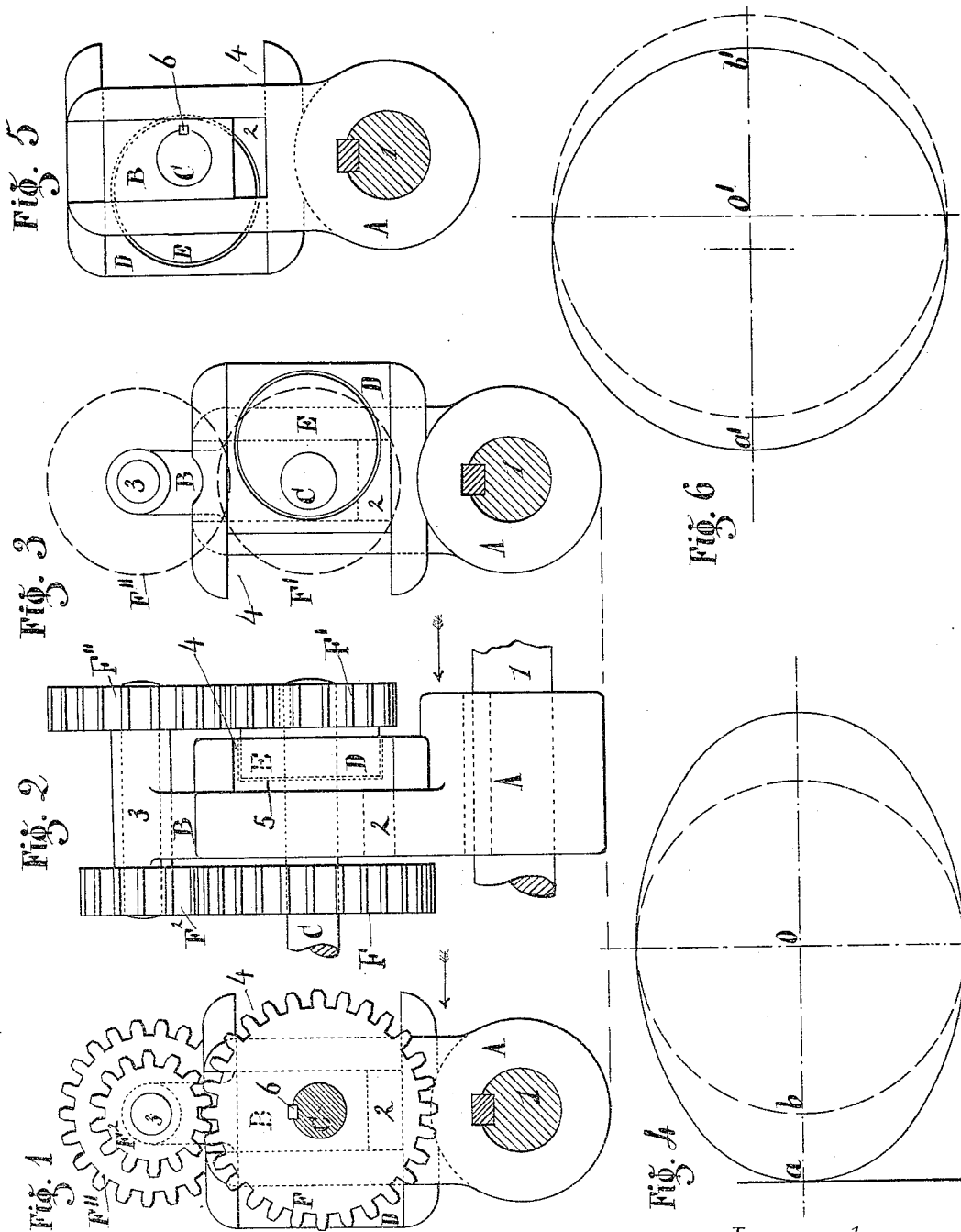


(No Model.)

H. J. F. GUILLON.
RECIPROCATING MOTION CRANK.

No. 546,847.

Patented Sept. 24, 1895.



Witnesses:

J. Chebet.
O. Block.

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UNITED STATES PATENT OFFICE

HENRI JOSEPH FÉLIX GUILLOU, OF PARIS, FRANCE.

RECIPROCATING-MOTION CRANK.

SPECIFICATION forming part of Letters Patent No. 546,847, dated September 24, 1895.

Application filed July 27, 1894. Serial No. 518,696. (No model.) Patented in France January 30, 1894, No. 235,893.

To all whom it may concern:

Be it known that I, HENRI JOSEPH FÉLIX GUILLOU, a citizen of the French Republic, residing at Paris, France, have invented a new and useful improvement in cranks for use in machinery where it is desired to change a rotary to a reciprocating motion, and vice versa, (for which I have obtained Letters Patent in France No. 235,893, dated January 30, 1894,) of which the following is a specification, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to provide a crank of such form that the path of the crank-pin during the rotation of the shaft to which the same is attached will be other than that of a circle struck from the center of such shaft, the path being in one form of my device an ellipse and in another form a circle eccentric to such shaft; and to these ends my invention consists of the construction, combination, and arrangement of the several parts of my improved crank shown and described in the following specification, of which the accompanying drawings form a part, wherein similar letters and numerals of reference designate like or equivalent parts wherever found throughout the several views, and in which—

Figure 1 is a side view of my improved form of crank, the crank-pin of which will describe an ellipse during rotation. Fig. 2 is a view of the construction shown in Fig. 1 looking in the direction of the arrow shown in Fig. 1, and Fig. 3 is a side view of such construction looking in the direction of the arrow shown in Fig. 2, the gear-wheels on that side being removed. Fig. 4 is a diagram of the path of the crank-pin in the form of construction shown in Figs. 1, 2, and 3, O designating the shaft and the dotted circle the path which would be described by a crank of ordinary form. Fig. 5 is a side view of the modified form of construction used where the crank-pin is to move in a circle eccentric to the shaft; and Fig. 6 is a diagram of the path of the crank-pin in the form of construction shown in Fig. 5, O' designating the shaft, and the path of an ordinary crank-pin being designated by a dotted circle.

I will first describe the construction and operation of my improved form of crank in

which the crank-pin during rotation of the crank describes an ellipse, after which I will describe the construction and operation of the form in which such crank-pin describes a circle eccentric to the axis of rotation of the crank.

Referring to the drawings, as shown in Figs. 1, 2, and 3, my improved form of crank of this particular construction consists of a crank-piece A, preferably of substantially the shape shown and formed in one piece of steel or other suitable metal or material. This crank-piece A is secured, when in position for use upon the crank-shaft 1, in any desired manner, usually by means of a slot and key, as shown. The crank-piece A is provided with a slot 2 in line with the crank-shaft 1, which slot is open at the upper end and is adapted to receive, so as to slide easily up and down therein, a slide-bar B, preferably of substantially the shape shown, having in the inner end thereof a hole for the reception of the crank-pin C, and in the outer end a second hole or journal in which easily rotates a short shaft 3. Formed in the crank-piece A in one side thereof, at one side of the slot 2, at an angle thereto and to the crank-shaft 1, preferably at a right angle to both such slot 2 and crank-shaft, as shown, is a second slot 4, in which slides easily back and forth a slide-block D, having a suitable perforation 5 formed in and through the same, in which easily rotates a cam E, provided with a perforation located at one side of the center of such cam and adapted to receive the crank-pin C, which cam E, for convenience of description, will be hereinafter referred to as the "eccentric cam."

Rigidly mounted upon the crank-pin C is a suitable gear-wheel F, meshing with a similar gear-wheel F², rigidly mounted upon the shaft 3, which is journaled in the top of the slide-bar B, and rigidly mounted upon such shaft 3 at its farther end is a second gear-wheel F'', meshing with a similar gear-wheel F', which is rigidly secured to the outer face of the eccentric cam E and mounted loosely upon and concentric with the crank-pin C, so that such cam and gear-wheel will be rotated together. The gear-wheels are so arranged and are of such relative diameters that one

rotation of the wheel F will cause two rotations of the wheel F' and consequently of the eccentric cam E, and the length of the ellipse described by the crank-pin will of course be regulated by the distance of the crank-pin C from the center of the eccentric cam. When the parts are in position, the crank-pin C is rigidly secured in any desired manner to the pitman-rod, (not shown,) and is likewise rigidly secured to the gear-wheel F in any desired manner, usually by means of a slot and key 6 of ordinary form, and such crank-pin extends beyond such gear-wheel F and through the slide-bar B and eccentric cam E and gear-wheel F', which are loosely mounted upon such crank-pin, so as to allow a free rotation thereon.

It will be seen upon an examination of Figs. 1, 2, and 3 that when the crank is rotated in the usual manner, either by pressure exerted upon the pitman-rod or by rotary motion transmitted to the crank-shaft 1 as the crank-pin C is thereupon moved or gyrated about the shaft 1, with but slight oscillation around its own axis due to the varying angularity of the pitman-rod, the gyration of the shaft 3, carrying the gear-wheel F² around the non-rotating wheel F, which is rigidly secured to the crank-pin, will cause the gear-wheels F², F', and F'', and consequently the eccentric cam E, to be rotated, whereby by the movement of such eccentric cam the slide-block D and slide-bar B will be moved back and forth in their respective slots, and the consequent movement of the crank-pin C toward and away from the crank-shaft 1 as the slide-bar B moves back and forth in the slot 2 will cause the path of such crank-pin during a complete rotation of the shaft 1 to approach the form of an ellipse, as shown in full lines in the diagram Fig. 4.

The mechanism used where it is desired to have the path traversed by the crank-pin an approximate circle eccentric to a circle struck from the center of the crank-shaft 1, as in the diagram Fig. 6, differs from the construction heretofore described only in the fact that the gear-wheels, and consequently the journal for the shaft 3 in the outer end of the slide-bar B, are all omitted, and the eccentric cam E, instead of being revolubly mounted upon the crank-pin C, is rigidly secured thereto, so as to prevent rotation thereby, in any desired manner, preferably by a slot and key 6 of ordinary form, as shown in Fig. 5, and the eccentricity of the path of the crank-pin may of course be varied by shifting the position of the crank-pin in the eccentric cam E.

For use in steam or other double-acting engines the form of device shown in Figs. 1, 2, and 3 is of course used, and the parts are then so arranged that the longest diameter of the ellipse traversed by the crank-pin is at right angles to the line of thrust of the piston-rod, and when so arranged the advantage of the use of my improved form of crank is self-evident.

For use in single-acting engines and similar devices where there is only one impetus given to the pitman during an entire revolution I use the form of device shown in Fig. 5, which is more particularly adapted for use in gas, petroleum, or other explosive engines or motors and in bicycles and similar devices.

It is evident that many changes in the construction, combination, and arrangement of the several parts of my improved form of crank other than those mentioned herein may be made without departing from the scope of my invention, and I do not intend to limit myself to any particular construction thereof; but,

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a shaft 1, of a crank-piece A mounted thereon having a slot or slide 2 and a slot or slide 4 formed therein, a slide-bar B reciprocating in the slide 2, a slide-block D reciprocating in the slide 4, a cam E revolubly mounted in the slide-block D, and a crank-pin C revolubly mounted in the slide-bar B and eccentrically mounted in the cam E, substantially as shown and described.

2. The combination with a shaft 1, of a crank-piece A mounted thereon, a reciprocating slide-bar B carried by the piece A, a slide-block D also carried by the piece A and reciprocating at an angle to the line of reciprocation of the slide-bar B, a cam E revolubly mounted in the slide-block D, and a crank-pin C revolubly mounted in the slide-bar B and eccentrically mounted in the cam E, substantially as shown and described.

3. The combination with the shaft 1, of a crank piece, A, of substantially the shape shown, a slide-bar B, a slide-block D carried by the piece A, an eccentric-cam E, and a crank pin C in the cam E, substantially as shown and described and for the purposes set forth.

4. The combination with a shaft 1, of a crank-piece A mounted thereon, a reciprocating slide-bar B carried by the piece A, a slide-block D also carried by the piece A and reciprocating at an angle to the line of reciprocation of the slide-bar B, a cam E revolubly mounted in the slide-block D, a crank-pin C revolubly mounted in the slide-bar B and eccentrically and revolubly mounted in the cam E, and mechanism for rotating the cam E in the slide block D as the crank is rotated, substantially as shown and described.

5. The combination with a shaft 1, of a crank-piece A mounted thereon, a reciprocating slide-bar B carried by the piece A, a slide-block D also carried by the piece A and reciprocating at an angle to the line of reciprocation of the slide-bar B, a cam E revolubly mounted in the slide-block D, a crank-pin C revolubly mounted in the slide-bar B and ec-

centrically and revolubly mounted in the cam
E, a gear-wheel F rigidly mounted upon the
crank-pin C, a gear-wheel F' rigidly secured
to the cam E, and gearing connecting the gear-
5 wheel F with the gear-wheel F', substantially
as shown and described.

In testimony that I claim the foregoing I

have hereunto set my hand this 22d day of
May, 1894.

HENRI JOSEPH FÉLIX GUILLOU.

Witnesses:

VICTOR MATEAU,

DAVID T. S. FULLER.