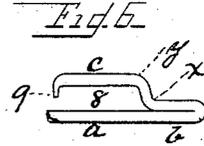
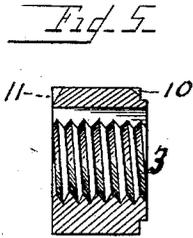
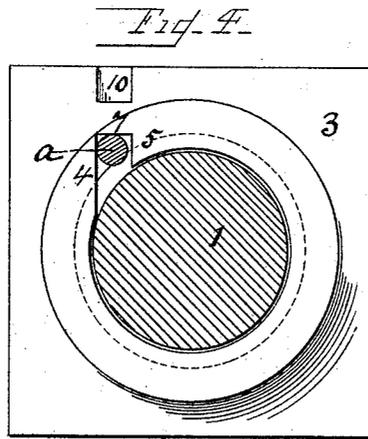
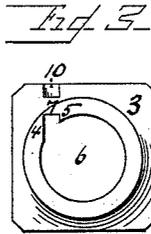
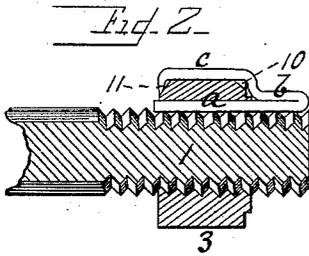
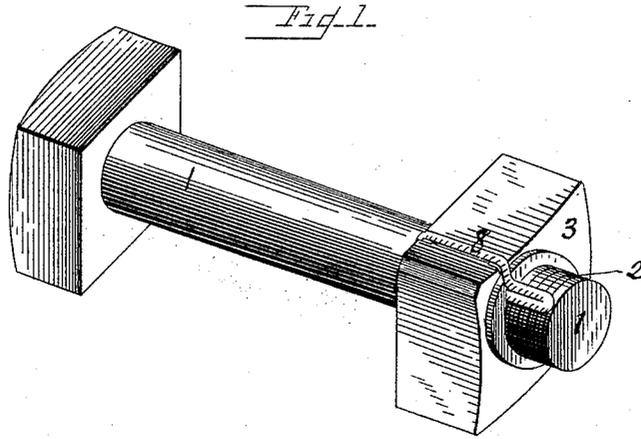


(No Model.)

S. H. RAY.  
NUT LOCK.

No. 395,348.

Patented Jan. 1, 1889.



Witnesses  
*E. A. Tauberschmidt,*  
*Edwin S. Clarkson.*

Inventor  
*Samuel H. Ray*  
By his Attorney *J. W. Ritter*

# UNITED STATES PATENT OFFICE.

SAMUEL H. RAY, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO  
GEORGE S. TYLER, OF SAME PLACE.

## NUT-LOCK.

SPECIFICATION forming part of Letters Patent No. 395,348, dated January 1, 1889.

Application filed September 26, 1887. Serial No. 250,724. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL H. RAY, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Nut-Locks; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 is a perspective view of devices embodying my invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a plan view of the nut. Fig. 4 is an enlarged end view of the nut with the bolt and locking-pin in section, for the purpose of showing distinctly that the locking-pin is of greater diameter than the depth of the eccentric groove of the nut, and also how the edges of the bolt-threads are abraded in driving in the locking pin or key. Fig. 5 is a sectional view of the nut. Fig. 6 is a detached view of the key.

Like figures and letters refer to like parts wherever they occur.

My present invention relates to that class of nut-locks wherein the nut is provided with an eccentric or cam groove, and a key is used to bind on the bolt and prevent the turning of the nut on the bolt, and of which the nut-lock described in my Patent No. 371,971, dated October 25, 1887, may be taken as a type, and on which the present invention is an improvement.

The advantages of the class of nut-locks referred to are, first, the simplicity of the construction, which requires little change in the present form of the nut and none in the bolts; and, second, the ability to lock the nut at any point on the bolt.

The main feature of the present invention lies in the character of the key which is used in combination with the full-threaded bolt and the nut having an eccentric key-groove, which locking key or pin is of tempered steel, provided with a spring-arm adapted to clasp the nut, and is preferably of harder material than the bolt with which it is to be employed, as well as of slightly greater diameter than the deepest part of the eccentric slot in the nut, so that when driven it (the key) shall slightly groove the threads of the bolt to prevent the subsequent cutting of the key by the bolt-threads; and shall clasp

the nut to prevent the accidental displacement of the key, while offering no material obstruction to the intentional removal thereof. 55

There are other features incident to the character of the key both as to material and form, all of which will hereinafter more fully appear.

I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

In the drawings, 1 indicates a bolt of any ordinary character with full thread 2, and 3 the nut employed therewith. The nut 3 is of the class provided with a groove eccentric to the aperture of the nut and which crosses the threads of the nut. The exact form or location of the groove is not material provided its bottom is of such character as to cause the key to hug the bolt when the nut is reversely rotated; but experience has shown that a concave or rounded bottom of the groove is not so desirable as a flat bottom, and that, owing to the greater amount of metal in the angle or corner of the nut the groove can be there placed with less liability of weakening the nut. 75

The preferable form for the eccentric groove of the nut is that shown in the drawings—that is to say, with two parallel sides, 4 and 5, the one, 4, being substantially tangential to the circle of the aperture 6 or a circle described with the axis of the bolt for a center and longer than the other or opposite side, 5, and the bottom of the groove flat, as at 7. 85

8 indicates the key used for locking the nut, which may be said to consist of three members—the locking-pin *a*, the driving and drawing section *b*, and the securing-arm *c* (or spring-catch)—all of which members are desirable, but each of which has a function in addition to the combined function of the parts. 90

The locking-pin *a* must be slightly greater in diameter than the depth of the eccentric groove of the nut, so that it shall not be capable of independent movement in the eccentric groove, except a slight rotation on its own axis, and is always inserted with force—as by driving—and it must be of a harder nature than the bolt 1, with which it is used, in order that when driven it may slightly groove or abrade the threads of the bolt. Otherwise subsequent jar or vibration of the nut or bolt will 100

cause the threads of the bolt to groove the key and destroy the lock. The locking-pin *a* is preferably round, as the cam action is more perfect, and there is less tendency for the pin to leave its seat in the abraded threads of the nut or to slide on said threads when the bolt and nut are jarred. As the pin *a* has to be driven with considerable force in order that it may abrade the threads of the bolt, and as considerable force is required to subsequently draw the pin, a driving-section, *b*, of considerable gripping-surface and of considerable rigidity is desirable, and as the lock is frequently used where the bolt and locking-pin are in a vertical position a securing-arm, *c*, (or spring-catch,) is employed. In order to form this key 8, I select merchantable steel wire of slightly-greater diameter than the depth of the eccentric groove in nut 3, which wire as found in the market is soft and may be readily bent, and at a point determined by the thickness of the nut and the length of driving and drawing head required fold said wire, as at *b*, upon itself, bending the wire the second time at right angles, as at *x*, where the driving and drawing section *b* is to terminate, and then, as at *y*, the third time to form the locking-arm *c* parallel with the locking-pin *a*, the end of the locking-arm *c* terminating in tooth 9, which may either enter a hole in the edge of the nut 3, or a recess in the back of the nut 3, as shown in the drawings. If desired, the head and sides of the driving and pulling section *b* may be flattened, which will give greater gripping-surface for withdrawing the key. When the key 8 has been thus formed, it is heated and hardened or tempered in such manner as to render the locking-pin *a* harder than the bolt, as before specified, and this, together with the parallel fold of metal, will so stiffen the driving-section that the key can be driven readily, which would not otherwise be the case, and will impart a spring-like or catch character to the securing-arm *c*.

To facilitate insertion and removal of the key, it is desirable to groove or bevel the outer edges of the nut 3, as indicated at 10 and 11, as the tooth 9 of the securing-arm can then ride up and over the edge of the nut without hinderance.

The grooves 10 and 11, or at least the anterior groove, 10, should be sufficiently wide to accommodate the play of the spring or securing-arm *c*, when the locking-pin *a* rotates slightly on its axis, as before specified, which slight rotation of pin *a* is the result of its cam action, as in moving from the deepest part of the eccentric slot or groove of the nut. If the anterior edge of the nut is sufficiently beveled, the equivalent of the groove 10 will be obtained.

The devices, being of substantially the character hereinbefore described, will be used as follows: The nut 3 is screwed upon the bolt 1 until it has reached the desired position, the end of locking-pin *a* of key 8 is then entered in the eccentric slot and forcibly driven home,

so that in its passage it abrades the edges of the bolt-thread, forming slight transverse nicks or grooves, which it is enabled to do by reason of its harder nature, which nicks form a seat for the key, in which it must remain, and consequently the key can never ride on the thread of the bolt, so as to be grooved or cut thereby.

I am aware that nut-locks have heretofore been devised on the principle of the wedge or cam action due to an eccentric groove in the nut and a spring-acting cam. I am also aware that nut-locks have heretofore been devised in which a radial groove in the bolt and a corresponding groove in the nut have been used in conjunction with a locking-pin which engaged in both grooves; and I am further aware that nut-locks on the pawl-and-rack principle have been devised; but all of the aforesaid devices have the disadvantages of complicated devices, which render them too expensive and too liable to become inoperative for the purposes intended, while most if not all of such devices either necessitate the securing of the nut at certain predetermined points in its rotation, or, if on the simple wedge or cam principle, result in the grooving of the locking-key by the threads of the bolt, so that the devices shortly become inoperative.

As hereinbefore specified, I have previously devised the combination of an eccentrically-grooved nut with a locking-pin of greater diameter than the depth of the eccentric groove, so as to be driven therein to form a lock, and do not herein broadly claim the same; but I have discovered that unless the said locking pin or key be sufficiently harder than the metal of the bolt, so as to groove the threads of the bolt slightly in its passage, and thus form a lock which combines the principles of the smooth cam or wedge and the pawl and ratchet, the life of the lock will be more or less limited, according to the extent of vibration or jar to which the devices are subjected.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in a nut-lock, of a full-threaded bolt, a nut having an eccentric key-groove and a beveled edge, as at 10, and a locking key or pin having a spring-arm adapted to clasp the nut, substantially as and for the purposes specified.

2. A tempered-steel locking-key for nut-locks, having the round locking-section, the folded driving and drawing section, and the spring-arm formed from a single piece of wire and shaped to clasp the nut, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 23d day of September, 1887.

SAMUEL H. RAY.

Witnesses:

I. NESBITT,  
GEO. A. STRATTON.