

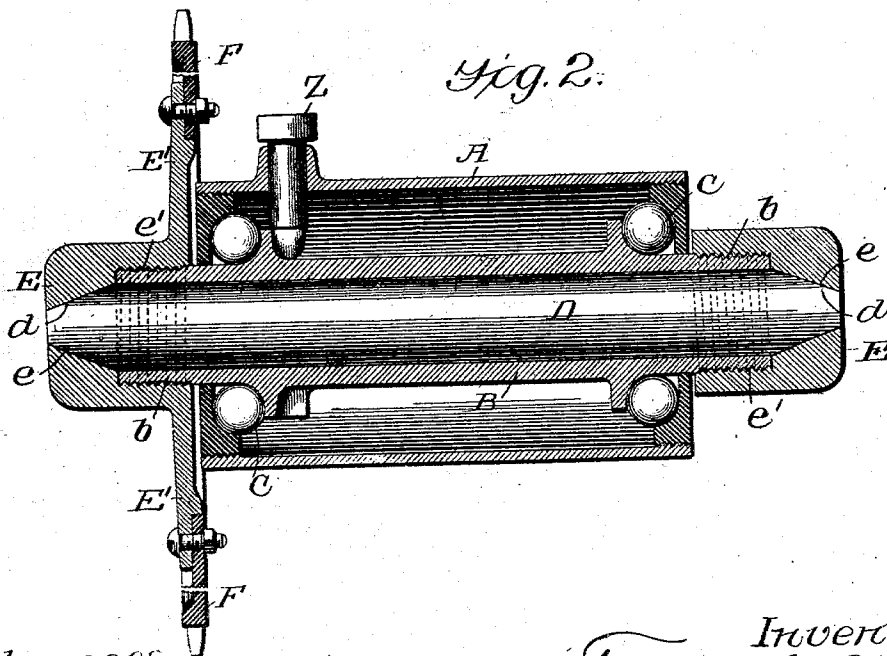
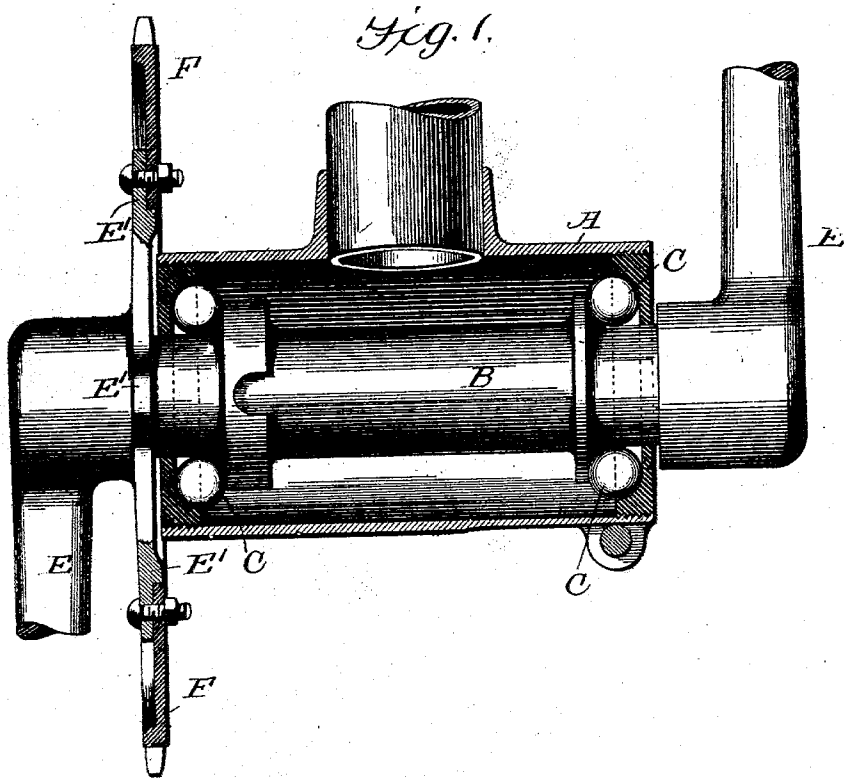
(No Model.)

2 Sheets—Sheet 1.

F. C. HOLMES.
CRANK SHAFT.

No. 564,958.

Patented July 28, 1896.



Witnesses

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 James R. Mansfield.

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Attorneys

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

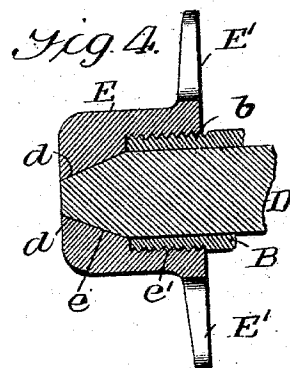
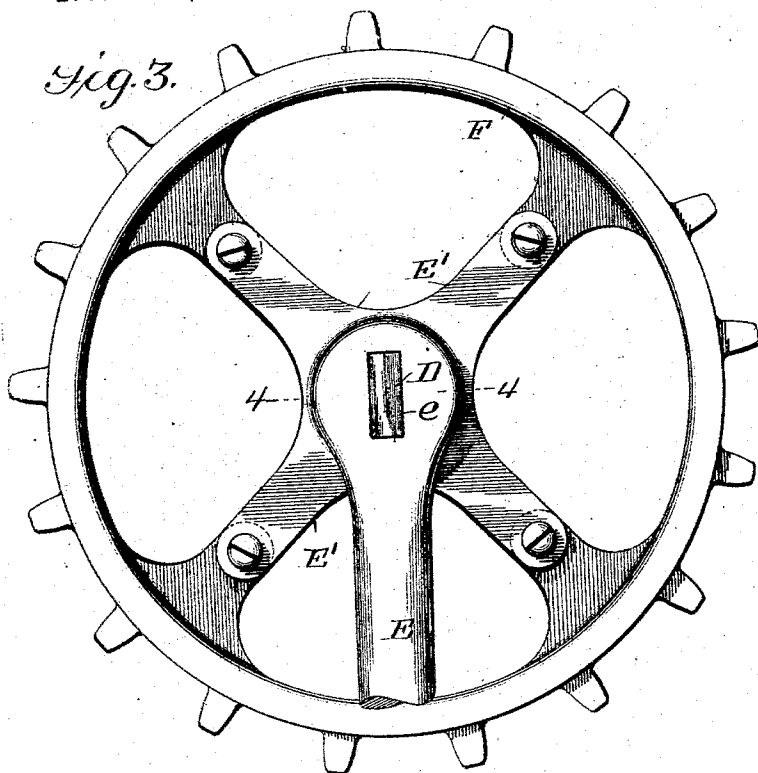


Fig. 5.

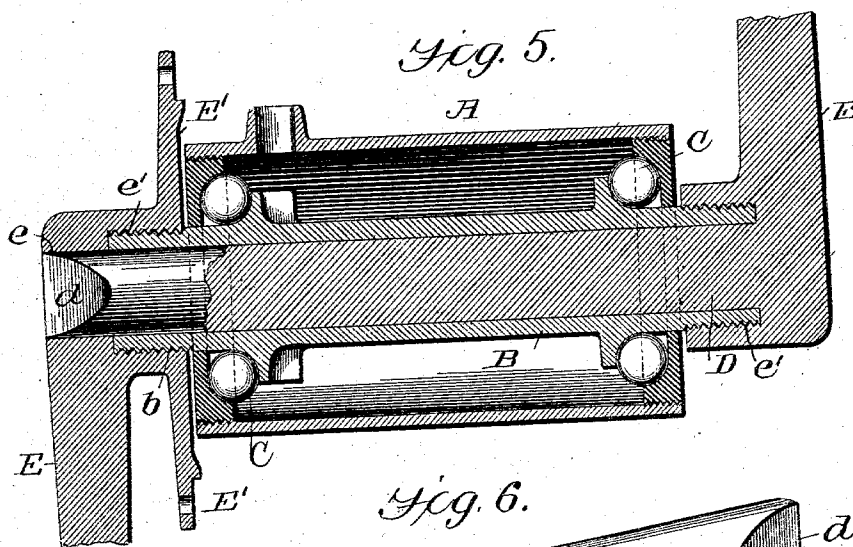
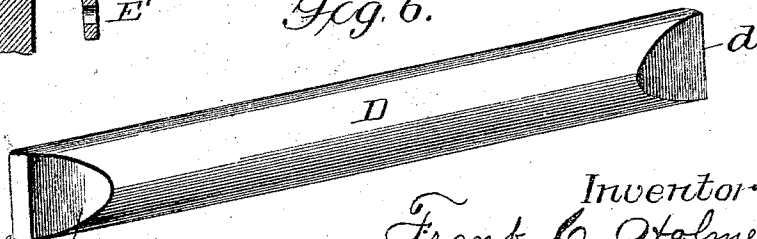


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK C. HOLMES, OF SCRANTON, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE LACKAWANNA WHEEL COMPANY, OF PENNSYLVANIA.

CRANK-SHAFT.

SPECIFICATION forming part of Letters Patent No. 564,958, dated July 28, 1896.

Application filed October 31, 1895. Serial No. 567,492. (No model.)

To all whom it may concern:

Be it known that I, FRANK C. HOLMES, of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Crank-Shafts; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improvement in the crank-shafts and in the connections of the cranks to the shafts in bicycles, &c.; and it consists in the novel construction and combination of parts hereinafter claimed, the best form of the invention now known to me being hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a central longitudinal section through the barrel of a bicycle-frame, showing the crank-shaft and cranks in full lines. Fig. 2 is a longitudinal vertical section through Fig. 1. Fig. 3 is a detail end or side view of the sprocket-crank; Fig. 4, a transverse section on line 4 4, Fig. 3. Fig. 5 is a detail section similar to Fig. 2, showing a modified form of the invention. Fig. 6 is a detail.

Referring to the accompanying drawings by letters, A designates the barrel portion of the frame of a bicycle of any suitable construction. A sleeve B is supported and centered within the barrel by ball-bearings C, as shown in the drawings, or in any other desired manner. The ends b of sleeve B project beyond the ends of the barrel and are threaded exteriorly, as shown, the threads on opposite ends being respectively right and left hand.

Through sleeve B and fitted closely therein, so as to have the least possible lateral play, is the crank-shaft D, which is preferably formed of one piece and projects at both ends slightly beyond the ends of the sleeve. The ends of the crank-shaft are preferably tapered on opposite sides, as at d, to fit into correspondingly tapered sockets e in the bosses of the pedal-cranks E, and these flattened tapered sockets go clear through to the outside faces of the cranks and the ends of

the shaft come flush with the outside faces, in this way permitting a perfect and strong fit to be made between the different parts. The hubs of the cranks are large and extend backward from sockets e', which are threaded to fit over the threaded ends of the sleeve B, as shown.

In assembling the parts sleeve B is first centered and supported in the barrel on suitable bearings, and is locked by means of the ordinary key Z. (Shown in Fig. 2.) Shaft D is then put into the sleeve, and the cranks are slipped on the ends of the shaft and simultaneously turned in same direction, so as to screw upon the ends of sleeve B, the cranks being thus drawn toward each other by the screw-threads until the tapered ends of the shaft fit into the sockets e of the cranks, as shown in Figs. 1 and 2. The locking-key is then removed, and the cranks will be found to be firmly mounted on and fastened to the shaft D, the sleeve B serving both to unite the cranks and to bind them on the ends of the crank-shaft.

It will be observed that all side or lateral strain which might be exerted on the threaded ends of the sleeve if the shaft was removed is obviated by the close fitting between the cranks and crank-shaft and crank-shaft and sleeve.

One of the most important features of the invention is the fact that the cranks are directly fastened to the shaft and that the strain from one crank to the other is exerted through a solid shaft and not upon the threads or sleeve, and that there is only one long sleeve between the two cranks, which draws the cranks together, and the sockets are so strongly constructed that they cannot be easily injured by a fall of the wheel.

The sleeve drawing the cranks upon the tapered ends of the crank-shaft makes the joints so close that there is no play of the cranks upon the shaft or in relation to each other, and so long as the sleeve is free to revolve in the barrel it will be impossible for the cranks to loosen or turn off, for the cranks are engaged by oppositely-leading screw-threads, and being firmly united to the crank-shaft by the tapered sockets they cannot be turned in.

dependently of each other unless the sleeve be locked. I do not, however, limit myself to the use of tapered ends on crank-shaft and tapered sockets in the crank-bosses. They are easy to drop-forged, but the essential feature is to prevent rotation of the cranks on the shaft.

The employment of a solid shaft, though not essential, is obviously a great advantage in point of strength and economy of construction, and all the parts are such that they can be easily drop-forged by ordinary tools, and can be assembled without special tools.

The construction described is simple, very strong, durable, and economical, and the parts so constructed, when properly assembled, appear and are as stiff as if made of a single piece of metal.

As shown, one of the cranks is forged with arms E' radiating from its boss, to which a sprocket-wheel rim F can be attached.

In Fig. 5 I have illustrated a modification of the construction shown in Fig. 1, by making the shaft integral with or welded to one of the cranks. The other parts and connections remain the same, however.

I do not limit myself to the precise construction herein shown and described, as various modifications may be made therein while retaining all the essential features of my invention.

One of the principal features of the invention is to secure the cranks on the crank-shaft by means of an internal bond, doing away with pins and keys between the cranks and crank-shaft and yet putting all the strain of rotation of cranks directly upon the crank-shaft.

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

1. In a bicycle the combination of a crank and crank-shaft, said crank-shaft having a flattened tapered end, and a second crank, fitted detachably on the flat tapered end of the crank-shaft, so that the end of shaft comes flush with face of crank, with a long sleeve closely fitted to and surrounding the crank-shaft and having oppositely-screw-threaded ends fitted into sockets on back of the cranks whereby the cranks are firmly held on the crank-shaft, all substantially as and for the purpose described.

2. In a bicycle, the combination of the crank-shaft having angular ends, and the detachable cranks having sockets in their bosses fitting the ends of the shaft; with a sleeve fitted on the shaft and having oppositely-threaded ends engaging corresponding threaded enlargements of the sockets in the bosses of the cranks, whereby the cranks are drawn toward each other and bound on the shaft, all substantially as and for the purpose described.

3. The combination of the barrel, the rotatable sleeve mounted therein, projecting beyond the ends thereof and oppositely threaded on its projecting ends and the shaft fitted in the sleeve and projecting beyond the ends thereof; with the cranks fitted on the ends of the shaft but not rotatable thereon; having internally-threaded sockets in their bosses engaging the ends of the sleeve whereby the cranks are bound together and upon the shaft, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

FRANK C. HOLMES.

Witnesses:

JAMES R. MANSFIELD,
T. H. ALEXANDER.