No. 760,460. PATENTED MAY 24, 1904.

W. T. LEIGHTON.

VARIABLE SPEED GEAR.

APPLICATION FILED JULY 10, 1902.

NO MODEL.

Fig. 2.

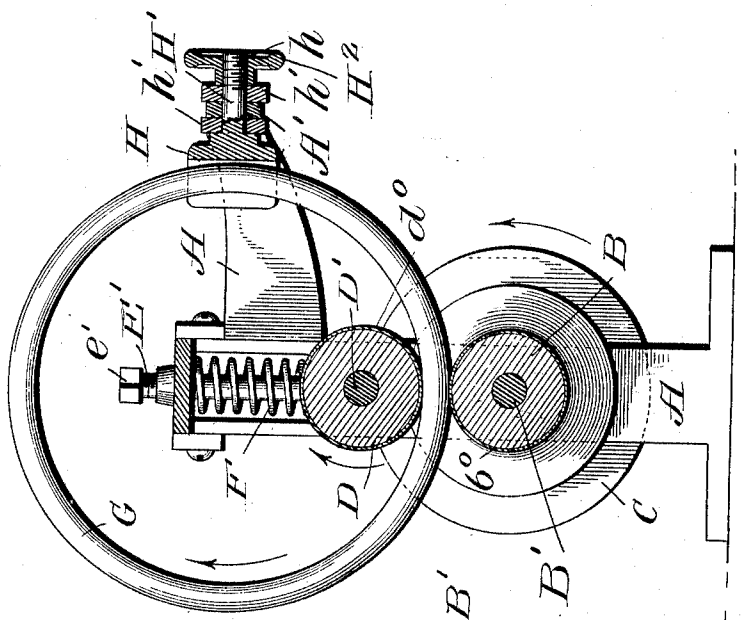
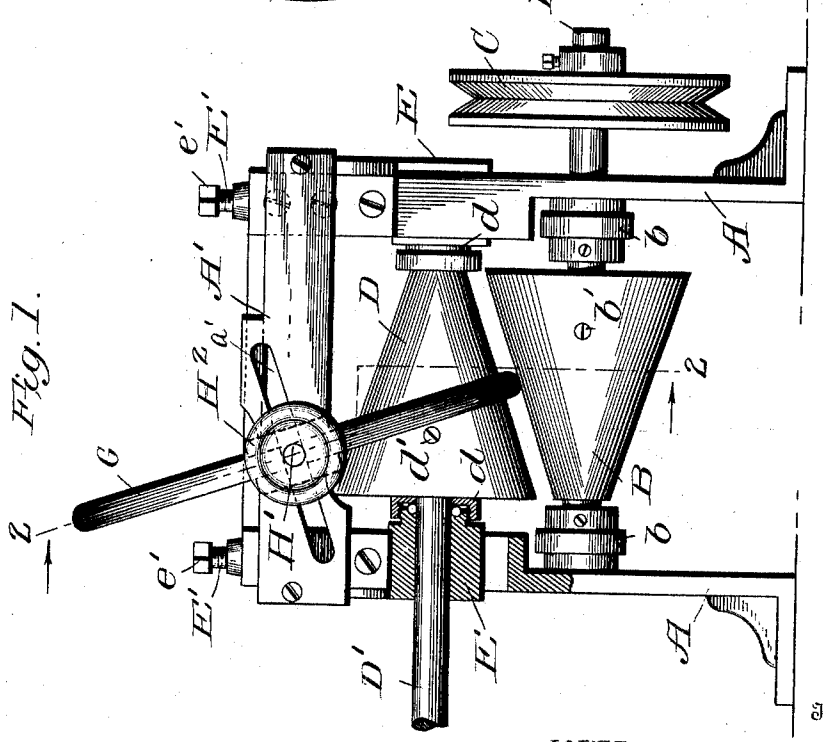


Fig. 1.



Witnesses

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No. 760,460. Patented May 24, 1904.

UNITED STATES PATENT OFFICE.

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VARIABLE-SPEED GEAR.

SPECIFICATION forming part of Letters Patent No. 760,460, dated May 24, 1904.

Application filed July 10, 1902. Serial No. 115,091. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. LEIGHTON, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Variable-Speed Gear; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved variable-speed gear; and it consists of certain novel features hereinafter described and claimed.

Broadly speaking, the invention contemplates providing a pair of reversed cones with an idler-ring therebetween which has the double function of communicating the motion from the driving to the driven cone and when set for the purpose gradually varying the speed of the driven cone by being moved along between the cones by the rotary movement of the cones themselves acting on the ring, as contradistinguished from some separate means for shifting the ring between the cones.

Reference is had to the accompanying drawings, in which the same parts are indicated by the same letters throughout both views.

Figure 1 is a front elevation, partly in section, of the speed-gear; and Fig. 2 represents a section along the broken line 2 2 of Fig. 1 and looking in the direction of the arrows.

A represents the framework or support, of any suitable construction.

B represents a cone-roller mounted on a drive-shaft B′ and driven from any suitable source of power—as, for instance, a pulley C.

b b are antifriction journal-bearings similar to the bearings shown at *d* in Fig. 1.

D represents another cone-roller reversely disposed to the first and mounted on the driven shaft D′, by means of which power is transmitted. These two rollers B and D may be covered, if desired, with a casing of leather, walrus-hide, or other tough flexible material, and the said rollers may be either made fast to the shaft by means of set-screws *b′ d′* or they may be splined or otherwise secured to said shafts in any convenient way. The pressure of one cone-roller toward the other may be obtained in any suitable way; but for the purpose of illustration I have shown the shaft D′ journaled in the boxes E E, which are supported by the adjusting-screws E′, provided with nuts *e′*. Surrounding these screws E′ are coiled springs F, which press the conical roller D toward the conical roller B.

The top piece A′ of the frame is slotted, as at *a′*, preferably in a line parallel to, but substantially distant from and out of alinement with, the space formed between the working surfaces of the cones, and in this slot is mounted the stem H′ of the fork H. This stem H′ is screw-threaded at its end *h* to receive the internally-screw-threaded binding-wheel H^2 and carries two washers *h′*, one on each side of the top piece A′, which prevent the fork from moving along the slot *a′* when the binding-wheel H^2 is tightened, and yet allows it to slide along said slot when said wheel is loosened. The binding-wheel H^2 enables the attendant to release the fork H and to slide its stem H′ along the slot *a′* and reset the fork at any desired point. Although I have illustrated this means for shifting the position of the fork, it is obvious that in actual practice the same end might be accomplished in other ways.

G is a ring rotatably supported between the cones and kept in close frictional contact therewith by the inward pressure, heretofore referred to, exerted on the cones or their bearings. This ring G is of sufficient diameter as to always project within and be guided by said fork for a purpose hereinafter mentioned. It will be obvious that when the pulley C is revolving this ring will transmit the motion of the roller B to the roller D. Now if the fork H be moved, say, upwardly along the slot *a′*, which may be done when the binding-wheel H^2 is loosened, a slight twist will be given the ring G and it will pivot from right to left about its point of contact with the cones in a plane at right angles to the working surfaces of the cones—that is to say, the direction of the feed of the ring G is changed, and it will speedily move upwardly between the cones

B and D in the same direction as was moved the fork H, thereby causing the cone D to gradually increase in speed until the ring has assumed a position lying in a plane parallel to its initial normal plane of rotation or perpendicular to the cone's working surfaces and passing through a point located centrally of the fork H. When the ring has traveled between the cone-surfaces to this point—that is, so that the ring will rotate in a plane perpendicular to both the fork and the cone's working surfaces—the new speed which has been imparted to the roller D will become constant, and the binding-wheel H^2 may be tightened to clamp the fork rigidly in position. On the other hand, if the fork H is moved along the slot a' in the opposite direction the ring will work downwardly toward the left end of the cones B and D and will similarly impart decreased speed to the cone D and its shaft D'.

It will be observed that the normal plane of rotation of the ring G is perpendicular to any given point of contact of the ring with either of the cones when located therebetween, and it will be understood that by the expression "changing the direction of feed" of the said ring I simply mean that the ring is swung around its point of contact with the cones, as a pivot, in a plane, still at right angles to but out of the normal plane of rotation, and hence out of the one plane which can lie perpendicular to the cones' working surfaces at this point. When thus located in a plane out of its normal plane of rotation, the action of the cones themselves will cause the ring to run along between the cones in a direction dependent upon the direction in which the ring is swung about until it has again assumed a position in a plane parallel to its normal plane of rotation, passing through a point located centrally of the fork, when the rotation of the driven cone will become constant, but at a changed speed, as before stated.

It will be seen that a simple mechanism is provided by means of which the speed of the shaft D' may be varied within wide limits while the shaft B' is running at the same constant speed, and it will also be noted that this change of speed of the shaft D' will be gradual, and thus sudden shocks or jars when the speed is changed will be obviated.

It will be obvious that the arrangement of the framework and the mounting of the cone-rollers may be varied in many ways without departing from the spirit of the invention, and the drawings show only one embodiment of the invention.

Said invention is applicable to use in a great many relations where it is desired to vary the speed of the driven mechanism and at the same time to use a motor which is running at a substantially uniform rate.

Having thus described my invention, what I claim is—

1. A variable-speed gear, comprising a drive-shaft and a driven shaft, rotary bodies carried thereby, having parallel working surfaces, and the driving-body having a changeable-speed surface, a motion-transmitting ring interposed between said rotary bodies, and means for changing the direction of feed of said ring, thereby causing it to travel along between said rotary bodies by the rotary action of the bodies thereon.

2. A variable-speed gear, comprising a drive-shaft and a driven shaft, a cone mounted on said drive-shaft, a rotary body carried by said driven shaft, the working surfaces of said cone and rotary body being disposed in parallel planes, a motion-transmitting ring interposed between said cone and rotary body, and means for changing the direction of feed of said ring, thereby causing it to travel along between said cone and rotary body by their rotary action thereon.

3. A variable-speed gear, comprising a drive-shaft, a driven shaft, cone-rollers mounted on said shafts, a ring interposed between said cone-rollers and transmitting the motion of one to the other, and means for changing the direction of feed of said ring thereby causing it to travel along between said cone-rollers by the rotary action of the cone-rollers thereon.

4. A variable-speed gear, comprising a drive-shaft, a driven shaft, cone-rollers reversely mounted on said shafts, a ring interposed between said cone-rollers and transmitting the motion of one to the other, and means for changing the direction of feed of said ring between the cone-rollers, thereby causing it to travel longitudinally of the said rollers by the rotary action of the cone-rollers thereon.

5. A variable-speed gear, comprising a drive-shaft, a driven shaft, cone-rollers reversely mounted on said shafts, a ring interposed between said cone-rollers and transmitting the motion of one to the other, a fork having jaws engaging said ring at a position substantially distant from the cone-rollers, and means for shifting said fork so as to change the direction of feed of said ring, whereby said ring is caused to travel longitudinally of said rollers a predetermined limited distance by the rotary action of the rollers thereon.

6. The combination with a suitable support, of a drive-shaft and a driven shaft journaled in said support and means for normally pressing one shaft toward the other, cone-rollers reversely mounted on said shafts, a ring interposed between said cone-rollers and transmitting the motion of one to the other, a plate carried by said support, provided with an elongated slot disposed parallel to but out of alinement with the space formed between the working surfaces of said cone-rollers, a fork, slidingly mounted in said slot, having jaws engaging said ring at a position substantially

distant from the cone-rollers, and means for shifting the position of said fork along said slot whereby said ring is caused to initially pivot on the cone-rollers, and subsequently ride longitudinally between same, a predetermined limited distance, by the rotary action of the cone-rollers thereon.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM T. LEIGHTON.

Witnesses:
FRED. M. WHITNEY,
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