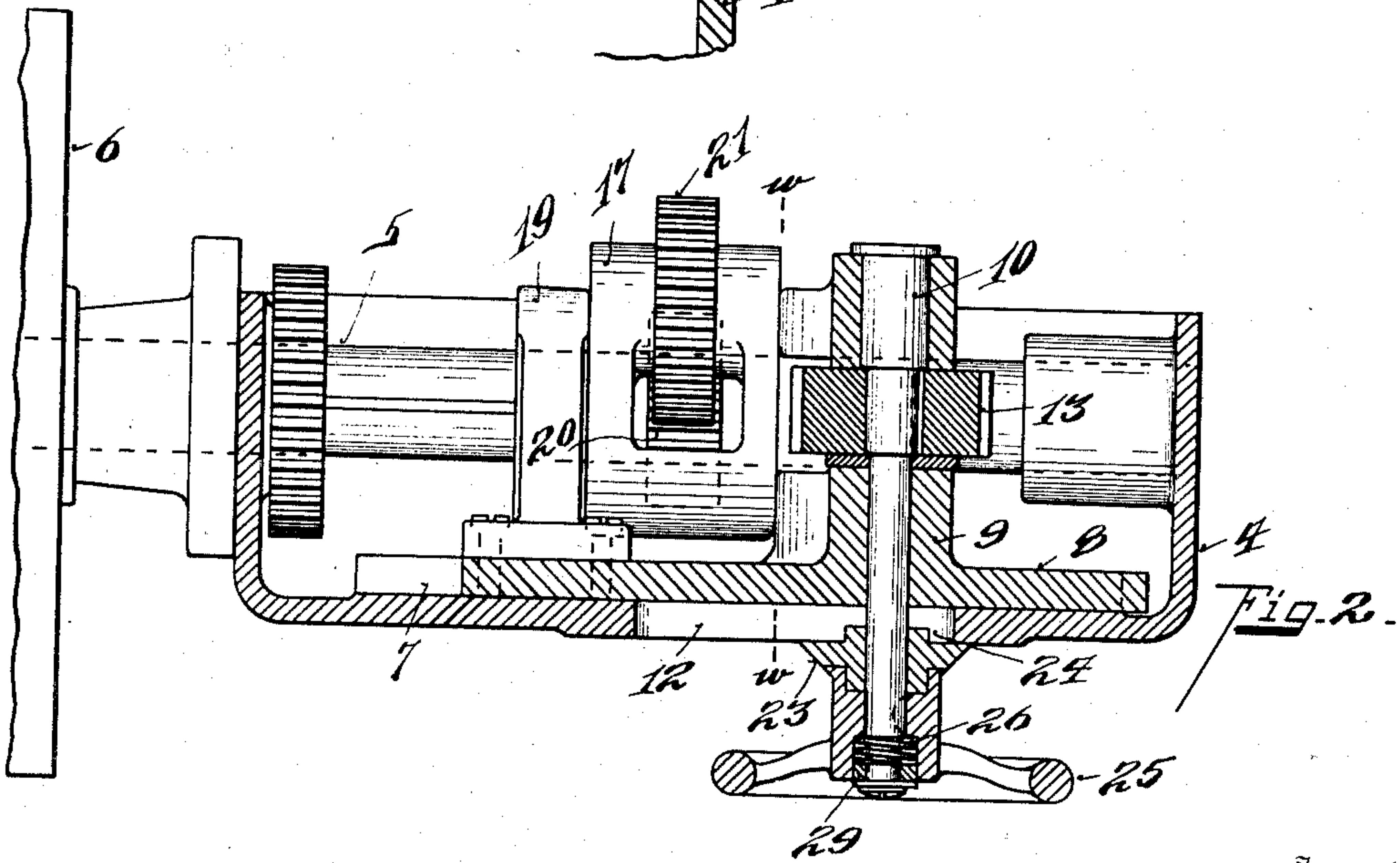
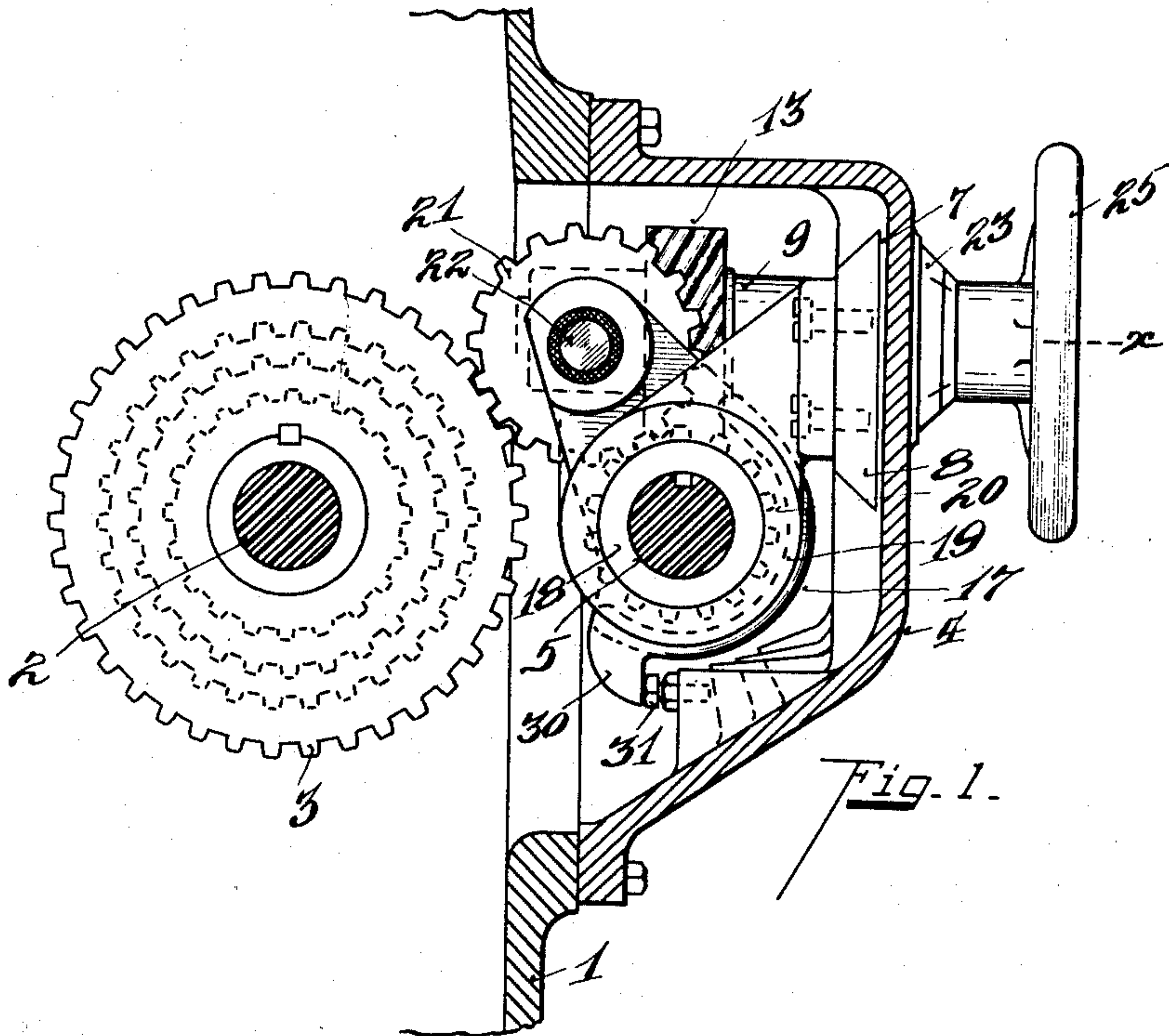


A. L. DE LEEUW.
VARIABLE SPEED MECHANISM.
APPLICATION FILED JUNE 24, 1907.

905,506.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 1.



Inventor

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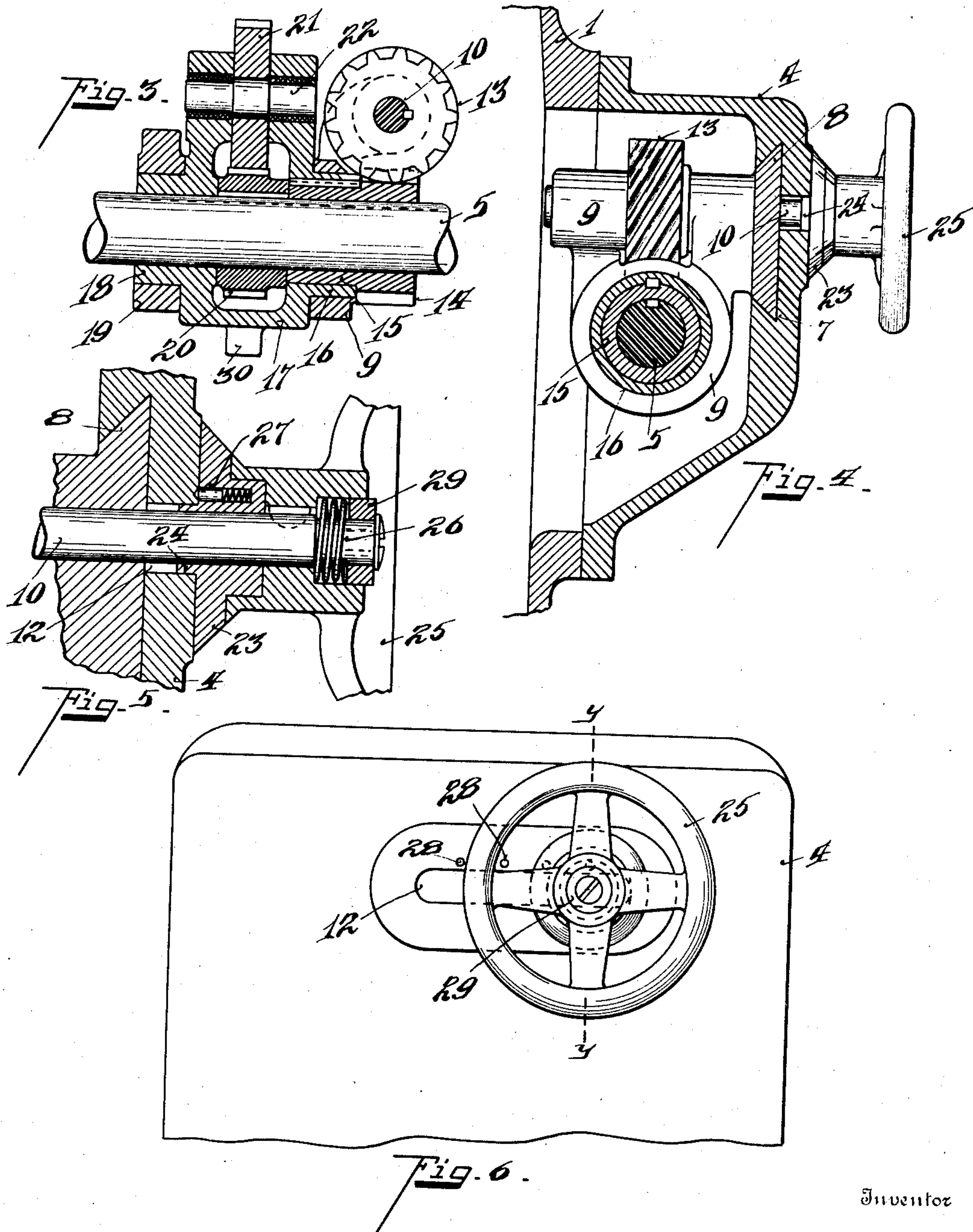
Attorneys

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UNITED STATES PATENT OFFICE.

ADOLPH L. DE LEEUW, OF HAMILTON, OHIO, ASSIGNOR TO THE CINCINNATI MILLING MACHINE COMPANY, OF CINCINNATI, OHIO, A CORPORATION.

VARIABLE-SPEED MECHANISM.

No. 905,506.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed June 24, 1907. Serial No. 380,623.

To all whom it may concern:

Be it known that I, ADOLPH L. DE LEEUW, a citizen of the United States, residing at Hamilton, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Variable-Speed Mechanism, of which the following is a specification.

My invention relates to a variable speed mechanism primarily of the cone and tumbler type.

One of the objects of my invention is to provide means for securely locking the tumbler frame in any position of transmission, forming a rigid support for the tumbler gear.

Another object of my invention is to provide means whereby the tumbler frame can be moved longitudinally and laterally by the same lever or hand wheel as the case may be.

Another object of my invention is to provide means whereby the mechanism for shifting the tumbler gear laterally into mesh with one of the gears of the cone, likewise locks the tumbler frame rigidly to such adjusted position.

Another object of my invention is to so mount and support the tumbler that it transmits no strains to the shaft relative to which it slides.

The features of my invention are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which:—

Figure 1 is a side elevation of the tumbler mechanism and cone with its supporting frame shown in section. Fig. 2 is a section on line *x, x*, Fig. 1. Fig. 3 is a central vertical section through the tumbler frame. Fig. 4 is a section on line *w, w*, Fig. 2. Fig. 5 is an enlarged section on line *y, y*, Fig. 6, through the hand wheel and casing adjacent. Fig. 6 is a front elevation of the hand wheel and tumbler frame.

1 represents the main frame of the machine within which is journaled a transmission shaft 2, carrying a cone of different diameter gears 3. The frame 1, as shown in the drawings, is provided with an opening over which the tumbler frame 4 is secured, and within which frame the driving shaft and tumbler mechanism is mounted.

The principle of the construction shown

is applicable to any machine in which a varying speed is desired. Again, I have termed the shaft upon which the tumbler mechanism is mounted as the driving shaft, and the shaft 2 carrying the cone of gears as the driven shaft, but the relations of these shafts may be reversed.

5 represents the driving shaft journaled within the frame 4, and 6 represents a pulley fixed to the free end of said shaft for imparting rotation thereto.

7 represents a slide-way formed in the casing 4, within which slide, plate 8 is mounted and adapted to be moved longitudinally.

9 represents a bracket projection formed integral with the slide plate 8, and projecting downwardly, through which the driving shaft 5 and tumbler frame actuating sleeves pass and are supported.

10 represents an actuating shaft, journaled in the bracket projection 9, and projecting forward through a slot 12, oblong in shape, formed in the frame 4.

13 represents a worm fixed to said shaft 10 and mounted directly above the driving shaft 5. Said bracket projection is cut away to permit the worm 13 to be mounted directly above said shaft 5, and thereby form a bearing for the actuating shaft 10 upon each side of the worm.

14 represents a worm wheel loosely mounted upon the shaft 5, provided with a sleeve extension 15, adapted to be fixed within the sleeve extension 16 of the tumbler frame 17. Thus it will be seen that as the worm wheel is rotated it will move the tumbler frame laterally to and from the cone according to the rotation of the worm wheel. This rocking frame may be generically regarded as a tumbler lever.

18 represents a sleeve projecting from the tumbler frame 17 fitting and supported within a bracket 19 fixed to the slide plate 8, see Figs. 1 and 2. This bracket 19 and the bracket projection 9, projecting from the slide plate opposite each other form a very substantial journal support for the tumbler frame. The tumbler is therefore pivotally mounted in a sliding support, which support is gibbed to the frame 4.

20 represents a gear keyed to the shaft 5, but slidable thereon, in mesh with a gear 21 journaled upon the stud shaft 22, supported

upon the free ends of the limbs of the tumbler frame 17. Said gear 21 is constantly in mesh with the gear 20 and adapted to be brought into selective engagement with any one of the gears forming a part of the cone 3.

From the construction heretofore described it will be seen that the tumbler frame and its actuating mechanism are mounted upon the slide plate 8, and that by moving said slide plate the tumbling gear is adjusted to selected position opposite to one of the gears of the cone, the tumbler proper can then be rocked on the sliding frame to bring the tumbling gear into or out of mesh with the cone.

The following instrumentalities are employed for conveniently shifting the slide plate and its contained mechanism longitudinally; the same being likewise in part employed for rocking the tumbler. 23 represents a disk shaped plate loosely supported upon the actuating rod 10, provided with an oblong shaped boss 24, projecting into the slot 12 to prevent said disk plate 23 from turning. The opposite end or face of said disk plate 23 is provided with a projecting boss over which the hub portion of the hand wheel 25 projects.

27 represents a spring controlled detent adapted to engage into the orifices or notches 28 to indicate the position of longitudinal shifting to place gear 21 into proper engaging relation with a selected gear of the cone. The hand wheel 25 is slidably keyed to the actuating shaft 10.

26 represents a spring, one end of which bears against the hand wheel 25, the opposite end against a collar 29 fixed to the free end of the actuating shaft 10, said collar being of a diameter to permit the same to slide within a bore encircling the coiled spring 26, the function of which will be hereinafter described.

30 represents a boss projecting downwardly from the tumbler frame 17, adapted to engage with set nuts 31 arranged in step form upon the frame 4, see Fig. 1, forming a lock or abutment in locking the tumbler frame in a driving position, at the same time as the tumbler is locked against lateral movement it is also locked against longitudinal movement, which is accomplished as follows:—Assume that the slide plate 8, has been shifted to bring the tumbler gear 21 adjacent to one of the gears of the cone, the hand wheel 25 is then rotated, say to the right, which, as it is keyed to the actuating shaft 10 will cause rotation of the worm 13, and then of the worm wheel 14, moving the tumbler frame, or its free end carrying the tumbler wheel 21, towards the cone of gears, and this action is continued until the lug 30 contacts with the set nut or rigid abutment 31, whence a slight additional rotation of the hand wheel, through the powerful

worm and worm wheel drive, will force the slide plate 8 against the slideway 7, preventing longitudinal movement of the slide plate and the compression engagement of the lug 30 against the set nuts 31 preventing any rocking movement of the tumbler frame. To release the tumbler frame and shift it so as to bring the tumbler gear 21 to a second position the hand wheel is rotated in the opposite direction releasing the clamping action on the tumbler frame against the rigid abutment and moving the tumbler gear away from the cone. The hand wheel is then pulled outward against the tension of the spring 26, which action while slight will release the spring controlled detent pin 27 and disk plate 23, so that the slide plate 8 can be moved longitudinally to disengage the detent pin 27 from its engaged notch. The hand wheel thus controlled can easily be moved, either to the right or left, to a second of the series of notches, which would position the tumbler gear 21 properly. If the slide plate 8 is desired to be moved further than one notch, the hand wheel is held in such outward position and moved longitudinally to carry the detent pin to its proper position for engagement with the selected notch.

From this description, the principle of the invention will be readily understood. The tumbler frame or lever is pivoted on a slidable support; when this lever is moved into position of gear intermesh, it engages solidly against a rigid frame abutment, and it is held in this position by the clamping action of the mechanism between the tumbler and the frame. As a result, when the tumbler is in the position of gear intermesh, it is clamped against the rigid abutment, and so becomes incorporated bodily into the frame structure. In this position the lever may be regarded as simply a gear support, the strains being entirely taken up by the frame work. The gear intermesh and the throw of the lever will always be accurate, there being no lost motion or wear which cannot be compensated for at once.

In the preferred method of construction there is one rigid support for the tumbler frame and one rigid abutment against which the tumbler frame engages, the support and abutment occupying a position on each side of the fulcrum of the tumbler frame, the equivalent of engaging the tumbler frame on opposite edges thereof, so that the tumbler is rigidly clamped between two rigid portions of the machine frame.

It is obvious that when the tumbler gear is in intermesh with the cone, the tumbler is clamped against a rigid and an immovable abutment forming part of the frame, thus regulating the depth of intermesh and holding the tumbler gear firmly in its position, without possibility of further rocking move-

ment. A further tightening of the hand wheel reacts upon the sliding frame and jams it outwardly, serving to clamp this slide piece on its gib-way, so that at this point also the tumbler mechanism is clamped against a rigid abutment or a portion of the fixed frame, and further longitudinal movement of the slide piece is impossible. The tumbler does not fulcrum directly on the driving shaft but in the brackets projected from the sliding support, so that no tumbler strains are imparted to the driving shaft or tumbler gears. The tumbler and its sliding support are therefore both clamped against rigid frame abutments upon opposite sides of the fulcrum of the tumbler lever. This makes a powerful tumbler mechanism, very simply manipulated and very durable.

Having described my invention, I claim:—

1. A gear, a tumbler and gear, an abutment for the tumbler in the position of gear intermesh, and means for clamping the tumbler against said abutment, substantially as described.

2. A cone and tumbler gear system, a series of abutments corresponding to the positions of gear intermesh, and means for clamping the tumbler against the abutments, substantially as described.

3. A series of different diameter gear wheels, a tumbler frame and gear, means for sliding the frame, a series of rigid abutments, adapted to be engaged by the tumbler frame in the different positions of gear intermesh, and means for rocking the frame and clamping it against its abutments, substantially as described.

4. In a cone and tumbler variable speed gear system, a frame, a sliding tumbler support, a tumbler pivoted to the support, a series of abutments adapted to be engaged by the tumbler in its respective positions of gear intermesh, and means for clamping the tumbler against said abutments, substantially as described.

5. In a cone and tumbler variable speed gear system, a frame, a sliding tumbler support, a tumbler pivoted to the support, a series of abutments adapted to be engaged by the tumbler in its positions of gear intermesh, means for clamping the tumbler against said abutments, and also for clamping said sliding support against the frame, substantially as described.

6. In a variable speed device, a frame, a first shaft, a cone of gears thereon, a second shaft, a slide-plate slidably mounted within the frame, a tumbler frame supported upon said slide-plate, said second shaft projecting through said tumbler frame, transmission gearing between the second shaft and first shaft, adapted to be controlled by said tumbler frame, worm and worm wheel connection with the tumbler frame for lateral adjustment thereof, and worm actuating and

slide plate shifting means carried by said slide plate, whereby the tumbler frame can be actuated longitudinally and laterally, substantially as described.

7. In a variable speed device, a frame, a first shaft, a second shaft, a cone of gears mounted upon said first shaft, a tumbler frame, intermediate transmission gearing controlled by said tumbler frame for imparting motion from said second shaft to a selected gear of the cone, a tumbler frame support slidably mounted in said frame, and means for moving said tumbler frame support longitudinally and said tumbler frame laterally, and locking said parts in a selected position, substantially as described.

8. In a cone and tumbler variable speed gear system, a frame, a sliding tumbler support, a tumbler pivoted to the support, and manipulating mechanism adapted to slide the support and rock the tumbler, substantially as described.

9. In a cone and tumbler variable speed gear system, a frame, a tumbler shaft, a sliding tumbler support, a tumbler pivoted on said support coincidently to the tumbler shaft, a series of abutments formed on the frame against which the tumbler engages in its positions of gear intermesh, and manipulating mechanism adapted to slide the support, rock the tumbler and clamp it against its abutments, substantially as described.

10. In a cone and tumbler variable speed gear system, a frame, a tumbler shaft, a sliding tumbler support, a tumbler pivoted on said support coincidently to the tumbler shaft, a series of abutments formed on the frame against which the tumbler engages in its positions of gear intermesh, and manipulating mechanism adapted to slide the support, rock the tumbler, clamp the tumbler against its abutments and clamp the sliding support against its slideway, substantially as described.

11. In combination with a tumbler and gear, a gear with which the tumbler gear intermeshes, a rigid abutment for the tumbler in the position of intermesh, and worm mechanism adapted to rock said tumbler and hold it by pressure against said abutment, substantially as described.

12. A frame, a gear to be engaged, a shaft journaled in the frame, a tumbler support held by the frame, a tumbler pivoted in said support concentric with said shaft, a pinion fixed to said shaft, a tumbler gear engaging said pinion, an abutment for said tumbler in the position of gear intermesh, and mechanism for rocking said tumbler on its support and clamping it against said abutment, substantially as described.

13. A frame, a series of gears to be engaged, a shaft journaled in the frame, a tumbler support adapted to slide on the frame parallel with the gears to be engaged,

a tumbler pivoted in said support concentric with the said shaft, a pinion fixed to said shaft, a tumbler gear engaging said pinion, a series of abutments adapted to be engaged 5 by said tumbler in the positions of gear intermesh, and mechanism for sliding said support and locking the tumbler, adapted to clamp the tumbling and sliding devices against rigid frame abutments, substantially 10 as described.

14. In a cone and tumbler variable speed gear device, a frame, a tumbler support adapted to slide on the frame, a tumbler pivoted to the said support, and worm 15 mechanism carried by the sliding support, adapted to rock said tumbler, substantially as described.

15. In a cone and tumbler variable speed gear system, a frame, a tumbler support 20 slidable on the frame, a tumbler pivoted to the said support, a series of rigid abutments adapted to be engaged by the tumbler when in its positions of gear intermesh, and worm mechanism carried by the sliding support, 25 adapted to rock the tumbler and clamp it against said abutments, substantially as described.

16. In a cone and tumbler gear system, a frame, a tumbler support slidable on the 30 frame, a tumbler pivotally mounted on the support, worm mechanism carried by the slidable support, a hand wheel outside of the frame for operating said worm, and

means for pinning the hand wheel to the frame, substantially as described. 35

17. In a cone and tumbler gear variable speed system, a frame, a tumbler shaft, a slide piece on the frame, a tumbler pivoted concentrically relative to the tumbler shaft, and adapted to be moved along said shaft 40 by means of said sliding piece, a series of abutments for the tumbler, and means for rocking said tumbler and clamping it against said abutments in the positions of gear intermesh, substantially as described. 45

18. In a cone and tumbler variable speed gear system, a frame, a tumbler lever, said frame having a series of abutments adapted to limit the movements of the tumbler toward the cone, means for applying com- 50 pression to the tumbler lever, whereby said compression is resisted by said abutments, substantially as described.

19. In a cone and tumbler variable speed gear system, a frame, a tumbler lever ful- 55 crumed therein, means for rocking and sliding the tumbler, and means for clamping the tumbler lever against the frame in positions of gear intermesh, substantially as de- 60 scribed.

In testimony whereof, I have hereunto set my hand.

ADOLPH L. DE LEEUW.

Witnesses:

OLIVER B. KAISER,
LEO O'DONNELL.