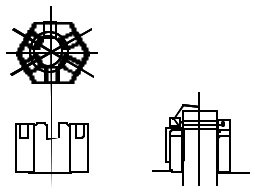
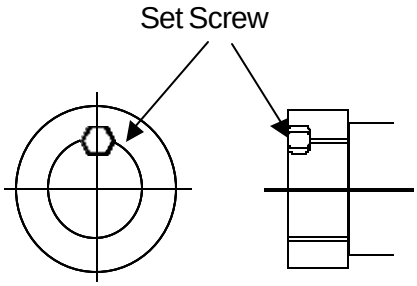
(1) Method to fix Mechanically with BOLT or NUT

Fig. 1 – Nut with Grooving



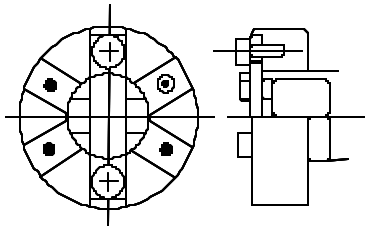
1. Fixing by putting split pin.
2. Certain prevention for coming out is possible.
3. In order to match pinhole with grooving, it is difficult to give proper tightening strength.

Fig. 2 – Set Screw Method



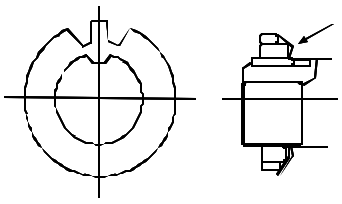
1. To be tightened closely.
2. Joint processing after tightening the nut.
3. Satisfactory effect is available in vibration resistant and shock resistant.

Fig. 3 – Key Method



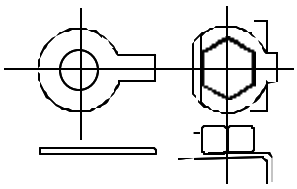
1. Mainly it is to be used in rotating shaft.
2. It is to withstand high torque.
3. In order to match the grooving it is difficult to give proper tightening strength.

Fig. 4 – Roller Bearing Nut



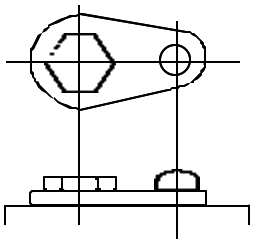
1. Roller bearing washer to be used together.
2. Mainly, it can be used in rotating shaft.

Fig. 5 – Tongued washer



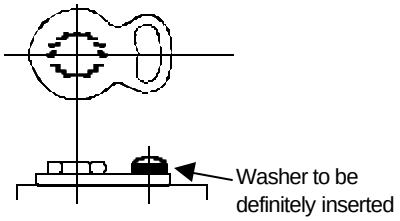
1. To bend washer.
2. It is being used in small electrical equipment.

Fig. 6 – Looseness preventive plate (A)



1. Looseness preventive plate to be locked.
2. In order to match the tapped hole, its adjustment is required (It is difficult to give proper tightening strength).

Fig. 7 – Looseness preventive plate (B)



1. Proper tightening is possible.
2. Sinking and looseness occurs if washer is not inserted.

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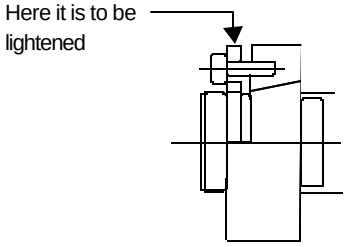
(2) Method to maintain the press fixing of thread ridges, occurs due to tightening, during operation of machine.

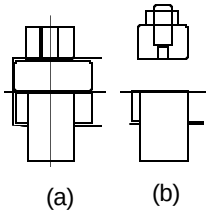
Fig. 8 – Slit Method



1. Press fixing of screw to be done by getting elastic deformation.
2. Nut end surface which is not to be used to be lightened.

Fig. 9 – Lock Nut method

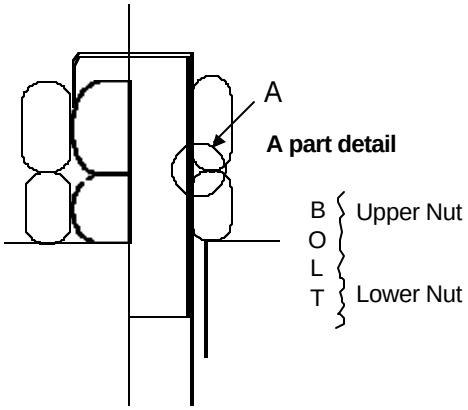
Patch plate made of soft material to be put.



(a) Damages the screw by set screw edge.

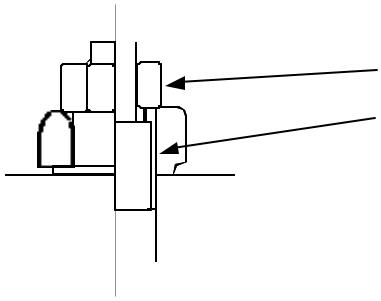
(b) Nut becomes locking for set screw.

Fig. 10 – Double nuts



1. Lower nut to be tightened in upper nut by turning the screw reversely.
2. Fastening of nut and nut is important.
2. Proper tightening strength is available even by turning the screw in the reverse way.

Fig. 11 – Double Nuts (Use of lead difference)



$P_A < P_B$

A – Screw A

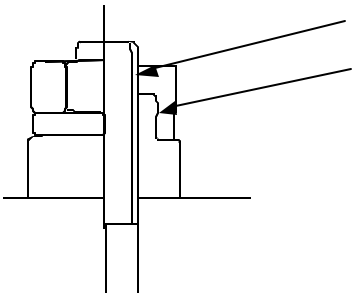
(Pitch P_A)

(B – Screw B)

(Pitch P_B)

1. It is to be interacted so that press fixing can be hardened for upper and lower nut as much as turn back.

Fig. 12 – Double Nuts (Use right & left hand thread)

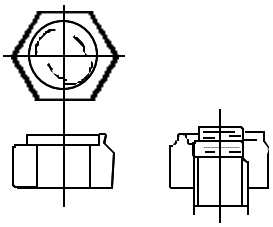


Right hand thread

Left hand thread

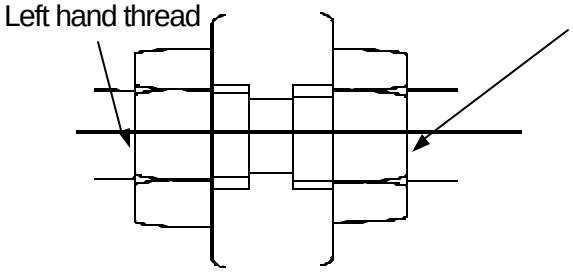
Screwing the upper and lower nut together and rotating the upper nut to the left fasten it (Lock it).

Fig. 13 – U nut



By elasticity of inserted special spring in the NUT body, looseness to be stopped by increasing the frictional force.

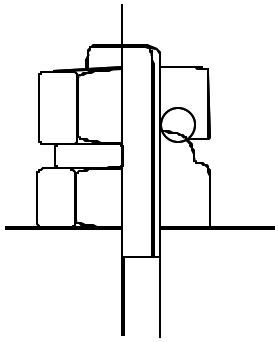
Fig. 14 – Double locking method



1. Stop looseness by left & right hand thread.
2. To be used mainly in rotating shaft.

(3) Method to increase the rotation friction torque of screw by deforming the thread ridge

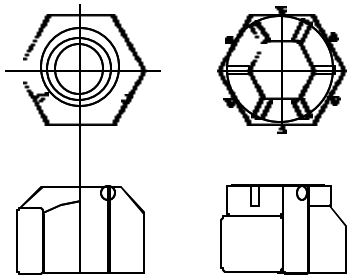
Fig. 15 – Double Nuts (Elastic deformation method)



Wedge Effect

- Elastic deformation to be conducted partly due to upper Nut fastening, external thread to be fastened tightly.

Fig. 16 – Nut providing Elastic deformation



1. Deformed internal thread part interferes with the external thread in case screw gets lock-in and develops rotation friction torque.

   Δ Caulking part

   O Thread deformation part

(4) Method to obstruct the screw rotation by intervening soft things in-between screws

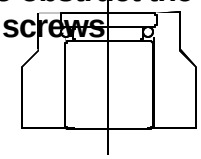


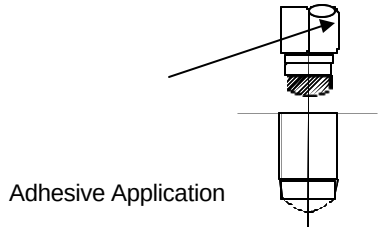
Fig.17 – Inserted Nylon Nut

Nylon

1. If the nut is screw into, then Nylon gets moulded and leads to friction force.

(5) Method to fix after applying adhesive on thread ridge and tightening

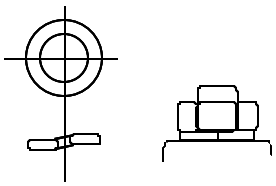
Fig. 18 – Adhesive Usage



1. To be fixed by adhesive after screwing into

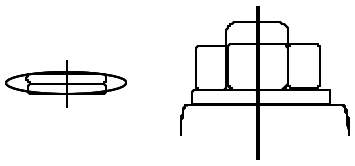
(6) Method to use washer

Fig. 19 – Spring Lock Washer



1. To be tightened till it become flat.
2. Elasticity declines in long term tightened condition.
3. Spring reaction force concentrates in cut end part.

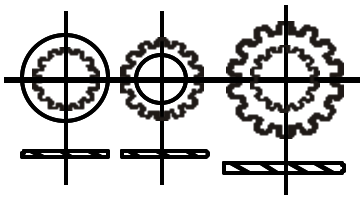
Fig. 20 – Conical Spring Washer



s

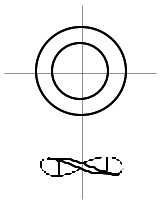
1. To be tightened till it becomes flat.
2. Spring reaction force is average on bearing surface.

Fig. 21 – Toothed Lock Washer



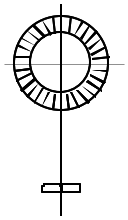
1. Clawpart elasticity is used.
2. Effect becomes less in case bearing surface is too hard or soft.
3. To be used mostly in small size electric equipments.

Fig. 22 – Waved Lock Washer



1. To be tightened till it become flat.
2. To be suited during tightening high tightening strength in soft bearing surface like light alloys.

Fig. 23 – Serrated Conical Washer



Decline in tightening strength to be prevented due to spring effect and bearing surface contact certainly.

PREVENTIVE METHOD

FOR

BOLT LOOSENESS

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