

No. 661,655.

Patented Nov. 13, 1900.

A. V. BRYCE.

LOCK NUT.

(Application filed Feb. 20, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 4.

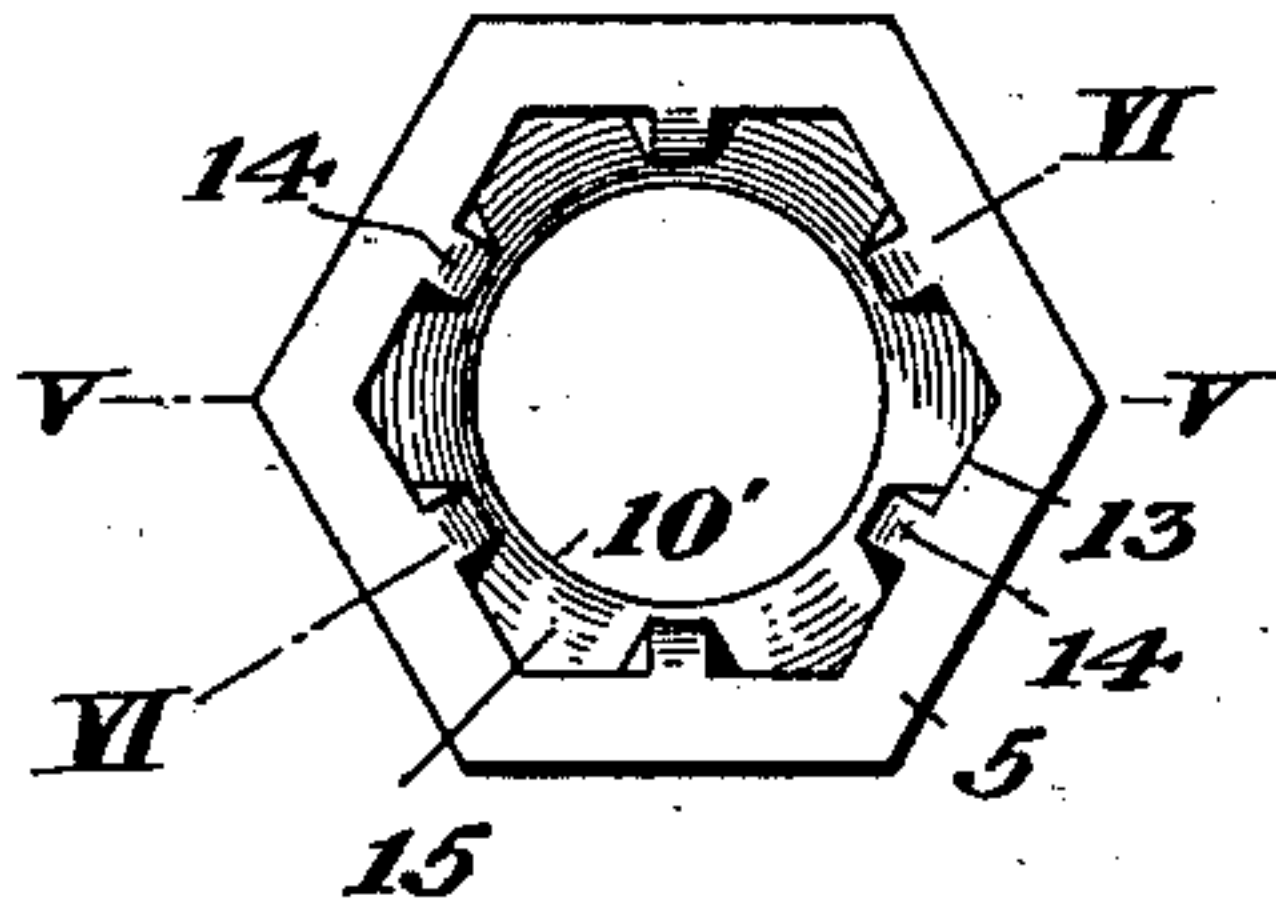


Fig. 2.

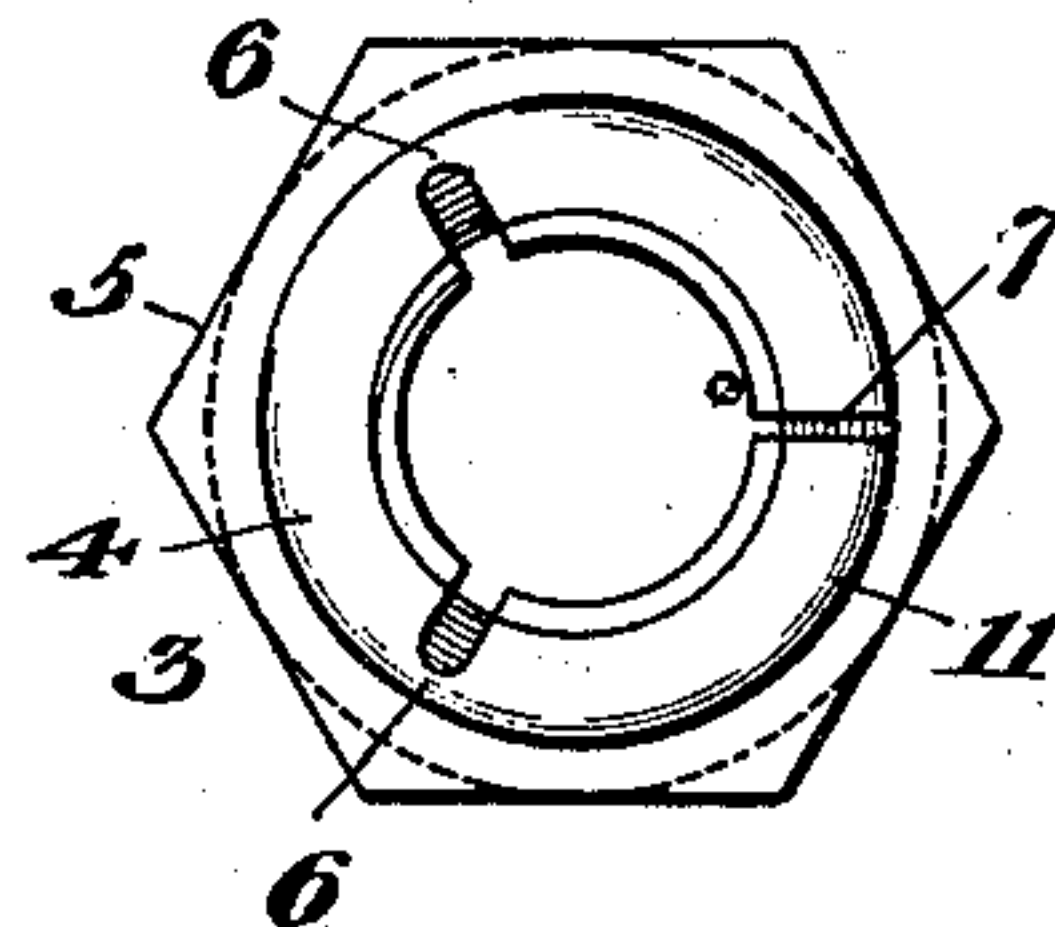


Fig. 5.

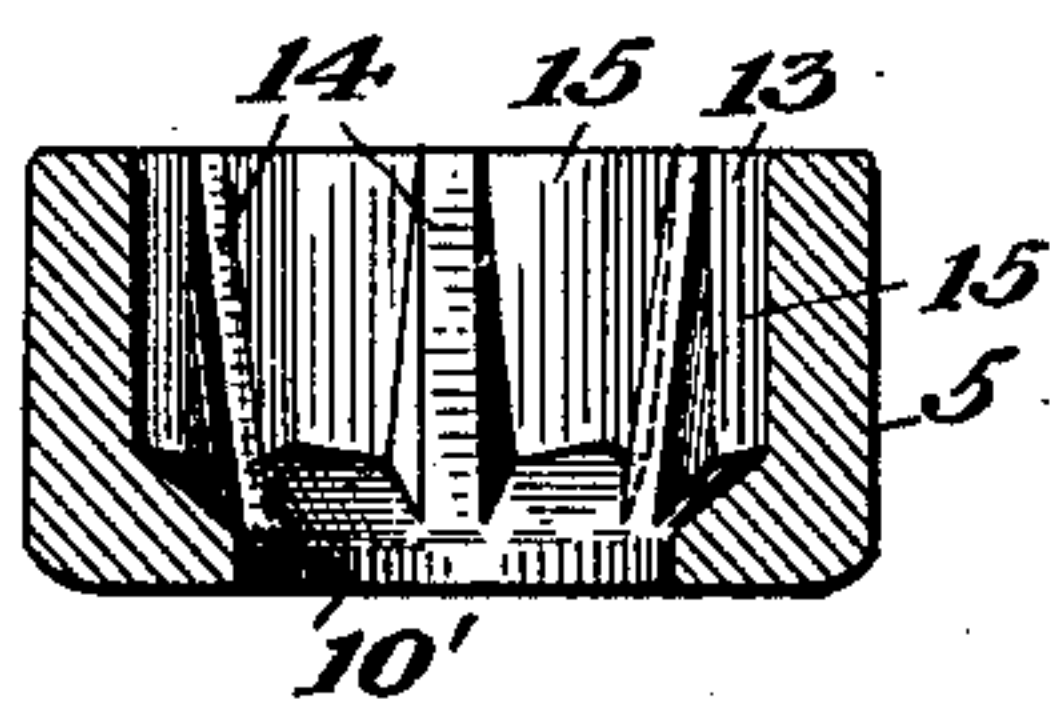


Fig. 3.

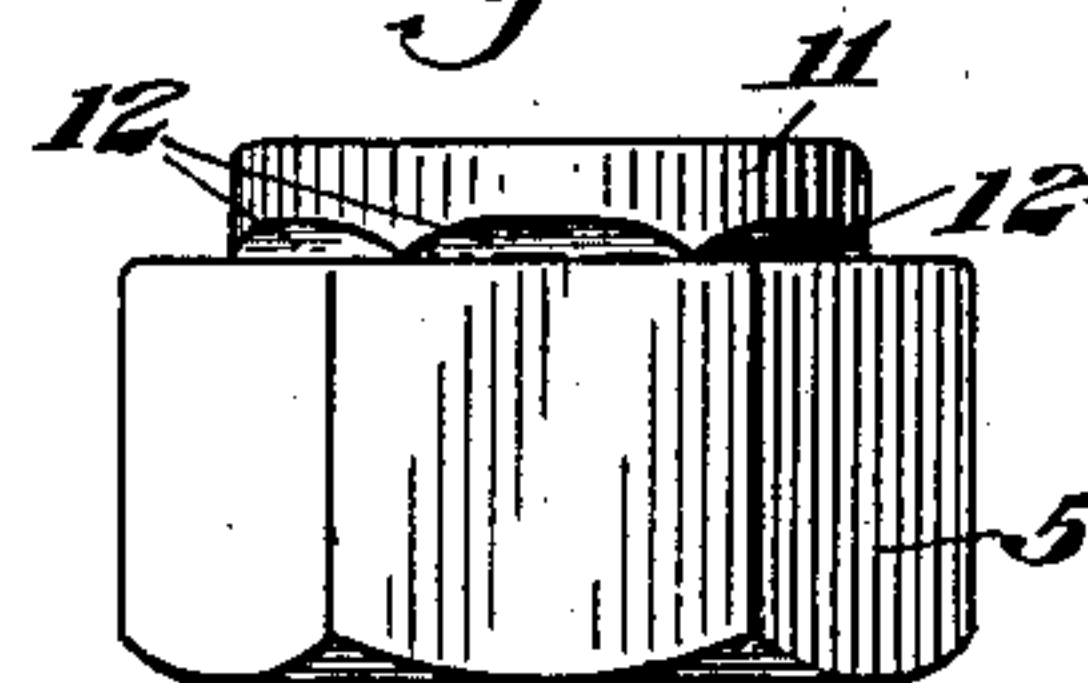


Fig. 6.

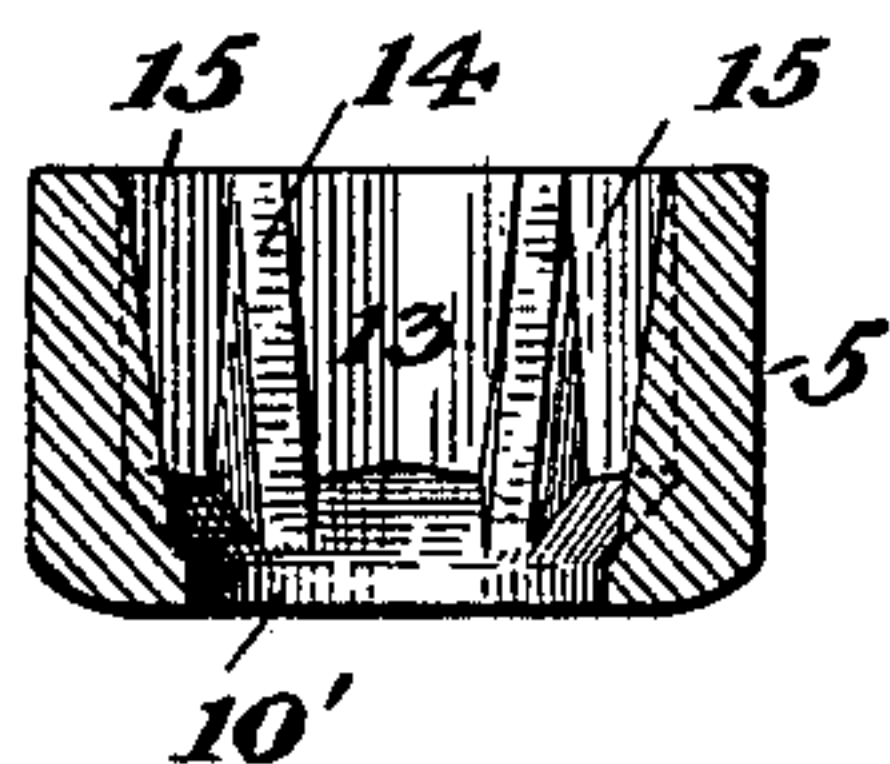


Fig. 7.

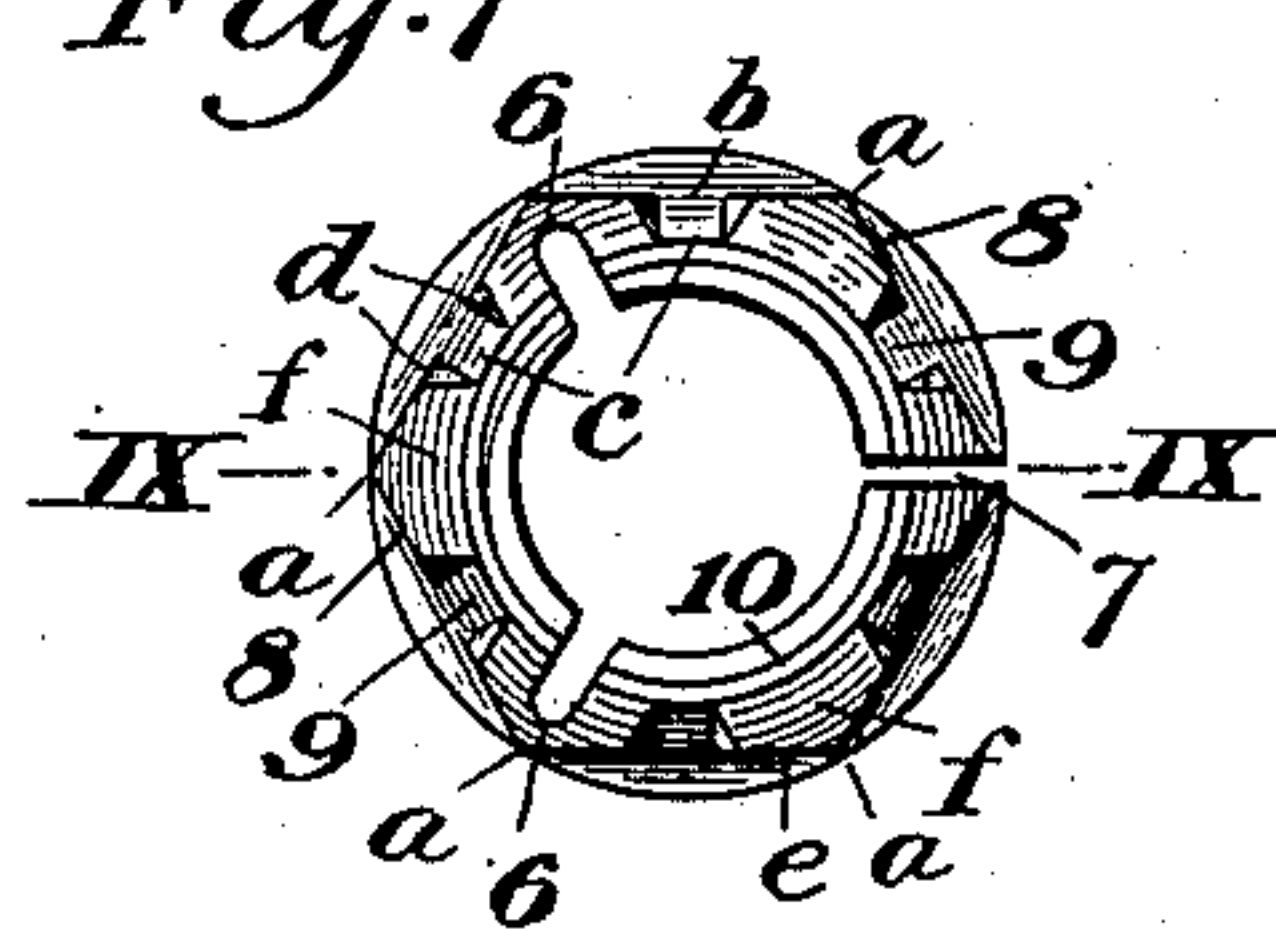


Fig. 1.

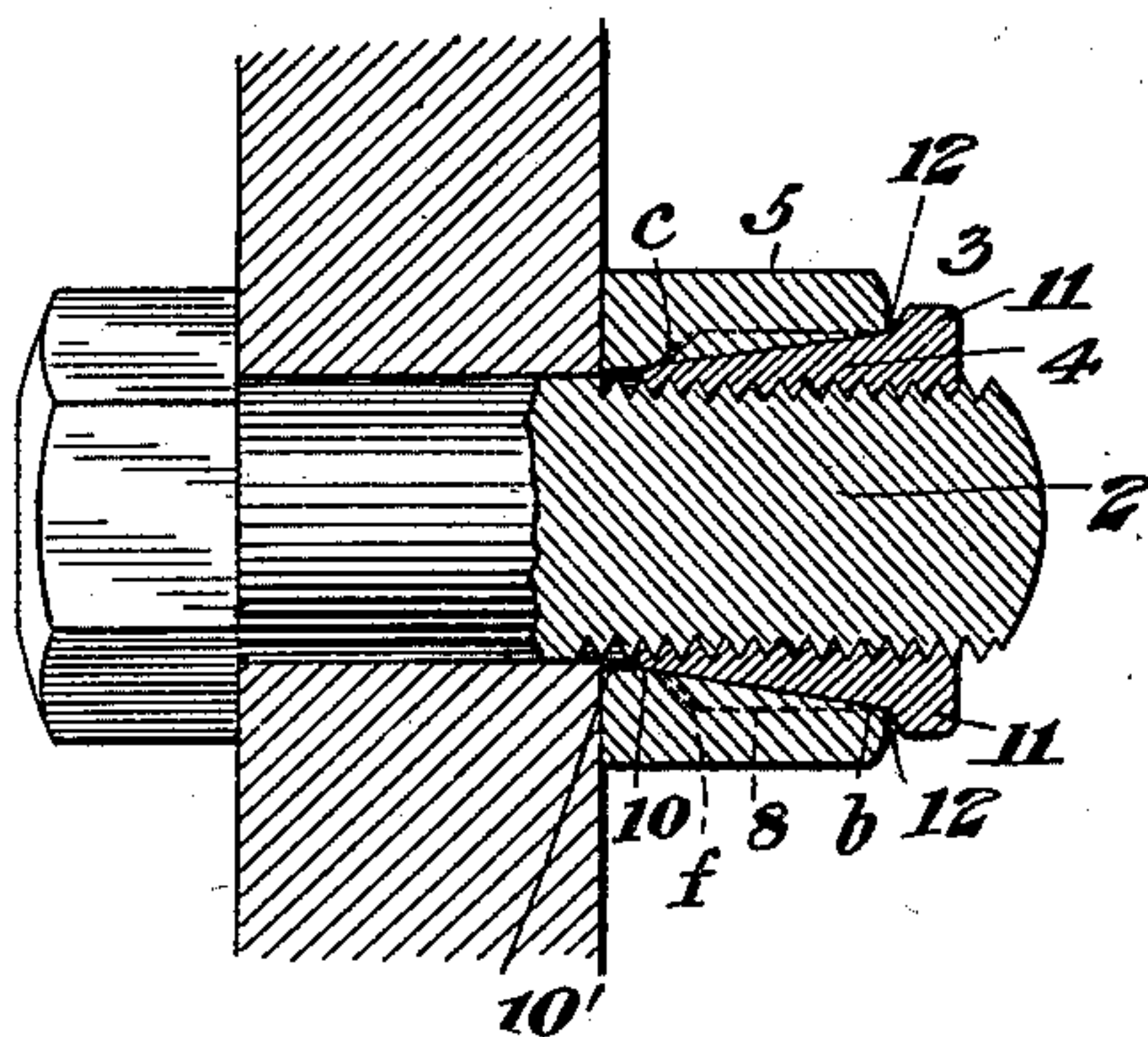


Fig. 8.

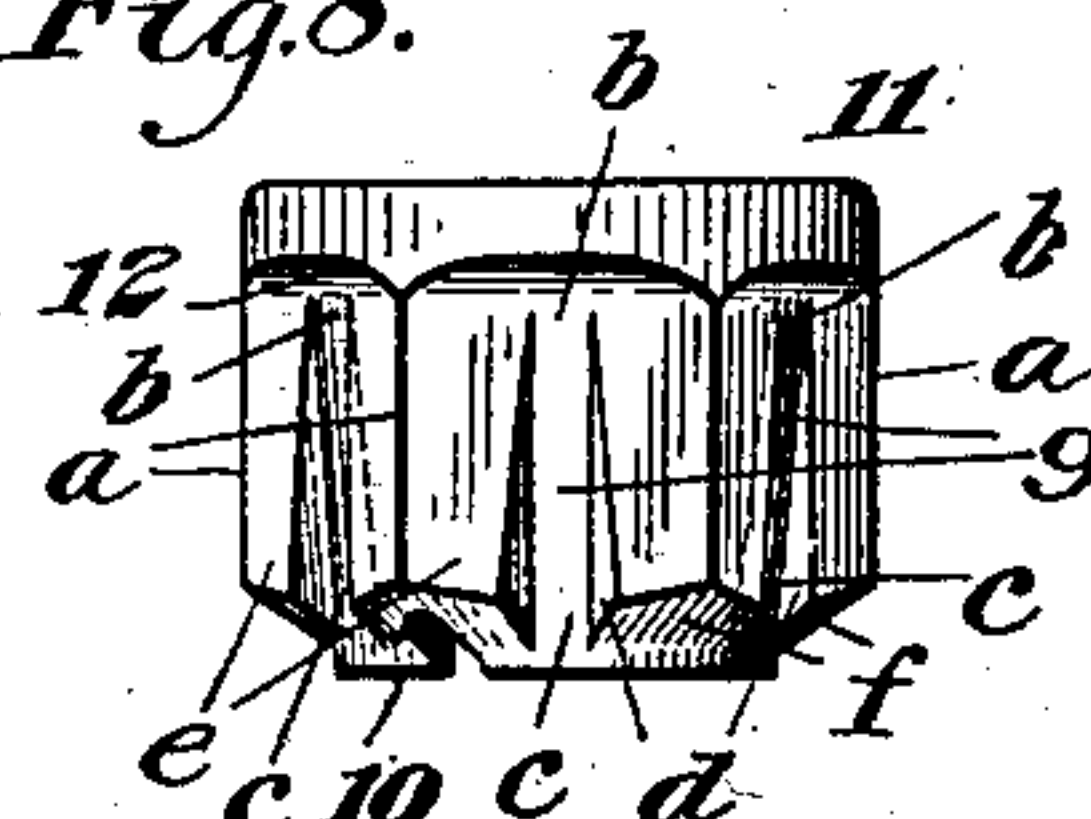
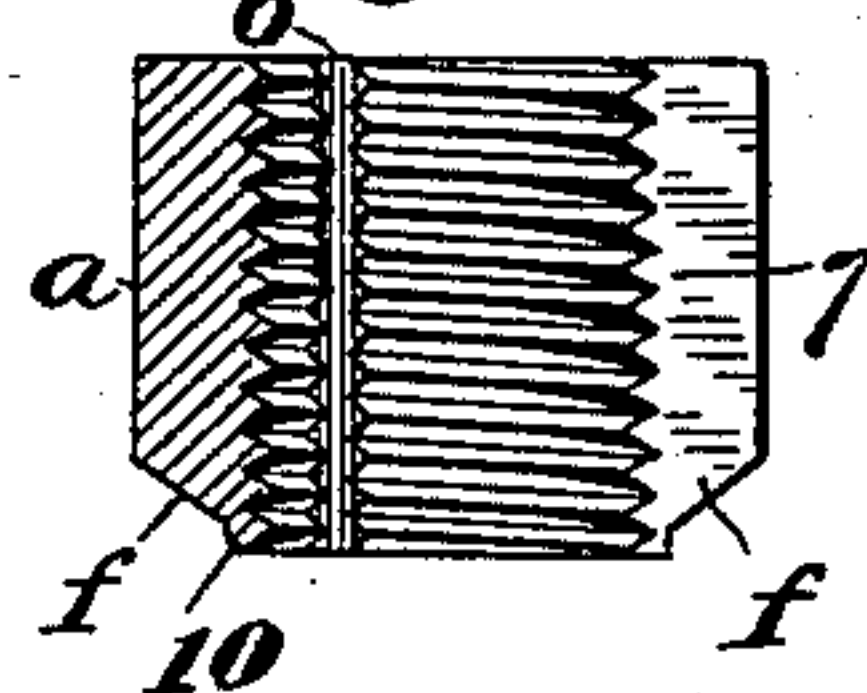


Fig. 9.



WITNESSES

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2 Sheets—Sheet 2.

Fig. 11.

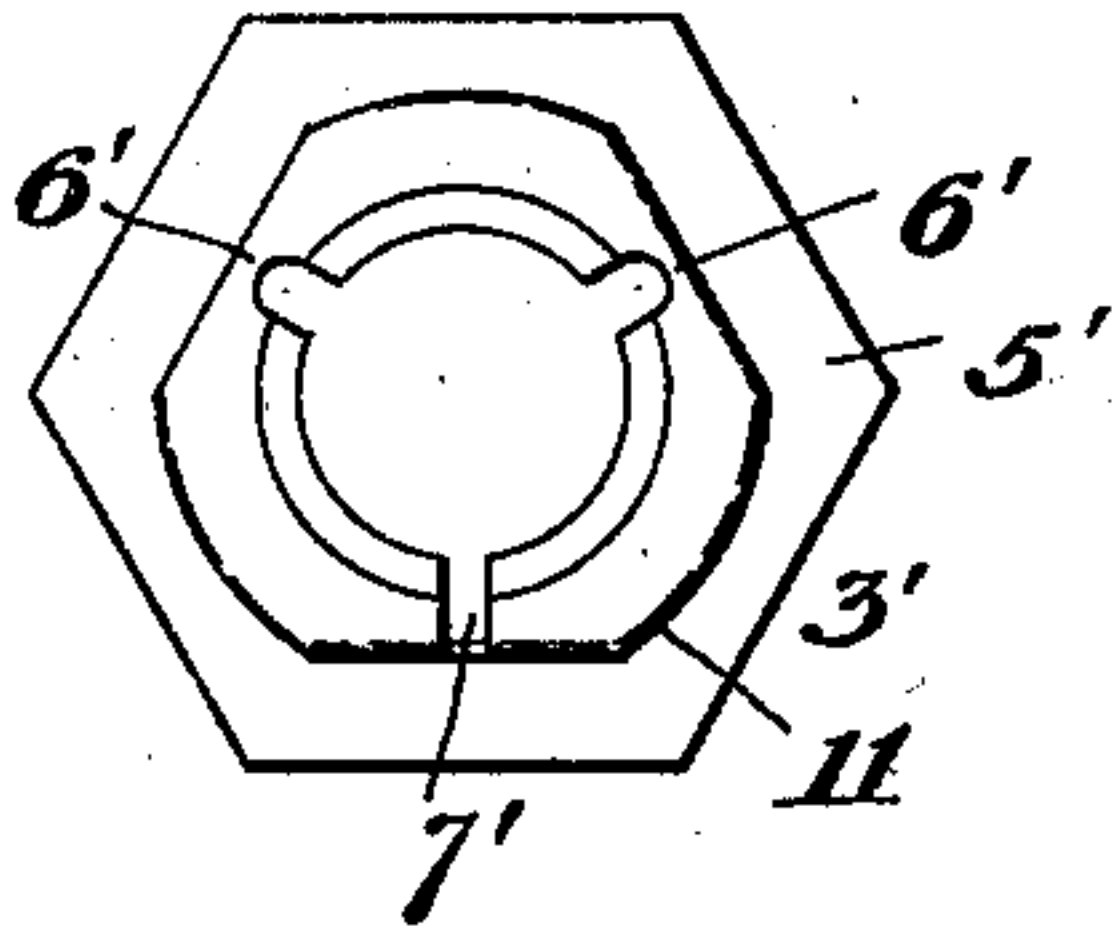


Fig. 12.

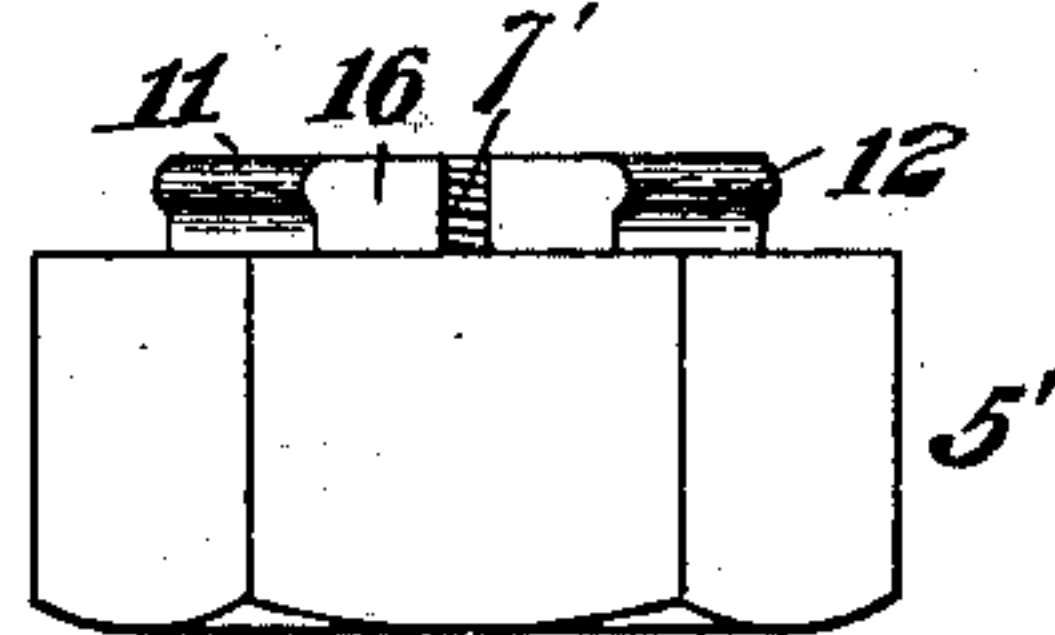


Fig. 13.

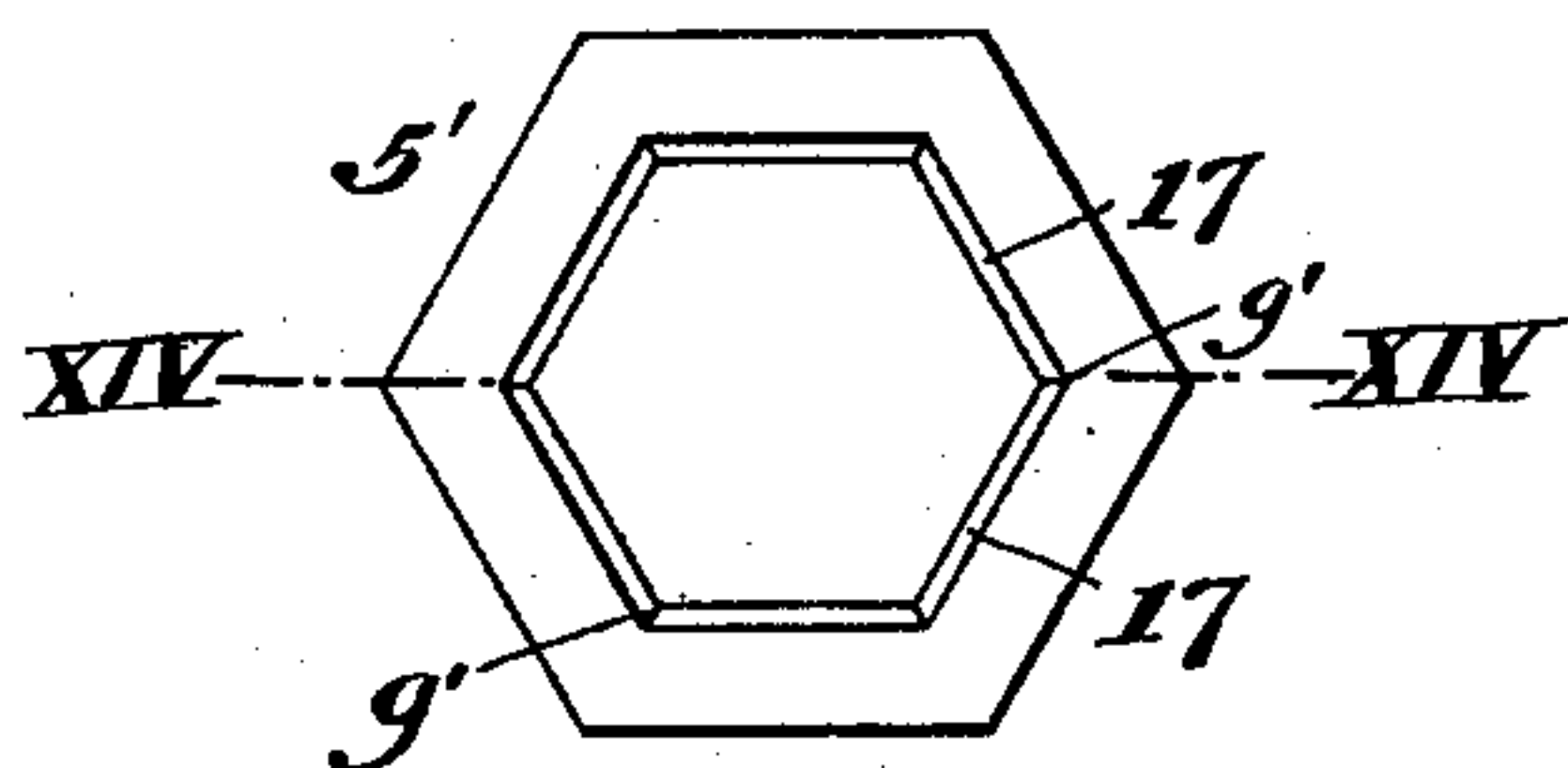


Fig. 14.

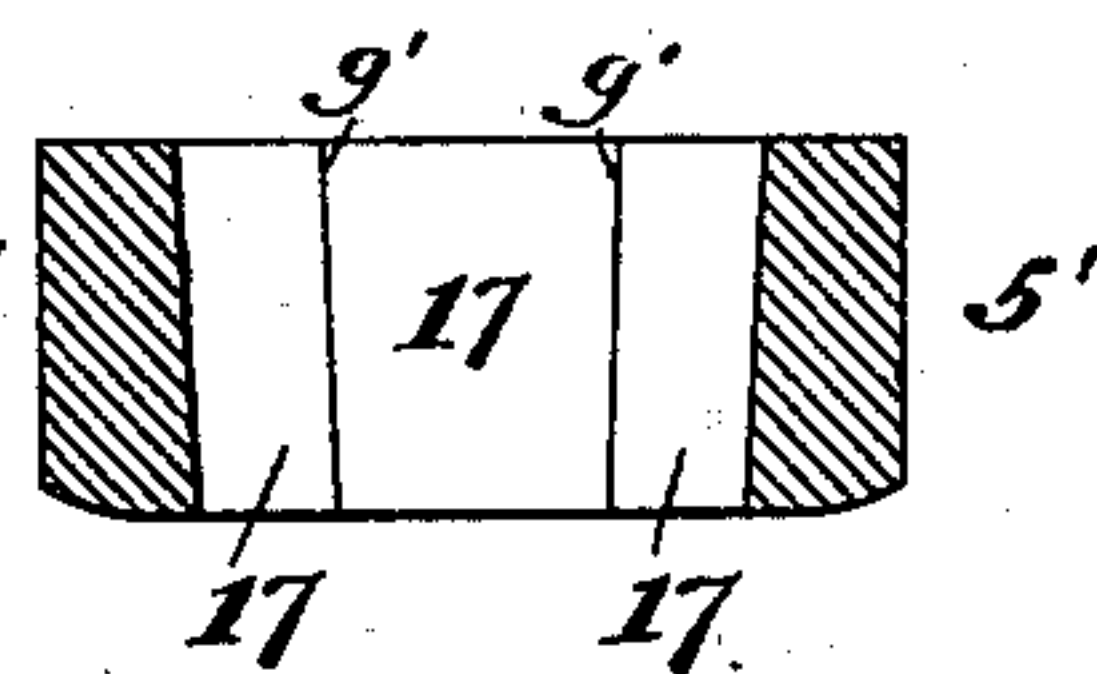


Fig. 15.

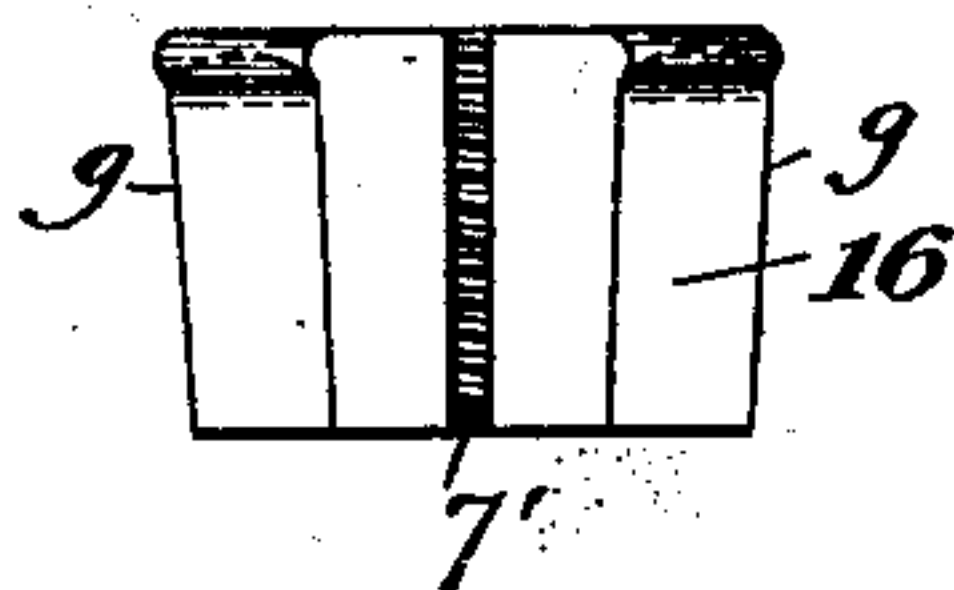


Fig. 16.

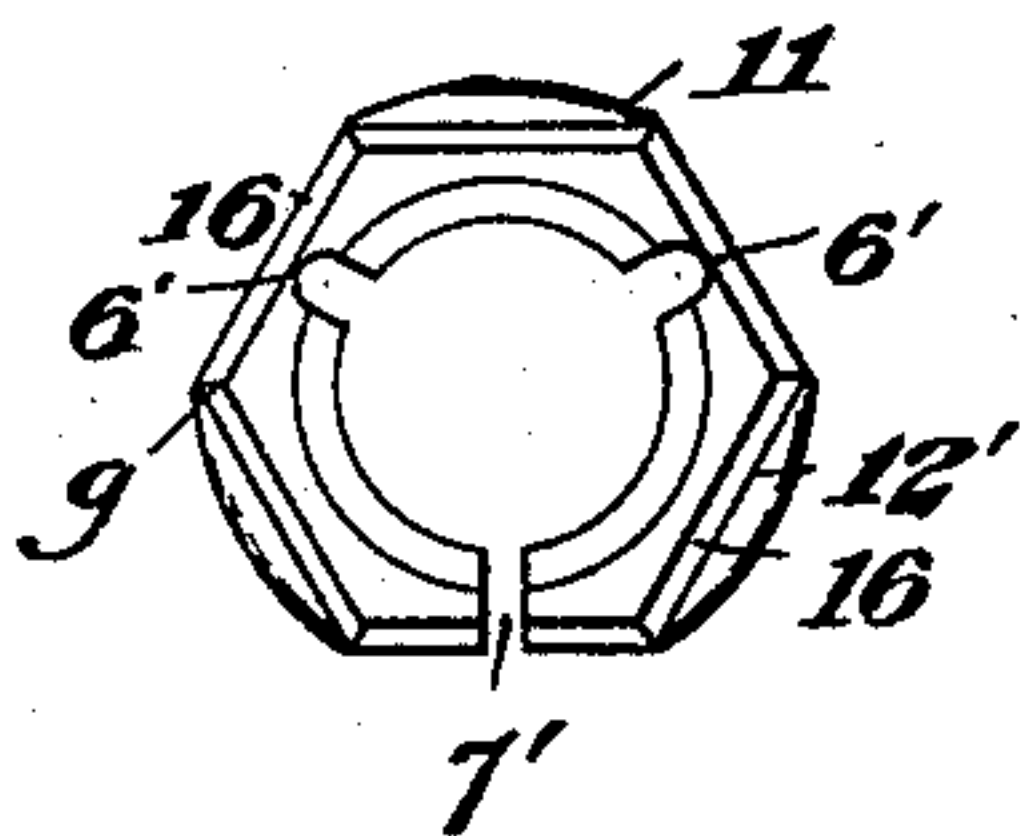
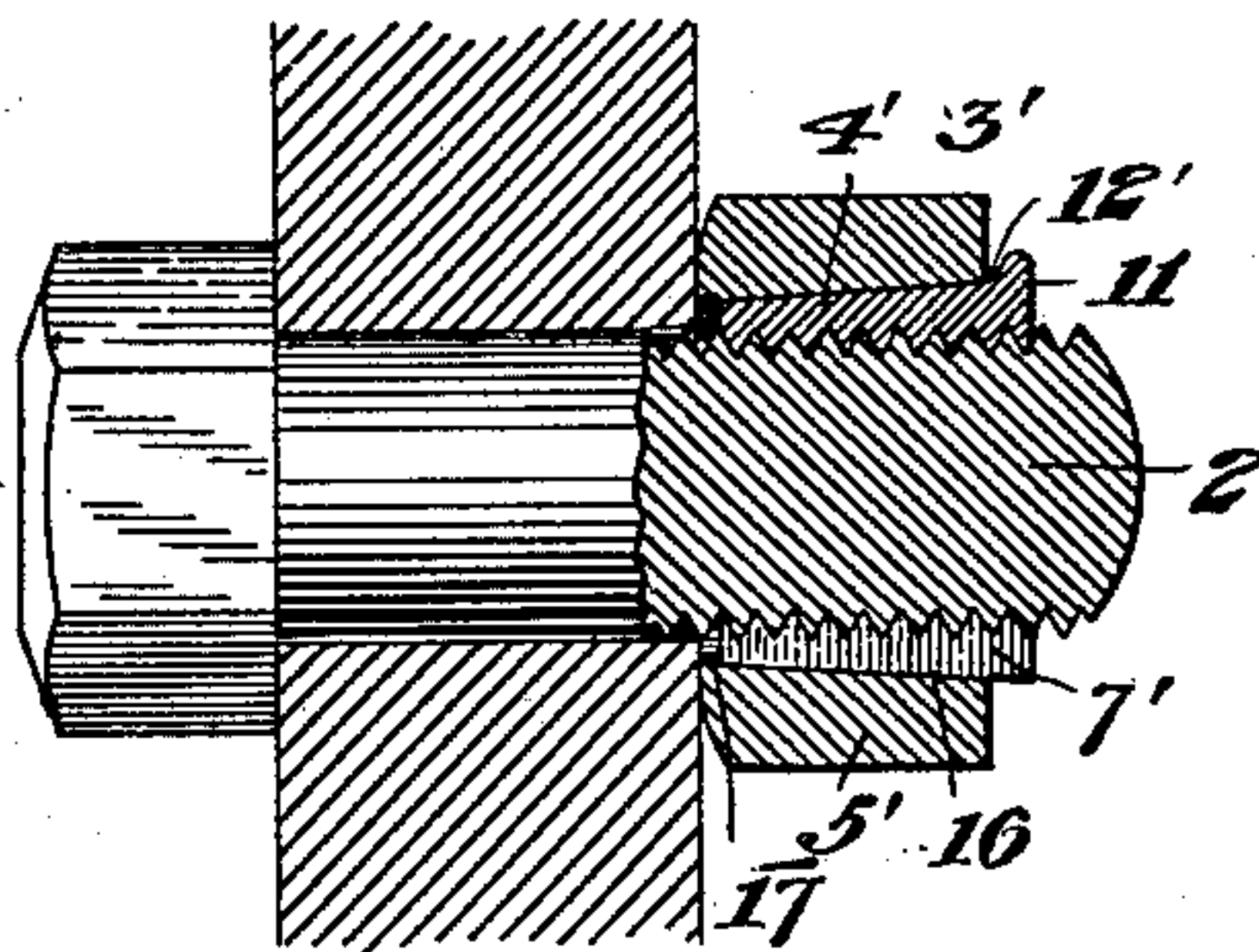


Fig. 10.



WITNESSES

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# UNITED STATES PATENT OFFICE.

ANDREW V. BRYCE, OF ALLEGHENY, PENNSYLVANIA, ASSIGNOR OF NINETWENTIETHS TO GEORGE B. WIX, OF SAME PLACE.

## LOCK-NUT.

SPECIFICATION forming part of Letters Patent No. 661,655, dated November 13, 1900.

Application filed February 20, 1900. Serial No. 5,896. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW V. BRYCE, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lock-Nuts, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, Sheet 1, is a side elevation, partly in section, showing my nut-lock applied to a bolt and locked thereon. Fig. 2 is an end view of the nut. Fig. 3 is a side view thereof. Fig. 4 is a view similar to Fig. 2 with the inner threaded part removed. Fig. 5 is a section on the line V V of Fig. 4. Fig. 6 is a section on the line VI VI of Fig. 4. Fig. 7 is an inner end view of the threaded part of the nut. Fig. 8 is a side view thereof. Fig. 9 is a section on the line IX IX of Fig. 7. Fig. 10, Sheet 2, shows a modified construction of lock-nut embodying the same principle as that shown in Figs. 1 to 9 applied to a bolt and locked. Fig. 11 is an end view of the nut. Fig. 12 is a side view thereof. Fig. 13 is an end view of the outer part of the nut. Fig. 14 is a section on the line XIV XIV of Fig. 13. Fig. 15 is a side view of the threaded part of the nut. Fig. 16 is an inner end view of the same.

My invention relates to lock-nuts, being designed to prevent the nut from becoming loose after it has been tightened upon the bolt and has been brought to bear upon the object it is desired to secure.

One object is to provide a lock-nut which is adapted to fit upon ordinary bolts and to be locked securely thereon without destroying or distorting the threads.

A further object is to provide a lock-nut in which the threaded portion is separate from the portion to which the wrench is applied and yet when placed within the unthreaded external portion is held therein, so that the two portions constitute a lock-nut.

My invention provides a lock-nut which is simple in construction, durable and effective, and can be cheaply and rapidly made by automatic machinery.

In the drawings, Sheet 1, Figs. 1 to 9, inclusive, 2 represents the bolt, screw-threaded

in the ordinary manner. The lock 3 is composed of an internal threaded part 4 and an external unthreaded part 5, having suitable shoulders of hexagonal or polygonal form, to which the wrench is applied in securing the nut upon the bolt. The internal threaded part 4 is preferably formed in two or more sections united by a thin connecting web or hinge 6, and a gap 7 is formed between the meeting ends of the hinged portions. This gap 7, together with the web or hinges 6, gives to the threaded part 4 the necessary amount of resiliency, which enables it to be compressed, so as to grip the threads of the bolt. In order to give this threaded part 4 of the lock-nut 3 the requisite strength and afford a suitable surface by which it may be engaged by the outer threadless portion 4, so as to be turned thereby when the outer part is rotated, I form thereon ribs 8 of such shape that this threaded portion is given an external shape preferably hexagonal or polygonal in form and preferably the counterpart of the internal shape of the outer or unthreaded portion 4 of the lock-nut. These ribs 8 at the apex of their angles are parallel with the bolt, as shown at *a*, and are separated by grooves 9, which begin at the surface at the point *b* and taper toward the point *c*, forming the frustum of a cone between the ribs 8. This taper, however, I prefer to make very slight. The groove 9 at the point *c* is deep, and the body of the threaded part 4 should be as thin as possible at this point to provide the necessary resiliency. The valley of the groove 9 is parallel, or substantially so, but the walls diverge as the groove deepens, as shown at *d d*, and this divergence produces a corresponding contraction to the inner end of the ribs 8, as shown at *e*. This gives the ribs 8 the form of a wedge, which widens toward its outer end, where it merges into the hexagonal or polygonal exterior above described. The inner end of these ribs 8 are beveled, as shown at *f*. The inner end of the part 4 of the nut is cylindrical, and I have found it convenient to form the outer portion 11 annular, or substantially so, as it affords a protection against tampering with the threaded part 4, and it enables me to form the cam or inclined por-



tions 12 thereon, the purpose of which I will presently explain.

The outer part 5 of the nut, to which the wrench is applied, is provided with a cylindrical hole 10' at its inner end, preferably but slightly larger than the external diameter of the bolt. The hexagonal or polygonal socket 13 is provided with ribs 14, which interfit with the grooves 9 in the part 4. The ribs 14 form wedge-shaped grooves 15, which interfit with the ribs 8 on said part. The parts 4 and 5 are made male and female in respect to the internal shape of one of said parts and the internal shape of the other.

The operation is as follows: The nut, which comprises the inner threaded part 4 and the outer unthreaded part 5, the former having been inserted within the latter, is applied to the bolt, the wrench is placed upon the external hexagonal or polygonal surface of the part 4, and by reason of its internal shape and the external shape of the part 4 they move together. In locking the nut it is advanced until the part 5 comes in contact with the surface against which it is to abut, and as the engagement between the inner and outer parts is not positive, except as regards rotation, the turning of the outer part 5 after meeting the resistance of the abutting surface causes the within-contained threaded part 4 to continue to advance until the taper of the grooves 9 is resisted by the correspondingly-shaped ribs 14 and the wedge-shaped ribs 8 engage the correspondingly-shaped grooves 15, the tendency of the wedges being to expand the part 5, while its resistance tends to compress the part 4, causing it to firmly grip the thread of the bolt. This gripping action is further effected by the inclined or cam portions 12, the outer part 5 being expanded by them as it engages therewith. In case sufficient power is applied to force the threaded part 4 still farther within the outer portion the cylindrical portion 10 at the inner end of the part 4 and the beveled portion *f* of the ribs 8 will engage the corresponding portion of the outer threadless part 5 of the nut and will cause the inner end of the part 4 to impinge upon the thread of the bolt with greater tenacity. A positive lock is thus afforded without injury or distorting the thread of the nut or bolt, and yet it can be removed without destroying the bolt or nut, if necessity requires. The nut cannot work loose by jar or shock.

In Figs. 10 to 16, inclusive, I have illustrated a modified form which embodies the general features I have just described—viz., a lock-nut 3' made in two parts 4' 5', the inner part 4' being threaded and having a hexagonal or polygonal exterior surface and also having hinges or webs 6 and a gap 7, which are placed on the sides and not at the angle, as in Figs. 1 to 9. The outer part 5', to which the wrench is applied, has a hexagonal or polygonal external and internal surface, the latter fitting the exterior of the part 4', and

the external surface being adapted to receive the wrench. The external surface-threaded portion 4' in the modified construction has plain faces 16, which are slightly tapered, the inner end being the smaller, and the socket formed in the outer part 5' being correspondingly tapered and having plain faces 17, each of the said faces being wedge-shaped, formed by the angles, as at *g g'*, as shown in Figs. 14 and 15. The operation of this nut is similar to that just described, the parts are assembled and rotated in the same way, the inner threaded part is caused to grip the bolt by reason of the engagement of the wedge-shaped faces 16 and 17, and the taper of the socket of the outer part 5' and the external surface of the part 4', the cams 12' tending to further expand the outer part 5' and causing a corresponding compression of the inner part 4'. The modified form of lock-nut shown is especially designed for the smaller sizes which would render the formation of ribs and grooves difficult and the construction less substantial. The cams or inclines 12 12' act as stops, so that the limit of safety cannot be exceeded, and the outer parts 5 5' become broken by application of too much power, these portions preventing the further advance of the internal threaded part.

The advantages present in the form shown in Figs. 1 to 9 are present to practically the same degree in the modified form.

Many changes may be made and will suggest themselves to the skilled mechanic without departing from my invention.

I claim—

1. A lock-nut comprising an outer unthreaded portion, having an angular interior, and an inner threaded part having an angular exterior, said inner part having thinner web portions extending its entire length and acting as hinges, and having also a separating-slot along one side; substantially as described.

2. A lock-nut comprising an outer unthreaded portion having an angular interior, and an interior-threaded portion having a corresponding exterior, the inner portion having hinge-webs extending its entire length, and provided with inclined faces engaged by inner wedge-ribs on the outer portions; substantially as described.

3. A lock-nut, comprising threaded and unthreaded parts, separate from each other, the threaded part being composed of sections hinged together by thinner web portions extending the entire length of the threaded part, said part being within the unthreaded part and adapted to be turned thereby and locked upon the bolt, when the threaded part abuts against a resisting-surface; substantially as described.

4. A lock-nut, comprising threaded and unthreaded parts, separate from each other, the threaded part being within the unthreaded part and having a separating-slot throughout its length, and at least a portion thereof be-



ing tapered, and having an angular exterior, the unthreaded part being shaped interiorly to correspond therewith, the threaded part being turned thereby when the outer portion is rotated; substantially as described.

5. A lock-nut, comprising threaded and unthreaded parts, separate from each other, the threaded part being within the unthreaded, and adapted to be turned by the latter, a stop or shoulder on the threaded part, in the rear of the unthreaded, adapted to limit the inward movement of the threaded part, and to cause the same to bind upon the bolt, when the outer part abuts against a resisting-surface; substantially as described.

6. A lock-nut, comprising threaded and unthreaded parts, separate from each other, the threaded part being within the unthreaded, and adapted to be turned by the latter, a stop or shoulder having beveled or cam faces on the threaded part, in the rear of the unthreaded, adapted to limit the inward movement of the threaded part, and to cause the same to bind upon the bolt when the outer part abuts against a resisting-surface; substantially as described.

7. A lock-nut, comprising an inner threaded part, an outer unthreaded part, separate therefrom, the inner part being provided with ribs and grooves, and the outer part having interfitting wedge-shaped projections and recesses, whereby the threaded portion is turned, and locked when the outer part abuts against a resisting-surface; substantially as described.

8. A lock-nut having an outer unthreaded portion with an angular interior, an inner threaded portion with an angular exterior, said inner portion having faces inclined to the axis of said part and having also faces extending parallel with the axis, the outer

part having inner wedge-shaped ribs bearing upon the inclined faces of the inner part; substantially as described.

9. A lock-nut comprising threaded and unthreaded parts separate from each other, the threaded part being within the unthreaded, the inner part being provided with grooves which gradually deepen and widen toward the inner end thereof, wedge-shaped ribs formed thereby said ribs having their angular portion  $\alpha$  parallel with the longitudinal axis of the nut, said ribs being wider at their outer ends, and narrower at their lower end, the socket in unthreaded outer part being the converse of ribs and grooves of the inner part, whereby the latter is turned, when the outer part is rotated; substantially as described.

10. A lock-nut comprising threaded and unthreaded parts separate from each other, the threaded part being within the unthreaded, the inner part being provided with grooves which gradually deepen and widen toward the inner end thereof, wedge-shaped ribs formed thereby said ribs being wider at their outer end, and narrower at their lower end, the socket in unthreaded outer part being the converse of ribs and grooves of the inner part, whereby the latter is turned, when the outer part is rotated, a stop or shoulder on the threaded part in the rear of the unthreaded, adapted to limit the inward movement of the threaded part, and to cause the same to bind upon the bolt, when the outer part abuts a resisting-surface; substantially as described.

In testimony whereof I have hereunto set my hand.

ANDREW V. BRYCE.

Witnesses:

G. I. HOLDSHIP.

L. A. CONNER, Jr.