No. 682,861. Patented Sept. 17, 1901.

C. A. RITTMAN.

CHANGEABLE GEAR.

(Application filed Aug. 27, 1900.)

(No Model.)

FIG. I.

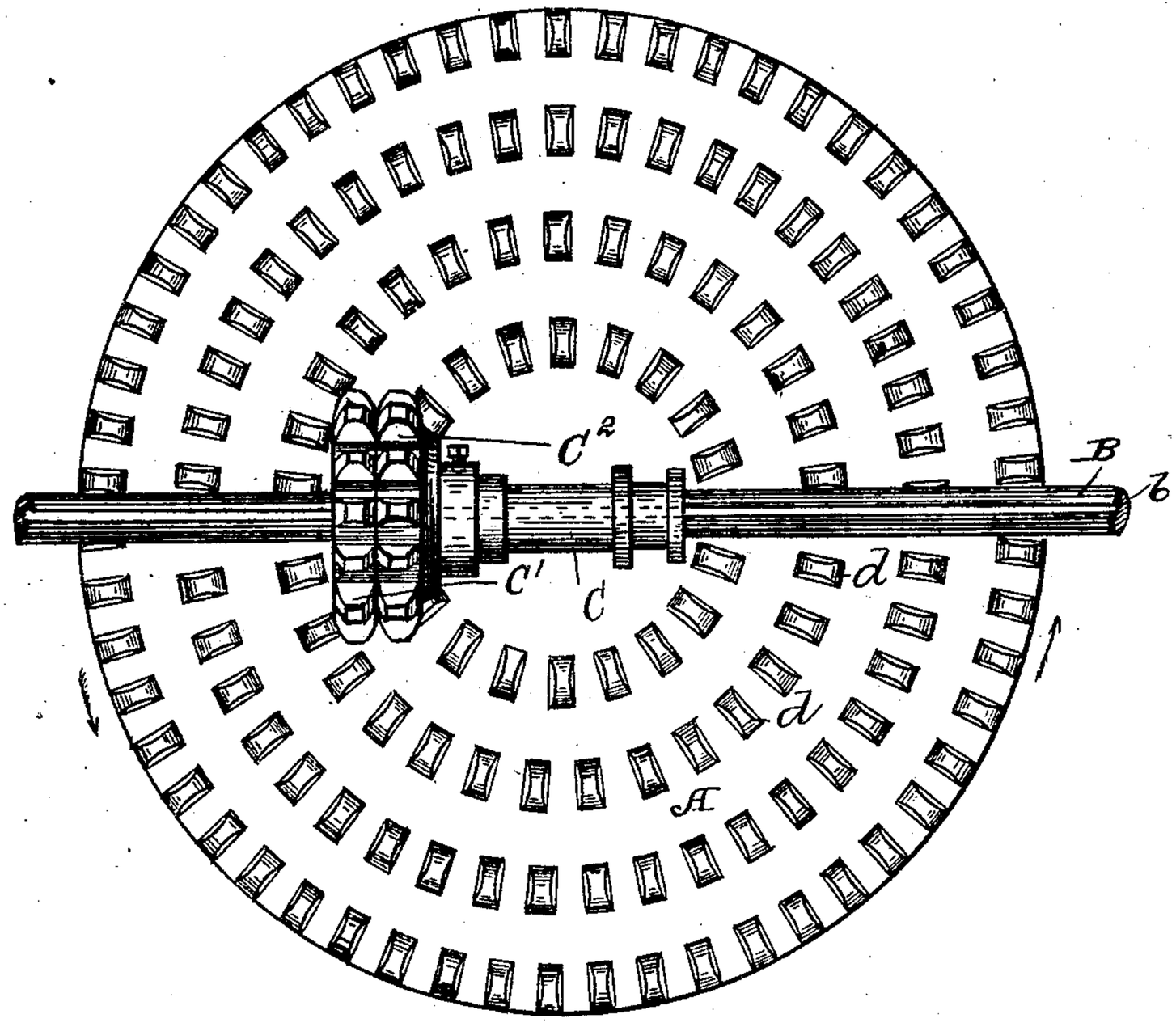


FIG. II.

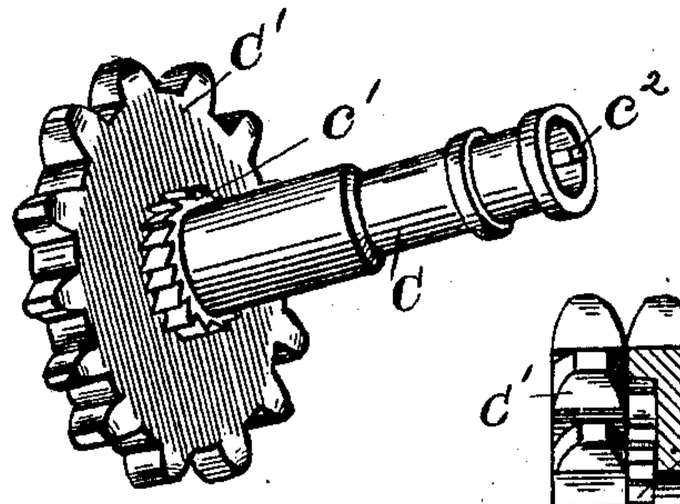


FIG. III.

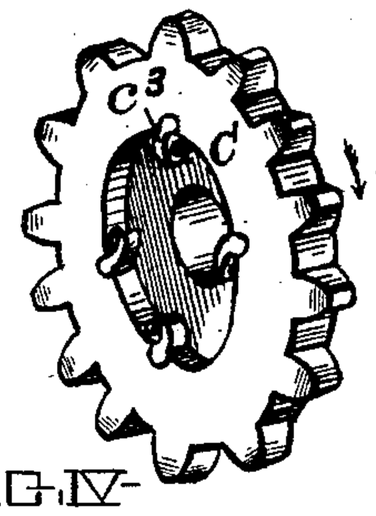
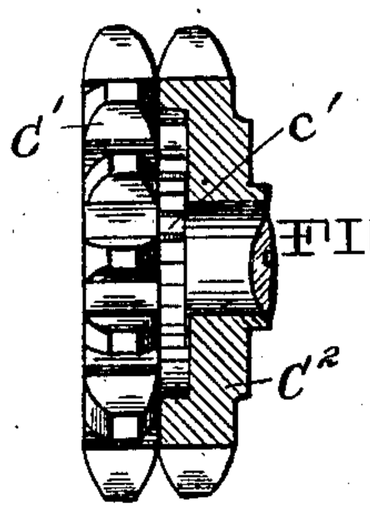


FIG. IV.



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UNITED STATES PATENT OFFICE.

CHRISTIAN A. RITTMAN, OF SANDUSKY, OHIO.

CHANGEABLE GEAR.

SPECIFICATION forming part of Letters Patent No. 682,861, dated September 17, 1901.

Application filed August 27, 1900. Serial No. 28,100. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN A. RITTMAN, a citizen of the United States, and a resident of Sandusky, county of Erie, and State of Ohio, have invented a new and useful Improvement in Changeable Gears, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to devices for changing the speed in gears; and it consists of means hereinafter fully described.

The annexed drawings and following description set forth in detail one mode of carrying out my invention, such disclosed means constituting but one of various forms in which the principle of said invention may be used.

Figure I represents a front elevation of a device embodying my said invention. Figs. II and III represent enlarged detail perspective views. Fig. IV represents a partial front elevational and axial sectional view of the parts shown in Figs. II and III.

A flat disk A, Fig. I, is provided upon its face with a series of teeth arranged upon the circumference of circles of varying diameters, such circles in the device illustrated being concentric, and is suitably mounted so as to be rotatable upon its axis. A shaft B is suitably mounted and has its axis of rotation angularly located with respect to the axis of rotation of said disk, such angular relation in the device illustrated in said figure being right angular. Said shaft B is provided with a longitudinal feather-groove *b*, as shown. Mounted upon said shaft is a sleeve C, whose inner surface is provided with a feather c^2, capable of engaging the groove *b* in the shaft B, thereby effecting the rotative engagement of the sleeve and shaft, at the same time permitting of their relative movement in the direction of their coincident axes. Secured to the sleeve at one end is a pinion part C′, whose teeth are capable of engaging the teeth of the several series on the face of the disk A. Mounted upon said sleeve and contiguous to the pinion part C′ is a second pinion part C^2, provided with a cylindrical depression upon its inner surface whose periphery is provided with a series of spring-actuated pawls c^3, adapted to engage the teeth of a ratchet-wheel *c*′, secured to or is a part of part C′, as shown in Fig. IV. The combined width of the pinion comprising the two pinion parts C′ C^2 is made greater than the distance between any two consecutive series of teeth as measured upon a radius of the disk A, whereby it is seen that either one or the other of said pinion parts engages a series of teeth at all times.

In the description of the operation of the above-described device I will assume the disk A to be the driving and the shaft B to be the driven member, and the direction of rotation of the driver to be that indicated by the arrow shown in Fig. I. Such being the case, it is seen that the speed of rotation of the pinion part C′ is greater than that of the pinion part C^2 when each part is engaging one of two contiguous series of teeth and that the part C^2 will hence lag behind. Such difference of movement is permitted as a result of the rotative mounting of part C^2, such rotation being, however, permitted in but one direction by the ratchet-teeth and pawls. The direction of rotation of said part C^2 upon the sleeve C must hence be in a direction opposite that of the direction of driving of the pinion. It is hence seen that during such engagement by both pinion parts part C^2 becomes idle and part C′ becomes the sole driver intermediate of the shaft and disk. When, however, the two-part pinion is placed in a position such that only part C^2 engages the disk-teeth, such part becomes the driver by engaging the ratchet-wheel *c*′ through the medium of the pawls c^3, part C′ having its teeth located in a space intermediate of two adjacent series of teeth, and hence rotating with and at the same speed as the part C^2. When part C′ solely engages teeth and the teeth of part C^2 are located in such intermediate space, such latter part is inoperative and rotates at the same speed as does said part C′. Any suitable means may be provided for shifting the position of the pinion upon the shaft, so as to engage different sets of teeth.

When it is desired to reverse the direction of rotation of the shaft, it is but necessary to shift said pinion to that portion of the shaft located upon the side of the axis of rotation of the disk opposite that shown in Fig.

I, the direction of movement of the disk-teeth being in the opposite direction on such side. In such position it is seen that the direction of rotation of the part C^2 upon the sleeve is the same as that of the direction of driving of the pinion, part C^2 being driven at the higher rate of speed when both pinion parts simultaneously engage two adjacent series of teeth, respectively. In the case of such reverse movement it is seen that when such two pinion parts simultaneously engage, as described, part C^2 being driven at a higher rate of speed than part C', such part C^2 is caused to advance relatively to part C', such advance being permitted inasmuch as it has the same direction of movement of which part C^2 is capable upon the shaft.

It will be understood that the above-described device may be modified, so as to permit the shaft B to constitute the driving and the disk A to be the driven member. In such case it is only necessary to interchange the locations of the two pinion parts, as will be readily understood. Where it is desired to effect the opposite rotation in either of the above-described cases, it is merely necessary to construct the ratchet-wheel c' and to locate the pawls c^3 so as to permit the rotatable part C^2 to rotate in the direction opposite that above described.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed provided the means covered by any one of the following claims be employed.

I therefore particularly point out and distinctly claim as my invention—

1. The combination of a rotatable disk provided upon its face with a series of spaced teeth arranged in concentric circles of different diameters, a rotatable shaft having its axis of rotation angularly located relatively to that of said disk, and a two-part pinion movable bodily longitudinally of the shaft adapted to engage said teeth, said parts being held against a separating movement axially, one pinion part being carried by and rotatable with said shaft, the other part being rotatable relatively to the first-mentioned part, substantially as set forth.

2. The combination of a rotatable disk provided upon its face with a series of spaced teeth arranged in concentric circles of different diameters, a rotatable shaft having its axis of rotation angularly located relatively to that of said disk, and a two-part pinion movable bodily longitudinally of the shaft adapted to engage said teeth, said parts being held against a separating movement axially, one pinion part being carried by and rotatable with said shaft, the other part being rotatable relatively to the first-mentioned part in one direction only, substantially as set forth.

3. The combination of a rotatable disk provided upon its face with a series of spaced teeth arranged in concentric circles of different diameters, a rotatable shaft having its axis of rotation angularly located relatively to that of said disk, and a two-part pinion adapted to engage said teeth, said parts being held against a separating movement axially, one pinion part being rotatable relatively to the other, the latter being held against rotating movement relative to said shaft, and means connecting the first-named part and the shaft through the second-named part.

4. The combination of a rotatable disk provided upon its face with a series of spaced teeth arranged in concentric circles, a shaft having its axis of rotation angularly located relatively to that of said disk, and a two-part pinion mounted upon said shaft, one pinion part being held against rotatable movement relative to said shaft, and a ratchet-and-pawl mechanism carried by the other part and adapted to have engagement with said first-named part and the shaft, substantially as set forth.

5. The combination of a rotatable disk provided upon its face with a series of spaced teeth arranged in concentric circles, a shaft having its axis of rotation angularly located relatively to that of said disk, and a two-part pinion mounted upon and movable bodily longitudinally relatively to said shaft, one pinion part being held against rotatable movement relative to said shaft and the other part rotatable upon said first-named part, substantially as set forth.

Signed by me this 20th day of August, 1900.

CHRISTIAN A. RITTMAN.

Witnesses:
FRED W. SEHER,
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