

(No Model.)

M. A. GREEN.
CRANK SHAFT.

No. 441,551.

Patented Nov. 25, 1890.

Fig. 1.

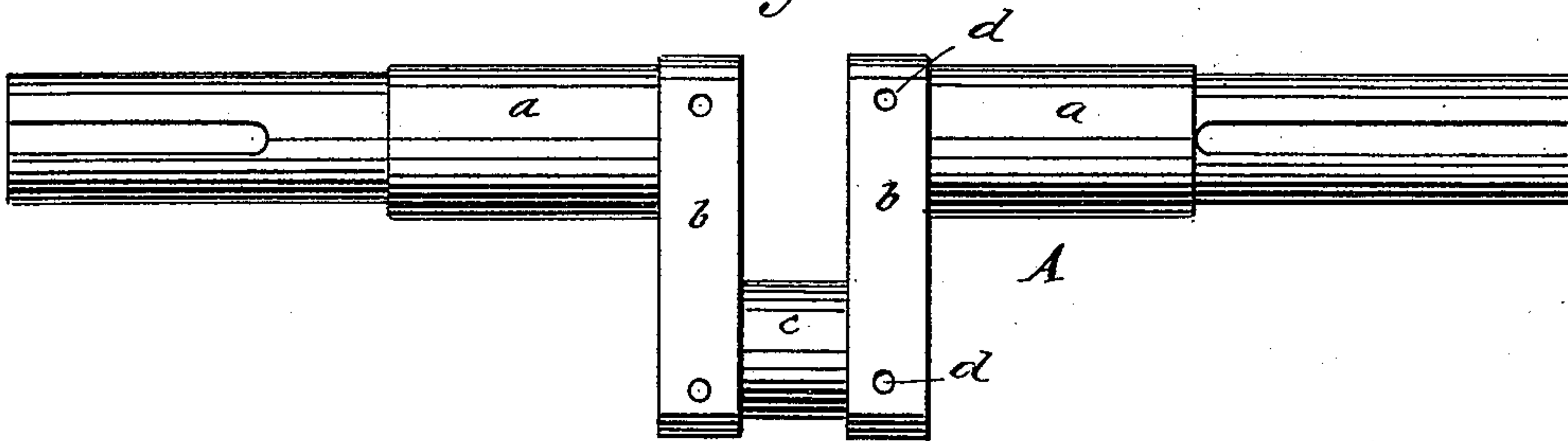


Fig. 4. Fig. 3. Fig. 2.

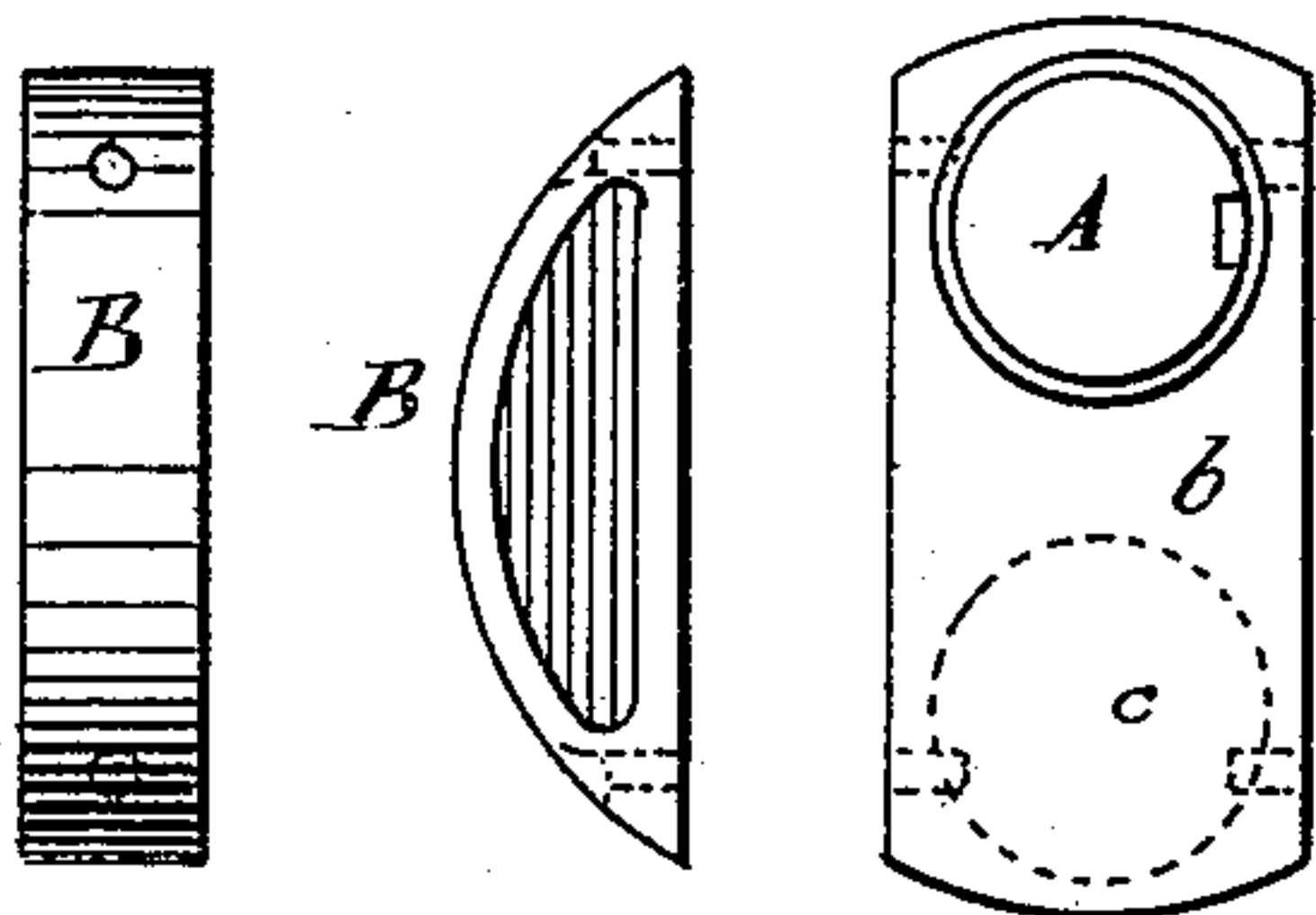


Fig. 6.

Fig. 5.

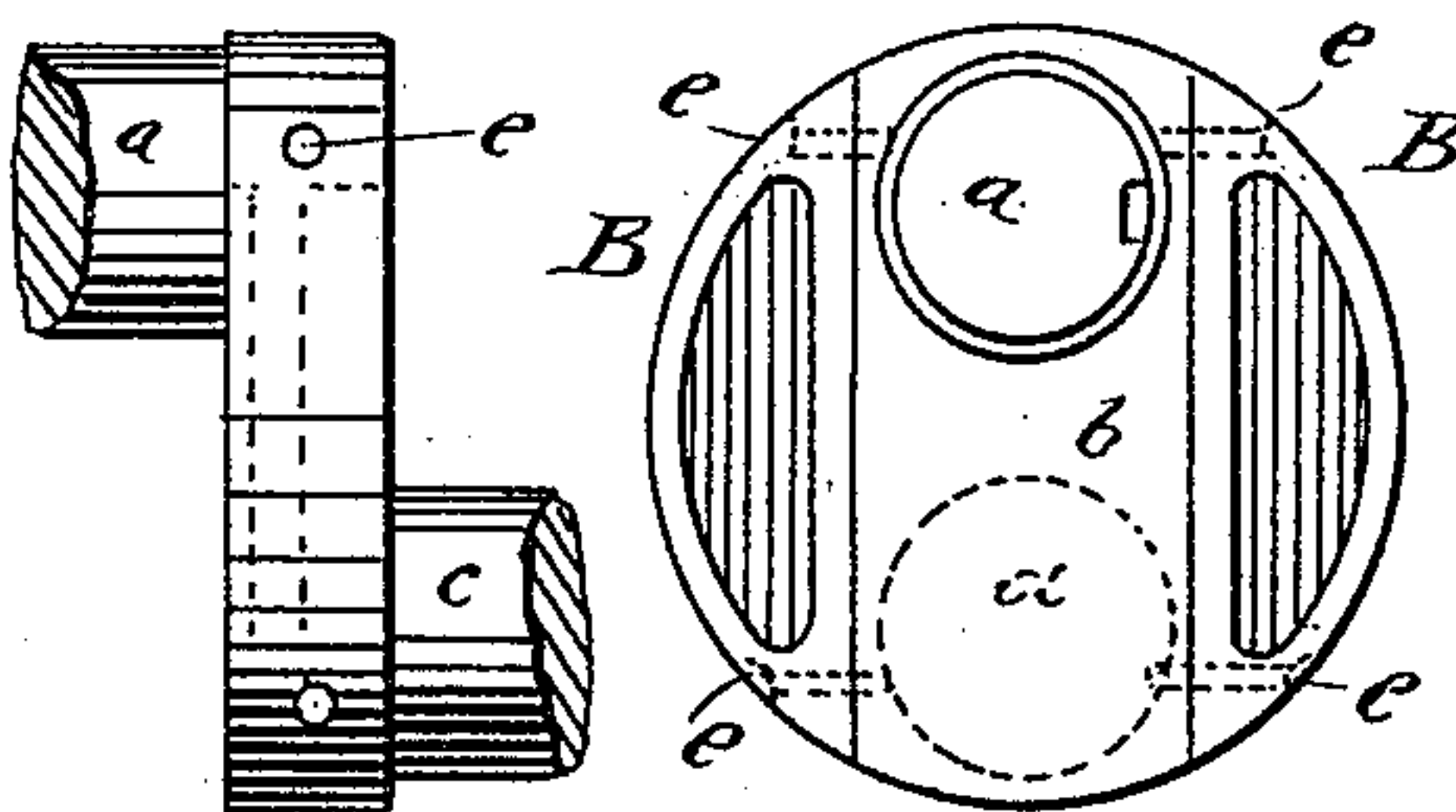


Fig. 7.

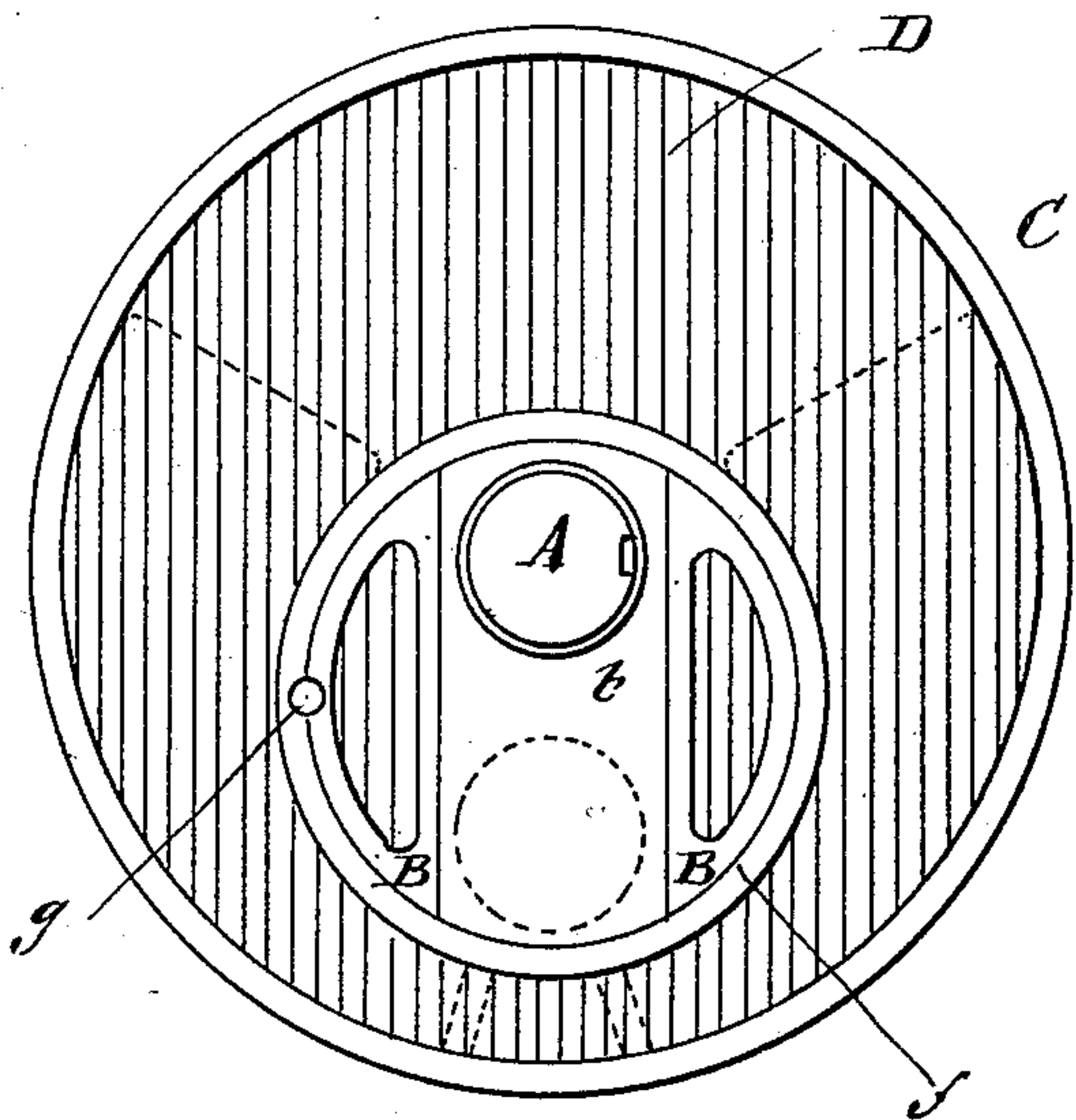
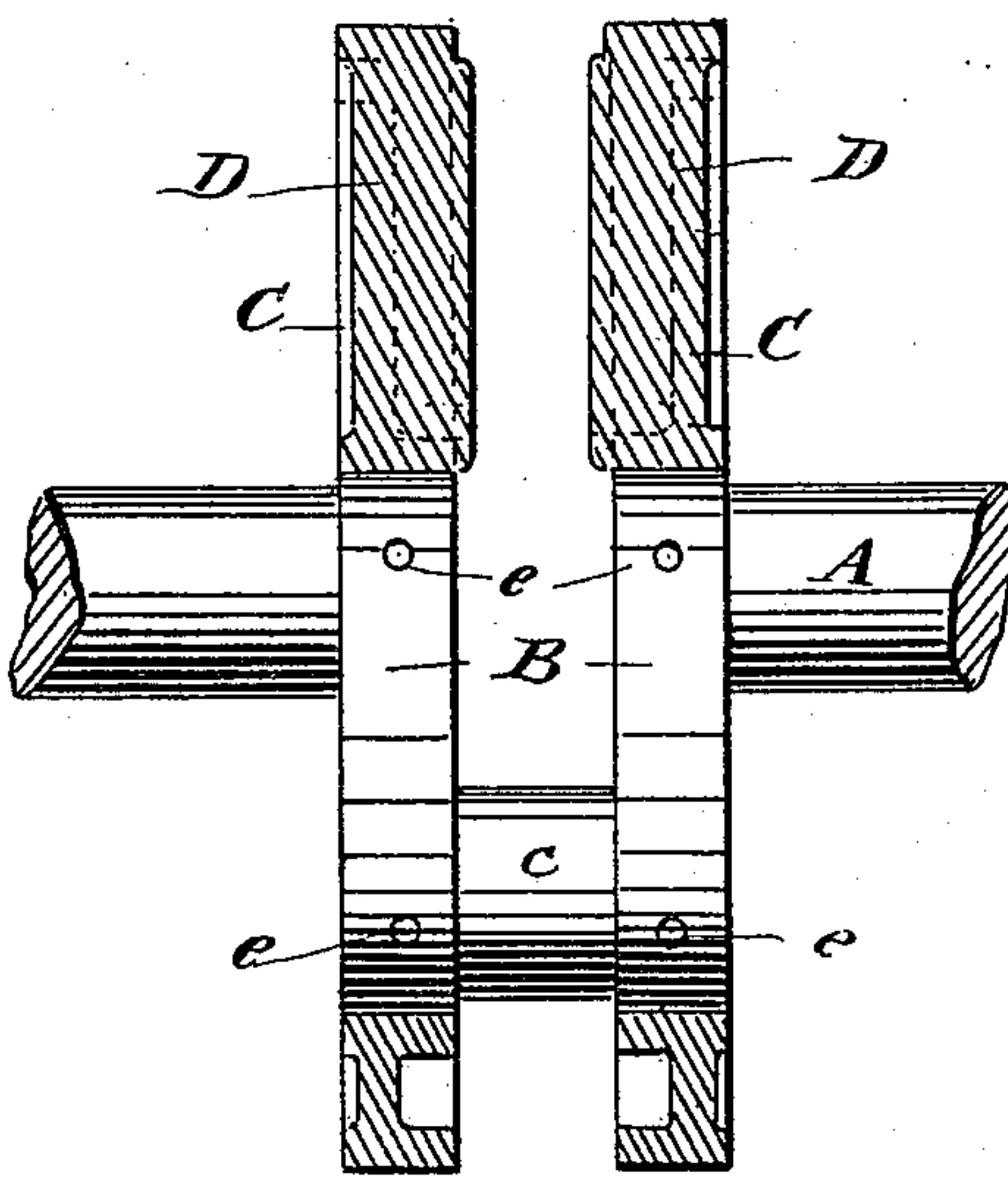


Fig. 8.



WITNESSES:

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UNITED STATES PATENT OFFICE.

MARTIN ASBURY GREEN, OF ALTOONA, PENNSYLVANIA.

CRANK-SHAFT.

SPECIFICATION forming part of Letters Patent No. 441,551, dated November 25, 1890.

Application filed July 31, 1890. Serial No. 360,512. (No model.)

To all whom it may concern:

Be it known that I, MARTIN ASBURY GREEN, of Altoona, in the county of Blair and State of Pennsylvania, have invented new and useful Improvements in Crank-Shafts, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side elevation of a crank-shaft suitable for the application of my improvement. Fig. 2 is an end view of the shaft. Fig. 3 is a side elevation of one of the convex blocks applied to the crank-shaft. Fig. 4 is an edge view of the same. Fig. 5 is a side elevation of a crank, showing the convex blocks in position. Fig. 6 is a side elevation of one-half of the crank, showing one of the blocks in place. Fig. 7 shows the eccentrically-bored disk in its position on the crank; and Fig. 8 is an edge view of the crank and disk, showing the latter in section.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to provide for the crank-shafts of center-crank engines a counter-balance which may be applied to the common center crank so as to be practically as solid as if formed integrally with the crank and the shaft.

My invention consists in the combination, with a center crank formed of two arms attached to or formed integrally with the shaft and a crank-pin connecting the arms, of convex blocks secured to opposite sides of the crank-arms and turned off, and disks fitted to the crank-arms and the blocks and shrunk on, the disks being eccentric to the crank-arm and blocks, but concentric with the crank-shaft, each of the said disks being chambered on the crank side and provided with a counter-balance on the opposite side, all as hereinafter more fully described.

The crank-shaft A, to which my improvement is applied, consists of a shaft *a*, the arms *b*, and crank-pins *c*, formed integrally of one piece of metal. The sides of the arms *b* are

plain, and at the opposite end of each arm and upon opposite sides thereof are formed tap-holes *d* for receiving the screw-rivets *e*, by means of which the convex blocks B are secured to the said arms *b*, these screw-rivets being designed merely for holding the convex blocks B in place when they are turned off together with the crank. The blocks B, which are made of cast-iron or other suitable material, are chambered to reduce their weight. To the crank-arms thus provided with the convex blocks are fitted the circular disks C, which are provided with eccentric apertures *f* for receiving the cranks and the convex blocks B, the said disks being bored so as to form a shrink fit on the crank and the convex blocks. The disks C upon the sides opposite the crank are provided with counterbalance-weights D, formed integrally with the disks, and the remaining portions of the disks are chambered to reduce their weight. After the disks are shrunk on they are further secured by the blind-screw *g*, inserted between one of the blocks B and the inner edge of the disk. The center crank thus counterbalanced is adapted for use in high-speed engines and will run without producing a vibration caused by an unbalanced crank.

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

The combination of the shaft, its crank-arm, the separate and independent blocks secured against the opposite edges of said arm, the outer edges of said blocks and the opposite ends of the crank-arm forming a circle, and the counterbalance-disk provided with a circular opening fitting the circle formed by the outer edges of the blocks and the opposite ends of the arm, substantially as set forth.

MARTIN ASBURY GREEN.

Witnesses:

CHAS. W. KNIGHT,
W. D. COUCH.