No. 698,779. Patented Apr. 29, 1902.

G. AMBORN, Jr.

CHAIN WRENCH.

(Application filed July 22, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

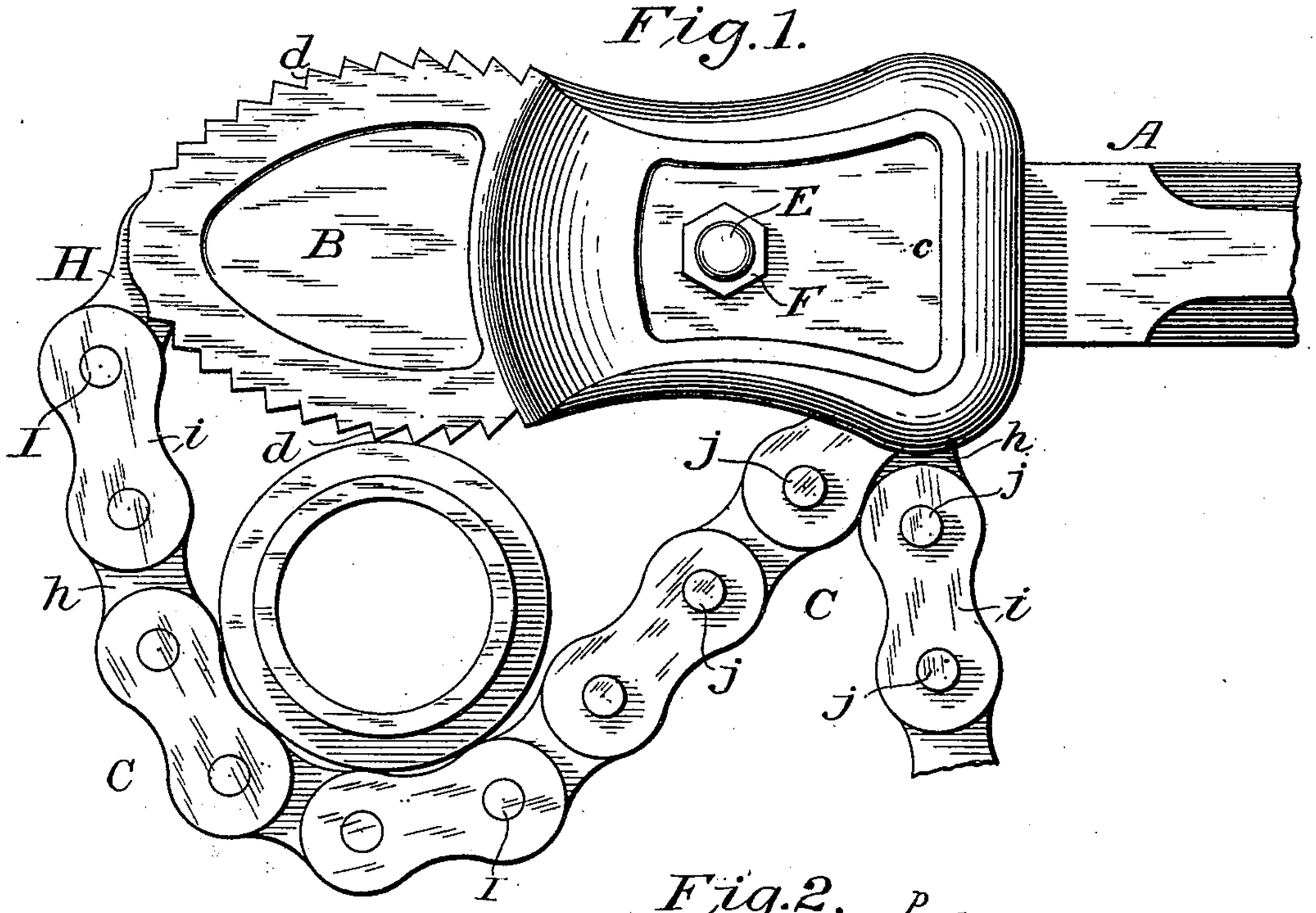

Fig. 2.

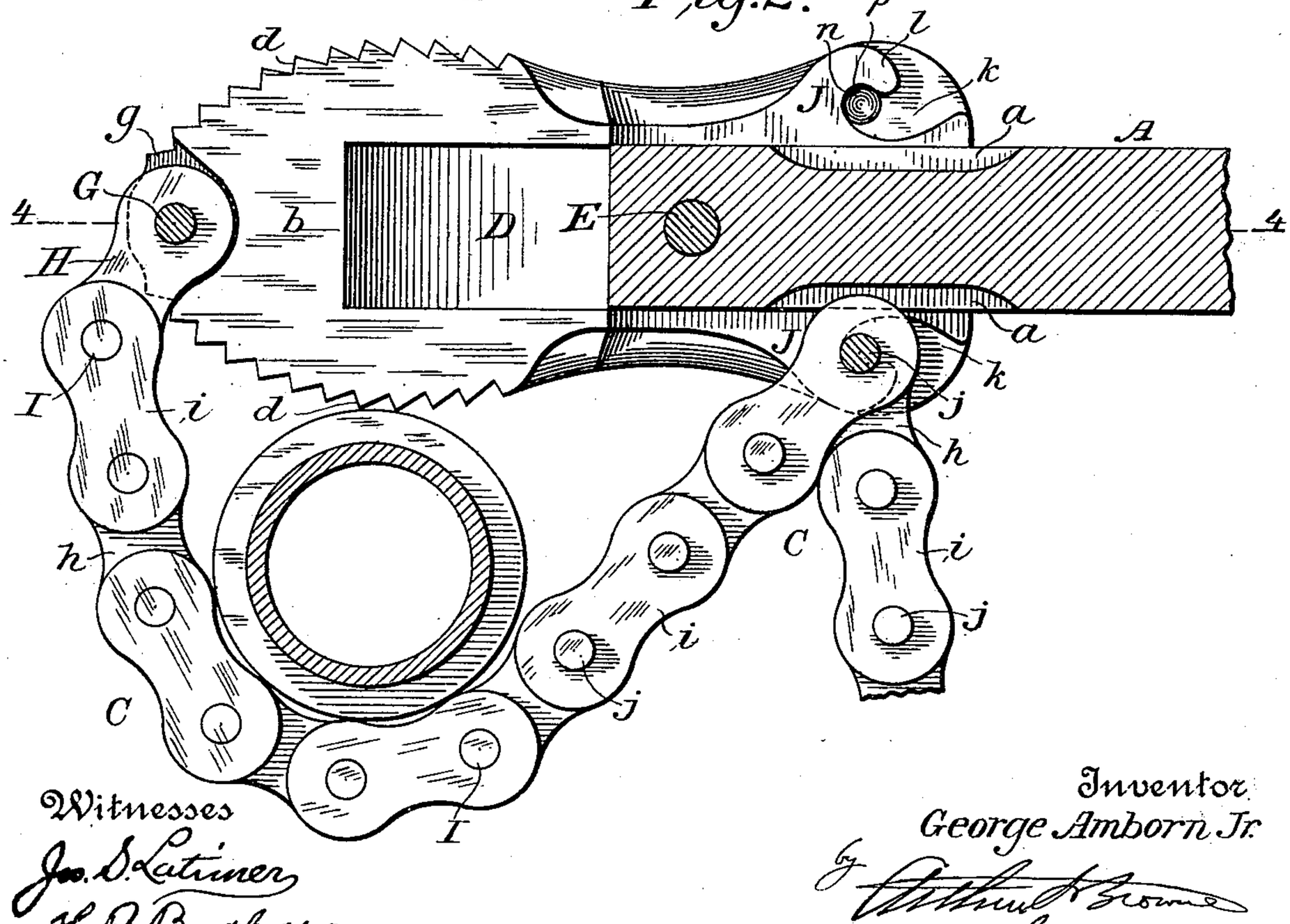

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Fig. 3.

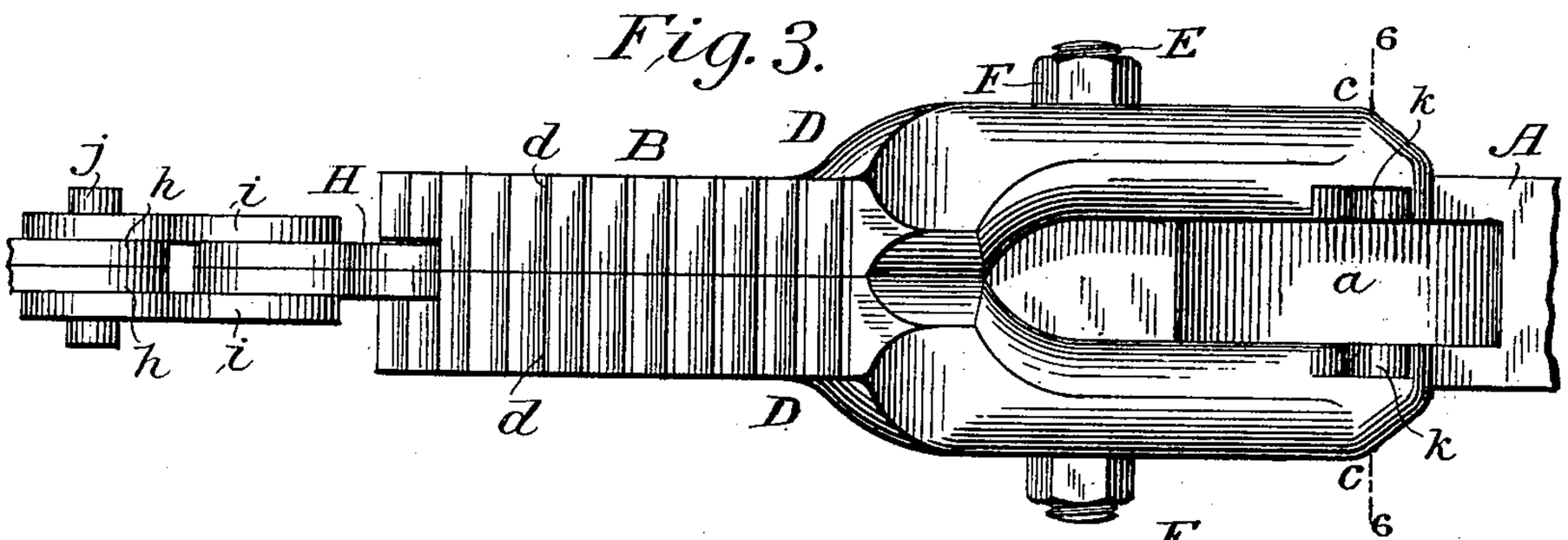


Fig. 4.

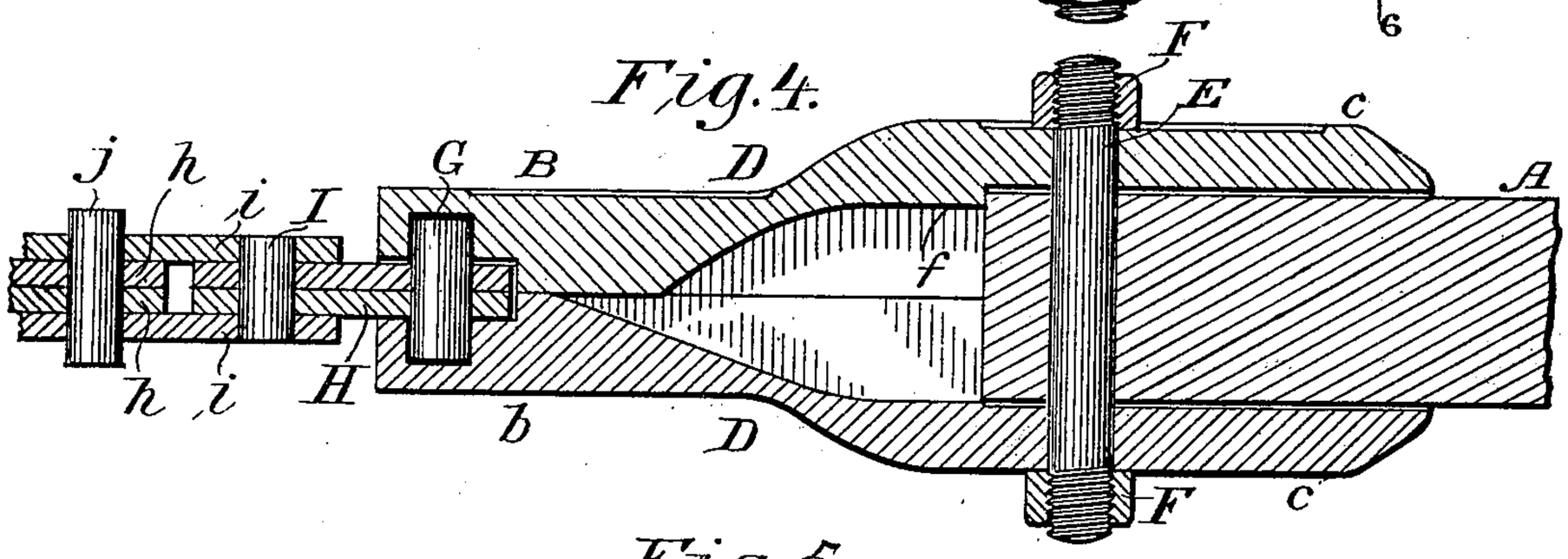


Fig. 5.

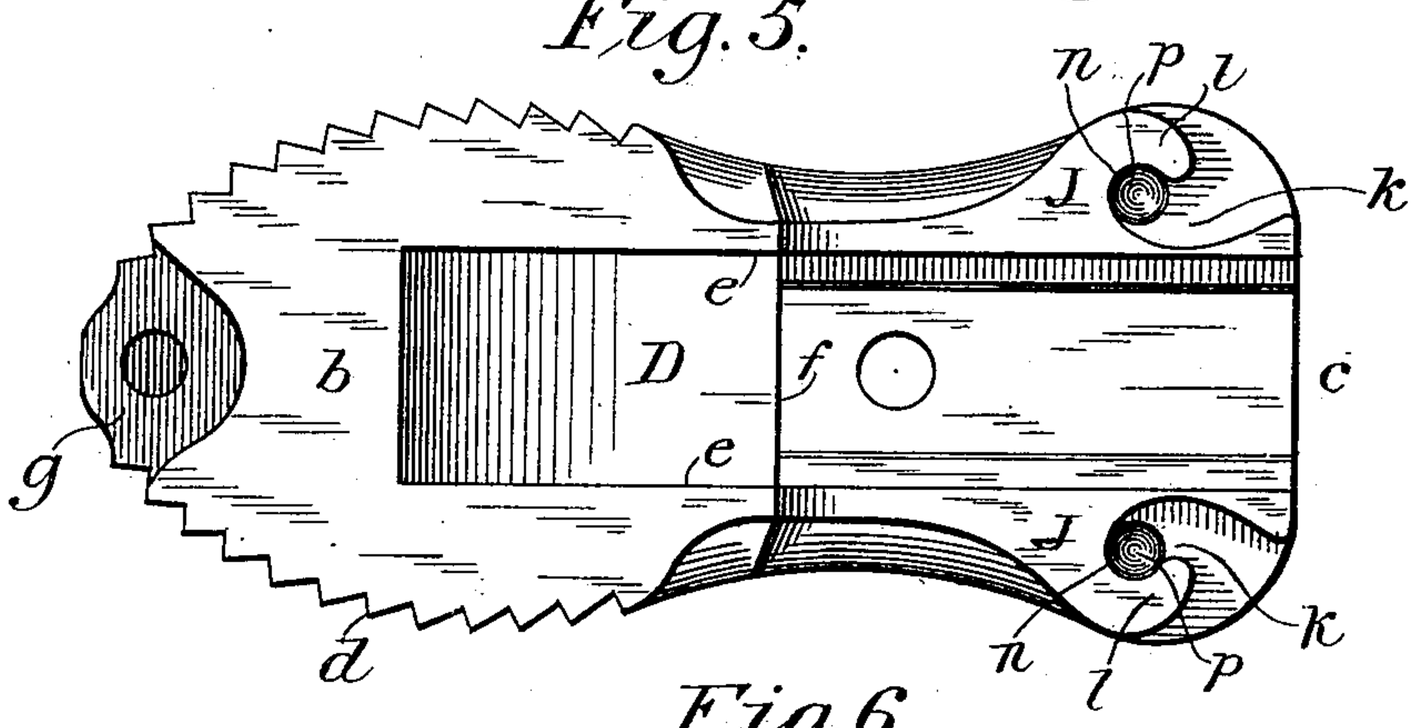
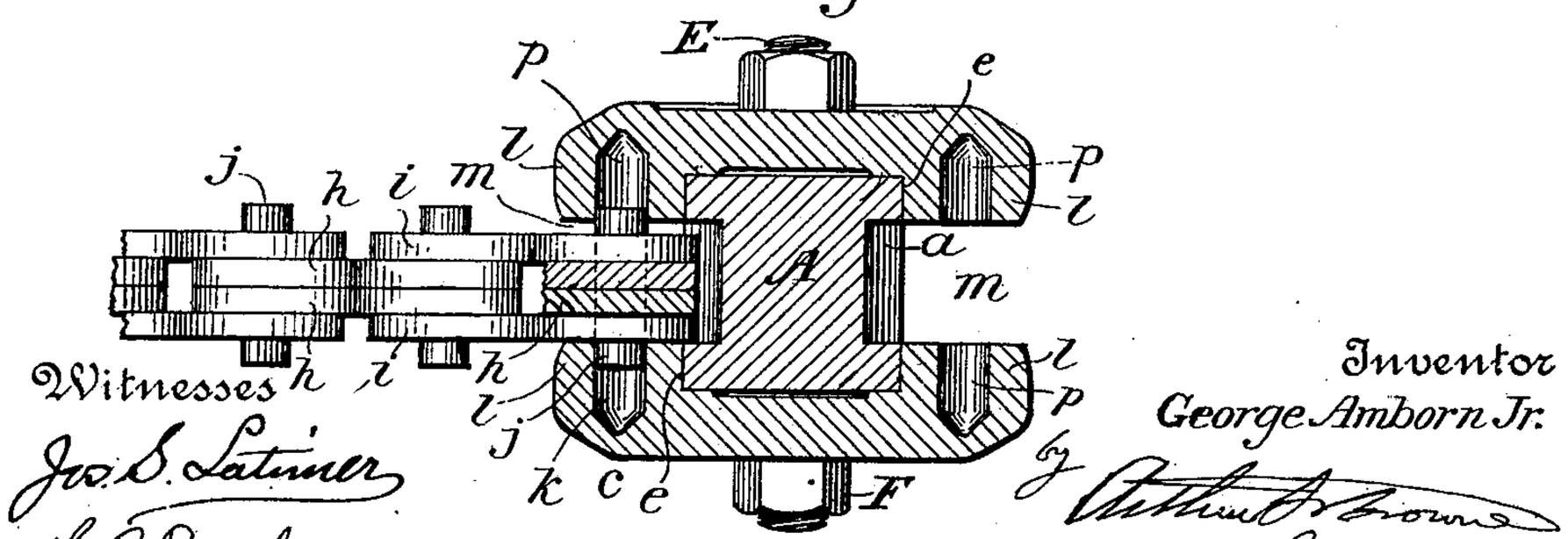


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

Fig. 7.

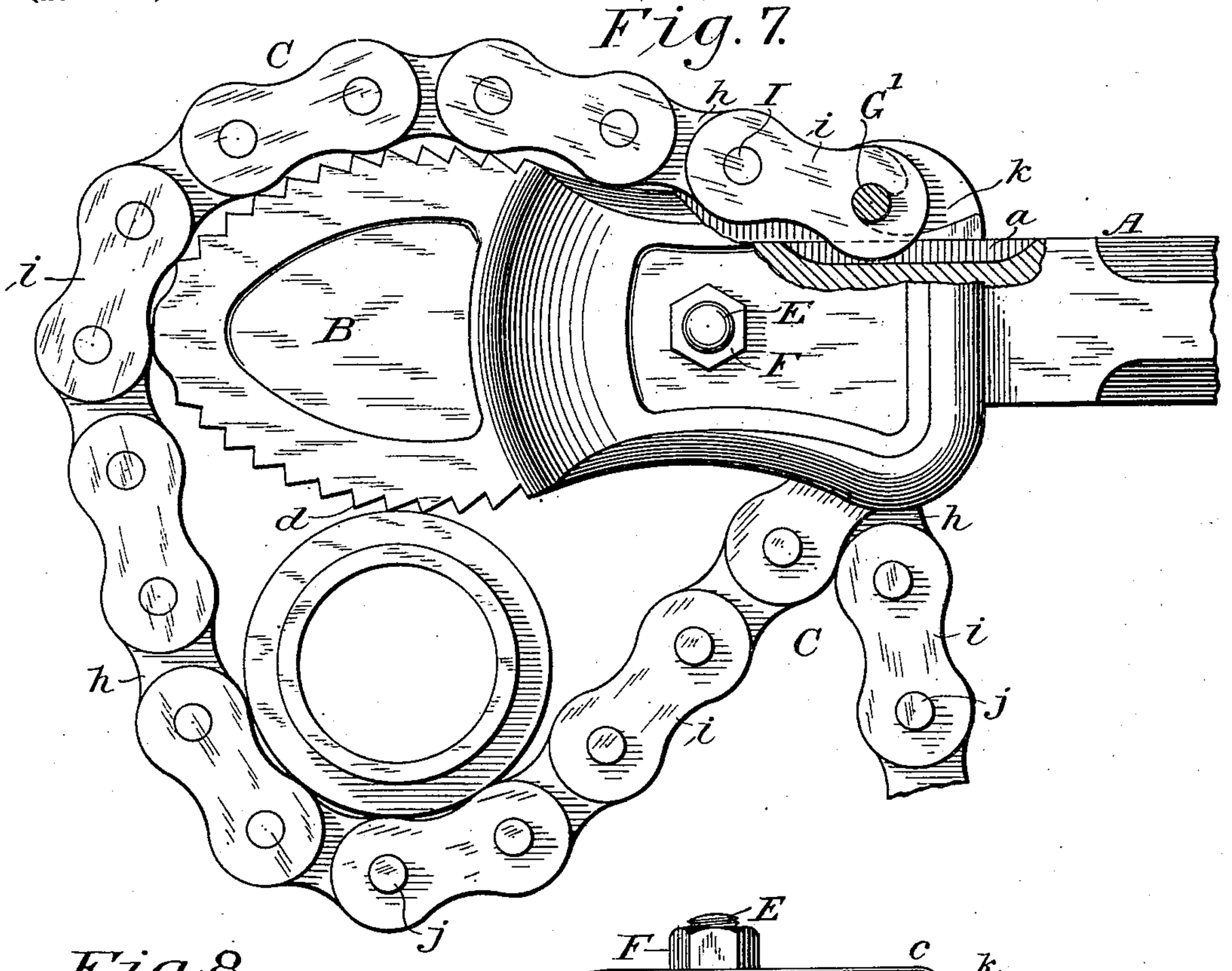


Fig. 8.

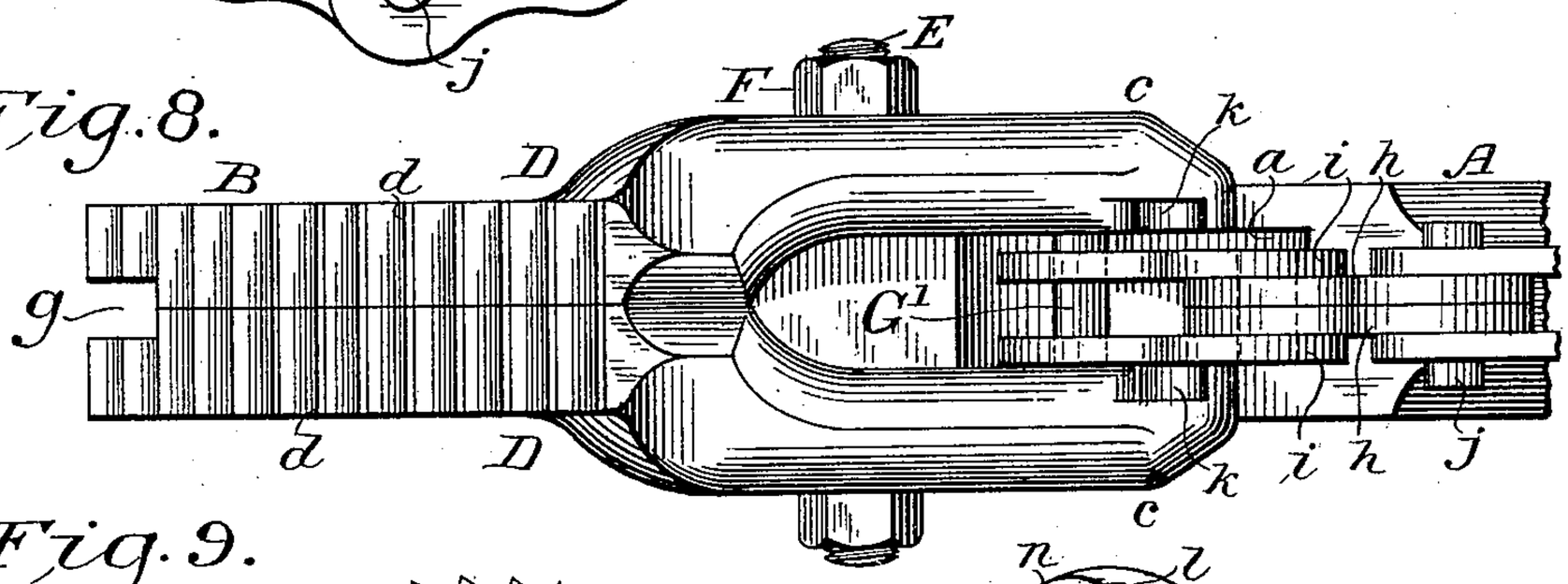
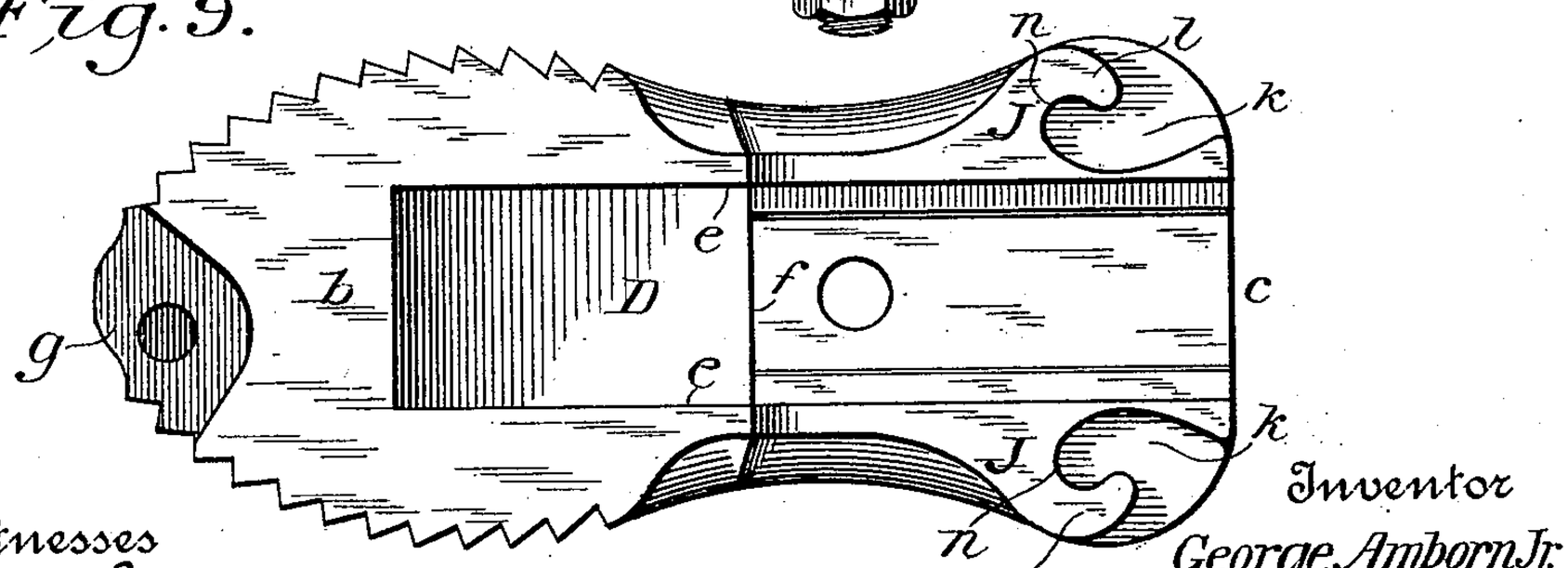


Fig. 9.



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UNITED STATES PATENT OFFICE.

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CHAIN WRENCH.

SPECIFICATION forming part of Letters Patent No. 698,779, dated April 29, 1902.

Application filed July 22, 1901. Serial No. 69,210. (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, county of Kings, city and State of New York, have invented certain new and useful Improvements in Chain Wrenches, of which the following is a specification.

The present invention consists in improvements upon the well-known "Vulcan" wrench, which is manufactured under United States Letters Patent No. 570,213, dated October 27, 1894, No. 570,214, dated October 27, 1894, No. 577,653, dated February 23, 1897, and No. 577,654, dated February 23, 1897. The said "Vulcan" wrench as set forth in said patents comprises a handle, a head rigid therewith, and a reversible swinging chain. In said "Vulcan" wrench the head is bifurcated and the chain is pivoted between the bifurcations, the head being provided on its opposite sides with external gripping-faces, with either of which the chain by being reversed may coöperate, so that the wrench may be used either side up, and provisions are located at the base of the head to lock the chain during use. With the commercial "Vulcan" wrench both "cable" and "flat" chains are used, the flat chain being preferred on account of its greater strength, which is of great importance, owing to the great strains to which this class of wrenches are subjected. When, however, the "Vulcan" wrench is equipped with a flat chain, it cannot be effectively used or can be used only with difficulty in turning pipe-fittings, elbows, T's, and short sections of small diameter connecting pipes of larger diameter. In such cases wrenches with cable-chains are ordinarily employed, and with these the manipulation is frequently difficult, since the chain is askew to the grip-face when so used.

One important object of the present invention is to so construct and organize the parts of a chain wrench that the pipe or other article to be grasped shall be squarely embraced between the reversible chain on one side and either of the opposing grip-faces on the other in order to facilitate the grasping of fittings, T's, elbows, short pipe-sections, and the like, and by preference a flat chain is employed, since when brought into the new organization the resulting structure possesses advantages which cannot be secured if a cable-chain is employed. The improved organization and construction also increase the strength of the wrench as a whole, and at the same time the wrench can be made more economically.

The accompanying drawings illustrate a wrench embodying the present improvements.

In said drawings, Figure 1 is a side view of the improved chain wrench, showing the same as it appears when in use, the handle and a portion of the chain being shown broken off, so as to enable the illustration to be on an adequate scale. Fig. 2 is a longitudinal section. Fig. 3 is a face view of the head and portions of the handle and chain. Fig. 4 is a longitudinal section in a plane indicated by the line 4 4 in Fig. 2. Fig. 5 is an inside view of one of the jaws constituting the head when detached. Fig. 6 is a cross-section in the plane indicated by the line 6 6 in Fig. 3. Fig. 7 is a side view similar to Fig. 1, but partly in section, as in Fig. 2, showing how the wrench can be altered so as to be used as a non-reversible chain wrench. Fig. 8 is a detail plan view of the same. Fig. 9 is a view similar to Fig. 5, illustrating a different location of the chain-pivot.

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. 3 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 to afford room for the chain when the wrench is in use.

The head B is composed of two exactly-similar detachable sections D D, each of which has a gripping member *b* and a fastening member *c* integral therewith. The two gripping members of the two sections lie closely

together, as shown in Fig. 2, the joint between them being in line with the middle longitudinal line of the handle and also of the chain. The gripping members are similarly serrated to constitute grip-faces, as shown at *d*, Figs. 1 and 3, to coöperate with the chain in grasping a pipe or other embraced article to be turned. These grip-faces *d d*, it will be noted, are practically continuous from side edge to side edge and may properly be regarded as extensions of the faces of the handle A. The fastening members *c c* of the two head-sections D D extend outwardly from the gripping members, so as to embrace the end of the handle on its sides, as clearly shown in Figs. 3 and 4. Each member *c* has a recess on its inner face provided with straight longitudinal shoulders *e* to fit over the handle, as shown in Figs. 5 and 6, and it may have a cross-shoulder *f* to fit the end of the handle, as shown in Figs. 4 and 5. As shown, however, in connection with one of the head-sections D in Fig. 4, this cross-shoulder *f* may be omitted. The two head-sections D D may be secured to each other and to the handle by any appropriate means. There is shown in the drawings a bolt E, Fig. 4, screw-threaded at both ends and passing through apertures in the handle and in both head-sections, upon the outward-projecting ends of which screw fastening-nuts F F. It is obvious that a headed bolt and a single nut might be employed or other equivalent fastening means. By reason of this fastening means and the fitting of the end of the handle in the closely-fitting shouldered recesses in the head-sections D D the head and handle are securely, rigidly, and strongly held together. At the same time should the grip-faces wear out or any part break the several parts can be readily separated and a fresh piece substituted for the defective part. The head-sections are made of a better quality of steel than the handle, and hence their separability from the handle renders the construction economical.

The reversible flat chain C is pivotally connected with the head at the apex thereof. The apex of the head has a central open slot *g* formed half in each section D, which communicates with two lateral pin-receiving recesses, one in each section, in which recesses enter the ends of a pivot-pin G, (see Fig. 4,) said pin hence extending across said slot *g*. This pin is put in place when the head-sections D D and the handle are assembled, and hence is securely retained in place. The terminal link H of the chain enters this slot, and the pin G extends through a lateral aperture in said link, so that said link, and hence the chain, swivels on said pin as a pivot. The chain, as shown, is a flat chain composed of similar links, the links being arranged in succession, with a pair of parallel internal links *h h* lying side by side and a pair of parallel external links *i i* embracing the links *h h* and pivotally connected by a cross-pin I, preferably connected immovably (by upsetting or endwise compression) with the outer links *i i* and passing loosely between the inner links *h h*, which swivel thereon. The terminal links H, connecting chain and head, is shown as composed of two of the inner links *h h*. The pins I I project outwardly on both sides of the chain to constitute projecting locking-studs *j j*, which interlock with suitable locking provisions J J at or near the base of the head. These locking-studs may be omitted throughout that portion of the chain nearest the pivot-pin G, which can under no circumstances register with the locking provisions J J; but to avoid showing a long section of chain in Fig. 2 the studs *j j* are illustrated closer to the pin G than is necessary in practice.

The locking provisions J J, (see Figs. 5 and 6,) which coöperate with the studs *j j*, consist of two rearwardly-extending grooves *k k* in the inner face of projecting portions or ears *l l* of each fastening member *c* of each head-section D, one of this pair of grooves being at each face of the handle A. As shown, the projecting portions or ears *l l* of the two sections D form a chain-receiving recess *m*, of which the handle A is the bottom, and the locking-slots *k k* face this recess and open thereinto. These slots curve inwardly and forwardly and are open at the rear to receive the chain-studs *j j* and are closed at their bottoms to form seats *n n*, against which the studs *j j* bear when the wrench is in use. The outer margins of the slots *k k* may be regarded as inwardly-projecting locking-lugs, with which the studs *j j* engage and which prevent the displacement of the chain during use. These locking provisions are, it will be noted, at both faces of the head, so that whichever way the chain is swung on its pivot G it can be locked. These locking-lugs incline inwardly toward the handle, as in the wrench set forth in United States Patent No. 499,508, dated June 13, 1893, so as to prevent the chain becoming accidentally unlocked when the wrench is in use with the chain underneath.

A plane perpendicular to the axis of the pivot G bisects longitudinally the head, the handle, and the chain, and said three devices are symmetrical on both sides of this plane. Consequently when the wrench is in use the article to be turned is symmetrically and squarely embraced by one of the grip-faces *d* on one side and by the chain on the other, thus enabling any pipe-fitting or similar device to be squarely grasped and readily turned. It will be noted that each grip-face is continuous from side edge to side edge, and hence affords a thrust-bearing for the article to be turned in opposition to all parts of the chain which bear against the other side of said article. The head, it will be noted, is central with reference to the handle, and its grip-faces extend across the plane of the handle—that is to say, across a central longitu-

dinal plane passing through the axis of the handle and centrally between the locking lugs or studs on each face of the handle, so that the chain and head are directly opposed to each other, thereby embracing squarely between them the article to be turned when the wrench is in use. Also the plane at right angles to the foregoing plane—that is to say, the plane on which the section shown in Fig. 4 is cut and which is indicated by the line 4 4 in Fig. 3—bisects the handle, head, and chain, and all of said parts are also symmetrical on both parts of this plane, thus securing complete reversibility of the wrench and enabling it to be used indifferently either side up or out, as may be most convenient.

Under some circumstances it may be desirable to use the wrench in a manner analogous to that in which the "Vulcan" wrench is used, and to that end the improved wrench is constructed so as to be convertible. To this end the ears *l l* of the sections D D are provided with pin-receiving recesses *p p*, (see Figs. 5 and 6,) communicating with the slots *k k*, into which (on either face of the handle A and extending across either recess *m*) may be placed a pivot-pin G′, (see Figs. 7 and 8,) to which the chain may be hung. The chain can then be used as shown in Fig. 7, its locking-studs engaging the locking provisions J J at the other face. The wrench is then not reversible except by taking the wrench apart and transferring the pin G′ and the corresponding end of the chain to the other face of the handle. In either case the pin G′ is held in place in a fixed definite position (just as the pin G is held in place) by the assemblage of the parts. In this arrangement a pair of the outer links *i i* of the chain constitute the terminal of the chain which is connected with the pivot-pin G′, so that the chain does not have undue sidewise play along pin G′ in recess *m*. Of course when the wrench is thus used the pin G is not in use.

Under ordinary circumstances the locking-studs *j j* of the chain in coöperation with the lugs *l l* give a sufficiently fine adjustment to enable any size of pipe to be efficiently grasped, particularly since the contour of the grip-faces is especially designed to secure this result. In case, however, a still finer adjustment is deemed expedient it is attained by the construction shown in Fig. 9. As here shown, the lugs *l l* are equidistant from the chain-pivot G; but the pivot is eccentrically located relatively to the middle line of the central head, and consequently it takes a longer reach of chain to connect with the lugs on one side than on the other, and the relation is such that this difference is approximately one-half the lengthwise distance on the chain between adjacent locking-studs. This obviously gives a fine adjustment.

A wrench embodying the present improvements is rendered strong, among other reasons, because the handle is not split to receive the chain and because the strains involved in use are squarely borne by the head in line with the length of the handle.

I claim as my invention—

1. A chain wrench having, in combination, a handle with chain-receiving recesses in the opposite faces; a head with opposite grip-faces in line with the faces of the handle, said head being composed of two like sections which at their bases embrace the end of said handle at the sides, said head-sections being recessed and shouldered on their facing surfaces to fit the end of the handle, the outer ends of said head-sections meeting beyond the end of the handle so as to provide substantially continuous gripping-surfaces on each face, and said sections being formed near their common apex with pin-receiving recesses closed at their ends but communicating with an open-mouthed slot extending to the apex of the head; means for securing the head-sections to the handle; a pivot-pin located in said pin-receiving recesses, and retained in place by the assemblage of the head-sections to the handle; a reversible flat chain pivotally connected to the said pivot-pin and symmetrically disposed with reference to a longitudinal plane extending medially through the handle and the grip-faces, said chain having laterally-projecting locking-studs; and locking provisions on said head-sections near the base thereof and on both faces of the wrench, said locking provisions coöperating with said chain-studs, and being constructed so as to prevent the chain becoming accidentally detached when in use.

2. A chain wrench having, in combination, a handle; a head with opposite grip-faces, said head being composed of two sections which at their bases embrace the end of said handle at the sides, and the outer ends of said head-sections meeting beyond the end of the handle so as to provide substantially continuous gripping-surfaces on each face; means for securing the head-sections to the handle; a chain pivotally connected at the apex of said head; and locking provisions for said chain near the base of said head.

3. A chain wrench having, in combination, a handle; a head composed of two sections which at their bases embrace the end of said handle at the sides, the outer ends of said head-sections meeting beyond the end of the handle, and said sections being formed near their common apex with pin-receiving recesses closed at their ends but communicating with an open-mouthed slot extending to the apex of the head; means for securing the head-sections to the handle; a pivot-pin located in said pin-receiving recesses, and retained in place by the assemblage of the head-sections to the handle; a chain pivotally connected to the said pivot-pin; and locking provisions for said chain near the base of said head.

4. A chain wrench having, in combination, a handle; a head composed of two sections which at their bases embrace the end of said

handle at the sides, the outer ends of said head-sections meeting beyond the end of the handle, and said sections being formed with pin-receiving recesses closed at their ends; means for securing the head-sections to the handle; a pivot-pin located in said pin-receiving recesses, and retained in place by the assemblage of the head-sections to the handle; a chain pivotally connected to the said pivot-pin; and locking provisions for said chain near the base of said head.

5. A chain wrench having, in combination, a handle; a head with opposite grip-faces in line with faces of the handle, said head being composed of two sections which at their bases embrace the end of said handle at the sides, said head-sections being recessed and shouldered on their facing surfaces to fit the end of the handle, the outer ends of said head-sections meeting beyond the end of the handle so as to provide substantially continuous gripping-surfaces on each face; means for securing the head-sections to the handle; a pivotally-connected chain; and locking provisions for the chain.

6. A chain wrench having, in combination, a handle; a head composed of two sections which at their bases embrace the end of said handle at the sides, the outer ends of said head-sections meeting beyond the end of the handle; means for securing the head-sections to the handle; a pivotally-connected chain; and locking provisions for said chain.

7. A chain wrench having, in combination, a handle; a head with opposite grip-faces extending across the plane of the handle, each grip-face extending on both sides of a plane passing centrally and longitudinally through the handle, said head comprising a section which at its base seats upon the end of said handle at its side, the outer end of said head-section extending beyond the end of and in line with the handle; means for securing the head to the handle; a pivotally-connected chain opposed to said head and having, when in use, a fixed definite pivotal point; and locking provisions for said chain.

8. A convertible chain wrench having, in combination, a handle, a two-part detachable central head with opposite grip-faces extending across the plane of the handle, means for securing said head to said handle, and a chain, said head being constructed with pin-receiving recesses near its apex and also near its base, adapted to receive and maintain in fixed definite position a pivot-pin for the attachment of the chain, said recesses being accessible for the reception of the pivot-pin and the chain when the head-sections are detached from the handle, and said pivot-pin and chain being secured in place by the assemblage of the handle and head-sections, and said chain and head being opposed to each other so that when in use they embrace squarely between them the article to be turned.

9. A convertible chain wrench having, in combination, a handle, a central head with opposite grip-faces extending across the plane of the handle and a chain, said wrench being constructed with means near the apex and also near the base of the head to receive and retain in fixed definite position a pivot-pin for the attachment of the chain, said chain and head being opposed to each other so that when in use they embrace squarely between them the article to be turned.

10. A chain wrench having, in combination, a handle, a head, locking provisions on opposite faces of the wrench, and a reversible chain, adapted to engage with the locking provision on either face, said chain being pivotally connected to the head so as to swing over the head in both directions by means of a pivot having a fixed definite eccentric location at one side of a longitudinal plane passing through the apex of the head and midway between the said locking provisions on opposite faces of the wrench, whereby fine adjustment of the chain is secured.

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

GEORGE AMBORN, JR.

Witnesses:
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F. E. BOWEN.