Oct. 2, 1928. 1,685,785

J. H. MUTH

LOCK MEANS

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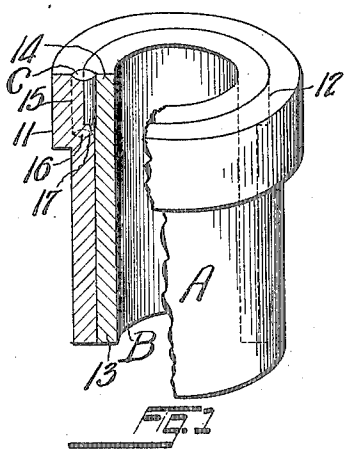


FIG. 1

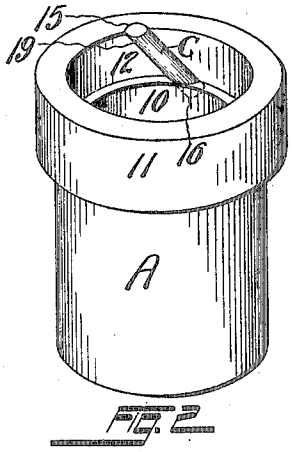


FIG. 2

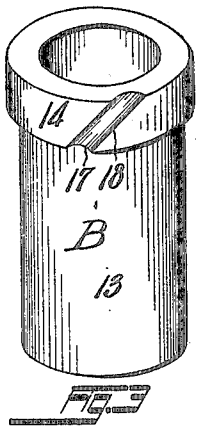


FIG. 3

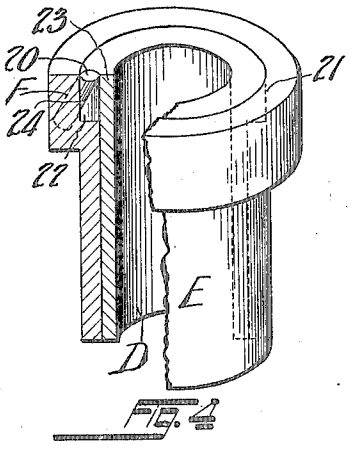


FIG. 4

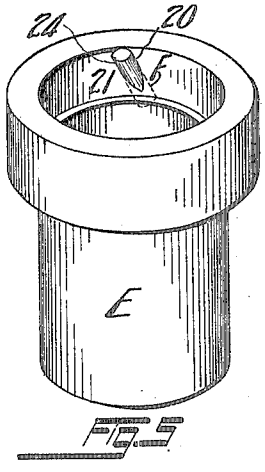


FIG. 5

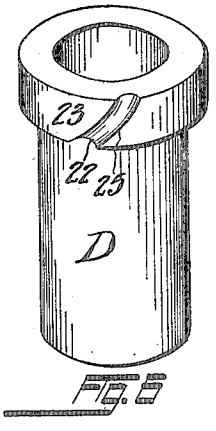


FIG. 6

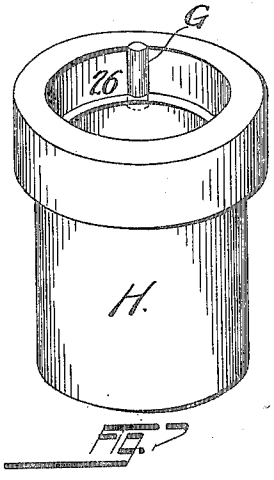


FIG. 7

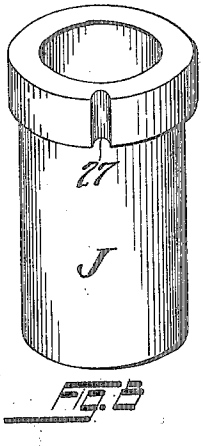


FIG. 8

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LOCK MEANS.

Application filed October 30, 1924. Serial No. 746,750.

My invention relates to lock means between associable members for such mechanisms as guide bushings telescoping into each other.

One of the objects of my invention is a simple, inexpensive and efficient lock means between associable members of a mechanism.

Another object is to provide a mechanism having insertable members with means whereby the insertion of one member into the other automatically and positively locks them to each other.

Another object is to provide a mechanism having associable members with means whereby the removal of one member from the other automatically and positively unlocks them from each other.

Another object is to provide a mechanism having associable members with a lock means which is not subject to bending or breaking.

Another object is to provide a mechanism having associable members with a lock means which is confined entirely within the bushing to prevent breakage thereof or tampering therewith.

Another object is to provide such mechanism as a guide bushing having a liner bushing and a plurality of slip bushings with a lock means common to all bushings so that either of the slip bushings may be inserted into the liner bushing and automatically locked therein upon insertion thereof and automatically unlocked therefrom upon removal thereof.

In guide bushings for instance, particularly those for guiding tools, boring bars, etc., as used in rapid production, it is quite necessary that bushings can be changed quickly and that these bushings are locked in desired relation to each other with the least amount of time and effort.

I attain the above objects and necessities by the mechanism illustrated in the accompanying drawing in which

Fig. 1 is a perspective view, partly in section, of a guide bushing embodying the features of my invention, showing the relations of the elements.

Fig. 2 is a perspective view of the liner bushing of Fig. 1, showing the retainer pin in position.

Fig. 3 is a perspective view of the slip bushing of Fig. 1, showing the groove in the head adapted to the pin of Fig. 2.

Fig. 4 is a perspective view of a guide bushing, similar to Fig. 1, partly in section to show more clearly the relation of the elements with a modified retainer pin.

Fig. 5 is a perspective view of the liner bushing of Fig. 4 showing the retainer pin in position.

Fig. 6 is a perspective view of the slip bushing of Fig. 4 showing the groove in the head adapted to the pin of Fig. 5.

Fig. 7 is a perspective view of a liner bushing showing another modified retainer pin.

Fig. 8 is a perspective view of a slip bushing adapted to the liner bushing of Fig. 7 and showing the groove in the head adapted to the pin of Fig. 7.

Similar reference characters refer to similar parts throughout the views.

Referring now to Figs. 1, 2, and 3. The guide bushing shown here comprises the liner bushing A, the slip bushing B, and the pin C.

The liner bushing A has the bore 10, the head 11, and the counterbore 12 in this head.

The slip bushing B has the body 13 fitting to the bore 10 as usual in telescoping bushings, and also has the head 14 loosely fitting into the counterbore 12.

The relations of the bushings A and B, when in operative position, is shown in Fig. 1.

While the guide bushing is in operation, it is quite desirable that some means is provided to retain the bushings in desired relation to each other by preventing either a rotative or a longitudinal movement, or both of these movements of the slip bushing in the liner bushing. It is also desirable that the slip bushing can be changed quickly and with the least amount of time and labor.

The mechanism illustrated attains these desirable features by arranging the elements so that the slip bushing automatically locks itself while the same is being inserted into the liner bushing without any extra operation other than the act of inserting the slip bushing and so that the slip bushing automatically unlocks itself while the same is being removed from the liner bushing without any other operation than the act of removing the slip bushing and so that the slip bushing automatically seats itself in the liner bushing when in desired relation thereto.

In Figs. 1 and 2 I have shown one manner of mounting a means for attaining the desirable features set forth in the preceding paragraph which means comprises the pin C driven into the head 11 and partly projecting into

the counterbore 12. In this instance, the pin C is inclined to the axis of the guide bushing in one plane but is parallel therewith in a plane at right angles to the first plane. The inclination to the first plane is best seen in Fig. 2 while the parallel of the second plane is best seen in Fig. 1.

It is observed that the pin C is partly embedded, longitudinally, in the material of the head 11 at 15 and that the lower part 16 thereof is wholly embedded in the bottom of the counterbore 12. This arrangement supports the pin C throughout its entire length and thereby prevents the bending or breaking thereof.

The head 14 of the slip bushing B is provided with the groove 17 inclined to correspond to the inclination of the pin C.

While the bushing B is being inserted into the bushing A, the pin C engages the groove 17 and thereby guides the bushing B into desired position in the bushing A.

After the bushing B is fully inserted in the bushing A, the entire length of the pin C engages the groove 17 and thereby forms a substantial abutment or retainer or lock means between both of the bushings which can not be destroyed easily since the pin C is supported in the bushing A throughout its entire length and, therefore, can not bend or be broken off either while the bushings are handled or during the use thereof.

The angular disposition of the pin C prevents the bushing B from moving longitudinally in the bushing A since the side 18 of the groove 17 engages the side 19 of the pin C and prevents such longitudinal movement unless the bushing B is rotated according to the inclination of the pin C.

When removing the bushing B from the bushing A, it is only necessary to push the bushing B longitudinally which action causes the bushing B to rotate according to the inclination of the pin C while it is moving longitudinally out of the bushing A.

In Figs. 4, 5, and 6, I have shown a modification of the lock and retainer means. In this modification, the bushing D fits into and is inserted into and removed from the bushing E similar to the bushings A and B previously described but the lock means shown here has the additional feature of exerting a wedging action on the lower side of the pin F to lock the two bushings to each other more positively than the lock means shown in Figs. 1, 2, and 3. This wedging action, however, should not be carried to a sufficiently high degree to prevent the ready removal of the bushing D from the bushing E.

In this modification, the pin F is also driven into the head of the bushing E, as in the bushing A, but is here inclined in two directions, i. e. in one plane the pin F is inclined to the longitudinal axis of the bushing while in a plane at right angles to the first plane it is also inclined to this longitudinal axis so that only the upper portion 20 projects into the counterbore 21 while the pin F is otherwise embedded similar to the pin C.

The bushing D is provided with the groove 22 in the head 23. It is observed that the groove 22 is arcuate in contour for the purpose of providing a wedging engagement between the side 24 of the pin F and the side 25 of the groove 23 when the bushing D is fully inserted in the bushing E and given a slight rotative movement. The pin F itself is straight, it is therefore necessary to doubly incline this pin so that the portion 20 only projects into the counterbore 21 to engage the arcuate groove 22 to guide and to retain the bushing D in the bushing E.

It is observed that the arcuate formation of the groove 22 is not the natural result of a groove cut straight and around on the circumferential surface of the head 23 and that the groove 22 is actually cut arcuate around this surface to acquire the necessary wedging action on the bottom of the side 24 of the pin F and that the arcuate formation of the groove is inclined to the longitudinal axis of the bushing.

In Figs. 7 and 8 I have shown another modification of a guide and retainer means. In this modification the pin G is also partly embedded in the head of the bushing H and also partly projects into the counterbore 26 similar to the pin C previously described but in this instance the pin G is not inclined in any manner and the head of the bushing J is provided with the groove 27 also uninclined to correspond to the pin G.

The structure of this last modification is the most simple and inexpensive and prevents the bushing J from rotation in the bushing H in either direction but does not prevent the longitudinal movement of the bushing J in the bushing H.

In the guide bushings illustrated in the accompanying drawings I have shown a pin to act as guide and retainer and lock means mounted in the head of the liner bushing in each instance. This is the most convenient manner of providing such a means since there is more metal there to mount in and the groove can readily be provided in the head of the slip bushing. In either manner of mounting of the pin or other guide or retainer or lock means the groove is formed to suit the pin.

It is understood that such a pin or other similar means may be mounted other than in the head of the liner bushing as shown in all of the illustrations; for instance, it may be mounted at the bottom of the liner bushing, or in the head of the slip bushing, or at the bottom of the slip bushing. Such guide or retainer or lock means may also be formed directly on the material of the bushings.

Modifications other than those shown and

described and pointed out may be made within the scope of the appended claims; therefore, without limiting myself to the precise construction and arrangement of elements shown and described and pointed out.

I claim:—

1. In a lock means, associable members to be locked to each other, a pin having one end thereof fixed in one of said members, the remainder of said pin partly embedded in said one member throughout the major portion of the length thereof, said pin disposed at an angle so that the end of said partly embedded portion projects further from the wall of said one member than the other portion thereof, and another one of said members to be locked to said one member having a groove arranged to engage both sides of said projecting portion of the pin so that either a longtitudinal movement between the members in one direction creates a rotative movement between the members in one direction or a rotative movement between the members in one direction creates a longitudinal movement between the members in one direction to lock the members to each other both longitudinally and rotatively and so that a reversal of said movements automatically disengages the members from each other.

2. In a lock means, associable members to be locked to each other, one of said members having a groove and a shoulder abutable on another one of said members, to be locked to said one member, a pin having one end thereof fixed in said other member, the remainder of said pin partly embedded in said other member throughout the major portion of the length thereof, said pin disposed at an angle so that the end of said partly embedded portion projects further from the wall of said other member than the remainder thereof, and said groove arranged to engage both sides of said projecting portion of the pin so that either a longitudinal movement between the members in one direction creates a rotative movement between the members in one direction or a rotative movement between the members in one direction creates a longitudinal movement between the members in one direction and thereby abuts said shoulder on said other member to lock the members to each other longitudinally and to arrest the rotative movement between the members when said shoulder so abuts said other member and so that a reversal of said movements automatically disengages the members from each other.

3. In a guide bushing, a liner bushing, a slip bushing insertable into and lockable to and unlockable from said liner bushing, a pin projecting from the wall of one of said bushings and supported therein throughout the major portion of the length thereof, a portion of said pin projecting from said wall, the outer end of said pin projecting further from said wall than the remainder thereof, and the other one of said bushings having a groove arranged to engage both sides of said projecting portion of the pin so that either a longitudinal movement between the bushings in one direction creates a rotative movement between the bushings in one direction or a rotative movement between the bushings in one direction creates a longitudinal movement between the bushings in one direction to lock the bushings to each other both longitudinally and rotatively and so that a reversal of said movements automatically disengages the bushings from each other.

4. In a guide bushing, a liner bushing having a bore and a counterbore, a slip bushing having a body adapted to said bore and a head adapted to said counterbore, a pin fixed in said liner bushing and supported therein throughout the major portion of the length thereof, a portion of said pin projecting into said counterbore, one end of said pin projecting further into said counterbore than the remainder thereof, and a groove in the wall of said head and arranged to engage both sides of said projecting portion of the pin so that either a longitudinal movement between the bushings in one direction creates a rotative movement between the bushings in one direction or a rotative movement between the bushings in one direction creates a longitudinal movement between the bushings in one direction to lock the bushings to each other both longitudinally and rotatively and so that a reversal of said movements automatically disengages the bushings from each other.

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