

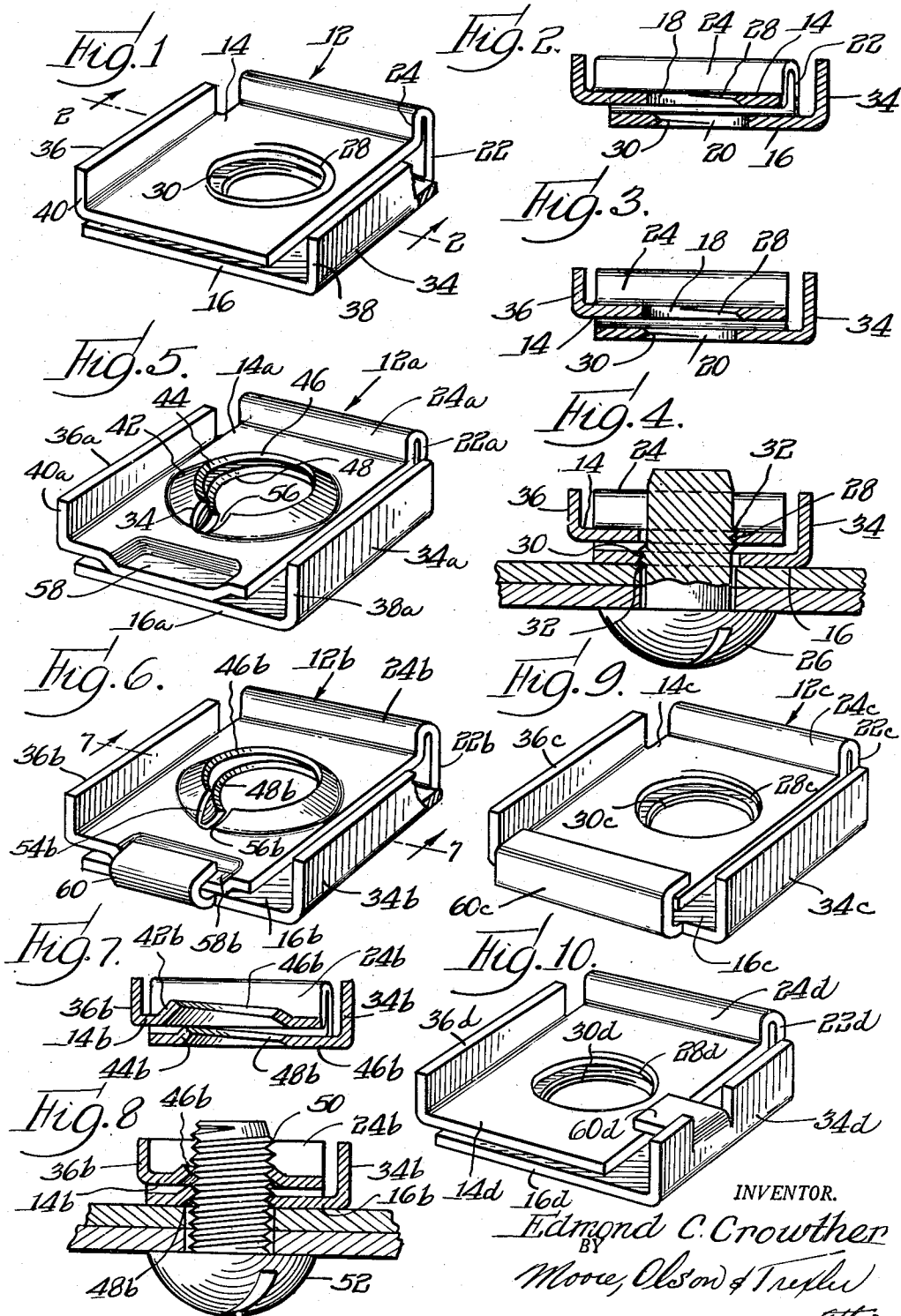
July 27, 1954

E. C. CROWTHER

2,684,704

LOCK NUT

Filed June 6, 1952



INVENTOR.

Edmond C. Crowther

BY Moore, Olson & Triplett

attys.

UNITED STATES PATENT OFFICE

2,684,704

LOCK NUT

Edmond C. Crowther, Chicago, Ill., assignor to
Illinois Tool Works, Chicago, Ill., a corporation
of Illinois

Application June 6, 1952, Serial No. 292,177

5 Claims. (Cl. 151-21)

1

The present invention relates to lock nuts, and more specifically to lock nuts, wherein superposed apertured plate members render the device self-locking when applied to a complementary fastener element.

An object of this invention is to provide a simple, relatively inexpensive, one-piece lock nut made from sheet material, which may be easily manufactured, which may be quickly assembled with a complementary fastener element, such as a screw or unthreaded stud, and which is constructed to provide very efficient locking characteristics.

A more specific object of this invention is to provide a lock nut of the above described type, wherein the self-locking quality is increased by laterally displacing the superposed plate members relative to each other to offset the axes of their apertures and by connection marginal edges of the plate members by a resilient hinge, so that opposite sides of the apertures firmly grip the surface of an assembled fastener element, such as a screw or stud.

Another object of this invention is to construct a lock nut of the type described above, so that it may be readily grasped by hand or tool for applying pressure to bring the apertures into alignment for easy application of a fastener element thereto and for turning the nut onto the fastener.

Still another object of this invention is to construct a lock nut of the above described type wherein the margins of the apertures are formed to provide helical screw accommodating threads, so that axial displacement between the plate members is restrained, whereby the threads of the plate members are spaced the correct distance for receiving the threads of a complementary screw element.

Other objects and advantages of the present invention will be apparent from the following description and the drawings, wherein:

Fig. 1 is a perspective view partially broken away, showing one embodiment of the present invention;

Fig. 2 is a vertical cross section taken along line 2-2 in Fig. 1;

Fig. 3 is similar to Fig. 2, but shows the plate members of the lock nut aligned after application of pressure in the direction of the arrows;

Fig. 4 is similar to Fig. 2, but shows the lock nut assembled with a work piece by an unthreaded stud;

Fig. 5 is a perspective view, showing a modified form of a lock nut, involving the present invention;

2

Fig. 6 is similar to Figs. 1 and 2 and shows another embodiment of the lock nut;

Fig. 7 is a vertical cross section taken along line 7-7 in Fig. 6;

Fig. 8 is similar to Fig. 7, but shows the lock nut assembled with a work piece by a threaded screw element;

Fig. 9 is a perspective view, showing another embodiment of the present invention; and

Fig. 10 is a perspective view, showing still another modified form of this invention.

Referring now to the drawings, wherein like parts in the several embodiments are designated by the same numerals, with the suffix *a*, *b*, *c*, et cetera, added as the case may be, Fig. 1 shows a lock nut 12 formed of a single piece of sheet material, which is preferably sheet metal.

The nut 12 includes superposed plate members 14 and 16, having complementary fastener element receiving openings 18 and 20 therein. The plate members are connected along adjacent marginal edges by a resilient hinge or wall portion 22, which extends upwardly from the plate member 16 to a point above the surface of the plate member 14. The hinge 22 terminates in an inwardly and downwardly directed flange 24, which merges along its terminal edge with the plate member 14. This formation of the hinge 22 in effect increases the length of the hinge, while permitting the plate members 14 and 16 to be disposed relatively closely together, as shown best in Figs. 2, 3, and 4. As shown in Fig. 2, the plate members 14 and 16 are laterally displaced relative to each other to offset the axes of the apertures 18 and 20. Therefore, when a complementary fastener element, such as the unthreaded stud 26, is applied to the nut 12, as shown in Fig. 4, the resilient hinge 22 urges the plate members to the original laterally displaced positions shown in Fig. 2, thereby causing the offset edges of the apertures 18 and 20 to firmly grip the sides of the shank of the stud 26. Because of the above described increased length in the hinge 22, the resiliency thereof is sufficient to allow the plate members 14 and 16 to be relatively easily moved laterally of each other. Furthermore, by adjusting the length of the flange 24, and thereby the length of the hinge 22, any desired degree of resiliency or stiffness may be given to the hinge.

In the embodiments shown in Figs. 1 through 4, the walls of the apertures are defined by coined edges 28 and 30 to facilitate engagement with either a threaded screw or an unthreaded stud. As shown in Fig. 4, the coined edges 28 and 30, which are preferably hardened, cut into the

3

shank of the unthreaded stud 26 to form protuberances 32 thereon, which protuberances interlock with the coined edges to securely retain the stud in assembled relationship with the nut.

In order to align the apertures 18 and 20, as shown in Fig. 3, for easy insertion of a fastener element, means is provided on the nut 12, so that it may be readily grasped by either a tool or the hand of the operator. This means includes an upturned flange 34 extending from the plate member 16 along the outer marginal edge of the plate 14. As shown best in Figs. 2, 3, and 4, the flange 34 is spaced from the marginal edge of the plate member 14, so that the above described lateral movement between the plate members may take place. Flange 36 is provided, extending from the plate member 14 on the opposite side of the nut from the flange 34. When it is desired to align the openings 18 and 20 for the insertion of the fastener element, it is merely necessary to apply pressure to the flanges 34 and 36 in the direction of the arrows shown in Fig. 3 by either a tool or by the hand. It is readily seen that the relatively broad outer surfaces of flanges 34 and 36 may be much more readily grasped to supply such pressure than would the relatively narrow edges of the plate members if the flanges were not provided. Furthermore, the flanges 34 and 36 provide surfaces which may be easily grasped by a tool used to turn the nut onto a fastener element or to hold the nut while a fastener element is applied thereto. In addition, the side edges 38 and 40 of the flanges and the opposed surface of the hinge 22 may be utilized as surfaces to which a tool may be applied to turn the nut onto a fastener element.

As indicated by like numerals, the lock nut 12-a, shown in Fig. 5, is substantially identical to the nut 12. In this embodiment, however, the mid portions of the plate members around the apertures are deformed axially to shape their edges 46 and 48 for engagement with helical screw threads 50 of the screw 52 shown in Fig. 3. In order to allow the edges 46 and 48 to be formed in the shape of a helical convolution, the members are cut away as at 54 and 56. In order to assure the correct axial spacing of the edges 46 and 48 to receive the screw threads 50, the plate member 14 is provided with a depressed portion 58. The depressed portion 58 provides an abutment, which engages the plate member 16, thus providing an accurate minimum axial spacing between the edges 46 and 48.

The lock nut 12-b, shown in Fig. 6, is identical to that shown in Fig. 5, except that a locking tab or hook 60 is provided, which extends outwardly from the plate member 16-b and thence over the outwardly facing surface of the depressed portion 58-b. The locking tab 60 is provided for the purpose of preventing axial separation of the plate members, which separation would cause the screw engaging edges 46-b and 48-b to become improperly spaced, so that the application of a screw element to the nut would be difficult. As shown in Fig. 6, the width of the tab 60 is less than the length of the depressed portion 58-b, so that the tab will not interfere with the desired lateral movement between the plate members during assembly of a screw element.

Fig. 9 shows a lock nut 12-c, which is identical to the lock nut 12, except that the locking tab 60-c extends from the plate member 16-c and overlies the outwardly facing surface of the plate

4

member 14-c. As in the embodiment shown in Fig. 6, the locking tab 60-c prevents axial separation of the plate members, which would render the assembly of either a threaded or unthreaded fastener element thereto very difficult.

Fig. 10 shows a modified form of the embodiment of Fig. 9 in that the locking tab 60-d is struck from the flange 34-d. This embodiment has advantage over the lock nut 12-c in that a saving in material is effected by reason of the striking of the tab from the flange 34-d, rather than providing a separate element extending from the plate member.

From the above description, it is seen that a simple lock nut is provided, which may be easily manufactured from a single piece of sheet material, which has very efficient self-locking characteristics and which may be easily grasped by a tool or by hand to be assembled with a complementary fastener element. Furthermore, relatively easy assembly with a screw fastener is always assured, because of the provision of means for maintaining the plate members in predetermined axial spaced relationship.

While I have described and illustrated several embodiments of the present invention herein, it is obvious that many structural changes may be made in the details of the lock nut without departing from the spirit and scope of the appended claims.

I claim:

1. A lock nut made from a strip of sheet material including a pair of superposed plate members having laterally offset apertures defining helical stud engaging impressions of substantial peripheral extent therein, resilient hinge means connecting adjacent marginal edges of said plate members whereby said plate members may be laterally displaced relative to each other to align said apertures for insertion of a complementary fastener element, said superposed plate members being disposed in predetermined axial spaced relationship to insure continuity of one helical impression with the other, and integral tab means extending from one of said plate members having a portion thereof overlying an outwardly facing surface of said second plate member for maintaining the predetermined maximum axial spaced relationship while allowing lateral relative movement between said plate members.

2. A lock nut, as defined in claim 1, which includes projection means extending from one of said plate members for engaging an inwardly facing surface of the other of said plate members and maintaining a predetermined minimum axially spaced relationship between said plate members.

3. A lock nut, as defined in claim 1, which includes flange means extending axially from a margin of said one plate member, said tab means being struck from said flange means, and a second flange means disposed oppositely from said first mentioned flange means and extending axially from said second plate member, said flange means providing relatively broad surfaces to which pressure may be applied to laterally displace said plate members relative to each other to align said apertures for insertion of a complementary fastener element.

4. A lock nut, as defined in claim 1, wherein the helical stud engaging impressions include helically deformed edges of substantial peripheral extent in the vicinity of each of the apertures and on their opposed margins with the col-

5

lective peripheral extent of said helically deformed edges totaling less than 360°.

5. A lock nut, as defined in claim 1, wherein said resilient hinge means includes an extension projecting from the marginal edge of one of said plate members to a point above the other plate member, and a flange extending downwardly from said extension and merging with the other plate member, whereby the resiliency of the hinge is increased.

Number
1,194,944
1,957,042
2,338,754
2,378,684
2,405,925

Number
18,898
of 1929

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
134,489	Rouse	Dec. 31, 1872

6

Name	Date
Brown	Aug. 15, 1916
Grant	May 1, 1934
Bonas	Jan. 11, 1944
Carlstrom	June 19, 1945
Poupitch	Aug. 13, 1946

FOREIGN PATENTS

Country	Date
Australia	Apr. 3, 1930