(No Model.) 2 Sheets—Sheet 1.

C. TYLER.

CRANK.

No. 516,137. Patented Mar. 6, 1894.

Fig 1

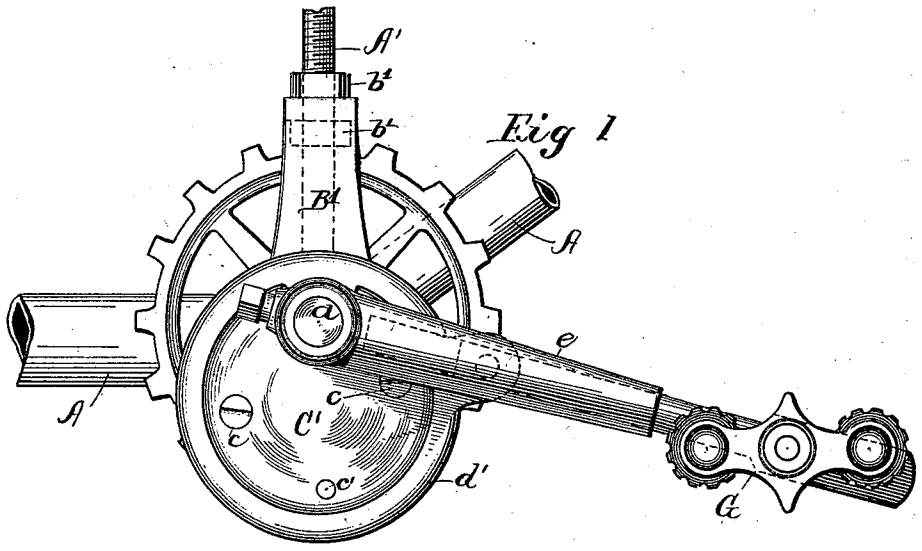
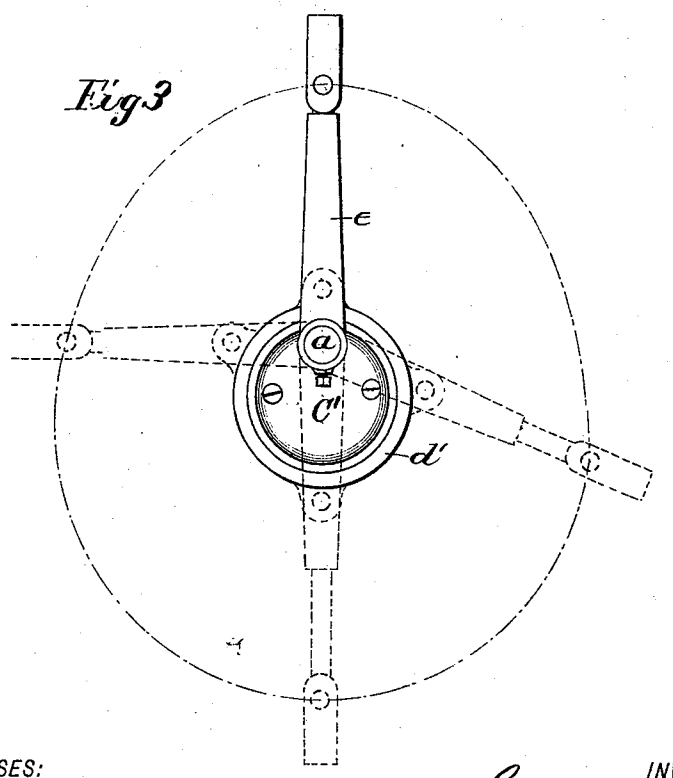


Fig 3



WITNESSES:

C. B. Burdine

I. B. Owens

INVENTOR

Coe Tyler

BY

D. Boardman & Son

ATTORNEYS.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

C. TYLER.

CRANK.

No. 516,137. Patented Mar. 6, 1894.

Fig 2

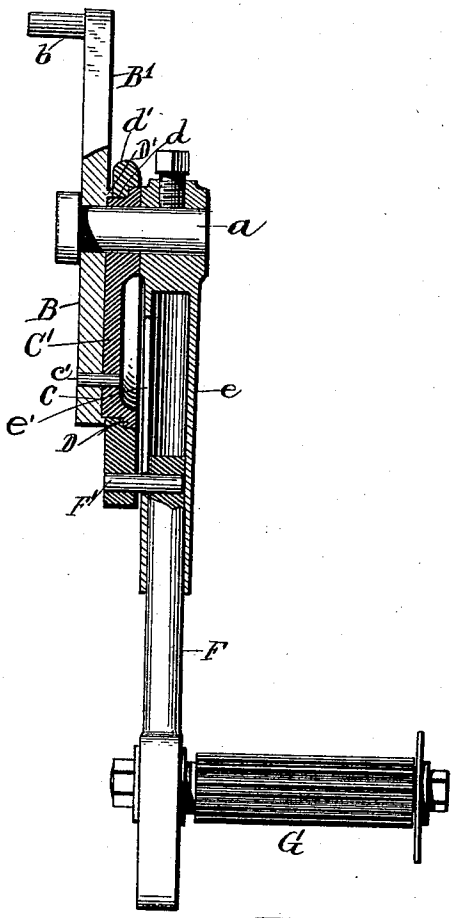


Fig 6

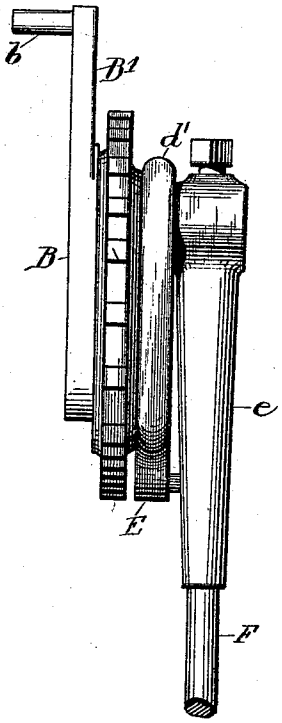


Fig 4

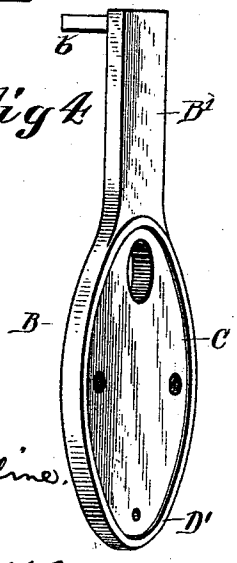
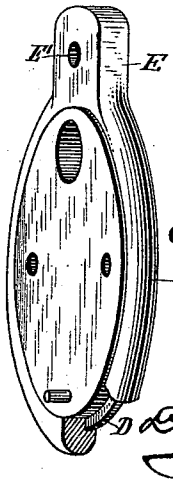


Fig 5



WITNESSES:

C. C. Burdine.

J. B. Lacey.

INVENTOR

Coe Tyler

BY

Dubois & Dubois

ATTORNEYS.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

COE TYLER, OF BINGHAMTON, NEW YORK, ASSIGNOR OF ONE-HALF TO WILLIAM C. BRONSON, OF SAME PLACE.

CRANK.

SPECIFICATION forming part of Letters Patent No. 516,137, dated March 6, 1894.

Application filed April 21, 1893. Serial No. 471,274. (No model.)

To all whom it may concern:

Be it known that I, COE TYLER, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented certain new and useful Improvements in Cranks; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to an improved crank, and it has special reference to that class used in connection with the pedals of velocipedes, although it could obviously be used in the relation of an ordinary crank.

The primary object of my invention is to provide a crank which will when making its stroke, considering a perpendicular position as the beginning of the stroke, be automatically extended or lengthened, and to construct the crank so that when the stroke has been completed, it will be shortened to the usual length. By this construction the operator is enabled to apply to the crank when lengthened, the force that is usually applied on the crank, thereby attaining the benefit of greatly increased leverage at the time when it is most effective, and when the stroke has been completed, the crank-rod in a perpendicular position, and the pressure of the operator relaxed, the crank will be in a shortened condition thereby avoiding the disadvantage of the operator raising his knee to a height equal to the length of the lever when hanging down and extended, which operation is both tiresome and disadvantageous to the rider.

To this end my invention consists of certain means by which the above object is attained.

It also consists of those novel features of construction and combination and arrangement of parts all of which will now be fully described and finally those portions which I regard as novel and patentable, embodied in the claim.

Referring to the accompanying drawings which show my invention embodied in tangible materials: Figure 1 represents a side elevation of the device applied to an ordinary safety bicycle; Fig. 2 a vertical section of the crank in an extended position; Fig. 3 a side elevation showing the various positions assumed by the crank; Figs. 4 and 5 detail views showing the construction of the eccentric-disk for operating the crank-arm. Fig. 6 a view of a modification.

The reference letter A indicates the frame of a safety bicycle having the usual brace A′ extending vertically from the axle *a*.

a indicates the axle which is as usual journaled in a box arranged at the lower end of brace A′, and has its ends extended or lengthened on each side of the box and beyond the sprocket-wheel for the reception of the crank mechanism. Mounted eccentrically and revolubly upon the extended ends of the axle *a* on each side of the bicycle, is a circular disk B provided at the edge nearest the point where the axle passes through it, with an arm B′, the end *b* of which is bent laterally in relation to the arm, and bifurcated. By means of the nut *b*′ working on the brace A′ the bifurcated end *b* of the arm B′, is firmly and rigidly secured to the brace A′, which together with the arm B′ forms a support which co-operates with the axle *a* in holding the disk B immovable in relation to the bicyle to which it is attached.

Formed in the outer face of the disk B is an angular depression C, concentric to the disk itself and of a depth equal to about one-sixth its thickness. In this depression the second circular disk C′ is rigidly fixed by means of the screws *c* and dowel-pin *c*′. This disk is of such a size that its inner end will fit snugly within the depression C of the disk B, and has its outer end formed with an annular concentric flange or bead D, and this end may be formed concaved or depressed so as to reduce its weight. By this construction it will be seen that the disks B and C′ are immovable in relation to the bicycle to which they are attached and concentric to the axle, which axle passes freely through the disk C′ as was the case with the disk B. It will also be apparent that by means of the flange D of disk C′ and the shoulder D′ formed by the depression C, a grooved way *d* is formed, and that this way is eccentric to the axle *a*. To

provide a way having these characteristics is the office of the disks B and C'.

Arranged to move concentrically on the way *d*, is a circular band *d'* which fits snugly within the groove and has its outer edge d^2 so formed that it will embrace the flange D of disk C', thereby presenting the appearance of a plain connection. By this construction all unevenness in the surface of the disks is guarded against, and the band *d'* is arranged to operate as near the outer ends of the axle as possible. Formed integral with the band *d'* is a stud or arm E provided at its outer end with an opening E' which extends across the stud and parallel with the axle *a*.

Rigidly secured to the axle ends on each side of the machine and one on each set of disks B and C', is a sleeve *e* open at its free end and provided with a slot *e'* extending longitudinally and nearly as long as the sleeve. In this sleeve the rod F is arranged and capable of longitudinal movement therein. This movement is effected by means of the pin F' which is firmly fastened to the rod F and projects through the slot *e'* of the sleeve *e*. The end of the pin F' is revolubly secured in the opening E' of the stud E, and by which stud the pin F' and hence its rod is given its longitudinal movement. To the outer end of the rod is fixed in the usual or any preferred manner the crank-pedal G which may be of any preferred or convenient kind.

For the sake of clearness, the joint or bearing between the grooved way *d* and band *d'* has been shown and described as a plain band connection, but in practice it will be necessary to interpose a series of balls or rollers with a view to reducing the friction of the two parts. No further description of this will be necessary however, as such contrivances and their use are well-known to the art and no invention would be involved either in applying or dispensing with them.

The operation of my invention will now be described, reference being had to the drawings, particularly Fig. 3. As the axle *a* of the bicycle revolves under the influence of the operator applied by way of the rod F, the sleeve *e* which is the crank arm, will swing in unison with the rod. The movements of the rod F owing to its connection by way of the pin F' and arm E with the band *d'*, will be followed by the circular movement of the band on the disks B and C'. This movement will be in a line eccentric to the axle *a* and to the pivotal point of the sleeve *e*, by reason of the eccentric disposition of the disks B and C'. As the band *d'* moves along its bearing its arm E will alternately swing toward and from the axis of the crank or the axle, which movement will be followed by the longitudinal play of the rod F, or the lengthening or shortening of the crank as previously explained. The parts of the crank are so arranged or adjusted that when the crank is in a truly diagonal position and making its down-stroke the arm E of the band *d'* will have swung to the limit of its outstroke or will be at that point on the disks B and C' which is farthest from the axle *a*. By such an arrangement the crank will attain its greatest length when the down-stroke has been completed and the up-stroke begun, thereby placing at the disposal of the operator the greatest leverage when most needed and when the crank has completed the stroke and in a perpendicular position and is about to enter into a second stroke it will have been shortened to its shortest length. At this point no pressure is applied by the operator.

The modification shown by Fig. 6 consists in extending the band *d'* of the crank mechanism laterally and forming its extended periphery into a sprocket-wheel. This will simplify the construction and may if desired, be substituted for the form described above. In this case it will be seen that the sprocket-wheel will operate after the manner of an elliptical sprocket owing to its eccentric disposition in swinging alternately toward and from the axis of the drive-wheel.

In the following claims I wish it understood that the term "eccentric" is used in its generic sense and is intended to define all devices which operate eccentrically or away from the center. Following this the term will and is meant to include not only the eccentric disks shown, but any other devices productive of similar results; for example, a crank movement when connected to the crank proper, or more properly speaking the rod F, will effect the same reciprocation and hence the same results.

Having thus described my invention, what I claim is—

In a crank the combination of a revoluble shaft, a disk immovably mounted adjacent and eccentric thereto, a band or strap working on the disk, a sleeve fixed at one end on the shaft and having the other end open, a bar or rod fitting loosely in the open end of the sleeve, and a connection between the bar or rod and the strap on the disk whereby when the bar and sleeve are swung with the shaft, the band or strap on the disk will travel around the disk and cause the rod to reciprocate in the sleeve and thus increase or decrease the length of the crank substantially as described.

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

COE TYLER.

Witnesses:
GEO. H. DOWNING,
W. R. MARINER.