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Serial No.
241,476
2 Sheets-Sheet 1

Fig.1

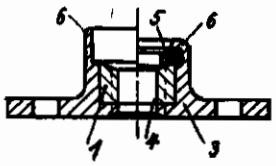


Fig.2

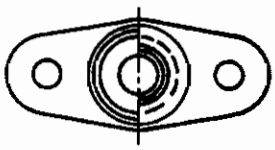


Fig.3

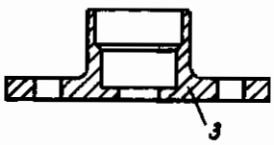


Fig.4

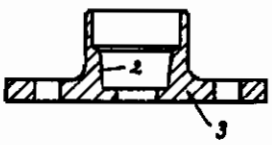


Fig.12.

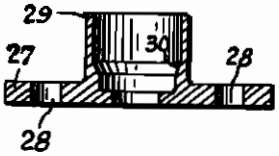


Fig.5

Fig.6

Fig.7

Fig.11

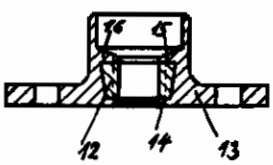


Fig.15.

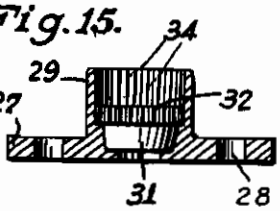


Fig.8

Fig.18

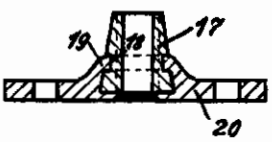


Fig.9

Fig.19

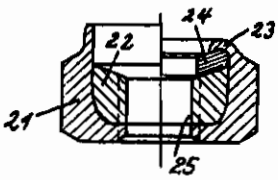


Fig.16.

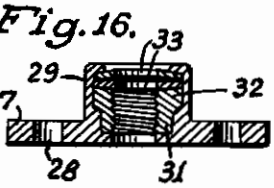
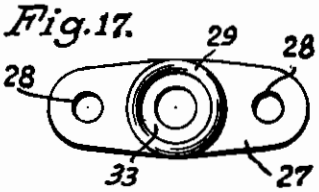


Fig.10

Fig.17.



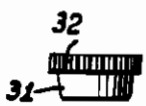
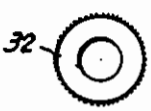


Fig.13.

Fig.14.



Inventors:
Martin Schmidt
Karl Gmähling
by Walter S. Bleistein
ATTORNEY

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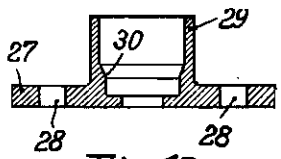

Fig. 12

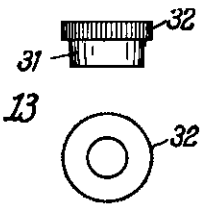

Fig. 13

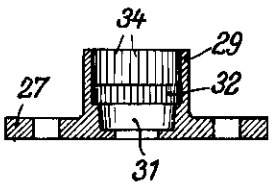

Fig. 14

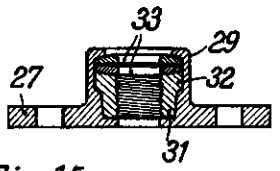

Fig. 15

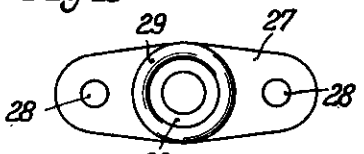

Fig. 16

Inventors:
Martin Schmidt
Karl Pinkling
by Walter S. Bleistein
ATTORNEY

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ALIEN PROPERTY CUSTODIAN

NUTS

Martin Schmidt, Weende, near Gottingen, and Karl Gmöhling, Gottingen, Germany; vested in the Alien Property Custodian

Application filed November 19, 1938

The present invention relates to nuts of the type which, for constructional reasons, such as in the manufacture of aircraft, are required to be of light weight yet have great strength as regards their screw connection.

For this purpose it is known to use nuts of light metal of various alloys, but with these nuts it is difficult if not impossible to obtain the same strength of connection as can be achieved with steel nuts. In particular, in the case of light metal nuts the strength against wrenching of the turns of the thread is frequently not adequate. Also, it often happens that the first turns of the thread of the nut are damaged if the bolt is applied at an angle other than a right angle, and this applies especially when steel bolts are used. Steel bolts also easily wear the light metal thread of the nut, and further, the turns of the thread are frequently fractured or broken by constant jolting.

In order to eliminate these drawbacks, a nut according to the present invention is so constructed that its inner thread is formed wholly or partly by a bush of steel or other heavy metal, which is bedded so as to be incapable of rotation in the nut element, which consists for the remainder of light metal.

With a construction of this kind, the light metal nut element may have any desired formation, for example, it may be an ordinary hexagonal nut, or it may be a flanged nut for riveting on. The weight of the light metal nut as a whole is only increased to an inconsiderable degree by the inserted steel threaded bush, while the strength of the thread and thus the strength of the screw connection correspond to that of a steel nut. In addition, there results the advantage, as compared with steel nuts, of simple and cheap manufacture together with the avoidance of waste of material.

Together with the steel threaded bush, any desired locking element can be installed into the light metal nut at a suitable point, or the steel bush can also act as a locking element itself, e. g. by known slotting. In order to preclude with certainty any wrenching of the steel threaded bush out of the light metal nut element, even on high tensile strains, it is of advantage to construct the bearing surface for the steel insert conically.

Further, with the present invention, a locking of the components of the nut against any form of twisting is obtained in a manner which is very simple from the manufacturing point of view, in that the rim or the superficies of the steel bush is provided with teeth or longitudinal ribs, of which the diameter is somewhat larger than the internal width of the cavity, which receives the bush, in the light metal nut. When a steel bush is inserted or pressed into the light metal surround, longitudinal grooves are formed on the inner wall of the cavity in the nut, which grooves then protect the fibre rings, which are likewise inserted into this cavity after the bush and are clamped fast by bending the rim of the nut inwards, against rotation.

The invention is more particularly described with reference to the accompanying drawing in which:

Figures 1 to 4 show a flanged light metal nut partly with an inserted thread bush of heavy metal and with a locking element of resilient material.

Figures 5 to 10 respectively, show various forms of construction of an inserted threaded bush.

Figure 11 shows a modified form of construction of a heavy metal threaded bush, whilst

Figures 12–13 show the light metal surround of the nut, and

Figure 14 the two elements combined.

Figures 15 and 16 show flanged light metal nuts into which conical heavy metal threaded bushes are inserted.

Figure 17 shows in section a hexagonal nut of light metal with a heavy metal threaded bush and a locking ring of resilient material.

Figures 18 to 22 show a further modification of the elements of a nut both separately and combined to form a nut for riveting on with a pressed in heavy metal threaded bush provided with circumferential grooves and with locking elements of resilient material.

In the construction according to Figures 1 to 3, a threaded bush 1, of steel, which is grooved on its periphery in the manner shown in Figure 5, is so inserted into a flanged riveting nut 3 of light metal that the thread 4 of the complete nut consists partly of light metal, but substantially of steel. Above the threaded bush 1 there is bedded into the light metal nut by flanging its upper rim 6, a locking ring 5 consisting of a resilient material. As shown in Figure 4, the bearing surface 2 for the threaded bush may also be of conical construction.

The inserted threaded bush may be prevented from turning in the light metal part 3 of the nut in various ways. As an example in the construction according to Figures 5 and 6, the outer surface of the threaded bush is grooved. In the construction illustrated in Figure 7, the threaded

bush is of oval formation externally, whilst in Figure 8, the threaded bush has two side lugs **26**. The threaded bush may also be constructed externally as a square or hexagon, as illustrated in Figures 9 and 10.

Instead of using a locking ring **5** of resilient material, the bush can be locked in position within the flanged surround **3** by virtue of the shape and formation. Thus, the threaded bush **7** of Figures 11 and 14 is provided with slots **9** at the end projecting out of the light metal part **9** of the nut. That end of the threaded bush **7** which is bedded into the nut has, in this case for instance, a conical milled bearing surface **10**, against which the originally cylindrical wall **11** of the riveting nut **8** is pressed.

According to Figure 15, a steel threaded bush **12** may also be inserted into the light metal nut **13** in such a manner that the two ends **14** and **15** of the steel threaded bush are shrouded by light metal. In this case, the locking ring **5** for the screw is placed upon the light metal intermediate wall **16**, so that it is separated from the steel threaded bush. In this manner it is possible to protect the steel threaded bush from the admission of moisture. This form of construction is formed for instance by die or pressure casting.

Figure 16 shows another form of construction in which the threaded bush **17** has a groove **18** into which the upper rim **19** of the light metal nut **20** is pressed. In Figure 17 is shown a hexagonal nut **21** of light metal with an inserted threaded bush **22** of steel. Between the threaded bush **22** and the upper flanged rim **23** of the light metal nut **21** there is again bedded as in Figure 1 a locking element **24** of resilient material. The thread **25** of the complete nut also consists here partly of steel and for the remainder of light metal. A steel threaded bush may also be inserted into the light metal nut in such a way that the entire thread of the complete nut consists of steel.

In the case of nuts in which fibre rings or the like are inserted for the purpose of locking the nut against twisting, it is desirable that not only the steel bush carrying the inner thread but also the locking rings should be incapable of rotation either relatively to each other or relatively to the nut part consisting of light metal. This, however, cannot always be obtained with sufficient certainty with the fibre rings by simple clamping of the inwardly bent rim of the nut. With the present invention, however, an additional protection against twisting can be obtained by pressing in a steel bush of which the diameter is somewhat larger than the diameter of the bore. When the grooved steel bush is inserted there are formed on the inner wall of the bore longitudinal grooves which prevent rotation of the fibre rings subsequently inserted into the bore (Figures 18–22).

A particularly advantageous construction consists in that the superficies of the steel bush is smooth-walled and slightly conical in the lower part and is toothed or provided with longitudinal ribs only in the thicker upper part, while the inner wall of the bore in the nut, which bore receives the bush, has an obliquely rising annular shoulder into which the longitudinal ribs or teeth of the steel bush penetrate more strongly or more deeply when being pressed in than into the upper part of the wall past which the bush is pushed when being pressed in, thus cutting longitudinal grooves. The teeth of the upper part of the superficies of the bush thus fulfill a double purpose in that on insertion of the bush firstly there are cut longitudinal grooves which impede rotation of the locking disc, and secondly, there is obtained a firm anchoring of the steel bush itself in the light metal.

As shown in Figure 19, the steel bush carrying the internal thread consists of a lower, smooth-walled slightly conical part **5** and of a thicker upper part **6**, which is toothed or provided with longitudinal ribs. When the bush is being pressed in, these longitudinal ribs cut corresponding longitudinal grooves **9** in the inner wall of the bore of the nut, which consists of light metal (Figure 3). In addition, the teeth penetrate particularly deeply into the light metal on the obliquely rising annular shoulder **4** of the cavity and protect the bush against twisting relative to the light metal element. However, the fibre rings **7**, which are pressed in after the bush and which are clamped firm by the inwardly bent rim of the nut, are also protected against turning by the grooves **9** cut in the inner wall when the bush is pressed in. The same form of protection against twisting as in the riveting nut provided with flanges **27** and bores **28** may obviously also be used with hexagonal nuts and the like.

MARTIN SCHMIDT.
KARL GMÖHLING.