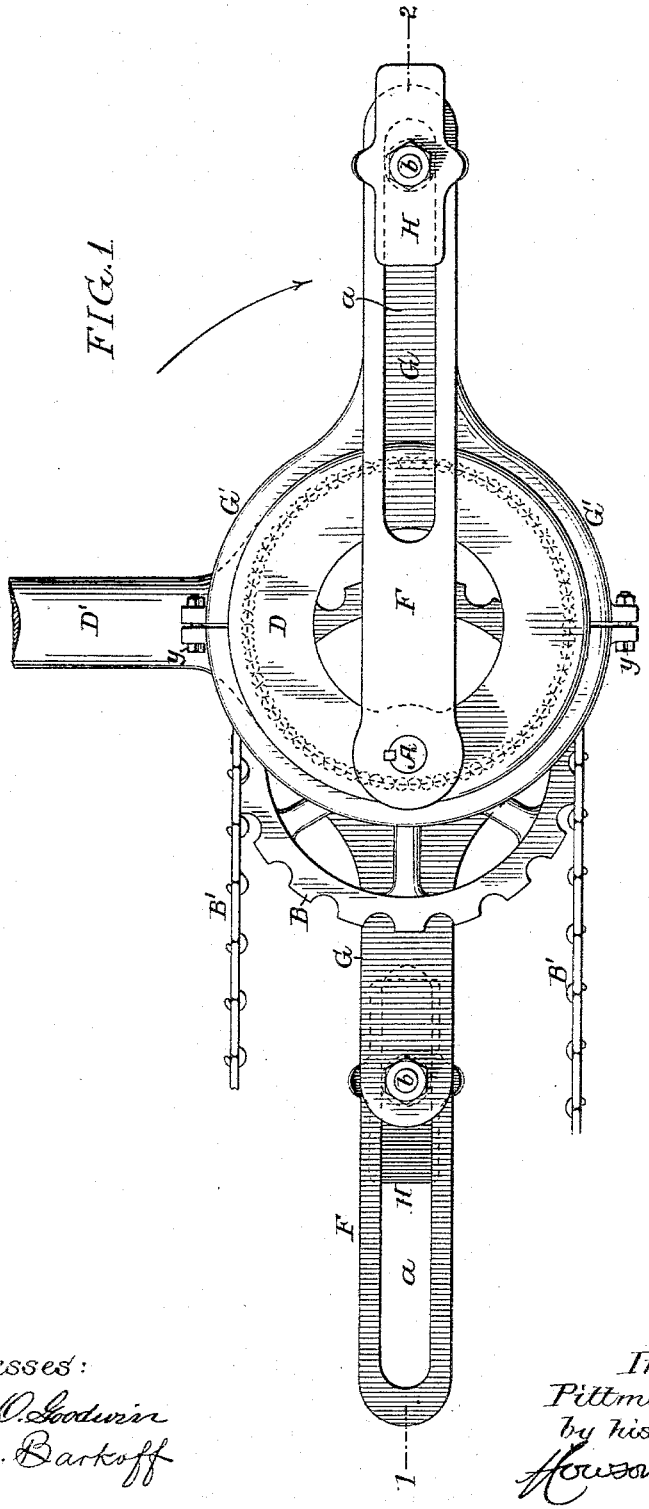
(No Model.) 2 Sheets—Sheet 1.

P. BRIGHT.

CRANK POWER.

No. 490,134. Patented Jan. 17, 1893.

FIG. 1.



Witnesses:
Fred. D. Goodwin
Alex. Barkoff

Inventor:
Pittman Bright
by his Attorneys
Howson & Howson

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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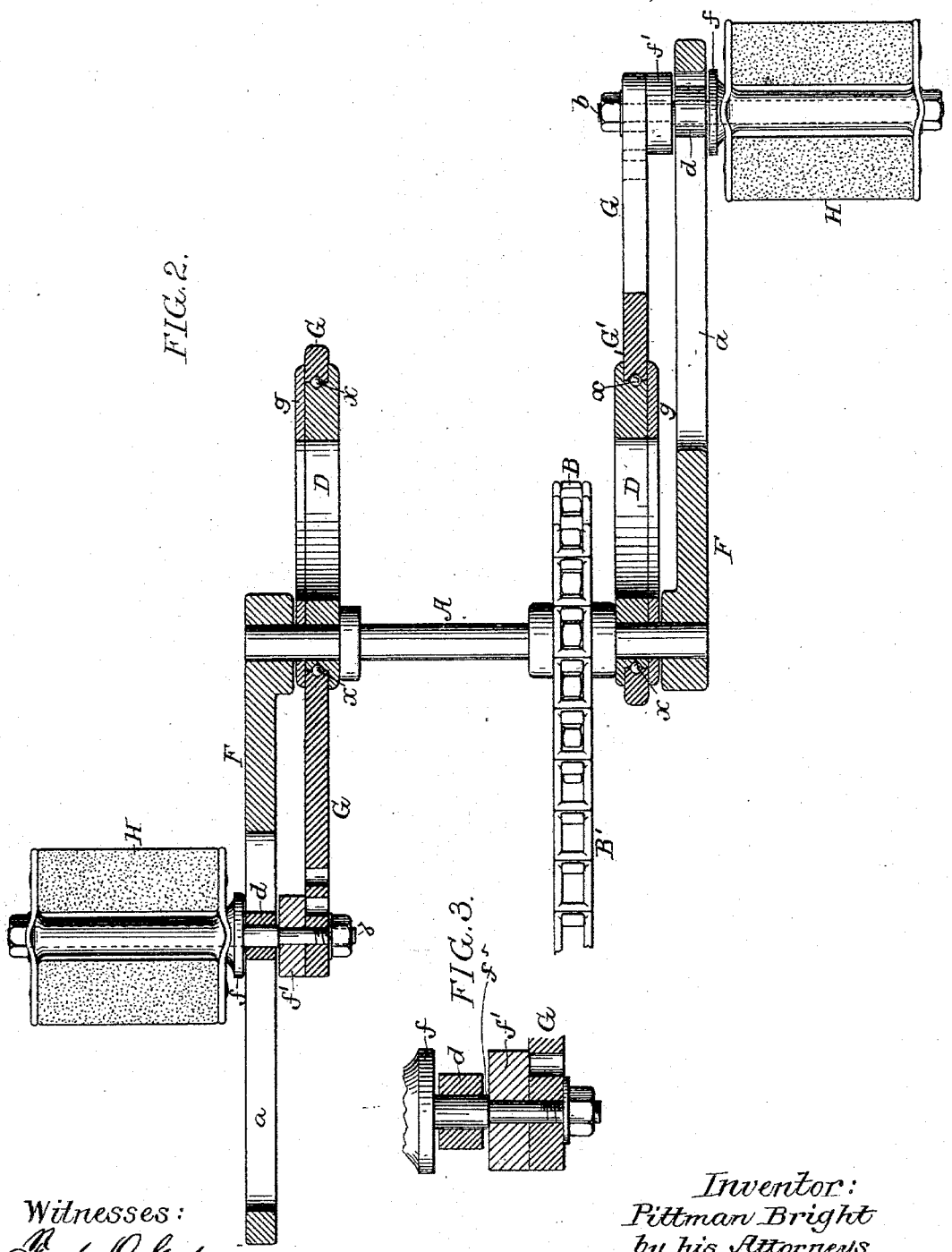
FIG. 2.



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UNITED STATES PATENT OFFICE.

PITTMAN BRIGHT, OF PHILADELPHIA, PENNSYLVANIA.

CRANK-POWER.

SPECIFICATION forming part of Letters Patent No. 490,134, dated January 17, 1893.

Application filed December 10, 1891. Serial No. 414,585. (No model.)

To all whom it may concern:

Be it known that I, PITTMAN BRIGHT, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Crank-Powers for Machinery, of which the following is a specification.

My invention consists of certain improvements in that form of crank motion in which two cranks are used, one of these cranks being secured to the shaft or axle to be driven and the other crank receiving the power, the two cranks being eccentric in respect to each other, but being connected in such a way that the crank to which power is applied drives the crank fixed to the shaft or axle, the result being that during the first half of the active portion of the stroke of the driving crank the leverage upon the driven crank is gradually increased as compared with the leverage exerted upon a single fixed crank of the same throw as the driving crank, until, by the time a quarter turn of the driving crank has been completed, the increased leverage represents the full distance between the axes of the respective cranks, the leverage gradually decreasing during the last half of the active portion of the stroke until it again equals that of a direct crank. Of course in a crank motion of this character the leverage during what may be termed the "inactive" or return half of the stroke of the driving crank is decreased as compared with the leverage of a single fixed crank of like throw in precisely the same ratio as it was increased during the forward or acting half of the stroke, but as no force is applied to the power-receiving crank during the return half of the stroke, this loss of leverage at that time is of no consequence as regards the application of power, while it is of advantage, especially in foot powers, because, if the foot which is being lifted exerts any downward pressure upon the pedal, this pressure exercises the minimum or retarding effect, owing to the short leverage of the crank during the rise. The increased leverage during the active half of the stroke may represent a positive gain of any required percentage, depending upon the degree of eccentricity of the two cranks.

My improvements have for their object the lessening of friction between the moving parts in a crank power of the character described, my improvements being fully described and specifically claimed hereinafter.

In the accompanying drawings I have illustrated one form of my improved crank motion intended for application to the driving shaft of a bicycle, this being one of the uses for which my improved crank motion is particularly adapted.

Figure 1, represents a side elevation of sufficient of the mechanism to illustrate my invention. Fig. 2, is a view partly in plan and partly in section on the line 1—2, Fig. 1; and Fig. 3, is an enlarged view of part of the device.

A represents a shaft having a sprocket wheel B for the reception of a chain B′ which imparts motion to a sprocket wheel on the driving axle of the machine, or, in another class of machines, the shaft A itself may constitute the axle carrying the drive wheel of the machine.

The shaft A is adapted to suitable bearings in circular bosses D formed upon the lower ends of the forked frame D′ of the machine, ball or roller bearings being usually employed, although plain parallel bearings are shown in the drawings.

To each end of the shaft or axle A is rigidly secured a crank F, one crank being arranged at an angle of one hundred and eighty degrees in respect to the other, and in each crank F is a longitudinal slot *a*.

Upon each of the bosses D is mounted, so as to be free to turn thereon, a sleeve G′ forming part of a crank G, and to the outer end of the latter is secured the wrist pin *b* to which, in this case, is applied the power necessary to rotate the crank, the wrist pin of each crank G passing through the slot *a* of the corresponding crank F, and the wrist pins of the respective cranks G carrying the usual pedals H, to which power is applied by the feet of the rider, which pedals may have bearings of any appropriate character. The bearing for the shaft or axle A is at one side of the boss D, so that the two cranks F and G are eccentric in respect to each other, the axis of each crank G being on that side of the shaft A which corresponds with the active half of the

movement of said crank G,—that is to say, the half turn during which power is applied to rotate the crank. As a consequence of this eccentric disposition of the two cranks, the wrist pin of each crank G travels in the slot *a* of its respective crank F as the two cranks are rotated simultaneously and in the same direction, the wrist pin being in its outermost position or farthest from the axis of the shaft A when midway of the active half of the stroke and in its innermost position or closest to the shaft A when midway of the inactive or return half of the stroke. By this means there is, as compared with an ordinary fixed single crank having a throw equal to that of the power receiving crank G, a gain of power due to increased leverage during the entire active half of the stroke of said power receiving crank, the gain being greatest when the crank is midway of the active half of the stroke and then representing an increased leverage equal to the distance between the axes of the two cranks, the shortening of the leverage during the inactive or return half of the stroke being the counterpart of the increased leverage during the active half, so that the increased power is gained without any actual increase in the length of the power-receiving crank as compared with an ordinary single fixed crank. There is also in the case of foot powers a further gain due to the short leverage through which is exerted whatever slight pressure of the foot there may be, during the inactive part of the stroke or rise of the crank, as before set forth, and there is less liability of the pedal to leave the foot on the upper quarter of the return stroke, a feature of advantage especially in bicycles when they are being driven at high speed.

An antifriction roller *d* is confined between collars *f f'* on each wrist pin *b*, this roller traveling in the slot *a* of the crank F so as to reduce to a minimum the friction between the two cranks. The collar *f* may be formed on the wrist pin, and the collar *f'* should have a bearing against a stop or shoulder f^5 on said pin, as shown in Fig. 3, so as to prevent binding of the crank F between the two collars.

The bosses D and the sleeves G' of the cranks G are grooved for the reception of balls *x* constituting the bearings for said cranks, said bosses D having opposite flanges or collars to laterally retain the cranks, one of said collars *g* being detachable, as shown in Fig. 2, and the sleeve G' may be made in halves secured together by bolts *y* as shown in Fig. 1, so as to provide for the adjustment of the sleeve.

The bosses D and sleeves G' may be of any character or width required by the machine to which the invention is to be applied, and where the sleeve and boss are of considerable width, roller or other bearings may be used instead of the ball bearings.

Although the mounting of the power-receiving crank upon an annular bearing is not absolutely essential to the proper carrying out of my invention in all cases, it constitutes an important feature of said invention, as it is practically essential to the application of the improved crank power to bicycles and other foot power machinery.

The cranks G are, by preference, provided each with a series of openings for the reception of the wrist pin so as to permit of the adjustment of the latter in respect to the axis of rotation of the crank.

Having thus described my invention, I claim and desire to secure by Letters Patent:—

1. The combination in a crank power, of the shaft or axle to be driven, a slotted crank fixed thereto, a driving crank eccentric in respect to the driven crank and having a wrist pin for engaging with the slot in said driven crank, and a bearing for said driving crank extending around the driven shaft or axle, said bearing having inner and outer projecting flanges or collars for the lateral retention of the driving crank, and said outer flange or collar being detachable, substantially as specified.

2. The combination of the shaft or axle to be driven, the slotted crank thereon, the driving crank mounted eccentrically in respect to the driven crank and having a wrist pin projecting through the slot in said driven crank, an antifriction roller on said pin, collars between which the roller is contained, and a stop or shoulder upon the wrist pin for limiting the approach of the collars and thereby preventing the same from binding upon the sides of the slotted crank, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PITTMAN BRIGHT.

Witnesses:
EUGENE ELTERICH,
HARRY SMITH.