No. 684,215. Patented Oct. 8, 1901.

C. H. FOSTER.

CHANGE SPEED GEARING.

(Application filed Jan. 2, 1901.)

(No Model.)

Fig. 3.

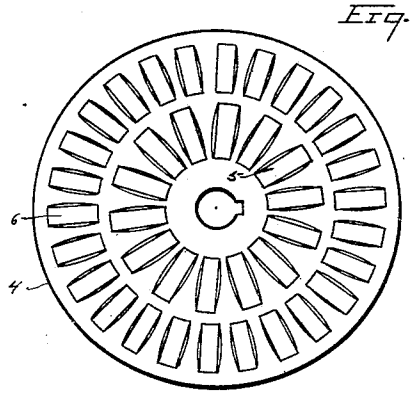


Fig. 2.

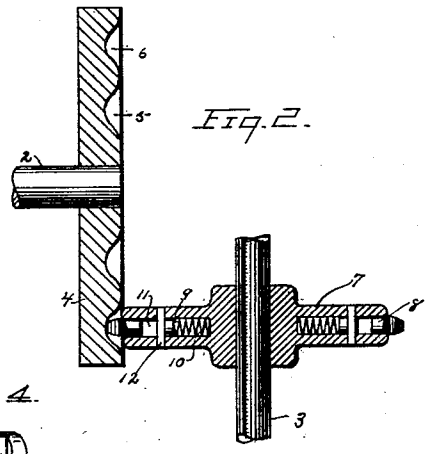


Fig. 4.

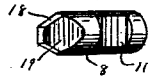
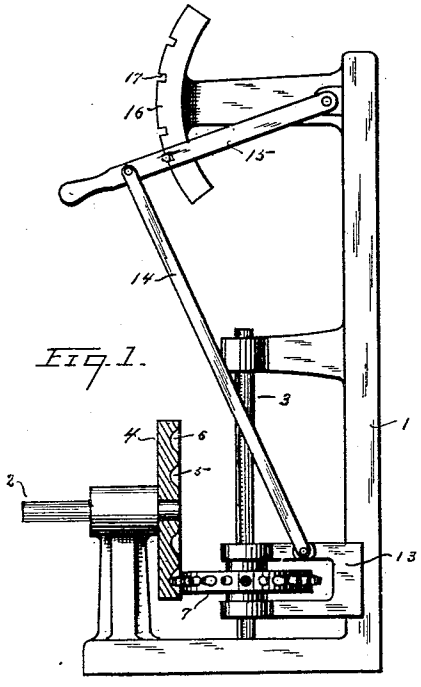


Fig. 1.



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UNITED STATES PATENT OFFICE.

CLAUD H. FOSTER, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO JOSEPH W. ROOF AND JOSEPH P. ROOF, OF SAME PLACE.

CHANGE-SPEED GEARING.

SPECIFICATION forming part of Letters Patent No. 684,215, dated October 8, 1901.

Application filed January 2, 1901. Serial No. 41,885. (No model.)

To all whom it may concern:

Be it known that I, CLAUD H. FOSTER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Change-Speed Gearing, of which the following is a specification.

This invention relates to change-speed gearing, and has for its object the production of a device of that character which is simple and effectual in operation and which is durable and economical in structure. This object I secure by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a view, partly in section and partly in elevation, of my change-speed gearing and shows a means which may be employed for shifting the same from one speed to another. Fig. 2 is a sectional view through the gears. Fig. 3 is a side elevation of one of the gears, and Fig. 4 is a perspective view of one of the yieldingly-mounted teeth of the other gear.

Similar reference characters designate corresponding parts throughout the several views.

1 represents a framework of some machine, which may be of any character or size whatever. Journaled in suitable bearings on this frame are two shafts 2 and 3, which, as shown, lie substantially in the same plane and are at right angles to each other, although this is by no means necessary. Keyed or otherwise secured to the shaft 2 is what may be called the "driving-gear" 4. As shown more clearly in Fig. 3, the face of this gear is formed with two concentric rows of equidistant depressions, the first or inner row being represented by 5 and the second by 6. Although but two rows of depressions are shown, it will be understood that any number of rows may be employed, the number being dependent upon the number of different speeds at which it is desired to drive the gear meshing with the gear 4. Longitudinally movable on the shaft 3, but keyed so as to turn the shaft therewith, is a driven gear 7. The teeth 8 of this gear, one of which is shown in perspective in Fig. 4, are yieldingly mounted in equidistant sockets 9, formed in the periphery of the same. These teeth may be of any desired form in cross-section, those shown being circular, the sockets being made of corresponding shape. The teeth fit loosely in the sockets and are adapted to be pressed inwardly substantially to their full extent when the gear 7 is shifted from one row of depressions in the driving-gear to the other. They are held outwardly in their operative positions by means of springs, rubbers, compressed air, or other means, that shown being coiled springs 10, which are placed in the bottoms of the sockets below the teeth. In order to prevent the teeth from falling out of their sockets and also to limit the outward positions of the same, they are recessed on one side at 11. Through these recesses pass pins 12, these pins also extending through the gear 7. The driven gear is moved along the shaft 3 by any suitable means, that shown consisting of a shifting yoke 13, which spans the hub of the gear and which is moved in the direction of the shaft by means of a link 14, which connects the same with a shifting lever 15. This lever is pivoted at one of its ends to the base 1 and has the link jointedly connected to it near its opposite end. The lever operates alongside a notched segment 16 and has any suitable form of detaining device for engaging with the notches 17 to hold the lever in any of its several positions.

The operation of the device is as follows: Assuming that the gears are in the position shown in Fig. 1 and the gear 4 doing the driving, it will be clear that the gear 7 is driven with considerable speed. If it is desired to change it to a lower speed, the lever 15 is rocked forward to the next notch 17, which will bring the teeth on the gear 7 into the inner row of depressions on the gear 4. As they pass from one row to the other the teeth are pushed inwardly, the ends of the depressions 6 and 5 being rounded for that purpose. The projecting ends of the teeth are also beveled at 18, so as to assist in this operation, and they are cut down at 19 in order to cause them to properly engage with the driving-surfaces of the depressions. This change of speed may and usually does take place without checking or stopping the rotation of the gears. As long as the gear 7 remains on the

side of the shaft 2 in which it is shown in Fig. 1 the shaft 3 will be driven in but one direction, although a number of different speeds may be secured. When, however, the lever 15 is thrown over its center to the farther notches in the segment 16, the gear-teeth 8 will be brought into mesh with the depressions 5 and 6 on the opposite side of the shaft 2, which will result in changing the direction of rotation of the shaft 3. It will thus be seen that my invention is not only a change-speed gearing, but is also a reversing mechanism.

The central points in all the rows of depressions have the same pitch as that of the teeth in gear 7, and the notches 17 in the segment are so spaced as to bring the teeth 8 to the central line of these rows, so that normally the gear-teeth and depressions are in perfect mesh. The pins 12 do not engage closely with the flat surface in the notches 11, as it is necessary for the teeth to turn slightly in their sockets as they pass from the point where they first engage with a depression to the point where they cease to mesh therewith.

While I have assumed for purposes of description that the gear 4 is doing the driving, it is clear that it is immaterial as far as my invention is concerned which of the gears 4 or 7 is used for this purpose. As stated above, it is also immaterial whether the shafts 2 and 3 are at right angles or not. All that is necessary is to have the shaft carrying the shifting gear parallel with the face of the gear which is provided with the depressions.

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

1. In a device of the character described, a gear-wheel having a plurality of concentric rows of equidistant depressions in its face, and a second gear-wheel having depressible teeth to mesh with the depressions in the first gear-wheel, and means for moving the second gear-wheel so as to shift its teeth from one row of depressions to the other.

2. In a gear-wheel, a main body portion having radial and equidistant sockets, depressible teeth having recesses in one of their sides mounted in said sockets springs beneath said teeth and tending to push the same outwardly, and pins passing through said recesses for limiting the outward movement of the teeth.

3. In a device of the character described, a gear-wheel having a plurality of concentric rows of equidistant depressions in its face, said depressions having rounded or beveled bottoms, a second gear-wheel having depressible teeth for meshing with the said depressions, means for forcing the teeth out into engagement with the depressions, and means for shifting said second gear-wheel across the face of the other wheel to cause its teeth to engage with another row of depressions and thus to change the speed of the driven gear.

4. In a device of the character described, a shaft, a gear-wheel on said shaft having a plurality of concentric rows of equidistant depressions in its face, a second shaft, a second gear-wheel on said shaft having depressible teeth for meshing with the said depressions, a yoke embracing the said second gear-wheel, and means for shifting the yoke along the second shaft to change the teeth of the second gear-wheel from one row of depressions to the other.

5. In a reversing mechanism, a shaft, a gear-wheel on said shaft having a row of equidistant depressions in its face, a second gear-wheel having depressible teeth meshing with said depressions, and means for shifting said second gear from one side of the shaft of the first gear to the other for the purpose specified.

6. In a device of the character described, a gear-wheel having a plurality of rows of equidistant depressions in its face, a second gear-wheel having teeth mounted in sockets therein, means for moving said second gear-wheel across the face of the first wheel in order to shift its teeth from one row of depressions to another, the teeth in the second gear being so mounted that they may turn in their sockets to adjust themselves to the surfaces of the depressions as they are shifted therein.

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

CLAUD H. FOSTER.

Witnesses:
W. C. MERRICK,
BEN P. BOLE.