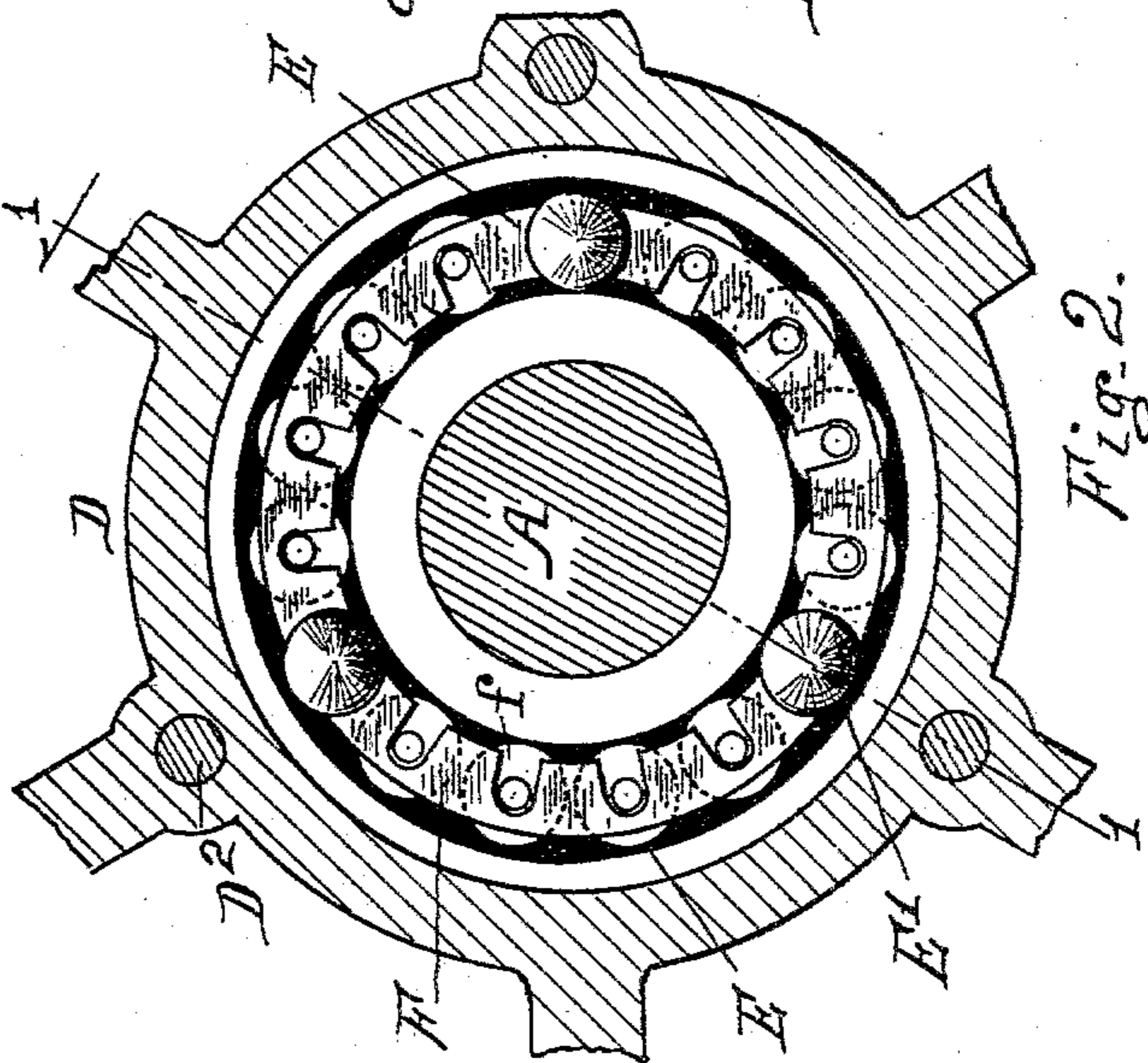
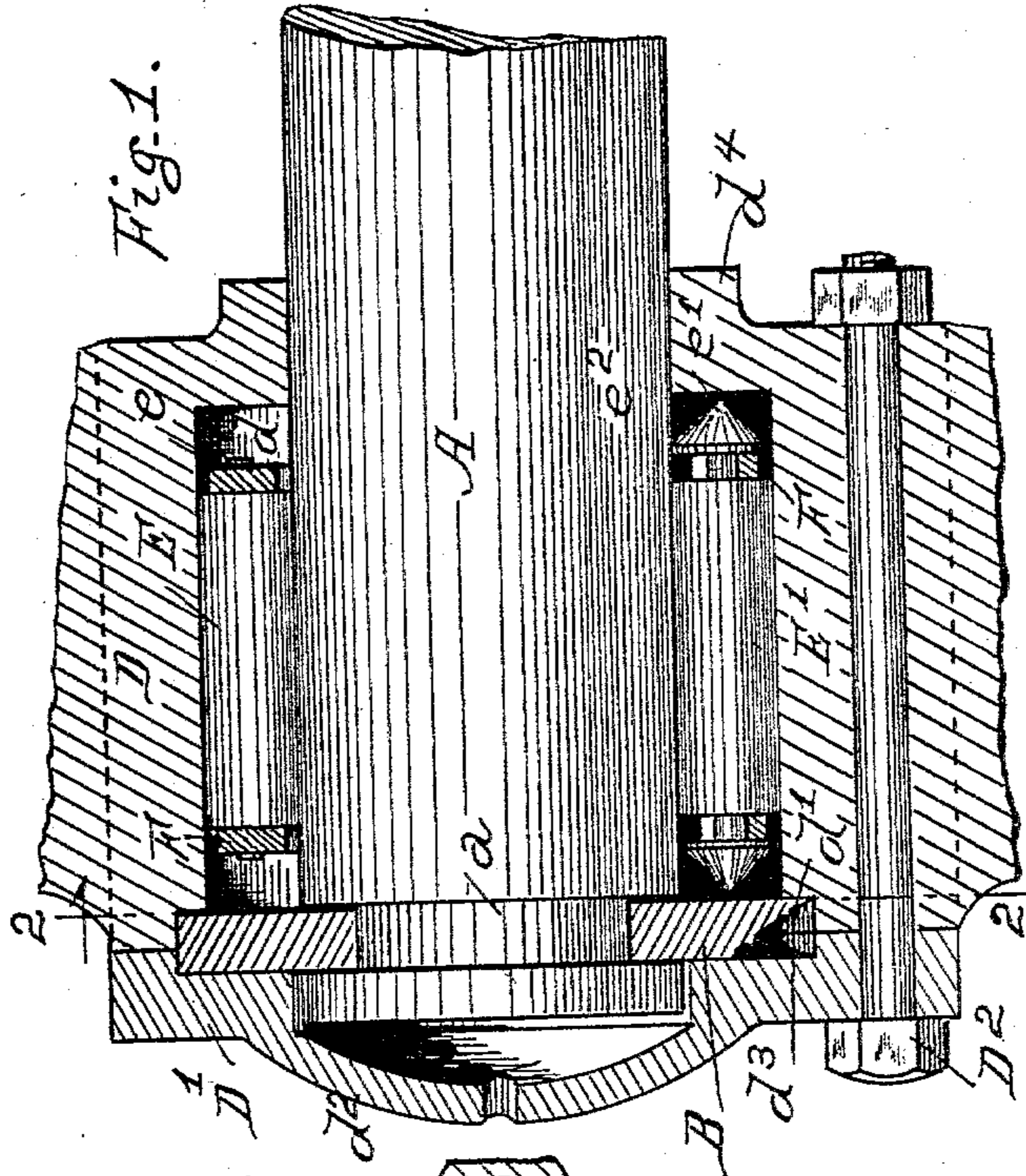
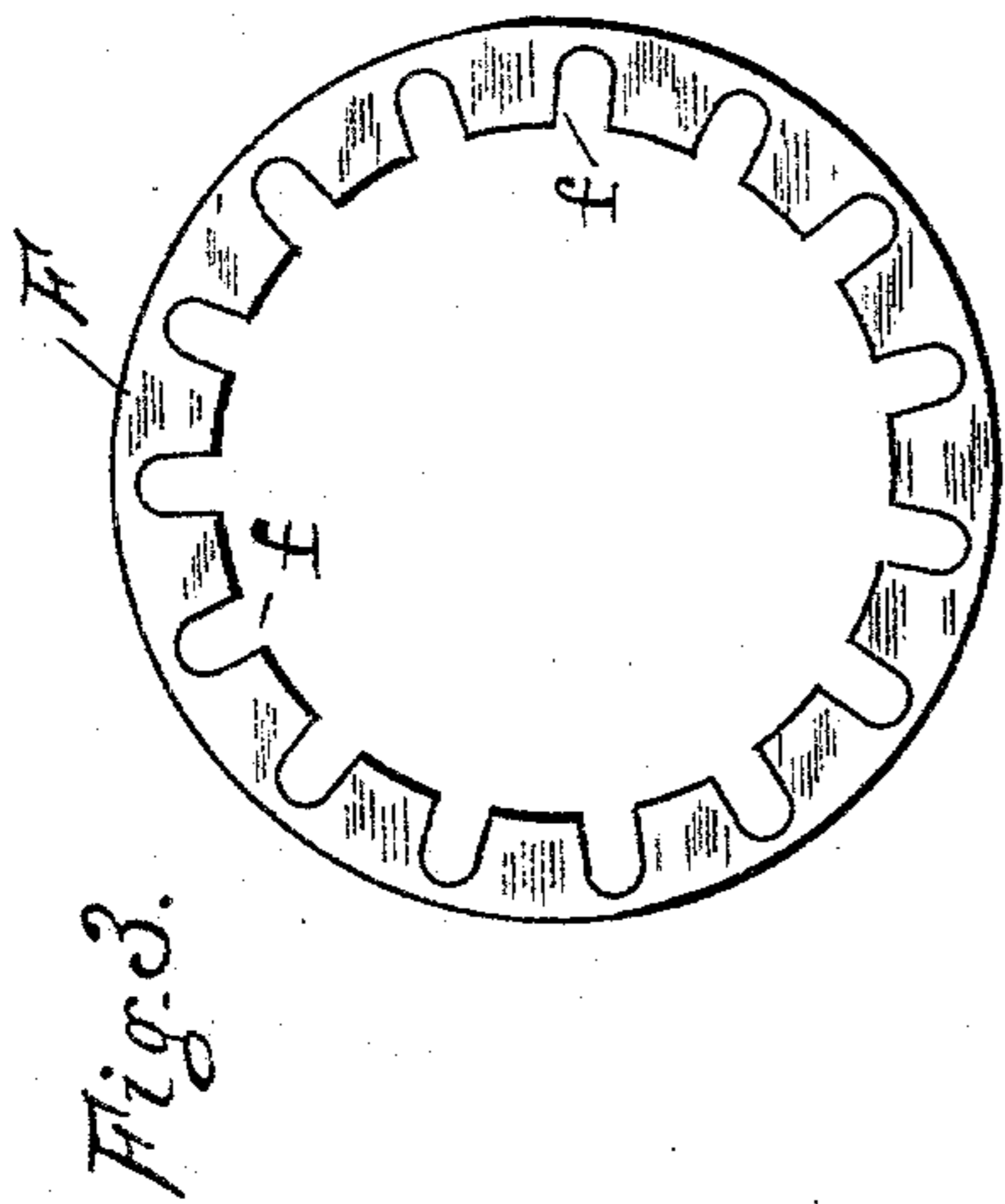
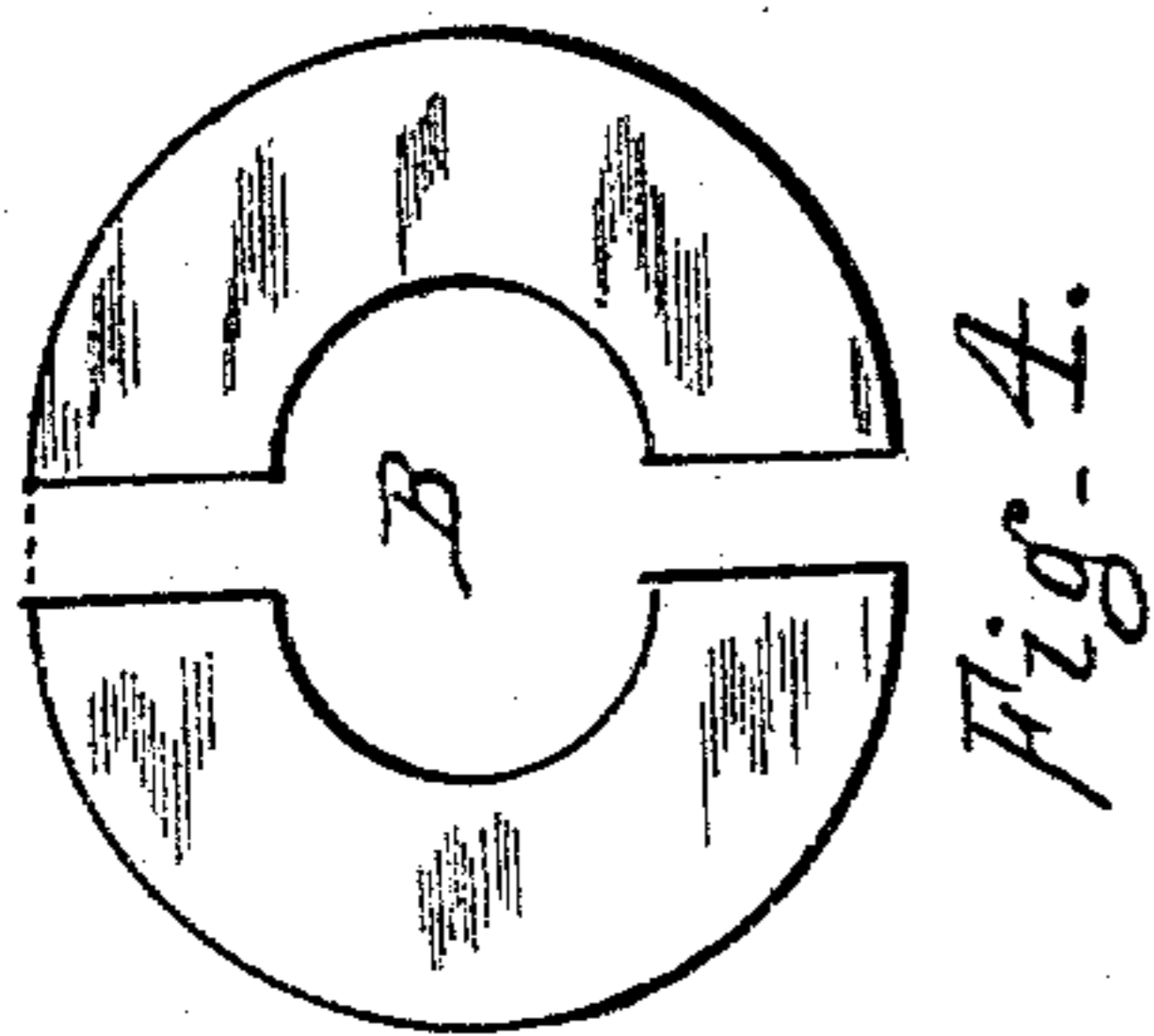
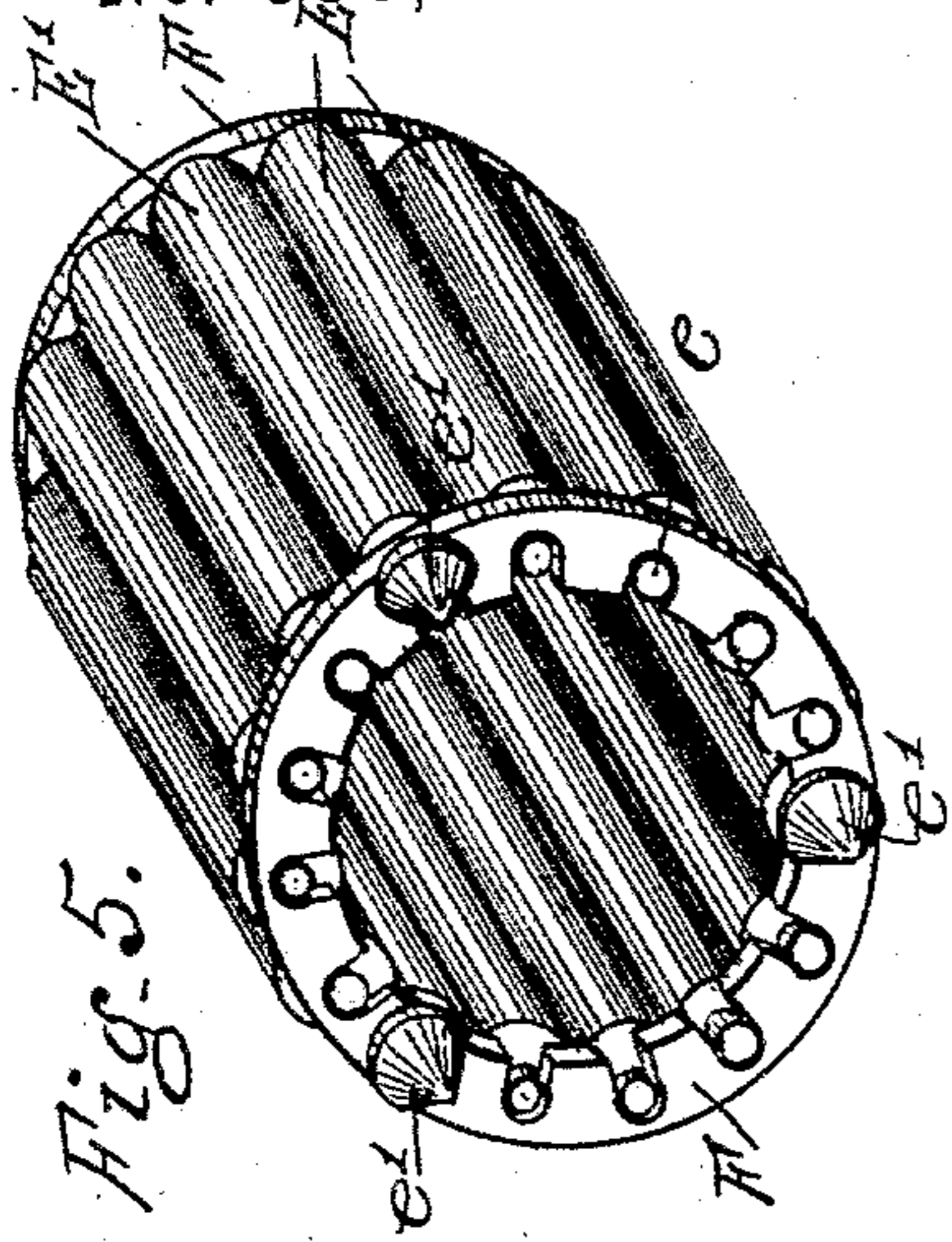


(No Model.)

J. L. COOK.  
BOX AND AXLE FOR VEHICLES.

Patented Mar. 24, 1896.

No. 556,809.



Witnesses  
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# UNITED STATES PATENT OFFICE.

JAMES L. COOK, OF SPRINGFIELD, ILLINOIS.

## BOX AND AXLE FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 556,809, dated March 24, 1896.

Application filed July 5, 1895. Serial No. 554,916. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES L. COOK, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a certain new and useful Improvement in Boxes and Axles for Vehicles, of which the following is such a full, clear, and exact description as will enable those skilled in the art to which it pertains to make and use my said invention.

My invention relates to boxes and axles of that class in which rollers within the box surround and turn on the axle and serve to reduce the friction between the box and the axle, and it may be applied to vehicles of any kind employing a rotatable wheel turning on a fixed axle, or may be applied in any situation where a rotatable shaft turning in a stationary box is employed.

20 The purposes of my invention are to provide means of novel and improved form adapted to connect antifriction-rollers surrounding an axle in such manner that the connected rollers and the means employed to connect them shall together constitute a structural element of the mechanism adapted to revolve and move longitudinally on the axle independently of the box within which said element is contained; to provide means of  
25 novel and improved form adapted to connect the box with the axle, or allow free rotation of the axle within the box accordingly as the axle is fixed and the box movable or the box fixed and the axle movable, so as to permit free rotation of the box on the axle; also adapted to prevent longitudinal movement of the box on the axle; also adapted to receive the end thrust of the cone-pointed rollers.

30 With these ends in view my invention consists of certain novel features of construction and combination of parts illustrated in the annexed drawings and hereinafter particularly described and claimed.

35 In the drawings, to which reference is hereby made, Figure 1 is a longitudinal section through the wheel-box on the line 1 of Fig. 2. Fig. 2 is a vertical transverse section through the box and axle on the line 2 of Fig. 1. Fig. 3 is a side elevation of one of the  
40 notched connecting-rings. Fig. 4 is a reduced side elevation of the split collar. Fig. 5 is a reduced perspective view illustrating

the position of the notched rings, the plain rollers and the cone-pointed rollers relative to each other when the said parts are assembled preparatory to being placed on the axle, and shows how the cone-pointed rollers serve to prevent spreading or the lateral displacement of the notched rings.

Similar letters of reference designate like parts in all of the views.

In the drawings I have illustrated my improvements as applied to the wheel and axle of a mine-car. I have shown only one end of the axle and only so much of one wheel as is  
65 necessary to show the forms and relative position of the several parts of the mechanism.

The axle A is preferably of steel rolled to the required diameter and hardened, and has near one end a circumferential channel  $a$  adapted to accommodate the split collar B. The hub of the wheel D has a central bore  $d$ , adapted to accommodate the rollers E and E' surrounding the axle within the bore. In the front end of the hub D is an internal circumferential recess  $d'$ .

The cap D' is connected with the hub D by means of bolts D<sup>2</sup>. In the cap D' is a central circular recess  $d^2$  somewhat longer in diameter than the axle A. The cap D' also has a  
80 circular recess  $d^3$  of the same diameter as the recess  $d'$  in the hub D.

The recesses  $d'$  and  $d^3$  together form a channel adapted to accommodate the split collar B, and when the collar is in the position shown  
85 in Fig. 1 the bolts D<sup>2</sup> clamp the cap against the collar and hold the collar firmly in the channel, so that the collar revolves with the hub and turns freely in the channel  $a$  around the axle A. On the inner end of the hub D  
90 is an integral annulus  $d^4$ , which serves as a sand-band to exclude dirt and grit from the axle-bore  $d$ .

Within the bore  $d$  and surrounding the axle A are two rings F, each having a series of  
95 equidistant radial notches  $f$  adapted to accommodate the spindles  $e$  and  $e^2$  of the rollers E and E'. The rollers E are plain rollers of hardened steel, and each roller has at each end a spindle  $e$  adapted to turn in the notches in  
100 the notched rings. The rollers E' have integral conical heads  $e'$  adapted to bear lightly against the inner side wall of the bore  $d$  of the hub and the inner face of the split collar

B, so as to reduce to the minimum the friction due to the end thrust of the rollers, and each roller is turned down near each end so as to form a spindle  $e^2$  between the conical head  
 5 and the body of the roller, which turns in the notches in the notched rings.

In practice I prefer to use two notched rings, each having fifteen notches adapted to accommodate a series of fifteen rollers, and in a series of fifteen rollers I prefer to use three cone-  
 10 pointed rollers and twelve plain rollers relatively arranged as shown in Figs. 2 and 5; but a greater number of cone-pointed rollers may be used in a series or an entire series may be  
 15 composed of cone-pointed rollers without departing from the spirit of my invention.

By reference to Fig. 5 it will be seen that the rings F keep all of the rollers equidistant and parallel to each other, and the conical  
 20 heads on the cone-pointed rollers serve to prevent spreading or lateral displacement of the rings, and the rotatable rings and the rollers, when assembled as shown, together constitute a structural element of the mechanism, which,  
 25 for the convenience in description, I designate the "cage." When the cage is in position in the bore of the hub and the axle is inserted through the cage, the cage is free to rotate on the axle, or to move longitudinally on the axle  
 30 within the limits of the bore  $d$ .

I am aware that annular chains consisting of slotted links adapted to connect rollers surrounding an axle have heretofore been used. I am also aware that radially-notched rings  
 35 connecting longitudinally-channeled rollers have heretofore been used. I therefore do not claim these features broadly, but restrict my claim to the novel features of construction whereby the cone-pointed rollers are  
 40 adapted to abut lightly against the face of the washer and against the inner side wall of the bore of the box.

There are three practical advantages attained by the use of the channeled cone-pointed rollers herein described. First, they afford  
 45 very simple and effective means for retaining the notched rings in such position as to facilitate perfect alignment of all of the rollers; second, the cone points of the rollers serve to  
 50 reduce to the minimum the frictional contact of the cage with the face of the split collar B or the end of the bore  $d$ ; third, the cone-pointed rollers are interchangeable and may be used in any of the notches of the rings.

55 If that part of the ring adjacent to the notches in which a roller turns becomes worn, the roller may be removed without the use of

tools and transferred to other notches, thus obviating undue wear on any part of the rings. 60

In assembling the parts the rollers and rings are first arranged as shown in Fig. 5 by inserting the spindles of the rollers in the notches of the rings and then spreading and temporarily holding the rollers radially apart  
 65 by means of waste or other suitable elastic material adapted to react and press the spindles of the rollers into the notches. The cage formed as described is then inserted in the bore  $d$ , the end of the axle is inserted in the  
 70 central space inclosed by the rollers, and the wheel is slid on the axle until the axle forces the waste out of the said central space. The two segments of the split collar B are then placed in the circumferential channel  $a$  and  
 75 the wheel is slid outward on the axle until the collar B seats firmly on the bottom of the recess  $d'$ . The cap D' is then placed in position on the hub and is secured by means of the bolts D<sup>2</sup>, so as to firmly clamp the ring B in  
 80 the recess in the front end of the hub.

In dismantling the wheel for replacement or repairs the performance which I have just described is reversed.

Having fully described my invention, what  
 85 I claim as new, and desire to secure by Letters Patent, is—

The herein-described box and axle for vehicles, consisting of an axle having a circumferential channel; a box or hub having a bore  
 90 accommodating said axle and surrounding rollers, also having an internal recess adapted to receive a split washer, said split washer fitting loosely in the channel in said axle, also fitting in the recess in the bore of said box or  
 95 hub; a recessed cap secured to said box or hub and abutting against said washer; and a cage rotatable and longitudinally movable on said axle, said cage consisting of two rings having equidistant radial notches, and a series  
 100 of rollers having pivots turning in the notches of said rings, some of said rollers also having cone-pointed heads abutting lightly against the face of said washer and against the inner side wall of the bore of the said box or hub:  
 105 as set forth.

In witness whereof I have hereunto subscribed my name, at Springfield, Illinois, this 18th day of June, 1895.

JAMES L. COOK.

Witnesses:

GEO. J. BARRETT,  
 WM. J. AURELIUS.