

(No Model.)

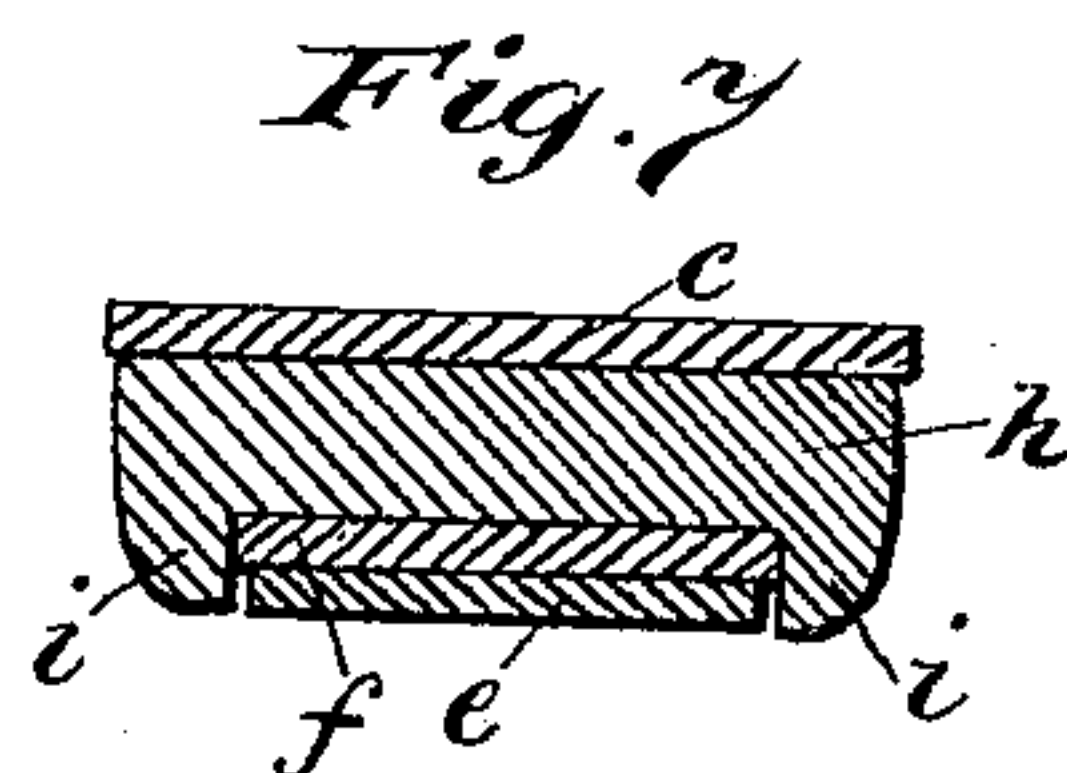
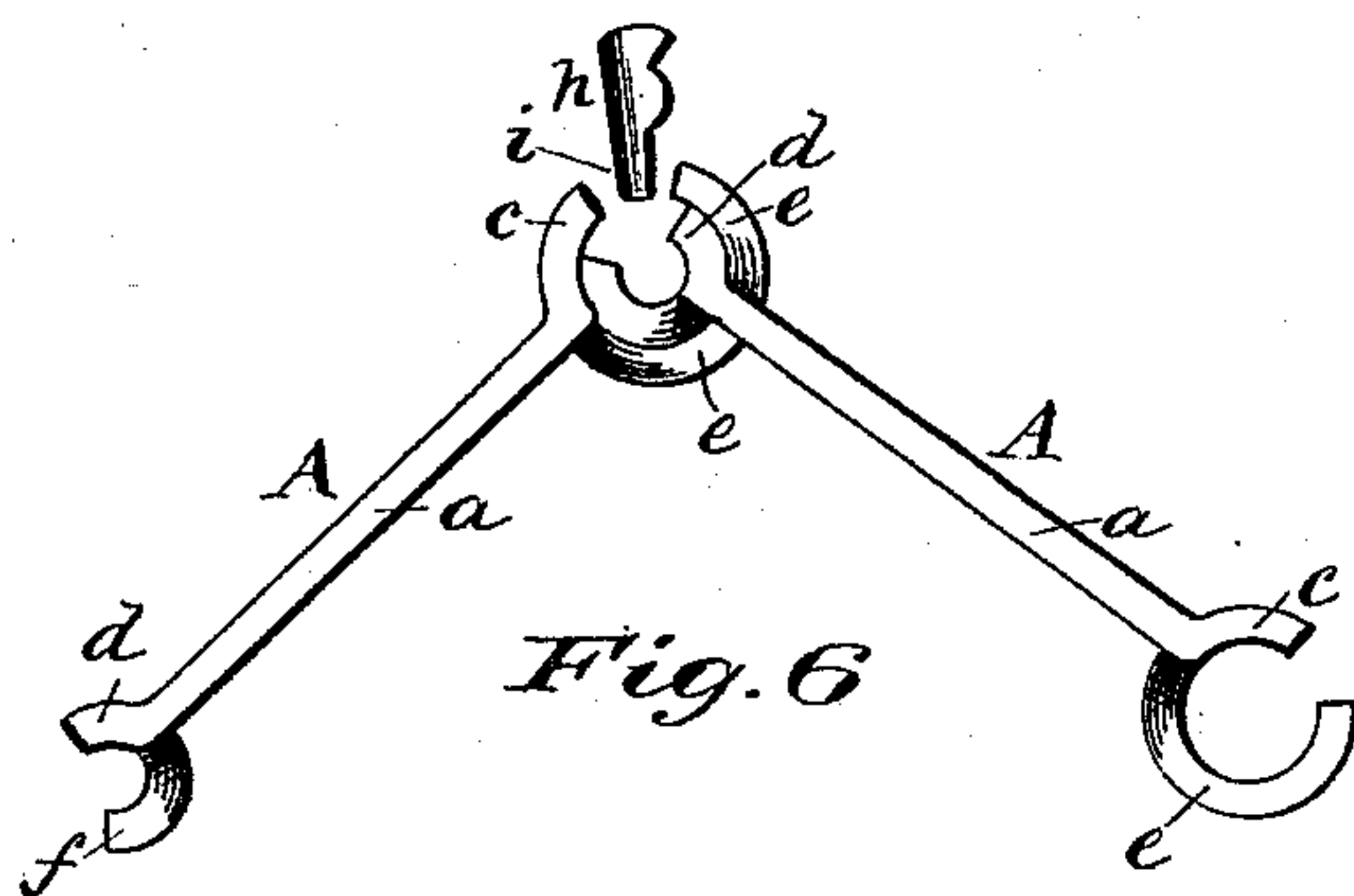
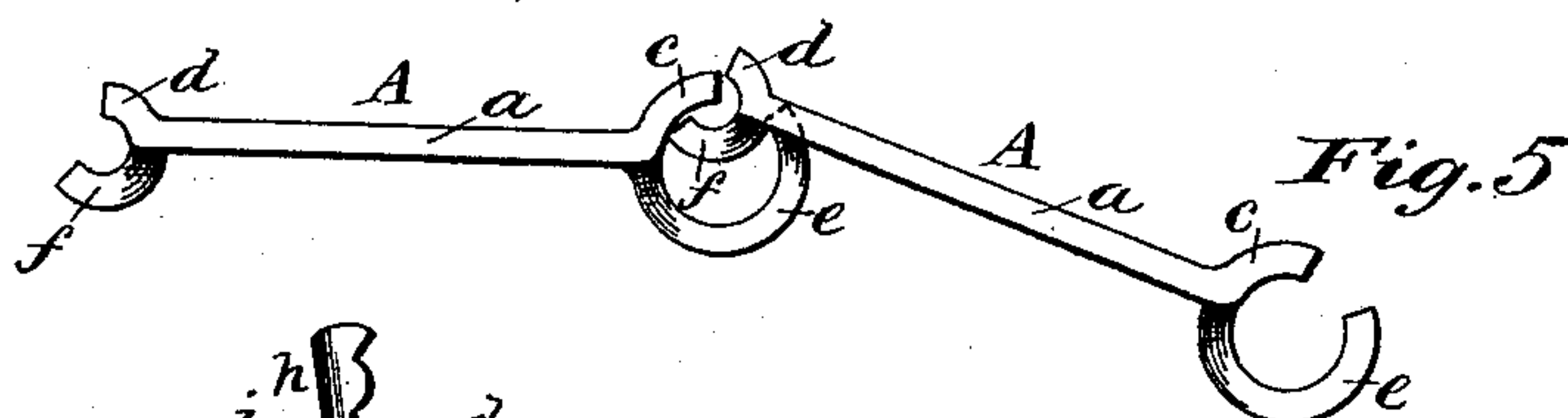
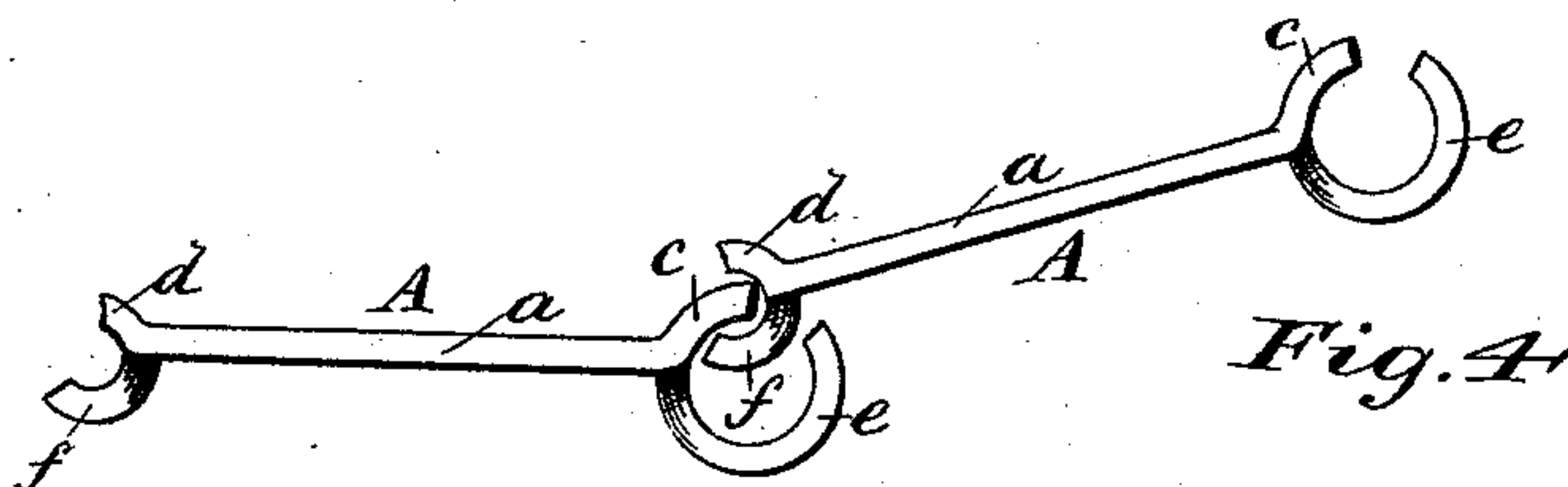
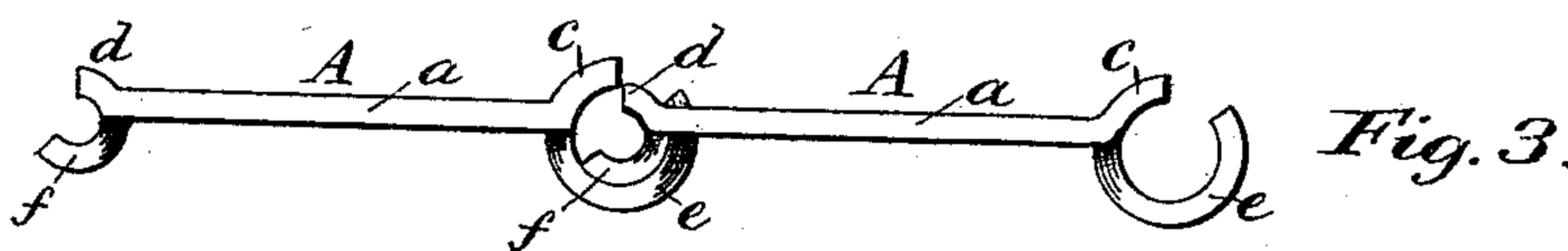
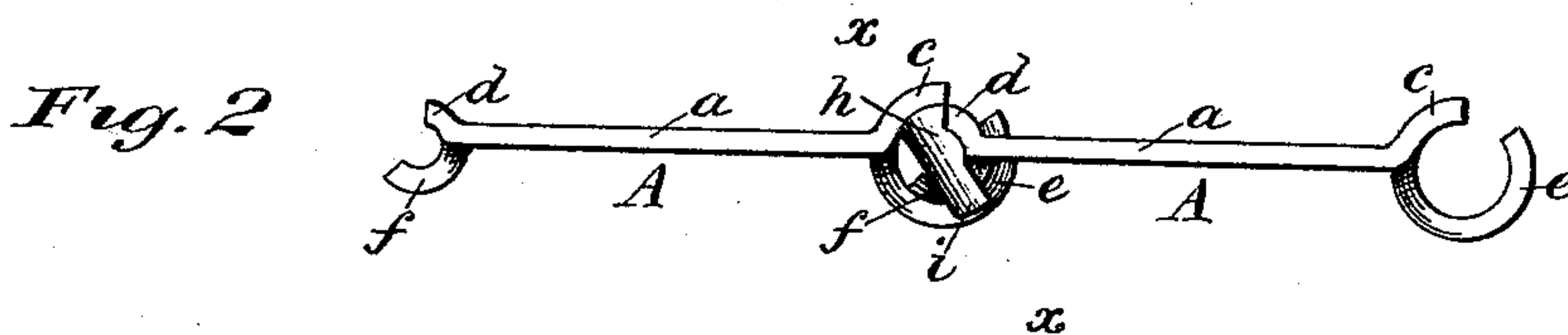
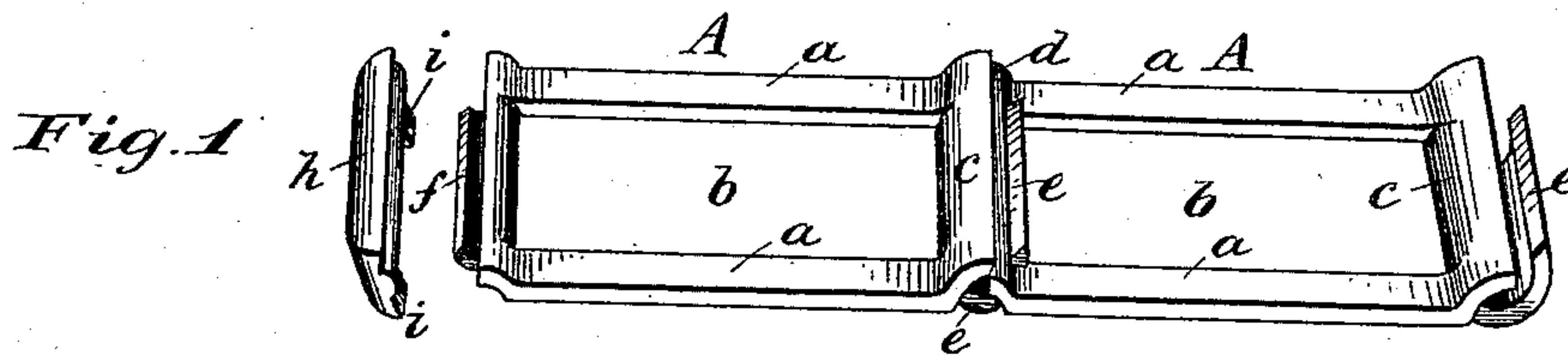
2 Sheets—Sheet 1.

S. D. LOCKE.

METHOD OF MAKING DRIVE CHAINS.

No. 393,912.

Patented Dec. 4, 1888.



WITNESSES=

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Fig. 8

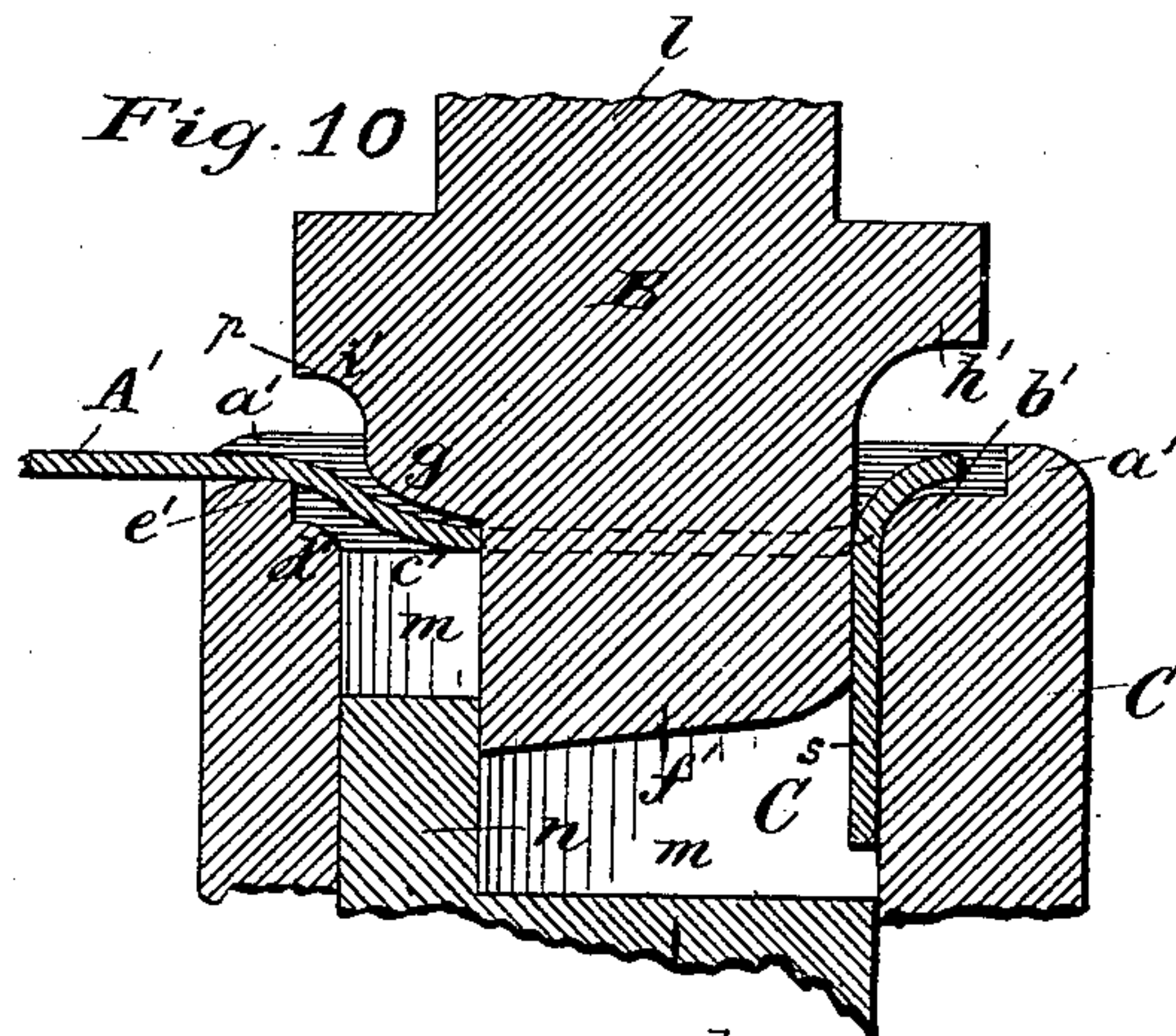
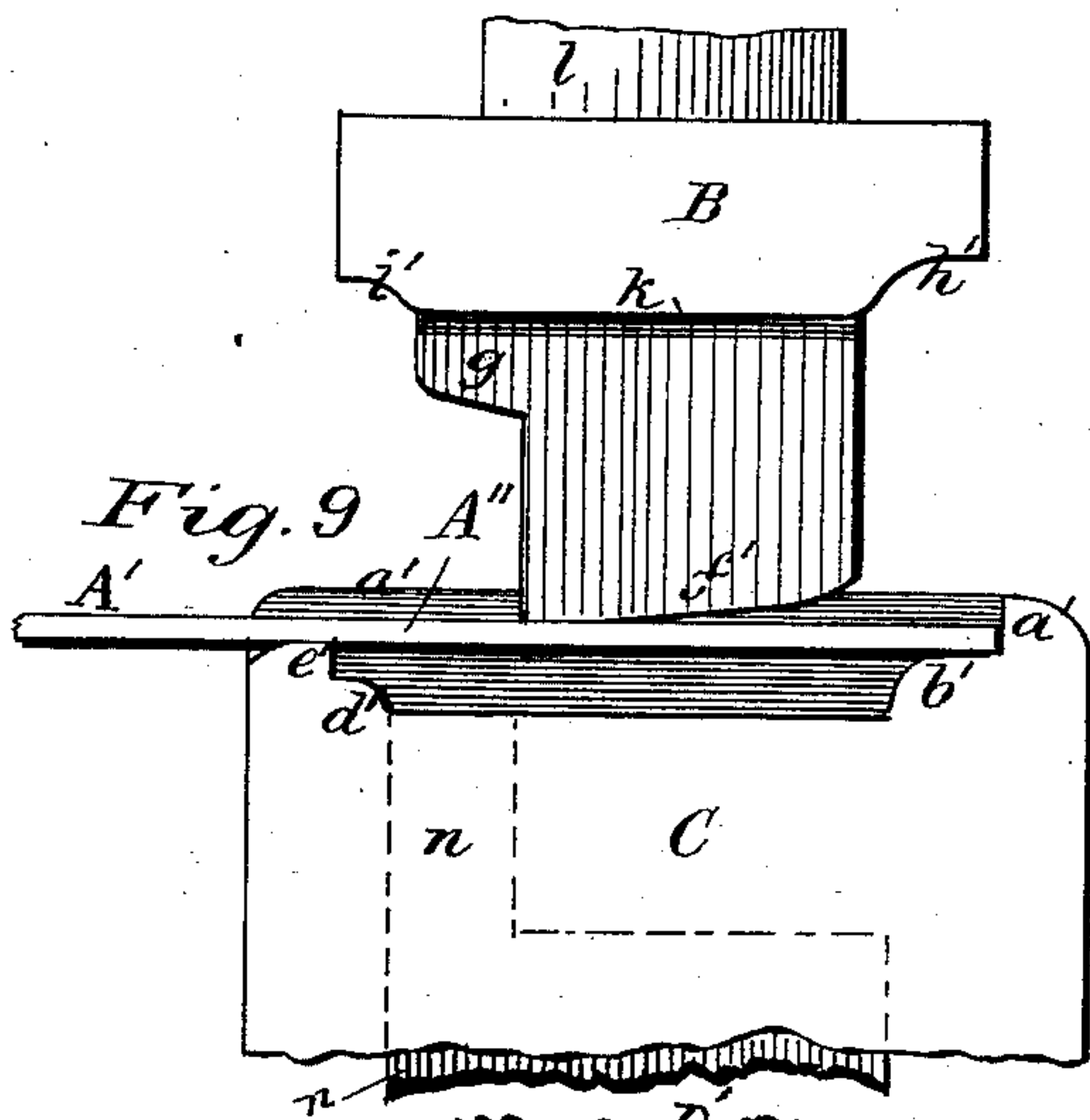
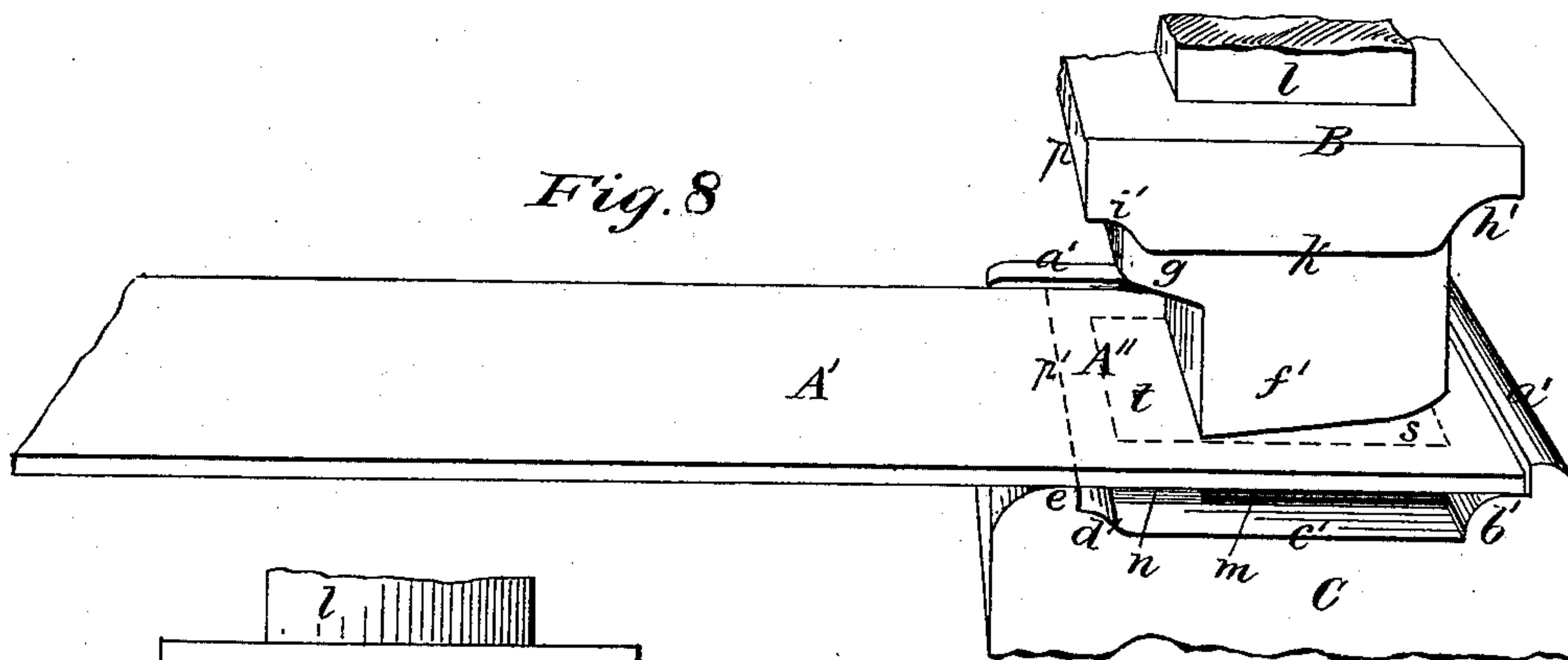


Fig. 13

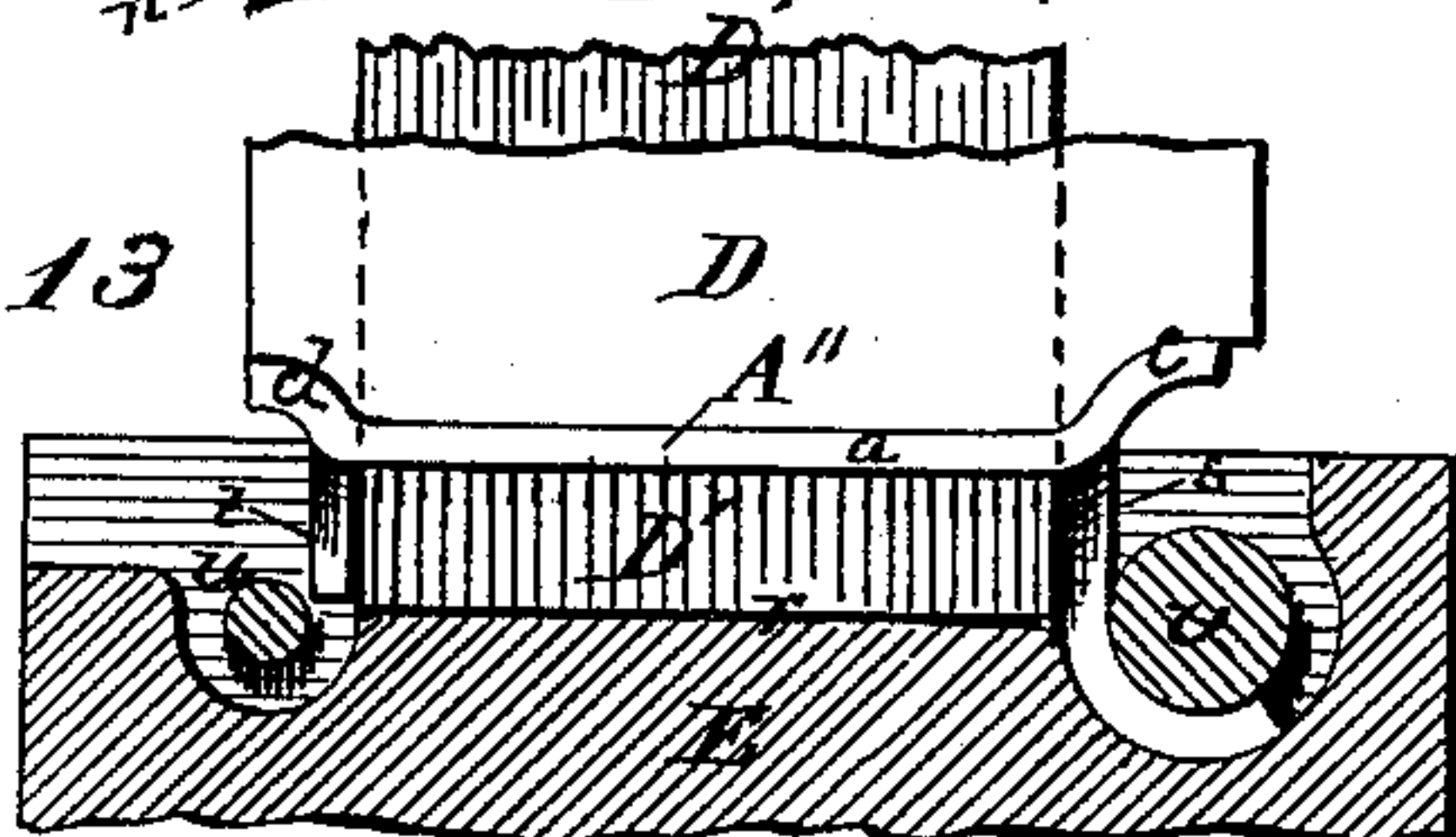


Fig. 11

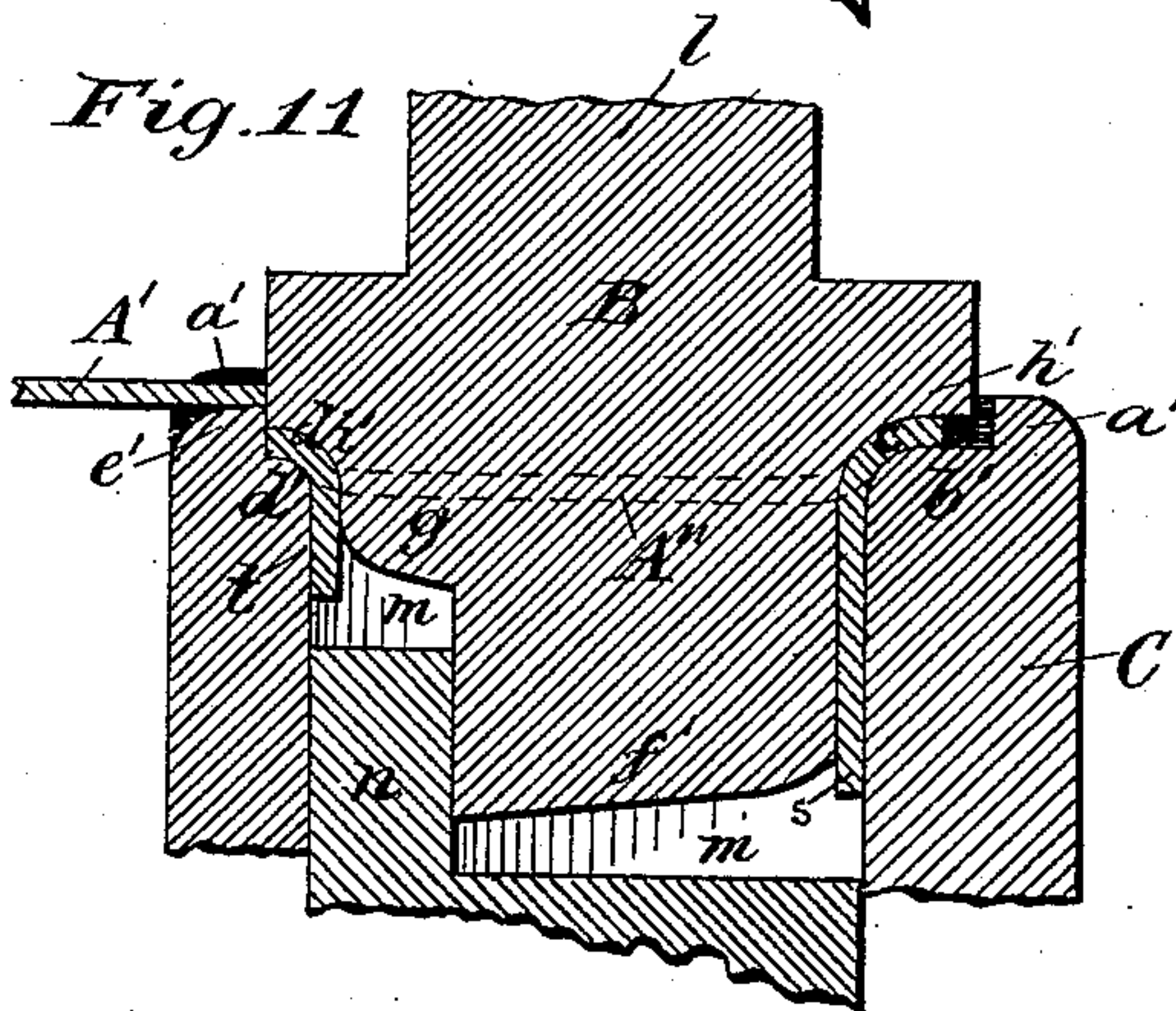


Fig. 14

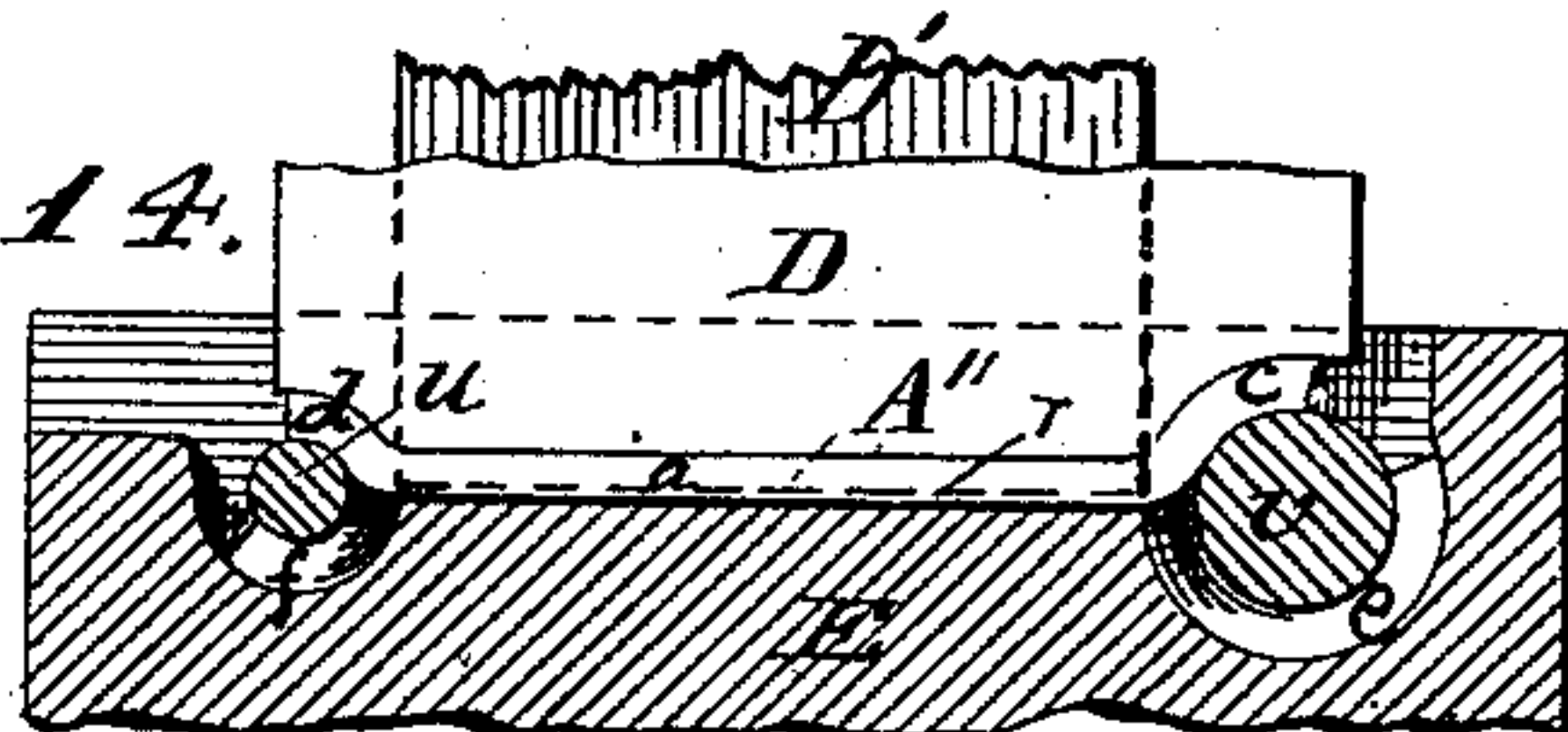
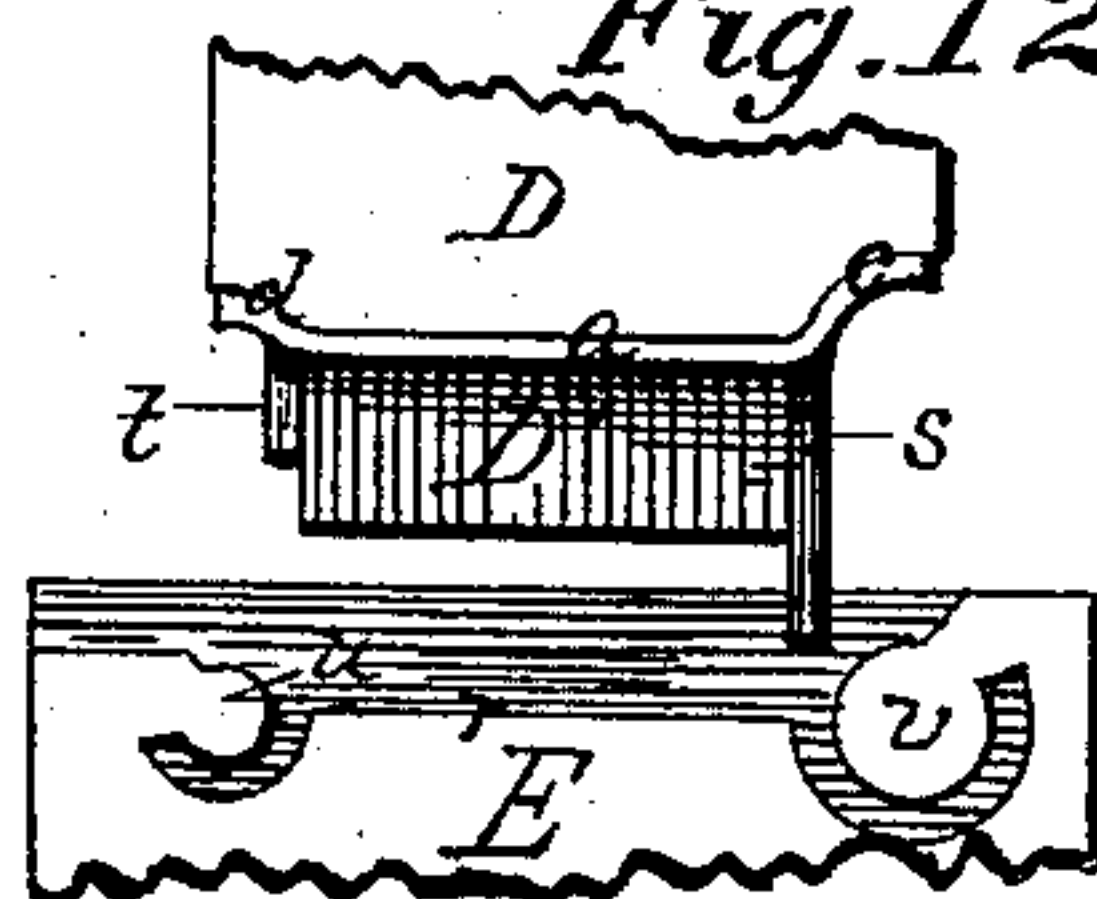


Fig. 12



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UNITED STATES PATENT OFFICE.

SYLVANUS D. LOCKE, OF HOOSICK FALLS, NEW YORK.

METHOD OF MAKING DRIVE-CHAINS.

SPECIFICATION forming part of Letters Patent No. 393,912, dated December 4, 1888.

Application filed February 20, 1888. Serial No. 264,666. (No model.)

To all whom it may concern:

Be it known that I, SYLVANUS D. LOCKE, a citizen of the United States, residing at Hoosick Falls, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in the Method of Making Links for Drive-Chains, of which the following is a specification.

The object of my invention is to provide a method for making detachable rectangular links for drive-chains that shall be equally as good and serviceable and much cheaper than the ordinary cast link, and also cheaper than any made of wire. This object is attained by forming the links from rolled or sheet metal in the manner hereinafter described, whereby links with two side bars and end and sprocket bars are made from a single piece of sheet metal of no larger area than the links themselves, the portion of the material taken from the opening of the link being punched and rolled up to form the hollow cylindrical sprocket-bar and also the end bar. The steps taken in this method and the means required for the production of this link are hereinafter particularly set forth and described.

That others skilled in the art may make and use my invention, I will proceed to describe it, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of two links of my chain formed in accordance with my method with a locking piece or key detached. Fig. 2 is a side elevation of the same with key in place. Fig. 3 is a side elevation of the same without the key. Fig. 4 is a side elevation of the same, showing the first position taken for coupling two links. Fig. 5 is also a side elevation showing the right-hand link swung down and its end bar entering the sprocket-bar of the other link. Fig. 6 is also a side elevation showing the two links coupled and in position for receiving the key or locking piece. Fig. 7 is a transverse oblique section through the links on the line *xx*, Fig. 2. Fig. 8 is a perspective view showing the means employed for punching out the link-blank—the first step in this method. Fig. 9 is a front elevation of the same. Figs. 10 and 11 are vertical sections showing, respectively, the

punching partly and wholly completed; and Figs. 12, 13, and 14 show different positions of the formers or dies by which the loop or hook parts of the end and sprocket bars are made or formed.

In the drawings, *A A* are two links of my chain. Each link has two side bars, *a a*, and the rectangular central opening, *b*, as well as a sprocket-bar, *c e*, and the end bar, *d f*. The sprocket-bar and end bar are of the same hollow and substantially cylindrical form, the latter, however, having its outer diameter a very little smaller than the inner diameter of the former, so as to allow the end bar to freely turn or pivot in the sprocket-bar. The parts *c* of the sprocket-bar and *d* of the end bar are bent or curved upward, as shown, from the ends of the link metal, while the hook or loop parts *e* and *f* of the same are punched down from the body thereof, leaving the central rectangular opening, *b*, and then turned outward and upward, as shown. The metal taken to form the central opening is all utilized in the loops *e f*.

It is apparent that to allow the links to couple the opening *b* next to the end bar, *d f*, should be slightly wider than the loop *e* of the sprocket-bar. For this reason I form the loop *f* at its base slightly wider than at its point, which is made of the same width as the loop *e*.

To join or couple two links it is only necessary to hold them in the position shown in Fig. 4, with the hollow end bar of one resting on the edge of the part *c* of the sprocket-bar of the other, and then to swing the right-hand link down on that edge as a pivot through the position shown in Fig. 5 and nearly to the position shown in Fig. 6, or until the end bar has swung into the hollow of the sprocket-bar.

The links so made and joined will not separate or get uncoupled in actual work, but are somewhat liable to uncouple when the chain is thrown loosely about. A convenient way of locking them against uncoupling is shown in the use of the key *h*. This key, when the links are in the position shown in Fig. 6, is readily inserted through the slit or opening in the sprocket-bar into the end bar, the forks or spurs *i* of the key striding the loops *e* and *f*, so preventing lateral displacement. When

this key is driven into the hollow of the end bar, it will not fall out even when the links are in the position shown in Fig. 6. With the links in any other position it cannot escape, and the links cannot escape while the key is in.

The above-described link is made from a single piece of metal punched from a sheet of the desired thickness or from a strap of the same of the exact width of the link, and the method herein employed for forming this link consists, substantially, of two steps. The first step is shown in Figs. 8, 9, 10, and 11, and the second step in Figs. 12, 13, and 14. In the first step, any suitable desired form of punching-machine provided with a punch, B, and a punch-block, C, is used. The machine itself being well known is not shown, the upper end of the punch and the lower end of the block, near where they join the machine, being broken off. By a single downward stroke of the punch two unequal lips are punched out, first a large one on the right for the sprocket-bar and then a smaller one on the left for the end bar; then, the stroke continuing, the link is cut off or out of the plate, and, finally, at the conclusion of the stroke, the upper face of the link is formed of the exact outline desired. The large lip *s* is cut out and driven directly downward by the advancing punch member *f'*, and the smaller lip, *t*, by the following punch member *g*. The punch member *f'* works against the shear-block *n*, that is interposed for this purpose with its upper face on a level with the face *e'* and afterward withdrawn or depressed, as shown in Figs. 10 and 11, to allow the other lip, *t*, to be cut out. This shear-block is seated in the mortise *m* in the block C, and is preferably driven up and down by a cam. After the lips are cut out and driven down, the punch still descending, the shear-edge *p*, working against the shear-edge *e'* in the block, cuts the link-blank on the dotted line *p'*, Fig. 8, out of the sheet, after which, and just as the punch descends to its full stroke, the forming-shoulders *h'*, *k*, and *i'* crowd the link-blank against the corresponding shoulders, *b'*, *c'*, and *d'*, of the block molding or fashioning it of the form desired. The return-stroke of the punch allows the link-blank already cut out and partly formed to be removed, when, the sheet or strap *A'* being again presented against the stops *a' a'*, the second downward stroke of the punch cuts out a second link-blank; and so, continuously, each stroke of the punch cuts out a link-blank and partly forms a link.

To allow the links to readily couple, the punch member *g* should be slightly wider at its outer side, so as to punch the lip *t* slightly wider at its base than the lip *s*. This causes the opening in the link next to the end bar to be slightly wider than the sprocket-bar.

The second step is fully shown in Figs. 12, 13, and 14, and results simply in forming the lips *s* and *t*, respectively, into the loop *e* of the

sprocket-bar and the loop *f* of the end bar. In this step the same or similar punching-machines are used, the punch B being succeeded by the follower D and the block C by the die or former E, the follower having the exact face conformation it is desired the face or top of the link shall have, and the die having the exact face conformation it is desired the bottom or under side of the link shall have, and also having cylindrical forming-sockets provided with fixed central stud-cores, *u* and *v*, whereby, when the follower descends from the position shown in Fig. 12 to that shown in Fig. 14, the lips *s* and *t* are formed into the loops *e* and *f*, respectively, and the link is completed. If the former E is open at one side and the stud-cores *u* *v* are only supported in the opposite side, or in the opposite side and as shown in Fig. 12, the link can readily be released from the die by slipping it off the end of the cores, or the cores might be withdrawn for this purpose.

To prevent the lips *s* and *t* from bending or buckling while being formed into the loops, I employ a support, D'. This support may be attached to the die E; but I prefer to seat it so as to slide freely up and down in a central mortise in the follower D. This support just fills the rectangular opening in the link-blank and is held normally projecting out of the follower by gravity or a spring, as shown in Fig. 12. As the follower descends, this support accompanies it until the support strikes the face *r* of the die, when it is stopped thereby and is driven up into the follower as the latter continues to descend. As the follower rises on its return-stroke, the support returns to the position shown in Fig. 12. This support also serves as a guide to the link-blank and insures perfect alignment of the latter with the die when put upon this support, as shown in Fig. 12.

To utilize gravity in holding the link-blank on the support in position shown in Fig. 12, the follower D and former E may exchange places and the follower become the lower member; or the die may be made the moving member attached to the punch-head and the follower D be fixed to the punch base or plate.

The conformation of the body of the link may be accomplished either before or after cutting the rectangular opening therein.

No claim is herein made for the link shown and described, as it forms the subject-matter of a separate application pending herewith.

No claim is herein made for the mechanism shown and described for accomplishing the purposes in view, as that will form the subject-matter of a companion application to be filed.

What I claim is—

1. The method herein set forth for forming links for drive-chains from rolled or sheet metal, which consists in first punching the stock to form lips from material wholly within the edges of the stock and to form side and

end bars, and then bending the lips thus formed into loops forming end and sprocket bars, substantially as specified.

2. The method herein set forth for forming
5 links for drive-chains from rolled or sheet metal, which consists in first punching the stock to form lips from material wholly within the edges of the stock, and to form side and end bars, then severing the link from the remain-
10 der of the stock, and subsequently bending the lips thus formed into loops, forming end and sprocket bars, substantially as specified.

3. The method herein set forth for forming links for drive-chains from rolled or sheet

metal, which consists in first punching the 15 stock to form lips from material wholly within the edges of the stock, and to form side and end bars, then severing the links from the remainder of the stock, and subsequently molding or otherwise finishing the body of the link 20 to the conformation desired and bending the lips thus formed into loops forming end and sprocket bars, substantially as specified.

SYLVANUS D. LOCKE.

Witnesses:

E. J. LOCKE,
I. J. WOOD.