

(No Model.)

2 Sheets—Sheet 1.

E. J. BROOKS.

Nut Lock.

No. 237,659.

Patented Feb. 8, 1881.

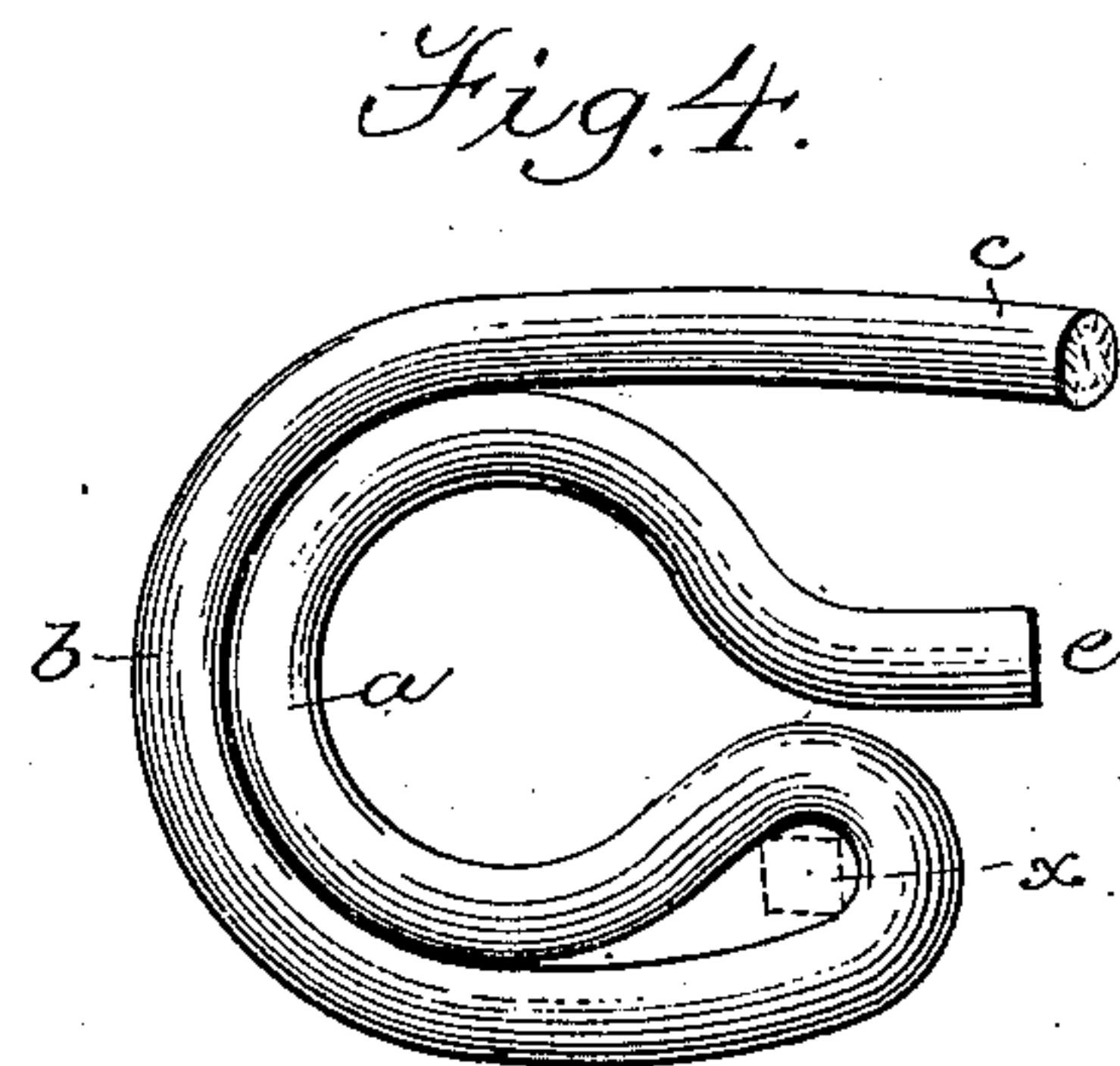
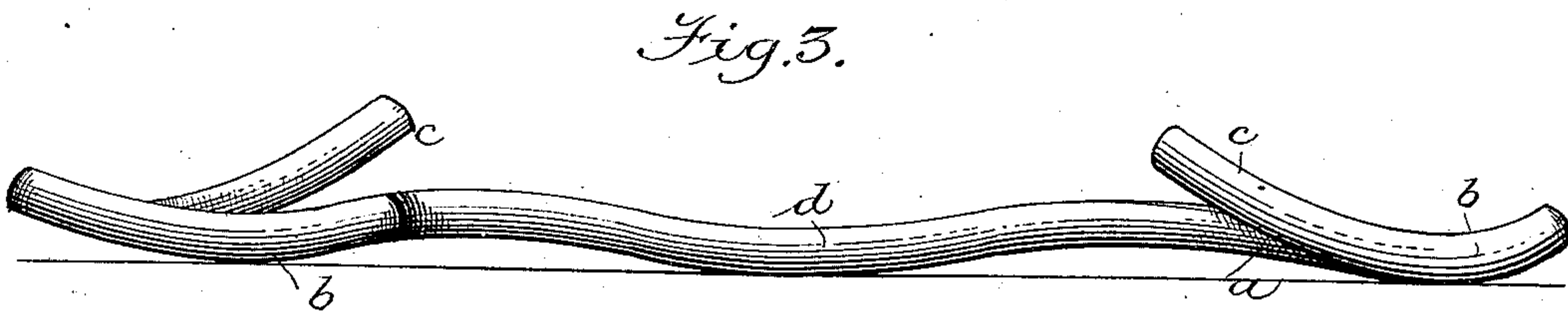
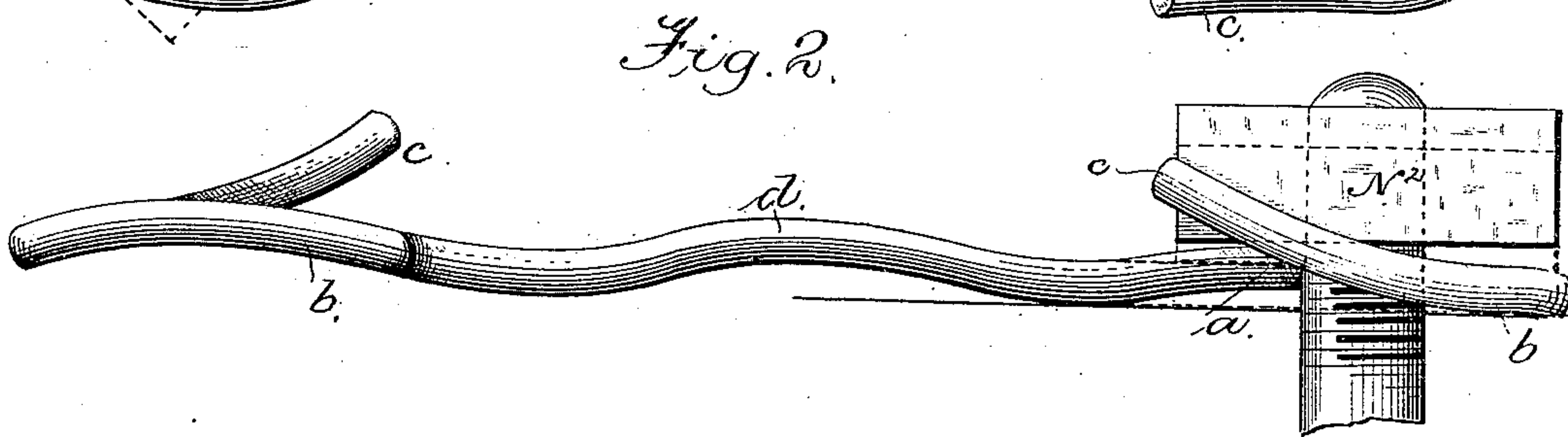
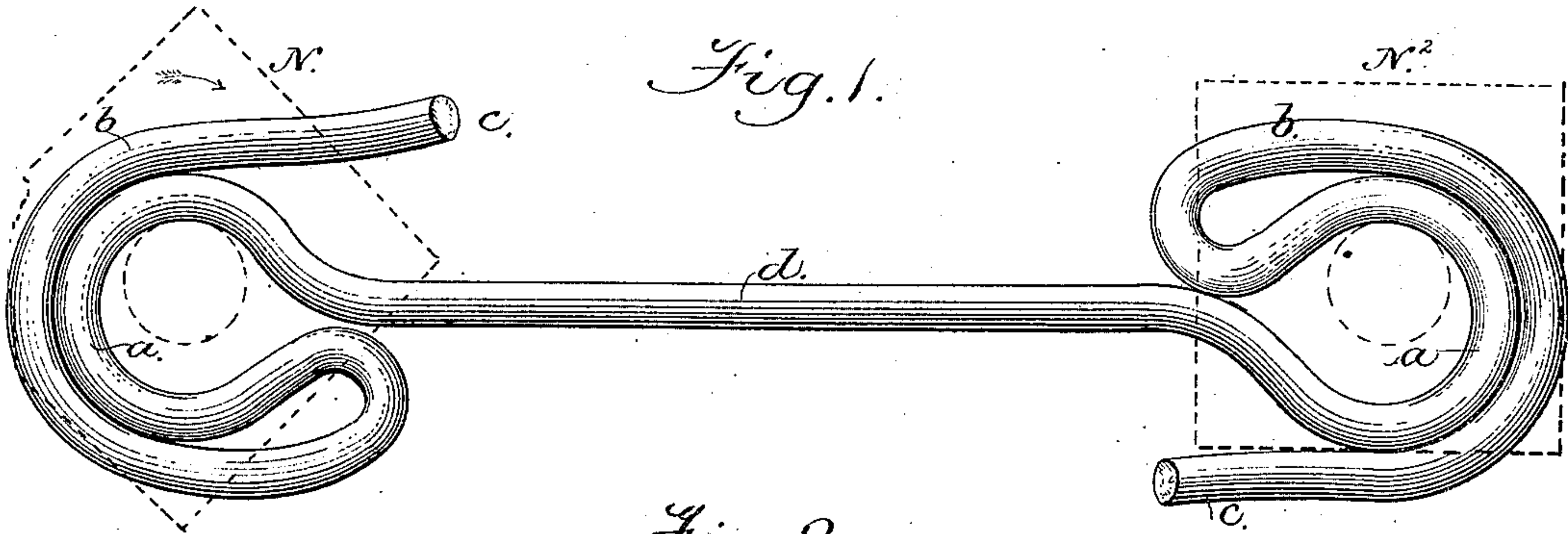
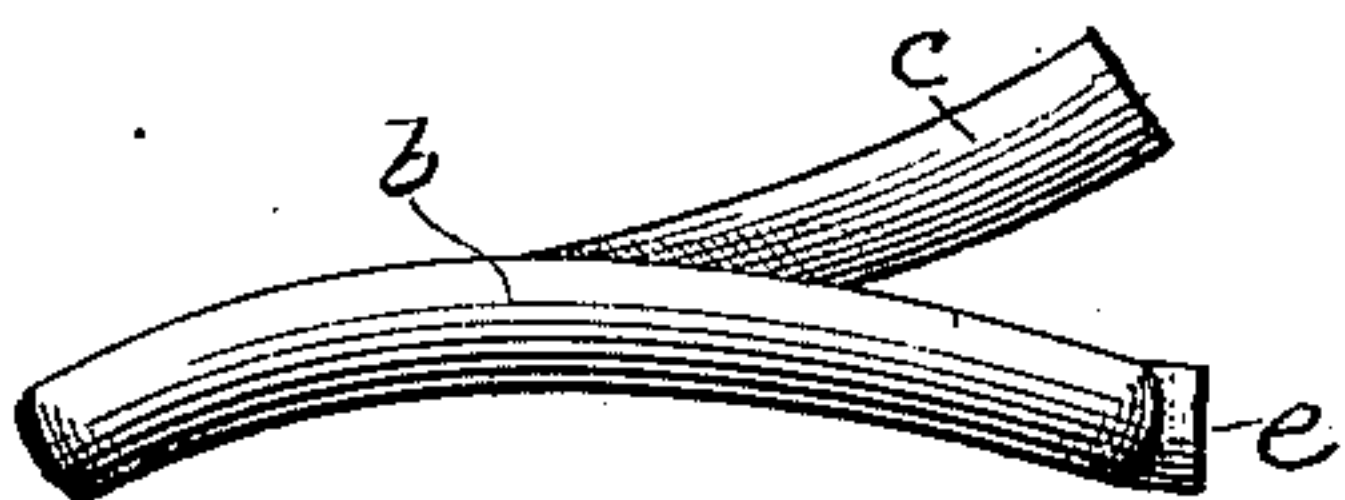


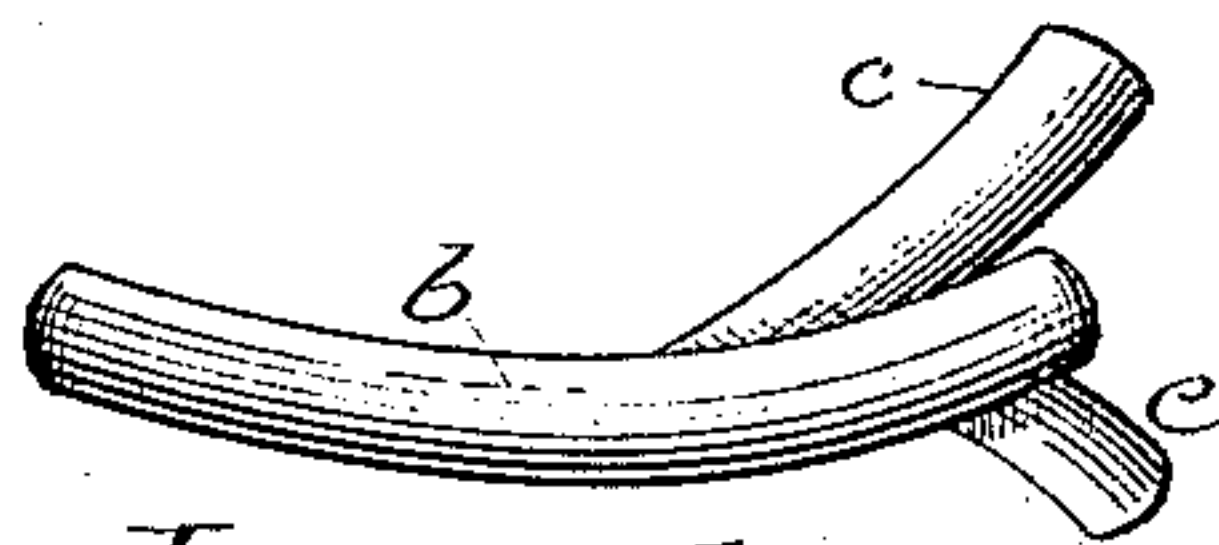
Fig. 5.



Witnesses:

J. Walter Fowler,
W. C. Chaffee

Fig. 6.



Inventor.
Edward J. Brooks,
by *As. & E. E. Ewin*,
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(No Model.)

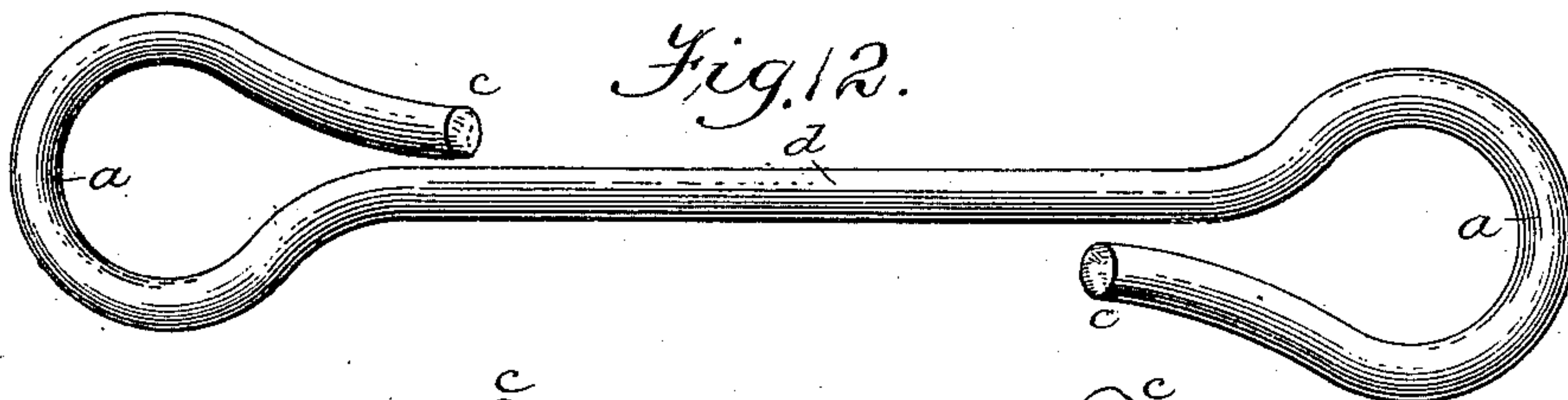
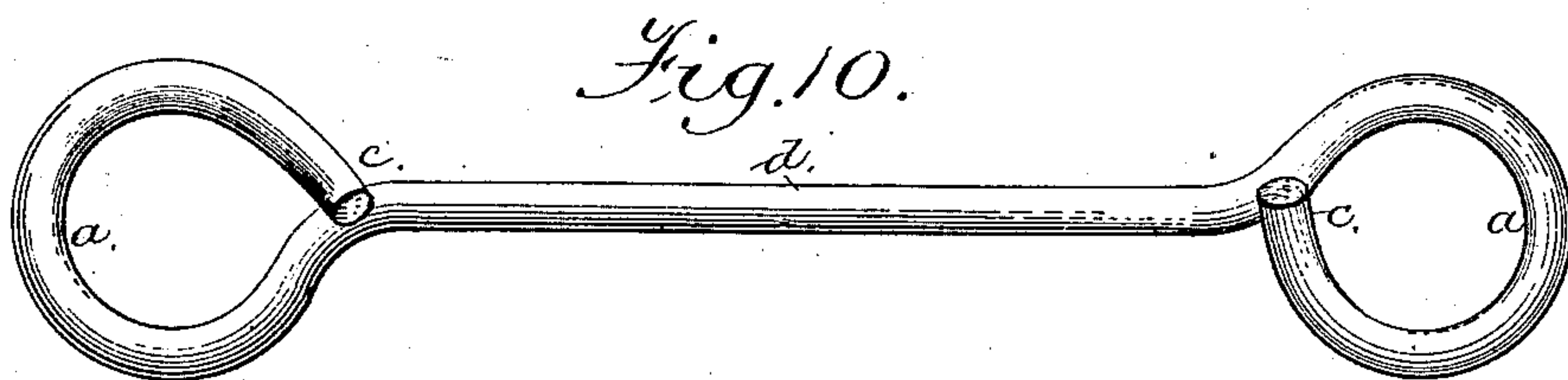
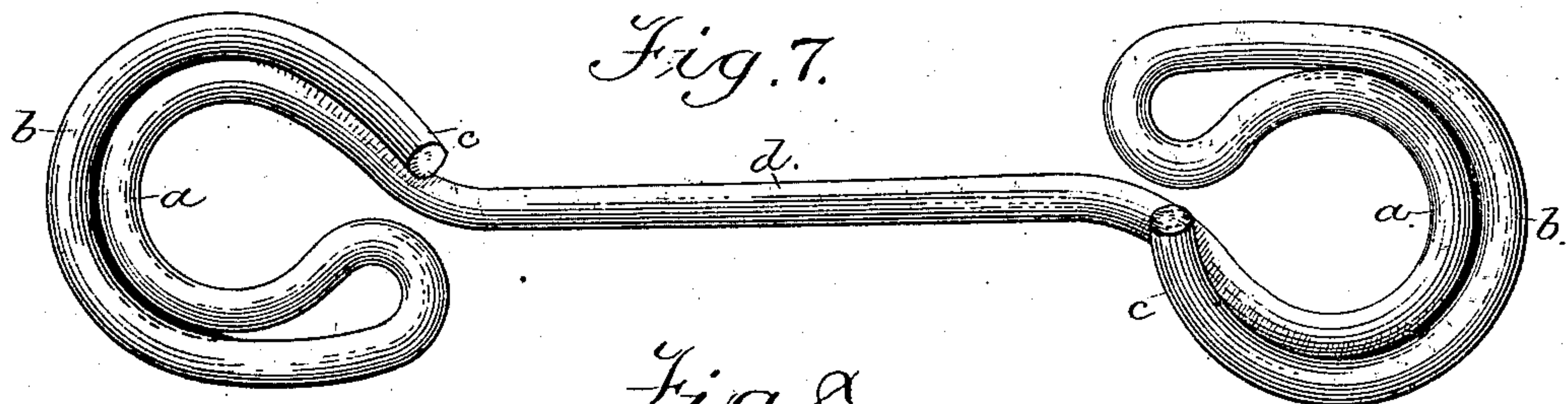
2 Sheets—Sheet 2.

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Witnesses:

F. Walter Fowler,
W. C. Chaffee

Inventor.

Edward J. Brooks,
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UNITED STATES PATENT OFFICE.

EDWARD J. BROOKS, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO E. J. BROOKS & CO., OF NEW YORK, N. Y.

NUT-LOCK.

SPECIFICATION forming part of Letters Patent No. 237,659, dated February 8, 1881.

Application filed November 8, 1880. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. BROOKS, a citizen of the United States, residing at East Orange, in the State of New Jersey, have invented a new and useful Improvement in Nut-Locks, of which the following is a specification.

This invention relates to means for securing screw-nuts upon bolts against the loosening effect of jars, &c., and it relates to those devices for this purpose which are distinctively known as "nut-lock washers," some of which have been made of wire.

The present invention is an improvement more particularly upon the wire nut-lock washers of Fred C. Hamilton, patented October 5, 1875; and it consists in certain novel features of construction hereinafter specified.

The object of the present invention has been, and is, to produce, by simple machinery and dies, elastic bent wire nut-lock washers having all the advantages of the Hamilton washer, and the following additional advantages, namely: first, adaptation to be made elastic, with the utmost degree of strength in the spring-bends, and with this quality produced in single and double washers alike, the stiff bolt-embracing portions, with their two or more thicknesses of wire, being utilized for this purpose; second, adaptation for manufacture, either "single" or "double," by one and the same set of machinery and dies, each end of each double washer being complete in itself; third, adaptation to be made double, with stiff elastic ends of two or more thicknesses and a connecting portion of single thickness, thus economizing stock.

In the accompanying drawings, which form part of this specification, Figure 1 is a face view of a double nut-lock washer illustrating this invention. Fig. 2 is an edge view thereof, and Fig. 3 is an edge view of another double washer bent differently. Fig. 4 is a face view of a single washer made according to this invention. Fig. 5 is an edge view thereof, and Fig. 6 is an edge view of another single washer bent differently. Fig. 7 is a face view, Fig. 8 an edge view, and Fig. 9 an end view, of another double washer, illustrating a superior combination of bends; and Figs. 10 and 12 are

face views, and Figs. 11 and 13 are edge views, of two double washers illustrating additional modifications.

Like letters of reference indicate corresponding parts in the several figures.

In the preferred forms of my wire nut-lock washer, illustrated by Figs. 1 to 9, inclusive, each end of each double washer and each single washer is constructed with an inner loop, *a*, which is nearly circular and of sufficient diameter to fit a bolt of given size loosely, and with an outer portion, *b*, of U shape, partially surrounding said loop *a*, connected therewith at one end, and forming at its free extremity an inclined holding end, *c*, the latter being adapted to engage with the sides of a nut successively, and to lock the nut against unscrewing in customary manner, as illustrated by Fig. 1. The nuts on a pair of bolts are indicated at *N N*² in this figure by dotted lines. The nut *N* illustrates the operation of receiving the nut as it is screwed home. As the nut turns in the direction indicated by the arrow thereon its corners successively force down the holding end *c* before them. The nut *N*² illustrates the locking operation. The projecting holding end *c* engages with one of the flat sides of the nut and precludes unscrewing until the nut is released by forcing back the holding end. The holding end may be substantially straight and tangential, as shown in Figs. 1 to 6, or may preferably be turned inward, as shown in Figs. 7 to 9.

To adapt the washers to prevent rattling, and to insure an efficient lock when the nuts are not fully screwed home, each end of each double washer and each single washer is bent transversely through its bolt-embracing loop *a*, so as to present an arched back, either toward the nut, as illustrated by Figs. 2 and 5, or toward the opposing surface, as illustrated by Figs. 3 and 6. The operation in both cases is substantially the same, and is illustrated by Fig. 2. A nut, *N*², is shown in full lines in this figure as locked in contact with the body of the washer, but without flattening the latter, and in dotted lines the same is shown fully home with the washer in its flattened condition. Until the latter condition of the washer is reached, and within a considerable scope, it

operates as a spring or elastic cushion, for the purposes above stated.

In Figs. 1 to 6 I have shown a single spring-bend through each bolt-embracing loop at right angles to the longitudinal axis of the washer. Such bends may cross the loops *a* in other lines, and preferably in two or more directions, as illustrated by Figs. 7 to 9, which show a double washer, the ends of which are arched in line with and also at right angles to the longitudinal axis of the washer.

To keep the washers from turning under the nuts, and to facilitate making and handling them, they are preferably made double, as shown, for example, in said Figs. 1 to 3 and 7 to 9, for use at rail-joints, and at other places where bolts are arranged in pairs, the washer ends above described being united by integral single-tie portions *d*, which may be either arched or straight; but equally efficient single washers may be constructed according to my invention, as illustrated by Figs. 4, 5, and 6. As used upon wood, such single washers may be held against turning by a nail driven through the small loop which connects the portions *a* and *b* of each washer, as indicated at *x* in Fig. 4; or for use upon wood or metal the inner terminal end of each washer may be bent backward more or less, to form a washer-holding end, *e*, which may engage with the groove in a grooved fish-plate, for example, or may hold sufficiently by biting on a smooth surface.

In the modifications illustrated, respectively, by Figs. 10 and 11 and Figs. 12 and 13, the outer portions, *b*, above described, are omitted, the holding ends *e* being formed in continuation of the bolt-embracing loops *a*, and in the former the holding ends constitute parts of the bolt-embracing loops, being designed to engage with the backs of the nuts, the latter to be either plain or provided with radial holding ribs or grooves, as shown, for example, in the said Hamilton patent. Washers of this form, and of the form illustrated by Figs. 7 to 9, provide for unscrewing the locked nuts by simply applying sufficient force thereto, the holding ends being adapted to yield in either direction without undue strain.

In manufacturing my said nut-lock washer in any of its forms I use heavy wire or light bar iron or steel, which may be of any preferred shape in cross-section. Annealed steel

wire of round section and suitable size is preferred. This is cut into proper lengths to form double washers or pairs of single washers, and the respective ends of each blank are bent (by a simple and compact bending-machine) into either of the described shapes, care being taken to reverse the blank before forming the second end of a double washer. In producing said preferred forms of my nut-lock washer, for example, each end of the blank is first bent (around a mandrel) to form a loop, *a*, and then rebent to form the outer portion, *b*, and holding end *e* belonging to said loop. The washers are next bent transversely, as above described, by "dropping" or pressing them between dies, and the holding ends *e* are turned up at the same or a subsequent operation. Single washers may be cut apart either before or after being dropped or pressed, or they may preferably be formed and severed successively without first cutting the wire into blanks. The washers are finished by hardening them and protecting them against oxidation by ordinary means.

The machinery and dies above referred to form no part of the present invention, and may be constructed on well-known principles which will suggest themselves to those skilled in making articles of bent wire.

Having thus described my said invention, I claim—

1. A nut-lock washer of elastic wire, having a bolt-embracing loop and arched at or in line with said loop, substantially as herein specified, for the purposes set forth.

2. A wire nut-lock washer having an inner bolt-embracing loop, a rebent outer portion partially surrounding said loop, and an inclined holding end at the free extremity of said outer portion, substantially as herein specified, for the purposes set forth.

3. A nut-lock washer of elastic wire, having a pair of arched bolt-embracing loops with rebent outer portions and holding ends at the extremities of a single tie portion, substantially as herein specified, for the purposes set forth.

EDWARD J. BROOKS.

Witnesses:

GEO. H. BROWN,
SALOMON VOS.

It is hereby certified that in Letters Patent No. 237,659, granted Feb. 8, 1881, to E. J. Brooks & Co., assignees of E. J. Brooks, for an improvement in Nut Locks, the grant was erroneously made to "E. J. Brooks & Co., their heirs or assigns," when it should have been to "E. J. Brooks & Co., its successors or assigns;" it appearing that said assignee is a corporation and not a firm; that the proper corrections have been made in line 16 of said Letters Patent and in the files and records of the Patent Office.

Signed, countersigned, and sealed this 14th day of February, A. D. 1881.

[SEAL.]

Countersigned:

E. M. MARBLE,
Commissioner of Patents.

A. BELL,
Acting Secretary of the Interior.