

(No Model.)

2 Sheets—Sheet 1.

B. PEDERSEN.
CRANK OR THE LIKE.

No. 558,516.

Patented Apr. 21, 1896.

FIG. 1.

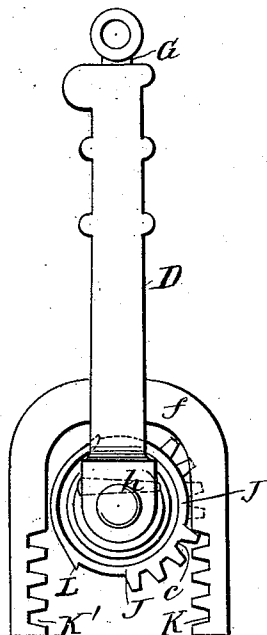


FIG. 2.

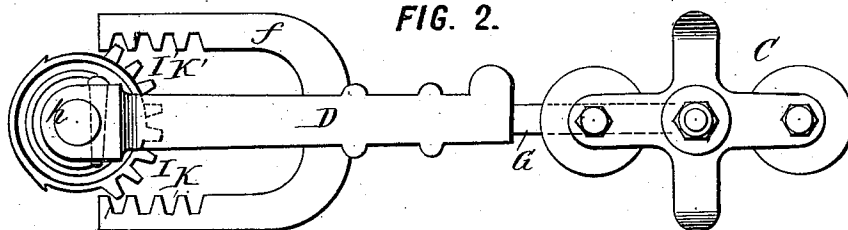
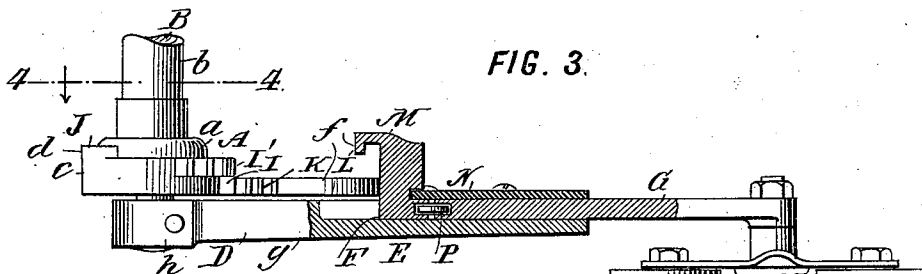


FIG. 3.



WITNESSES:

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FIG. 4.

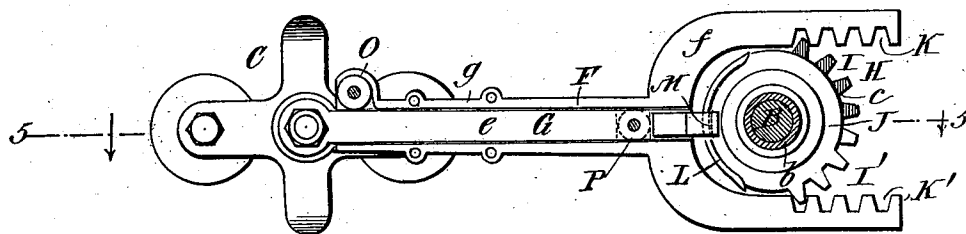
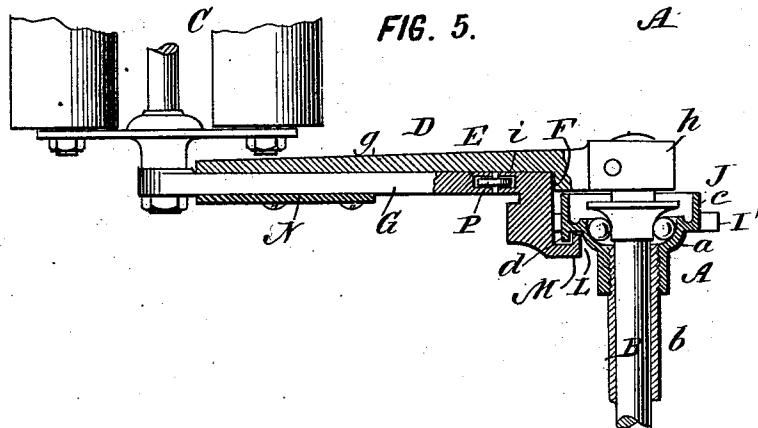


FIG. 5.



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UNITED STATES PATENT OFFICE.

BERNT PEDERSEN, OF NEW YORK, N. Y.

CRANK OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 558,516, dated April 21, 1896.

Application filed June 25, 1895. Serial No. 553,974. (No model.)

To all whom it may concern:

Be it known that I, BERNT PEDERSEN, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Cranks or the Like, of which the following is a specification.

This invention relates to cranks and analogous devices, such as levers and arms for receiving or transmitting power or motion, and aims to provide improvements in such devices.

The invention will be described with reference to the driving-crank of a bicycle; but it will be understood that it is equally applicable to all other mechanical devices in which a part having the function of a crank lever or arm is employed.

The invention aims to provide an improved means to control a variable crank which will automatically change its relation to the axis about which it moves, so that the leverage may be adjusted to increase it at certain points and decrease it or shorten the throw of the crank at other points in the path of the crank-pin, with the object to cause the pedal to travel in a circular path during part of the revolution. To this end in carrying out the preferred form of the invention as applied to a pedal-crank, I provide, in conjunction with the shaft to be driven by the crank and the pedal, an improved means holding the pedal from radial movement at a certain time, and a radially-movable connection by which the pedal can be shifted toward or from the shaft, and I provide certain other features of improvement, which will be more fully hereinafter set forth.

In the accompanying drawings, which illustrate the preferred adaptation of my invention when used as a bicycle-crank, Figure 1 is a fragmentary side elevation of a bicycle-frame, showing the hub for the pedal-shaft and the crank and pedal in elevation and in the initial position, or that at the beginning of the downward stroke of the pedal, the latter being about to start from the inward toward the outward position relatively to the axis of the shaft. Fig. 2 is a like view, but showing the pedal in the position of extreme outward projection and about to start its inward movement. Fig. 3 is a plan view, partly

in section, of the parts in the position shown in Fig. 2. Fig. 4 is a vertical section cut on the line 4 4 in Fig. 3 and showing the parts in a diametrically opposite position, and Fig. 5 is a horizontal section of the parts in the position shown in Fig. 4.

Referring to the drawings, let A indicate the hub of a bicycle-frame; B, the crank-shaft; C, the pedal, and D the crank.

According to the preferred form of my invention as shown in the drawings, I construct the crank D as an extensible or adjustable member, preferably by forming it with a fixed part E, having a radial track or groove F, and a sliding part G, moving in and out radially in the groove F. The standard part E is keyed to the shaft B and transmits the motion of the pedals thereto, and the pedals are mounted on the outer end of the movable part G.

Any suitable means for moving the pedals radially toward or from the shaft may be employed, and the inward and outward movements may be of any suitable number per rotation of the shaft. I prefer to employ the shifting means H, consisting of gear-segments I and I', arranged on the periphery of the hub-piece J, and provide the sliding member G with reciprocal racks K and K', engaging, respectively, with the segments I' and I'. The teeth and racks are so disposed that one rack while engaging with one segment will move the member G out during a quarter of its revolution, whereupon the other rack will engage with the other segment and move the member in during the succeeding quarter-revolution. Preferably for the other half of the revolution the crank is concentric with the shaft, this being accomplished in the construction shown by providing a track or holder L on the piece J, which is engaged by a finger M on the member G, thereby holding the latter concentric with the shaft. The piece J is preferably the bearing-piece of the crank-axle hub A, having internal ball-bearings a, screwed or otherwise fastened on the hub, tooth b having a cylindrical exterior c, from which spring the teeth I and I', and from the inner side of which extends a flange d, serving for the track L.

The member G has a straight radial body

e and a fork end *f*, surrounding the piece *J*, the forks of which are stepped so that one is outside of the plane of the other, and on the inner faces of these forks the racks *K* are
5 formed. The segments *I* and *I'* are in different planes corresponding to the racks, so that when one segment is engaged by the rack the teeth of the other rack will be riding on the smooth cylindrical wall *c* of the piece *J*.

10 The member *E* of the crank may be of any suitable construction, that shown consisting of a longitudinally-grooved bar *g*, having a hub *h* embracing the shaft.

A plate *N* is fastened onto the outside of
15 the member *E* to hold the member *G* in the groove *F*, and a friction-roller *O* is mounted in a socket in the member *E* to take up the friction as the member *G* moves. Another friction-roller *P* is mounted in a groove *i* in the
20 member *G* to take up friction at its inner end.

In operation the pedal runs outwardly in moving from the vertical to the horizontal position until the latter position is reached. Then it runs inwardly until the lower vertical
25 position is reached, and then it runs concentric with the shaft to the upper vertical position. Thus it gives an increasing leverage on the first half of the downstroke and a decreasing leverage on the latter half thereof
30 and a short upward throw on the return.

Any suitable means for accomplishing the desired shifting of the pedal may be employed according to my invention, the means shown being chosen as an example for which any
35 equivalent may be substituted.

It will be understood that I do not limit myself to the particular details of construction and arrangement set forth as constituting the preferred form of the invention, since
40 these may be modified as circumstances or the judgment of those skilled in the art may dic-

tate without departing from the spirit of the invention.

What I claim is—

1. In cranks and the like, a shaft, and a 45 crank comprising two members, the one fixed to the shaft and the other movably connected to the fixed one and movable radially relatively to the shaft, the movable member carrying the crank-pin, and means moving said 50 movable member radially from and toward the shaft during part of the revolution of the crank and means holding said movable member in a circular path and immovable radially 55 relatively to the shaft during another part of the revolution of the crank.

2. In cranks and the like, a shaft, and a hub surrounding the latter, in combination with a crank consisting of two members, the one fixed to the shaft and the other movably connected to the fixed member and movable toward and from the shaft, and gears on said hub and movable member respectively inter-engaging and moving the movable member 65 radially from the shaft during one quarter-revolution, and radially toward the shaft during the next quarter-revolution, and means maintaining said movable member immovable radially during the remainder of the revolution of the crank. 70

3. In cranks and the like, the hub-piece *J* having segments *I* and *I'* and track *L*, and the crank *D* having members *E* and *G*, the latter having racks *K* *K'* and finger *M*.

In witness whereof I have hereunto signed 75 my name in the presence of two subscribing witnesses.

BERNT PEDERSEN.

Witnesses:

CHARLES K. FRASER,
FRED WHITE.