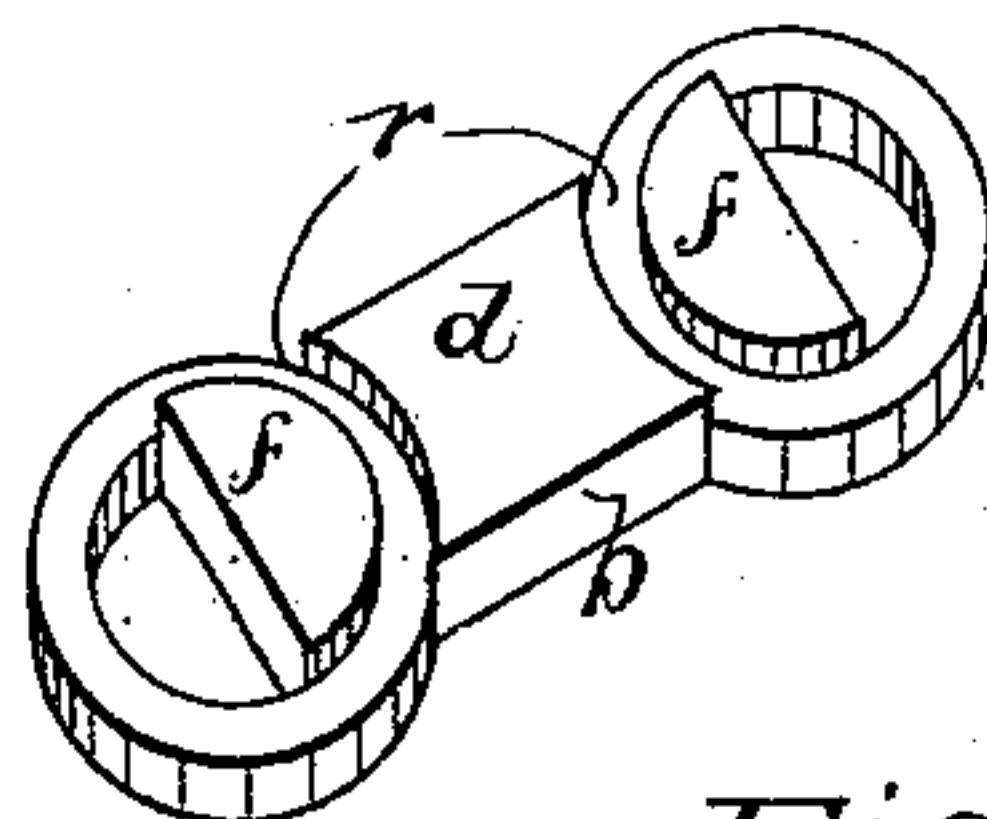
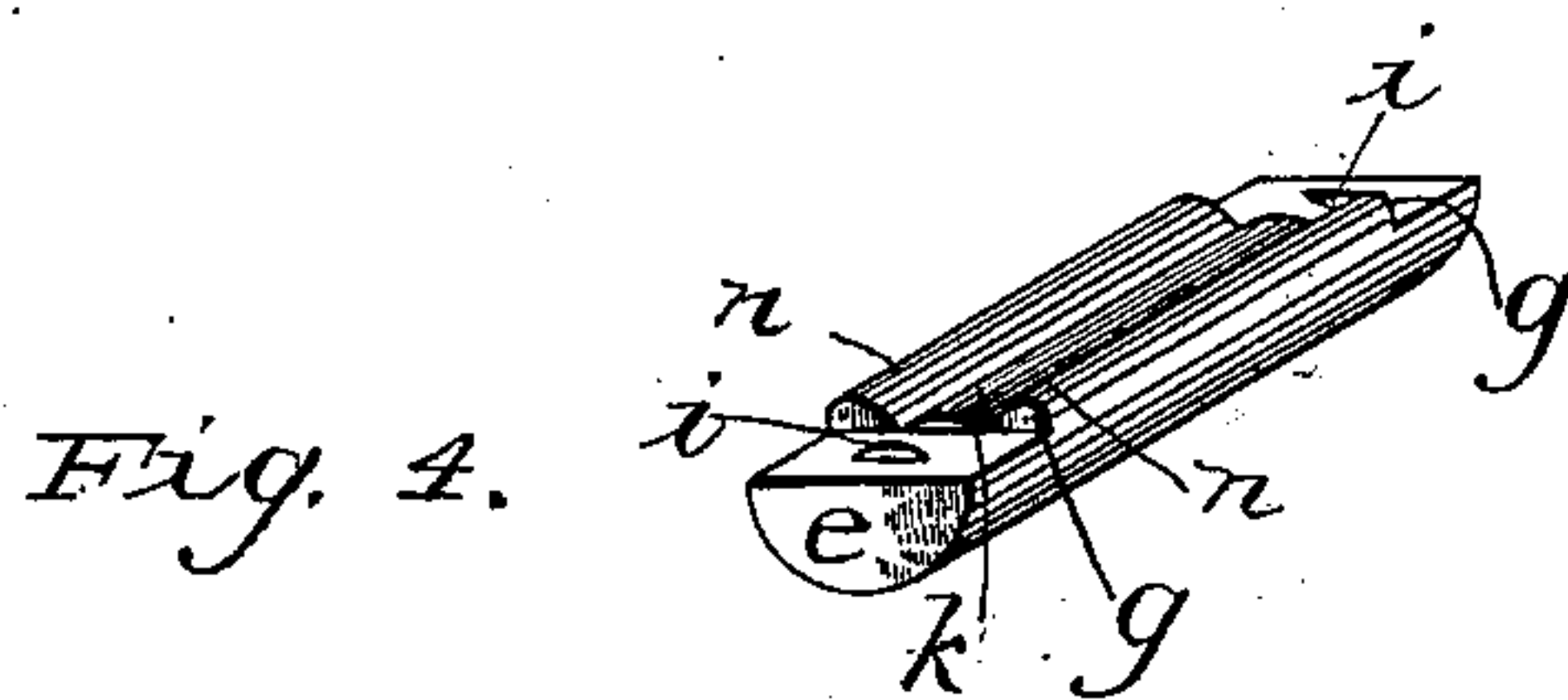
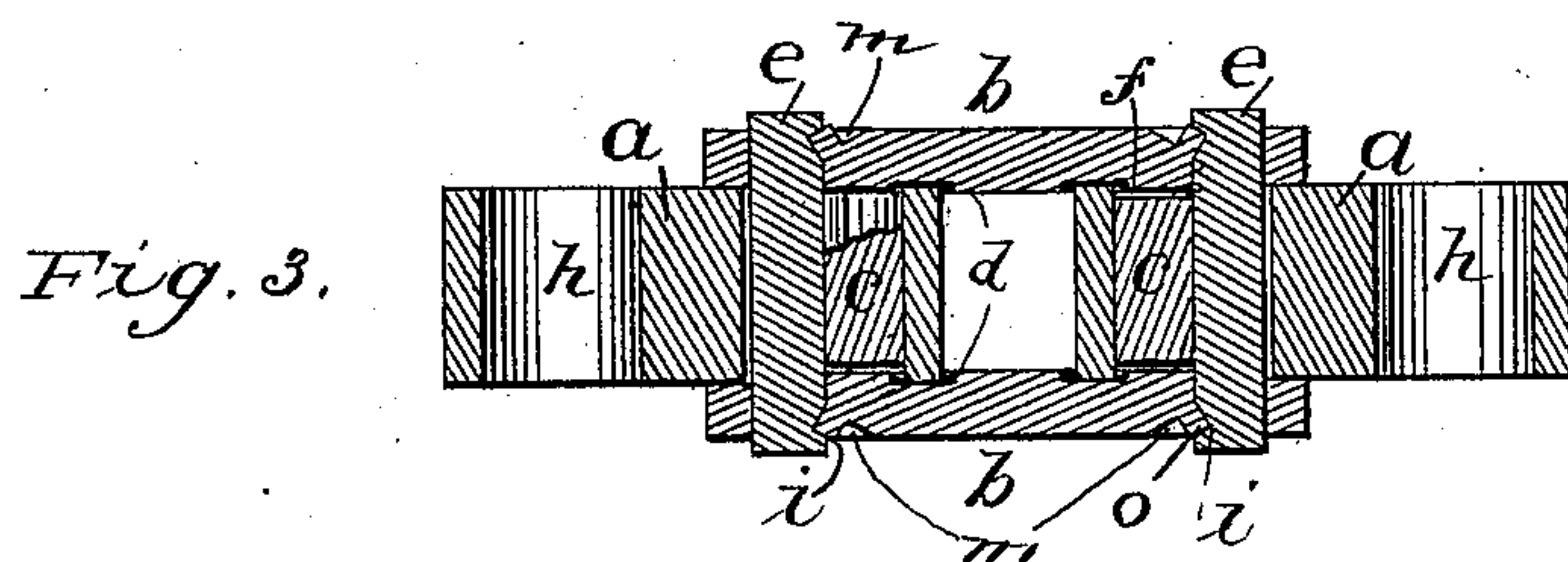
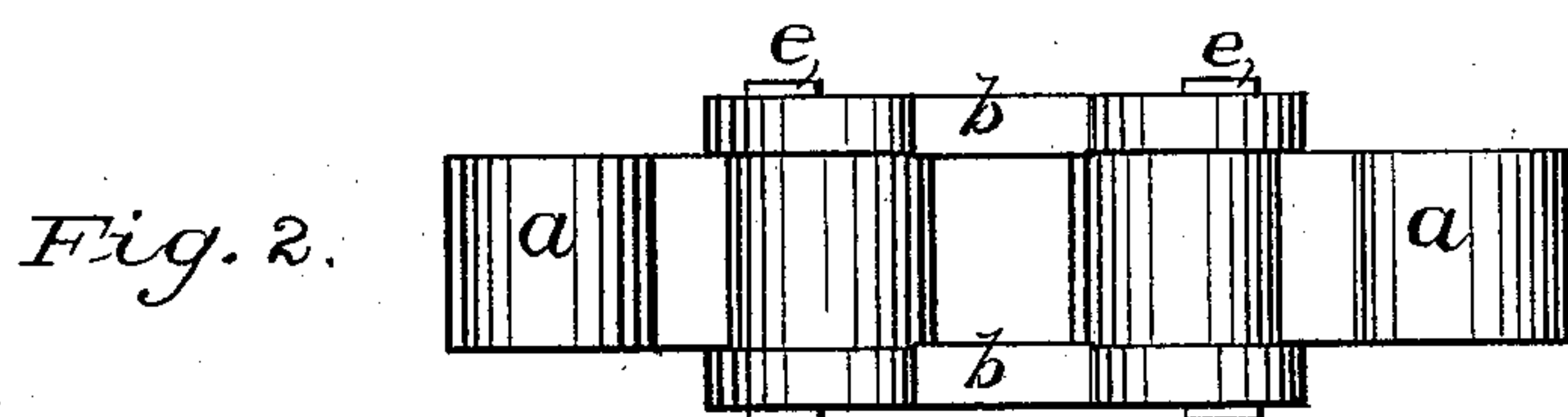
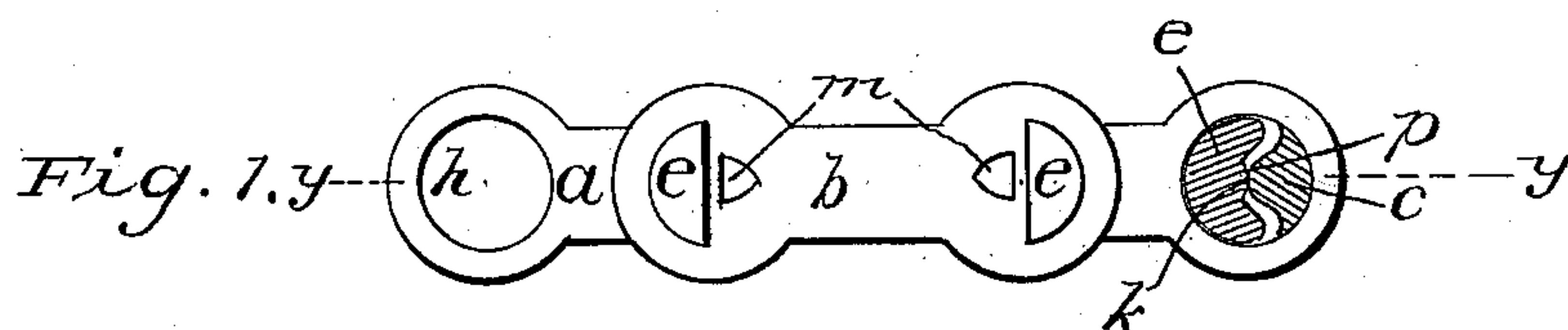


(No Model.)

E. F. MORSE.  
DRIVE CHAIN.

No. 583,151.

Patented May 25, 1897.



**WITNESSES :**

Frank L. Moore  
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# UNITED STATES PATENT OFFICE.

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## DRIVE-CHAIN.

SPECIFICATION forming part of Letters Patent No. 583,151, dated May 25, 1897.

Application filed November 13, 1893. Serial No. 490,750. (No model.)

*To all whom it may concern:*

Be it known that I, EVERETT F. MORSE, a citizen of the United States, residing at Trumansburg, in the county of Tompkins and State of New York, have invented certain new and useful Improvements in Drive-Chains, of which the following is a specification.

My invention relates more particularly to the couplings or joints of drive-chains, and has for its objects to nearly or quite obviate the shortening of the pitch of my roller joint chain patented October 24, 1893, as the chain bends around a small sprocket-wheel, to provide improved means for accurately and firmly securing the side links to the seat-pin of the chain, and to provide means for excluding matter from entering the apertures between the rolling and seat pins hereinafter described. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a piece of my improved chain. Fig. 2 is a plan view of the same. Fig. 3 is a sectional view of my chain on the line *y y*, Fig. 1. Fig. 4 is a perspective view of the seat-pin used in my chain. Fig. 5 is a perspective view of the side link, showing the construction of the side next to the central link.

Referring to the drawings, *a a* are central links and *b b* side links of my driving-chain, arranged as usual and providing an opening between them to receive the teeth of the sprocket-wheels. The central links are provided with two cylindrical holes, one near each end of the link. Through each of these holes two pins *c* and *e* of unequal length are passed. While the longer of these pins *e* extends through both the central and side links, the other pin *c* is a little shorter than the width of the central link, within which it is wholly contained and held by the side links against longitudinal displacement. Apertures are also provided in the ends of the side links *b*, which correspond in shape and size with the cross-sections of the ends of pins *e*, so as to hold said pins from turning during the act of securing the side links thereto. The rolling pin *c*, contained within the hole *h*, may be of any suitable form for making rocking or rolling engagement with the seat-pin, but the best form for my purpose is that

illustrated, wherein it has a segmental circular cross-section having one side preferably of same curvature as the surface of hole *h*, against which it rests, as shown. The seat-pin *e* has also a segmental circular cross-section, being somewhat larger than a semicircle. The radius of curvature, however, of this pin is somewhat smaller than the radius of hole *h* to allow for its free rolling motion within said hole. The principal feature of the seat-pin is the convexed curved rolling-base *k*, facing the forces of the joint and arranged parallel to and near the axis of hole *h* for the rolling pin *c* to roll upon. With the object of providing ample transverse strength the portions *n n*, reinforcing the otherwise semicircular form of pin *e*, are provided.

The principal feature of the rolling pin *c* is the curved bearing-surface *p*, whose center of curvature is located off the surface *k*, against which pin *c* rolls. From this curved surface the sides of the rolling pin *c* curve outward, thus providing a large base to bear against the walls of hole *h*. The spaces between the rolling and seat pins are adjusted in amount to permit the desired angular motion of the joint. The angular motion of any two adjoining links relatively to each other is oscillatory, turning one way as the links meet the sprocket-wheels and the opposite way as they leave the wheel. In providing for this motion the seat-pin *e*, which is restrained to turn with the side links *b b*, rolls on the rolling pin *c*, which turns with the central links *a*.

In my patent dated October 24, 1893, referred to above, the seat-pin is provided with a plane or substantially plane surface, and as the rolling pin rolls to either side of its central position the center of hole *h* follows a trochoidal path rising higher above the rolling-surface *k* as the rolling motion is increased to either side of the central position shown. This causes a shortening of the chain as it is bent around a small sprocket-wheel, and therefore a reduction of its pitch. The convexed curved rolling-base *k* compensates for this shortening of the pitch approximately in proportion to the sharpness of its curvature. If a tangent plane is drawn to the rolling-base *k* at its central point it will represent the rolling-surface shown in my patent referred to. As the rolling pin *c* rolls to either



side of the central position the distance between its point of contact with the seat-pin and this tangent plane equals the lengthening of the chain in this joint by virtue of the curved rolling-base *k* being used instead of the plane base represented by the tangent plane. It is this lengthening in each joint, which is effected by the curvature in the rolling-base *k*, that compensates for the shortening resulting from the use of the plane rolling-base. The seat-pin *e* being hardened so as to resist the rolling pressure of the joint within the elastic limit it cannot be readily riveted to hold the side links in place. With the object of accurately fastening these side links *b* to the seat-pins *e* I have milled the reinforcing portions *n* off the ends of the seat-pins, thus leaving shoulders *g g*, Fig. 4. The distance between these shoulders is such as to allow the side links to be forced close to the central links and at the same time to prevent them from crowding the same and causing friction in the working of the joint.

With the object of firmly securing the side links in position nicks *i i* are provided in each end of the seat-pin *e*. When the side links are in position on the seat-pin, as shown in Figs. 1, 2, and 3, the metal of the side links is forced, preferably in the form of a bur or projection, into the nicks *i i* by pressing the indentations *m m* in its sides, thus securing the side links firmly in position without riveting the seat-pins.

With the object of preventing dirt or other matter from entering the apertures between the rolling and seat pins projections *f* and *d*, Figs. 3 and 5, are provided on the inward side of the side links. The projections *f* provide an outwardly-curved surface, approximately fitting and extending a small distance into hole *h* of the central link. The projection *d* provides an inwardly-curved surface, approximately fitting and extending a small distance over the end of the central links. The parts of these projections, except what is sufficient to furnish these overlapping curved surfaces, are not necessary, but are simply left to facilitate construction, which is effected by simply milling annular grooves *r r*, Fig. 5, in the side links. It is evident that these projecting surfaces may be formed by attaching pieces to the side links and that the projection *f*, if separate, can be held in position, as in a vise, between the side links and the shoulders *g* on the seat-pins. Either of these overlapping surfaces may be used without the other.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a drive-chain composed of alternate central and side links, a seat-pin having its ends held firmly in the side links and extending through the central links, said seat-pin having a convex curved bearing-surface facing the force of the joint, a rolling pin arranged within the central link, at one side of the seat-pin and bearing against the walls of

the hole containing it, substantially as described.

2. In a drive-chain composed of alternate central and side links, a seat-pin having its ends held firmly in the side links and extending through the central link, said seat-pin having a convex curved bearing-surface facing the force of the joint, a rolling pin arranged within the central link, at one side of the seat-pin and having a curved rolling surface pressing against the bearing-surface of the seat-pin, and a suitable base opposite said curved surface bearing against the walls of the hole containing it, substantially as described.

3. In a drive-chain composed of alternate central and side links, said central links having cylindrical holes in each of their ends, two pins arranged within each of said holes, side by side one of said pins being longer than the other and extending through the side links, said pins being provided with convex curved bearing-surfaces arranged to roll one on the other, substantially as described.

4. The combination with the central and side links of a drive-chain, of a seat-pin extending through both the central and side links and having a central bearing-surface and raised reinforcing portions on either side of said bearing-surface, said reinforcing portions being cut away at the ends of the seat-pin, thus forming shoulders or stops for the side links to rest against, substantially as described.

5. The combination with the central and side links of a drive-chain, of a seat-pin extending through both the central and side links and having a central bearing-surface and raised reinforcing portions on either side of said bearing-surface, said reinforcing portions being cut away at the ends of the seat-pin, thus forming shoulders or stops for the side links to rest against, said seat-pin also having nicks into which the adjacent metal of the side link is forced, substantially as described.

6. In a drive-chain, the combination substantially as described, of a perforated side link and a hardened bearing-pin seated in an opening in the side link adapted to hold it from turning therein and provided with a shoulder to support the side link directly during and after fastening of the two together, said pin being provided with a notch between the shoulder and end of the pin into which the material of the side link is forced, as and for the purpose described.

7. In a drive-chain, the combination with the side links, having segmental holes therein, of connecting-pins having segmental heads corresponding with said holes with nicks in the straight side of said heads and shoulders below said nicks for the support of the side links, the metal of the side links being forced into said nicks to secure said links to the pins, substantially as set forth.

8. In a drive-chain, the combination with



a central link having cylindrical apertures in its ends and seat-pins extending through said apertures and partially filling the same, of side links arranged on either side of said central links and receiving the ends of the seat-pins, said side links having projections extending from their facing sides providing a convexed curved surface overlapping the walls of the apertures in the central links, substantially as described.

9. In a drive-chain, the combination with a central link having cylindrical apertures in its ends and seat-pins extending through said apertures, of bearing-surfaces for said seat-pins within said apertures, side links arranged on either side of said central links and receiving the ends of the seat-pins, said side links having projections extending from their facing sides providing a concave surface overlapping the ends of the central links, substantially as described.

10. In a drive-chain, the combination with a central link having cylindrical apertures in its ends and a seat-pin extending through

each of said apertures, of a roller-pin in each aperture coöperating with the seat-pin, side links arranged on either side of said central links and receiving the ends of the seat-pins, said side links having curved grooves *r*, in their sides into which the terminal portions of the sides of the central links project, substantially as described.

11. In a drive-chain, the combination with the side links, of shouldered hardened seat-pins connecting said links and having their ends seated in openings in the side links of the proper form to prevent the pins from turning therein during the operation of fastening said links and pins together, a hardened rocking or rolling pin coöperating with each seat-pin and a perforated central link in which the said seat-pin and the rocking or rolling pin are inserted.

EVERETT F. MORSE.

Witnesses:

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HOLLAND C. GREGG.