

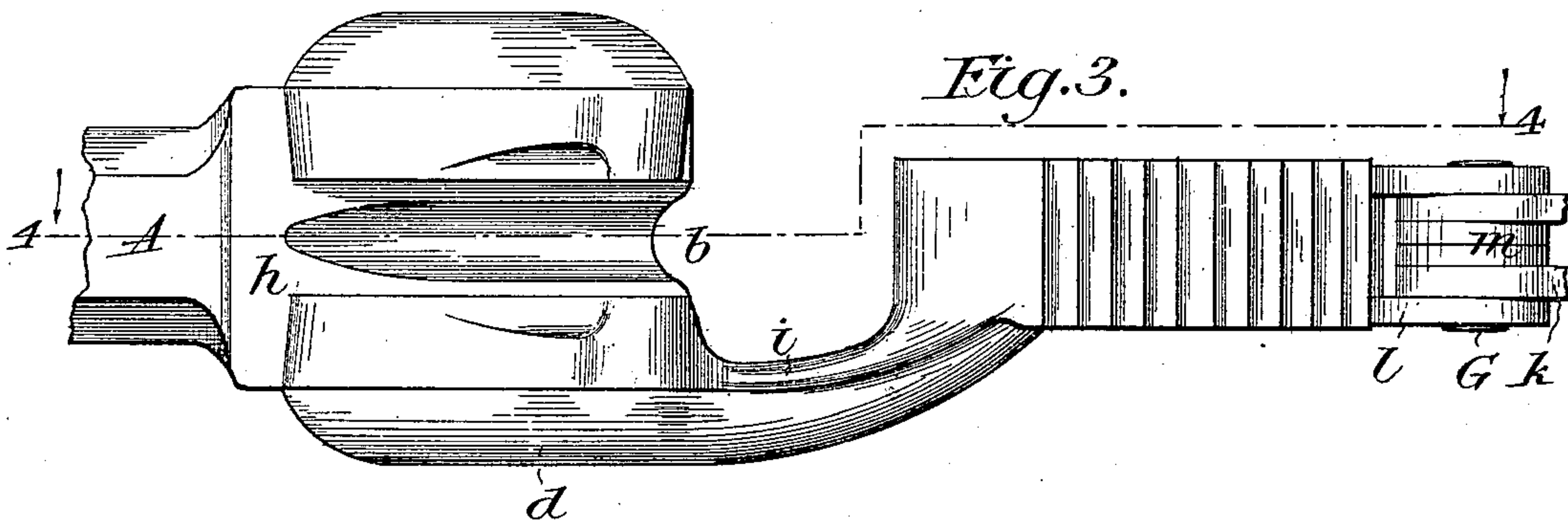
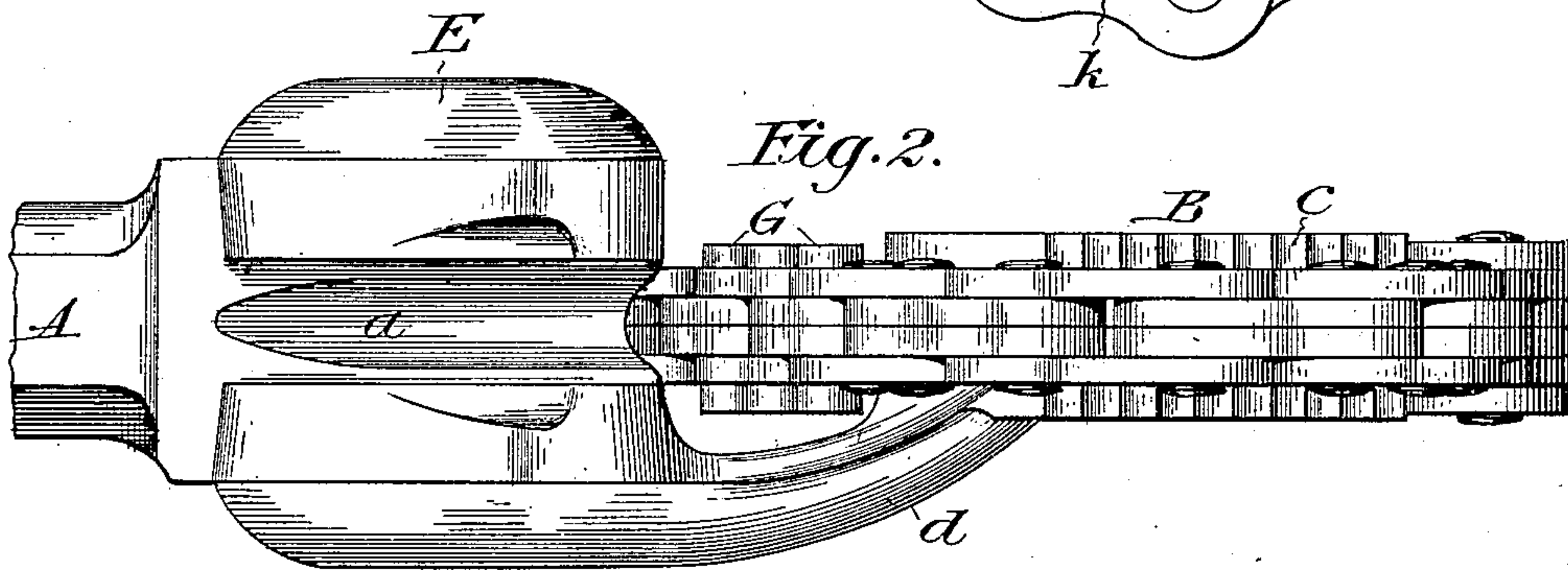
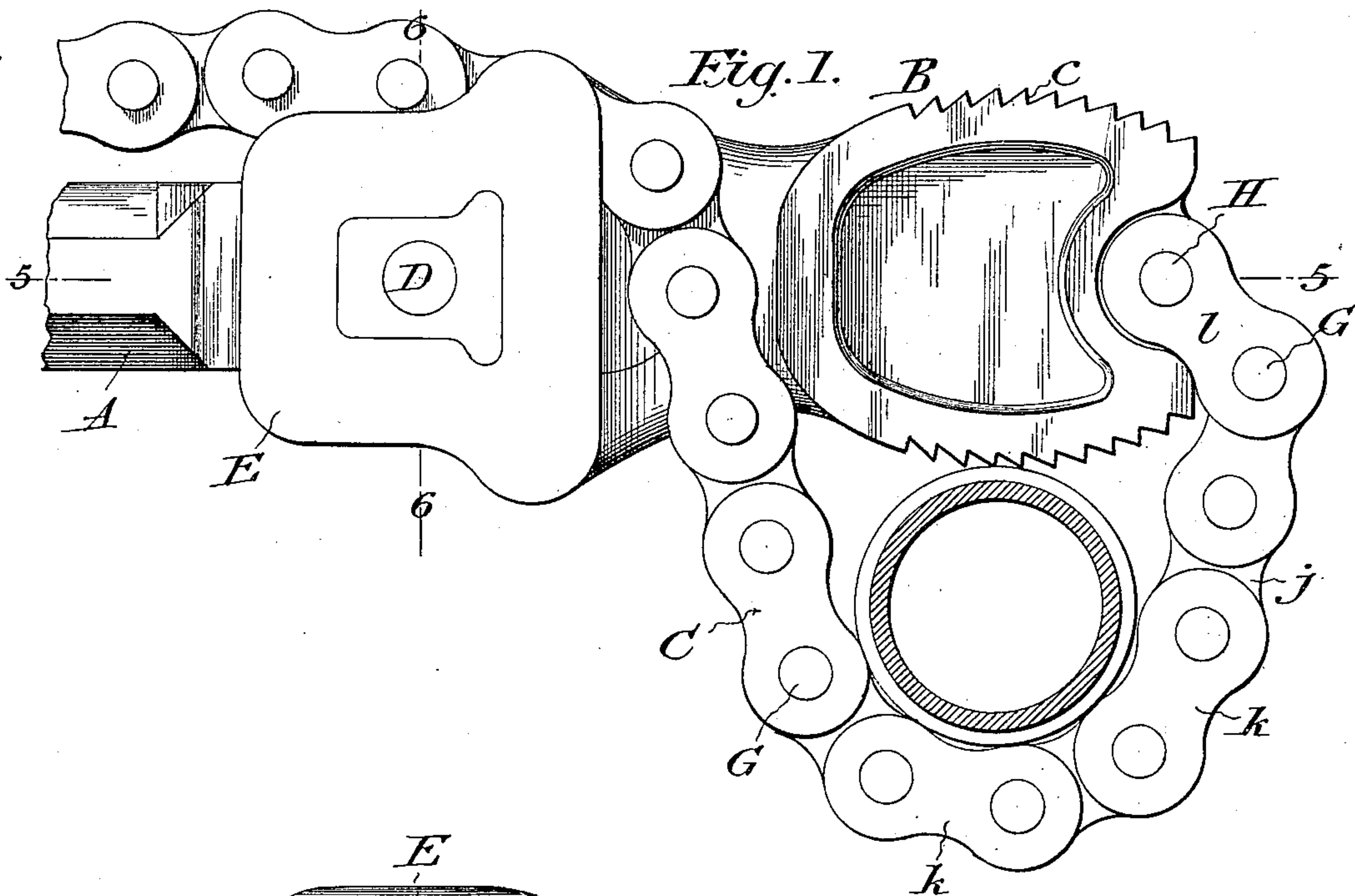
No. 698,780.

Patented Apr. 29, 1902.

G. AMBORN, JR.
CHAIN PIPE WRENCH.
(Application filed July 27, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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E. S. Jenckes

Inventor
George Amborn Jr.
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his Attorney

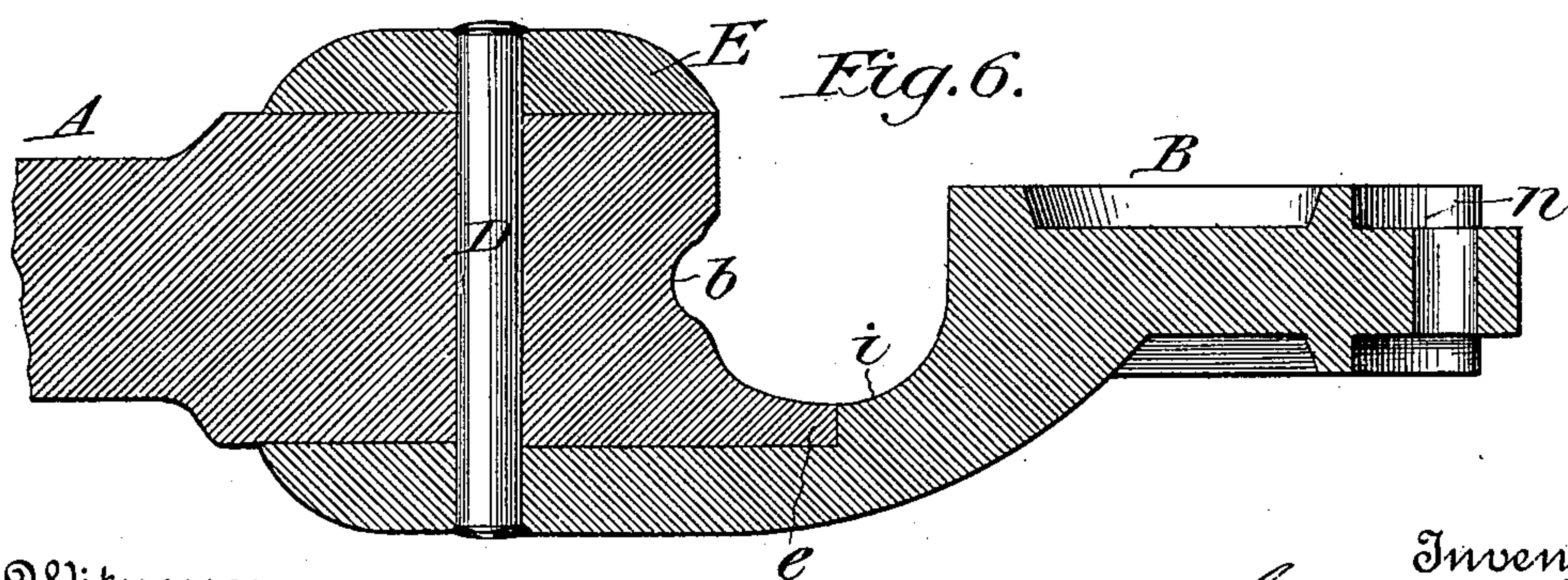
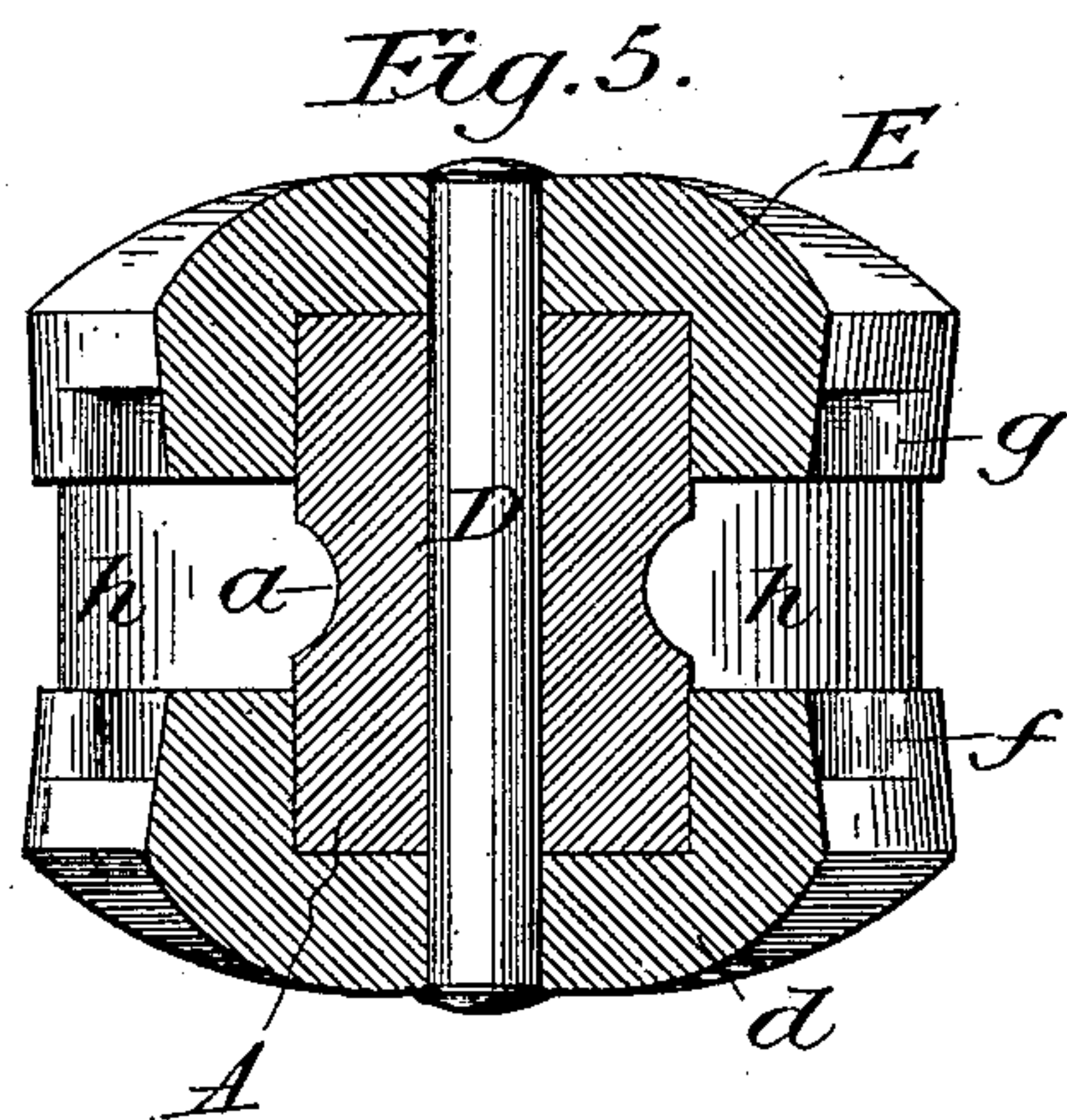
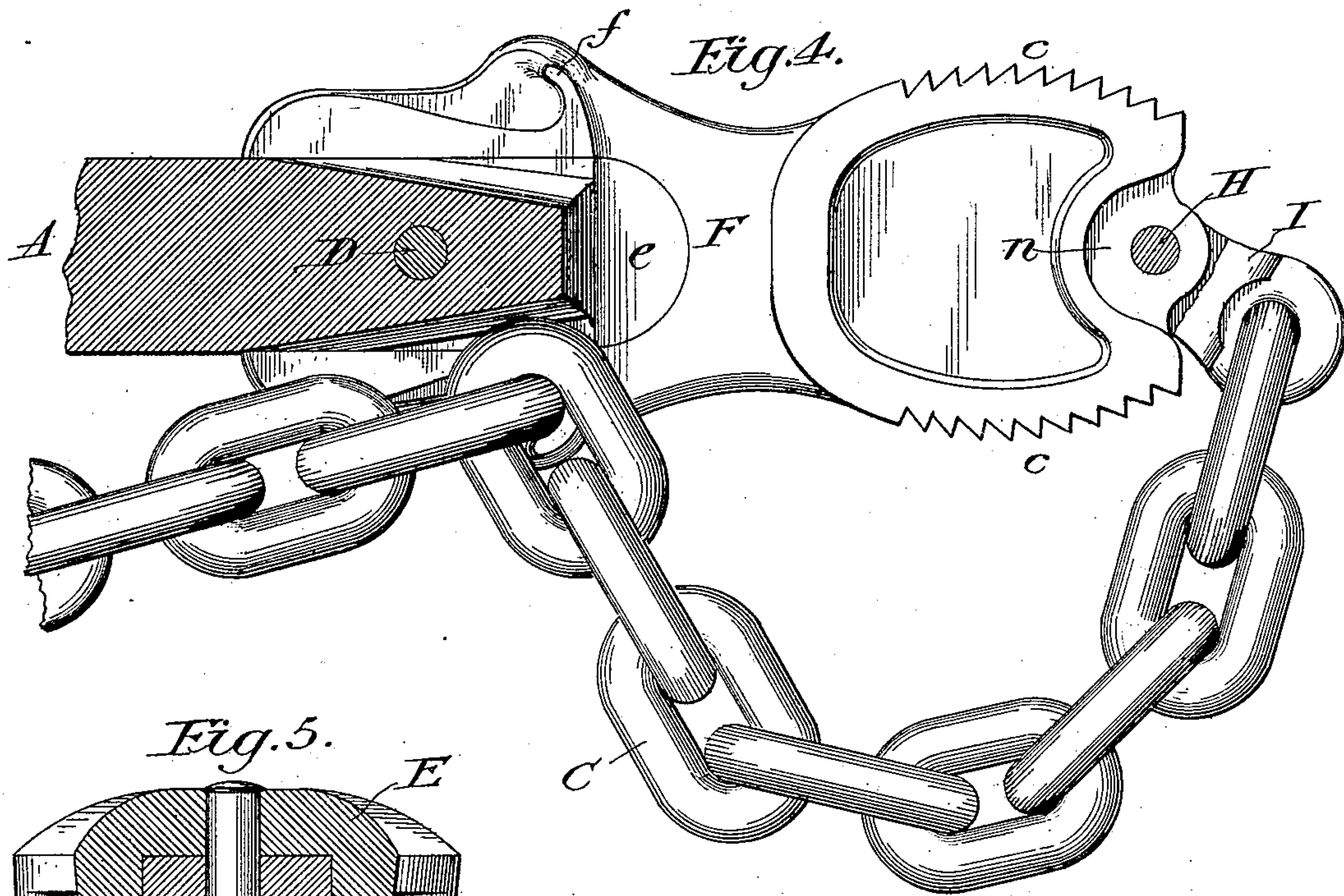
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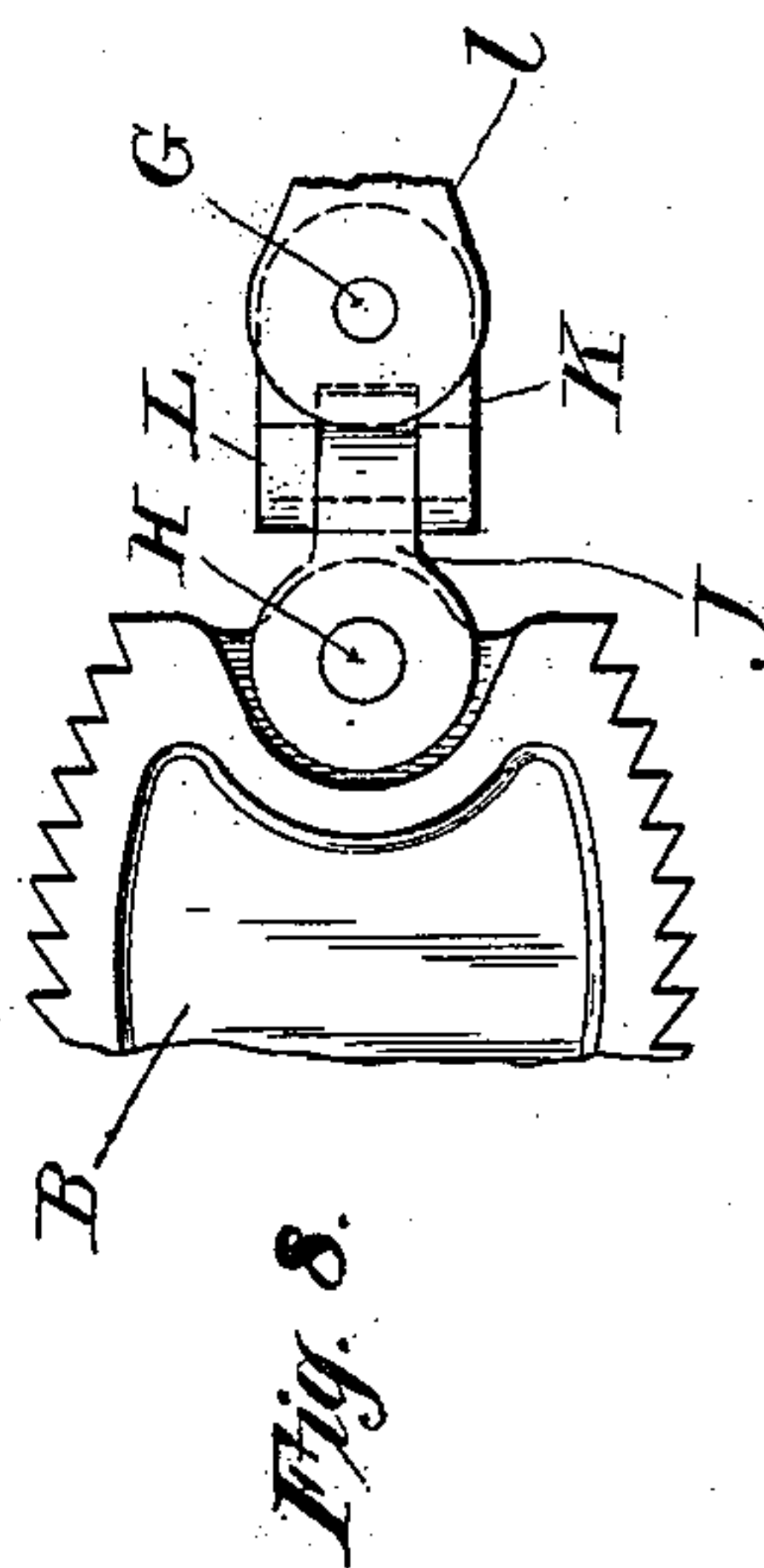
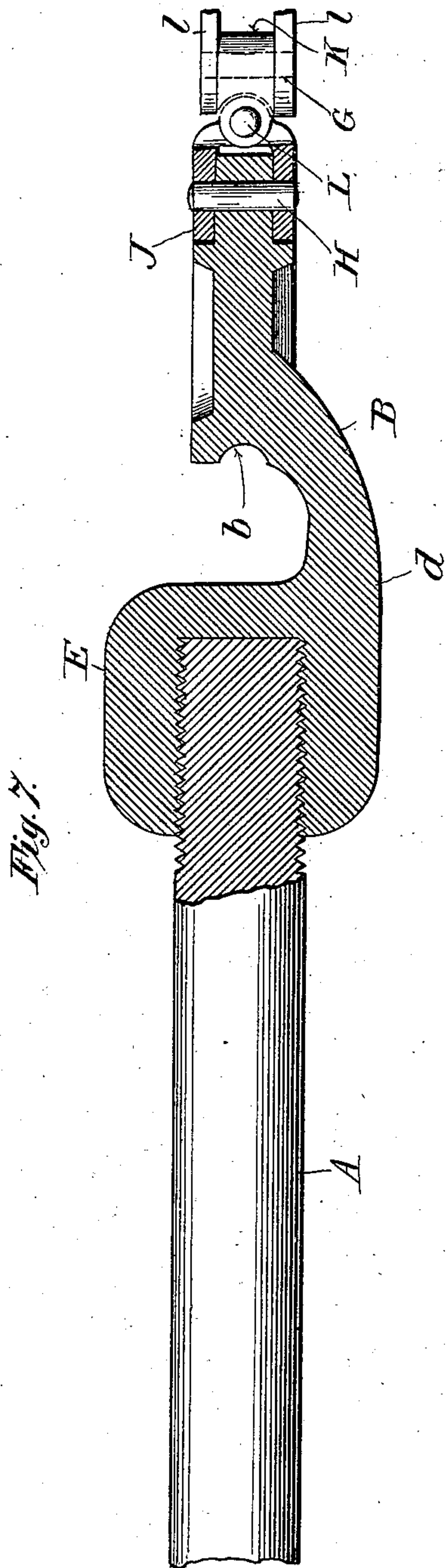
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3 Sheets—Sheet 3.



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CHAIN PIPE-WRENCH.

SPECIFICATION forming part of Letters Patent No. 698,780, dated April 29, 1902.

Application filed July 27, 1901. Serial No. 69,910. (No model.)

To all whom it may concern:

Be it known that I, GEORGE AMBORN, Jr., a citizen of the United States, residing in the borough of Brooklyn, in the county of Kings and city and State of New York, have invented certain new and useful Improvements in Chain Pipe-Wrenches, of which the following is a specification.

The object of the present invention is to produce a reversible chain pipe-wrench in which the chain can be conveniently used in a variety of ways, and particularly in which the chain can have an extended bearing upon the pipe. The chain is preferably a flat chain, although a cable-chain may be employed, and the chain is preferably used in connection with a head having serrated grip-surfaces on its opposite faces, the chain being preferably pivoted at or near the apex of the head and being adapted to cooperate with the head, so as to squarely embrace a pipe between it and the head, so that the wrench is adapted to be used on T's, collars, reduced sections of pipe, and in analogous situations.

The accompanying drawings illustrate one embodiment of the present invention.

In the drawings, Figure 1 is a side view of the improved wrench. Fig. 2 is a face view thereof with the chain locked. Fig. 3 is a face view with the chain not locked. Fig. 4 is a longitudinal section in the plane indicated by the line 4 4 in Fig. 3, a cable-chain being shown in this figure instead of the flat chain shown in the preceding figures. Fig. 5 is a longitudinal section in the plane indicated by the line 5 5 in Fig. 1. Fig. 6 is a cross-section in a plane indicated by the line 6 6 in Fig. 3. Fig. 7 is a longitudinal section illustrating modifications. Fig. 8 is a side view of the end of the head shown in Fig. 7.

For convenience in designating and distinguishing the different parts of the wrench the side which is shown in Fig. 1 and the side opposite thereto will be called the "sides" of the wrench, while the face which is shown in Fig. 2 and the face opposite thereto will be called the "faces" of the wrench.

Referring to the drawings, A is the handle, B is the head, and C is the chain.

Only a portion of the handle A is shown. It is rectangular in cross-section where the head is secured thereto, as shown in Fig. 6, and it has chain-receiving recesses *a a* on opposite faces and a chain-receiving recess *b* on its end to accommodate the links of the cable-chain when such chain is employed. If, however, a flat chain is always employed, these recesses will not be necessary. Since, however, it may be desirable to use either a flat or a cable chain with the same wrench, these recesses in the handle are desirable, even if the flat chain is to be ordinarily employed.

The head B is in a single piece, and its opposite faces are suitably serrated, as shown at *c*, to constitute gripping-faces to enable the wrench to obtain a secure hold upon the pipe to be turned. As usual in this class of wrenches, the contour of the serrated faces is such as to enable the wrench to be used with different sizes of pipes and when such pipes vary within narrow limits not provided for by the construction of the cooperating chain C. The head is located in line with the handle, so that a longitudinal plane which bisects the serrated gripping-faces of the head also bisects the handle longitudinally, thus bringing each gripping-face in line with the corresponding face of the handle. The head proper has integral therewith an offset attaching member *d*, which extends alongside of one side of the handle, as clearly shown in Fig. 3. This attaching member *d* is recessed on its inner side, so as to closely fit and embrace the handle, as clearly shown in Fig. 6. As shown in Fig. 5 and also in Fig. 4, the end of the handle on one side has a projection *e*, which fits closely in the end of the embracing recess of the attaching member *d*, thus forming a seat for the head on the end of the handle, and hence insuring a solid non-slipping connection between the head and the handle. The head is secured to the handle by any suitable means, such as the rivet D. (Best shown in Fig. 6.) The attaching member *d* of the head is shown provided with suitable locking-lugs *f* to cooperate with the chain, which, it will be noted, is located adjacent to the end of the handle and

at the opposite faces of the handle. Coöperating with these locks *f* are other locks *g*, similar thereto, which are shown as carried by a separate plate *E*, which is secured to the side of the handle opposite to the side where the head is secured. This locking-plate is shown as recessed on its inner side and embracing the end of the handle in the same way as does the attaching member of the head, (see Fig. 6,) and it is secured to the end of the handle by the same rivet *D* which secures the head thereto.

The parts of the locking-plate and of the attaching member of the head which project beyond the faces of the handle are a sufficient distance apart to form recesses *h* on opposite faces of the handle to receive the chain.

Between the inner end of the head proper and the end of the handle is an open-sided transverse chain-receiving passage *F*, which is closed on one side by the attaching member *d* of the head, but which is open on the opposite side. This open-sided chain-receiving passage is directly in line with the head and handle. Considering the inner wall *i* (see Figs. 3 and 5) of the attaching member *d* to constitute the bottom of the chain-receiving passage, it will be noted that the depth of this passage is at least as great as the thickness of the head proper, so that it can receive the full width of the chain when said chain is passed therethrough, so that then the faces of the chain can be directly in line with the grip-faces of the head, as will clearly appear when the construction and arrangement of the chain are considered.

Preferably the chain is of the flat-chain type, as shown in Figs. 1 and 2, although a cable-chain can be employed, as shown in Fig. 4. The flat chain is composed of similar links, the links being arranged in succession, with a pair of parallel internal links *j j* lying side by side and a pair of parallel external links *k k* embracing the links *j j* and pivotally connected by a cross-pin *G*, preferably connected immovably (by upsetting or endwise compression) with the outer links *k k* and passing loosely between the inner links *j j*, which swivel thereon. The terminal link connecting the chain and the head is shown as composed of two links *l l*, which embrace or straddle the first pair of the external links *k k*, (see Fig. 5,) and to maintain this first pair of links spaced apart washers *m m* are interposed, which surround the first link-pin *G*, which pin is secured by riveting to the terminal links *l l*, and around which the first links *k k* of the chain turn and upon which said washers are loose. These terminal links *l l* of the chain are pivoted by a connecting-pin *H*, which is carried by the head at or near its apex. This connecting-pin may be of any suitable construction; but, as shown, it passes loosely through an aperture in the apex of the head and loosely through the terminal links *l l*, so that said terminal links swivel freely thereon, and its ends are expanded by upset-

ting, so as to be held in place. The head at its apex is recessed on opposite sides, as shown at *n*, (see Figs. 4 and 5,) so as to accommodate the pivoting ends of the terminal links *l l*. Consequently no part of the chain need project beyond the plane of the sides of the head, the result being that the extreme width of the chain is approximately equal to and need be no greater than the thickness of the head. The pins *G G* of the chain project outwardly on both sides of the chain to constitute projecting locking-studs, which are adapted to interlock with the locks *f* and *g* at or near the end of the handle. These locking-studs may be omitted throughout that portion of the chain nearest the connecting of pivot-pin *H*, which can under no circumstances register with the locks *f* and *g*, and hence only appear in Fig. 2 at that portion of the chain which is nearest the handle.

The chain being pivotally connected to the head at or near the apex thereof is reversible—that is to say, it can be swung in either direction and used when so swung. In whichever way the chain is swung it may be used in either of two ways, one way being illustrated in Figs. 1 and 2 and the other way being illustrated in Fig. 4. As shown in Figs. 1 and 2, the chain is passed around the pipe to be turned, (Fig. 1 illustrating it passing around a flange on the pipe to be turned,) and the chain is then passed through the open-sided chain-receiving passage *F*, and the chain is then locked by one of its locking-pins *G* engaging the locks *f* and *g* at the face of the handle opposite where the pipe is located. Calling the apex of the head the “front” of the wrench, it will be noted that the chain is locked “behind” the chain-receiving passage *F*. This, it will be noted, enables the chain to embrace a large portion of the periphery of the pipe (or pipe-collar) to be turned, thus insuring an exceedingly efficient hold on the pipe, thereby preventing any possibility of slipping during the working stroke of the handle. It will be noted that owing to the chain-receiving passage *F* being at least as deep as the thickness of the head, and hence of the width of the chain, the chain when passed through said passage and locked in place extends around the pipe to be turned squarely without any twist to the chain, thereby enabling the pipe to be squarely embraced between the chain on one side and the grip-face of the head which is then in use. The fact that the chain-passage is open on one side is of very great importance and advantage, since it enables the chain to be passed through said passage with convenience and ease. With a flat chain there is sufficient lateral flexibility to enable the free end of the chain to be laid into the open mouth of the chain-receiving passage, and the chain can then be readily and conveniently drawn through said passage. To facilitate the entrance of the end of the chain into this passage, the walls of the passage at its entrance are rounded or beveled off, as

clearly shown in Figs. 3 and 5. The open side or mouth of this passage-head is of very great convenience, especially where the wrench is being used in difficult situations—as, for example, at the bottom of a trench which is dug just below a water, gas, or other pipe—where the chain is to be carried beneath the pipe and thence upwardly through the chain-receiving passage F. Instead, however, of the chain being passed through the chain-receiving passage it can be used in the ordinary way common to chain wrenches, as shown in Fig. 4—that is to say, the chain can be locked on the same face of the handle where the pipe is located without necessitating the chain being passed through the chain-receiving passage. This capacity is of especial advantage, since in perhaps the great majority of instances the wrench can be efficiently used with the chain locked, as in Fig. 4, without necessitating the passing of the chain through the chain-receiving passage; but if the exigencies in a particular case require a greater grip upon the pipe the chain can then be passed through the chain-receiving passage and locked on the opposite face behind the passage F by locks which are carried at or near the end of the handle, so that there is substantially no danger of breaking the head off as the result of use.

While it is preferred to use the flat chain, a cable-chain, such as is shown in Fig. 4, may be employed. This chain is an ordinary cable-chain, except that it is provided with a terminal coupling I, by means of which it is pivoted to the head at or near its apex.

Whichever kind of chain is employed, it is pivoted at or near the apex of the head, which is of especial importance, since the chain is thereby rendered reversible—that is to say, it can be swung in either direction, thereby utilizing both grip-faces of the head—and as a consequence the wrench can be conveniently used upon collars, fittings, reduced pipe-sections, and the like, since whatever portion of the pipe is operated upon it is squarely held between the chain on the one side and the head on the other. This is also of importance, since it brings all the strains in line with the length of the handle, so that there is no twisting strain upon the head or any other portion of the wrench. In this connection it will be noted that the same medial plane which bisects the handle longitudinally between the locks *f* and *g* also bisects the head and chain. Owing, also, to the chain being pivoted at the apex of the head, it can be passed through the chain-receiving passage F in either direction and can be locked at either face of the handle whether used as in Fig. 1 or as in Fig. 4.

The improved wrench is an economical one to make and to keep in repair. These wrenches most frequently require repairing on account of the breaking or wearing of the

gripping-teeth, and in case such repairing is necessary it is effected economically, since the head is in a single piece, economically made, and it can be readily removed from the handle and a new head substituted. The head might be made all in one piece with the handle; but it is preferable to make it in a single piece, both in order to facilitate repair and because it is desirable that it be made of a superior quality of steel to that employed for the handle. It will be noted that the chain-receiving passage is formed neither in the head nor in the handle alone, but is formed by the gap between the outer end of the handle and the inner end of the head proper.

Attention has been called to the fact that when the pipe to be operated upon is below the head the chain is slipped into the chain-passage by raising it and moving it sidewise at the same time; but when the wrench is below the pipe it is sufficient to merely drop the end of the chain into said passage.

The locks *g g* need not be on a separate plate secured by riveting or otherwise to the handle, but may be forged directly on the handle at or near its end. This is especially desirable in case the wrench is to be used close to a wall or in an analogous situation, since then no part of the handle need project materially beyond the plane of the side of the head where the mouth of the chain-passage F is located. The projection of the locks *g g*, which is shown in the drawings, is due to the fact that they are adapted to engage with a cable-chain as well as with a flat chain. If, however, a flat chain is solely to be used, the outer side of the handle, including the locks on the side where the chain-receiving passage is open, can be almost flush with the corresponding side of the head, thus greatly facilitating the use of the wrench in close quarters. Also in case a flat chain is exclusively to be used the recesses *a* and *b* in the handle can be omitted.

The handle can be square on the end instead of provided with the projection *e*, as shown.

This style of wrench, with solid head and locks on the end of the handle back of the chain-opening, can be arranged with gripping-teeth on one face of the head only; but the reversible construction shown is preferable.

The location of the locking-pins *G* along the chain, in connection with the contour of the grip-faces of the head, is sufficient to provide for any ordinary adjustment to fit different sizes of pipe. In case, however, finer adjustment is required the chain need not be pivoted directly at the apex, but may be pivoted in the manner set forth in my companion application, Serial No. 69,210, filed July 22, 1901—that is to say, it may be pivoted a little to one side—that is to say, “eccentrically”—so that the reach from the pivot to the locking-studs on one side may be greater than the reach when the chain is swung in the oppo-

site direction, and by making this difference equal to about one-half the distance between adjacent points G a fine adjustment is secured.

5 A universal or gimbal joint may be used between the chain and the head, so as to allow lateral movement to the chain, which may facilitate the entrance of the chain into the mouth of the passage F; but ordinarily there
10 is sufficient lateral play in the chain to permit its end to be readily passed into the mouth of said passage. Such a gimbal-joint is illustrated in Figs. 7 and 8, wherein the pivot-pin H and the terminal links *ll* of the chain are
15 united by a gimbal-joint comprising two couplings J and K, pivoted to each other by a pin L, the coupling J being pivoted to the pin H, the coupling K being pivotally connected to the terminal links *ll* by means of the first
20 cross-pin G of the chain, and the pin L being at right angles both to pin H and to pin G.

In case a cable-chain is used the recess *b* to receive the same can be in the near end of the head proper, as shown in Fig. 7, instead
25 of in the end of the handle, as shown in Figs. 3 and 5, or the passage F can be made wide enough to accommodate the links of the cable-chain without employing such recesses.

30 The lock-plate E may be forged in one piece with the extension or attaching member *d* of the head and arranged with a socket to receive the end of the handle, if desired, as shown in Fig. 7, the handle being then secured in any desirable way, either by riveting,
35 by a bolt, or by being screwed into the socket, as shown in Fig. 7.

Other modifications will readily suggest themselves to a skilled mechanic; but enough
40 has been stated to show that the wrench can be modified in many ways without departing from the spirit and gist of the invention.

I claim as my invention—

1. A chain pipe-wrench having a handle, a
45 head, the head and the handle being so related to each other as to leave an open-sided chain-receiving passage between said head and handle, a chain attached to the head and adapted to be passed through said passage,
50 and locks behind said passage to engage said chain.

2. A chain pipe-wrench having, in combination, a handle, a head, a chain-receiving

passage, a chain pivotally connected to the head at or near its apex and adapted to be
55 passed through said passage, and locks to engage said chain behind said passage.

3. A chain pipe-wrench having, in combination, a handle, a head secured to one side of said handle and having opposite grip-faces
60 substantially in line with the faces of the handle, said head extending beyond the end of the handle so as to provide an open-sided chain-receiving passage, locks on both faces of the wrench behind said passage, and a reversible flat chain pivotally connected to the
65 head at or near the apex and adapted to be passed through said passage in either direction and locked by one set of said locks, or to be locked on either face of the wrench without being passed through said passage.

4. A chain pipe-wrench having, in combination, a handle, a head secured to one side of said handle and having opposite grip-faces
75 substantially in line with the faces of the handle, said head extending beyond the end of the handle so as to provide an open-sided chain-receiving passage, locks on both faces of the wrench, and a reversible flat chain pivotally connected to the head at or near the
80 apex and adapted to be passed through said passage in either direction and locked by one set of said locks, or to be locked on either face of the wrench without being passed through said passage.

5. A chain pipe-wrench having, in combination, a handle, a head secured to one side of said handle and having opposite grip-faces
90 substantially in line with the faces of the handle, said head extending beyond the end of the handle so as to provide an open-sided chain-receiving passage, locks on both faces of the wrench, and a reversible chain pivotally connected to the head at or near the apex and adapted to be passed through said
95 passage in either direction and locked by one set of said locks, or to be locked on either face of the wrench without being passed through said passage.

In witness whereof I have hereunto signed
100 my name in the presence of two subscribing witnesses.

GEORGE AMBORN, JR.

Witnesses:

F. E. BOWEN,
C. M. CROCKER.