Jan. 18, 1944. C. CASTELLI 2,339,615

LOCK

Filed May 21, 1942

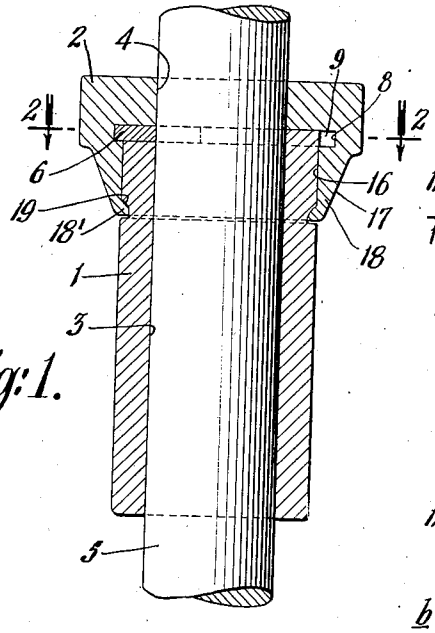


Fig:1.

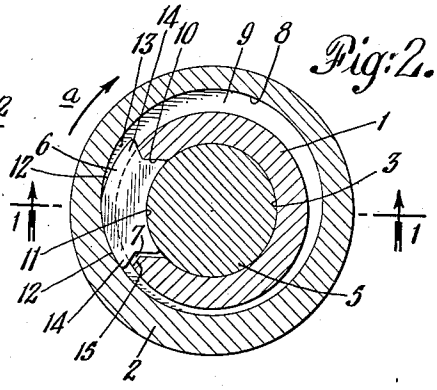


Fig:2.

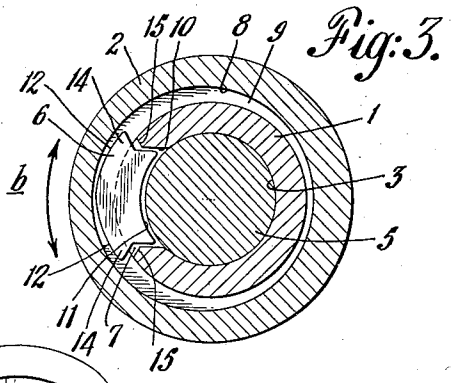


Fig:3.

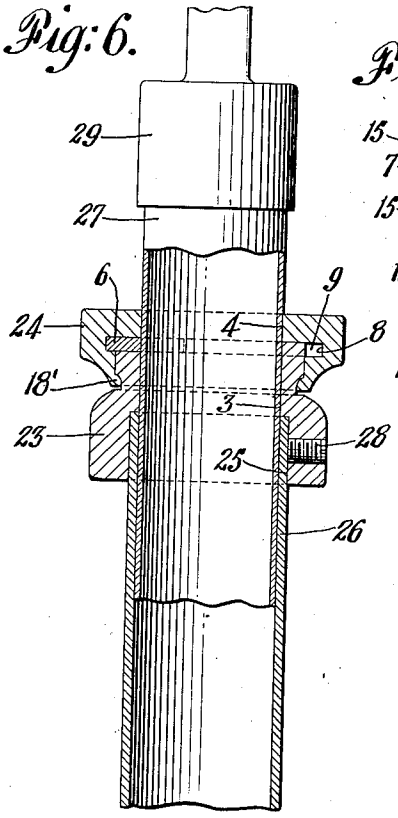


Fig:6.

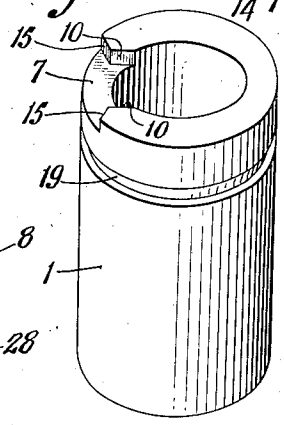


Fig:4.

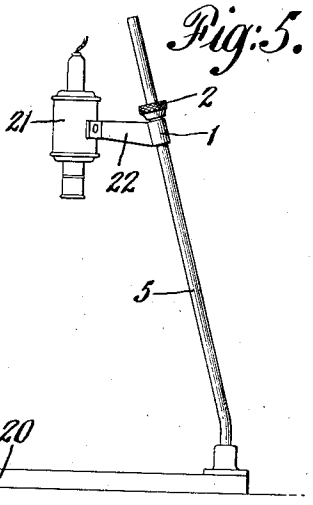


Fig:5.

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LOCK

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4 Claims. (Cl. 287—52.09)

The invention relates to locks or clamps for adjustably securing a mounting bracket on a tube or supporting rod, and for clamping telescoping members such as a tubular member which is adjustable in relation to another tubular member or rod.

It is an object of my invention to provide improved locking or clamping means for mounting apparatus in adjustable relationship to cylindrical supporting members such as hollow tubular or solid columns.

Another object of my invention is to provide locking means of the character described in which scratching or marring of the cylindrical supporting member by the locking means is avoided, or at least is less likely to occur than with ordinary clamping devices such as those employing set screws or the like.

A further object is to provide improved locking means for mounting apparatus in adjustable relationship to cylindrical supporting members by a positive cam action without requiring any grooves, notches, or other alterations in the smooth cylindrical surface of the supporting member.

A further object is to provide a locking device adapted to secure any desired apparatus at selected positions on a cylindrical supporting tube, rod, or the like, and which is capable of sustaining substantial loads, yet is inexpensive to construct and easy to operate.

A still further object of my invention is to provide a locking device of the character described which is adapted to a wide variety of uses such as in conjunction with adjustable supporting means for the lamp-housings of photographic enlargers, loudspeakers, microphones, fans, cameras, music stands, and so forth.

Other objects and advantages of the invention will appear as the description proceeds.

In the drawing, wherein are illustrated certain preferred embodiments of the invention:

Fig. 1 is a vertical sectional view, taken as indicated at 1—1 of Fig. 2, illustrating a lock or clamp for adjustably securing a mounting bracket on a tube or supporting rod.

Fig. 2 is a horizontal sectional view taken as indicated at 2—2 in Fig. 1. Both Figs. 1 and 2 show the parts in their locking position.

Fig. 3 is a horizontal sectional view taken in the same plane as Fig. 2, but showing the parts in unlocked position.

Fig. 4 is a perspective view of one of the relatively rotatable members shown in the preceding views.

Fig. 5 is a side elevational view of a photographic enlarging apparatus, illustrating the application of the locking device shown in the preceding views to supporting means for the lamp-housing of such apparatus.

Fig. 6 is a vertical sectional view similar to Fig. 1, but illustrating another embodiment of the invention. In this embodiment the locking device is applied to the clamping together of telescoping tubular members in adjustable relationship to one another.

Referring first to the embodiment illustrated in Figs. 1 to 5, the invention consists, in its general arrangement, of a pair of relatively rotatable members 1 and 2, and a locking element 6. The members 1 and 2 have aligned openings 3 and 4 therein adapted to receive a cylindrical support, such as the rod or column member 5. The member 1 has a recess 7 to receive the locking element 6 and limit relative circumferential movement of said member and locking element, thus providing means for controlling the position of the locking element in a circumferential direction. The member 2 has a cam surface 8 for forcing the locking element 6 inwardly upon relative rotation of the members 1 and 2, thus providing means for controlling the position of the locking element in a radial direction, operable upon relative rotation of the two members.

The cam surface 8 preferably is arranged at the base of a circumferential groove 9 in which the locking element 6 is slidably arranged so as to be movable both circumferentially and radially relative to the member 2. The cam surface 8 is eccentrically arranged with respect to the aligned openings 3, 4 for engagement with the locking element to force it toward the center of these aligned openings upon relative rotation of the members 1 and 2. The engagement of the shoulders 10 at the ends of the recess 7 of the member 1 with the ends of the locking element 6 provides means for producing positive relative movement between the locking element and the cam means 8 upon relative rotation of the members 1 and 2. Thus when the members 2 is turned in the direction indicated by the arrow a in Fig. 2, the tendency of the locking element or key 6 to rotate in the same direction—i. e., clockwise—is arrested by engagement of the leading end of the key with one of the shoulders 10, as shown in this view.

My preferred construction of the locking element is shown in Figs. 2 and 3, in which it will be seen that this element has opposed arcuate surfaces 11 and 12 for engagement respectively with

the cylindrical support 5 and the cam surface 8. These arcuate surfaces also preferably converge toward each end of the locking element so as to conform substantially to the converging arcuate surfaces of the cylindrical support and the cam. With this construction, when the locking element or key is in engagement with the support 5 along all points of the arcuate surface 11, or at least at both ends thereof, approximately one-half of the arcuate surface 12 will be in engagement with the cam surface 8, thus providing a stable bearing which assists in insuring that the key will bear evenly against the member 5, distributing the load in such a manner that undue scratching or marring of the surface of the member 5 will be avoided. The surface 12 of the key may be formed in two separate arcs of equal radius with different centers and intersecting at approximately the midpoint of the key, or it may be made in a single arc which most nearly approximates the curve obtained by the aforesaid two intersecting arcs. In either case, the key will have converging arcuate surfaces substantially conforming to the converging arcuate surfaces of the cylindrical support 5 and the cam 8.

Another feature of my preferred form of locking key is that at least a portion of its end surfaces, i. e., the surfaces which are adapted to engage shoulders 10 of member 1, are arranged at an acute angle to a tangent to the opening 3, at least a portion of each of the shoulders 10 being similarly arranged at an acute angle to the tangent. The purpose of this is to provide means for urging the engaging end of the key 6 inwardly. By "engaging end" I refer to that end of the key which is in engagement with one of the shoulders 10. With the member 2 being rotated in the direction of the arrow a in Fig. 2, this would be the upper end of the key as viewed in this figure, since the rotation of the member 2 tends to carry the key around in the same direction. With this acute angular disposition of the shoulder 10, or of a portion of the shoulder 10, and the complementary portion of the key, the engaging end of the key is forced tightly against the support 5 notwithstanding the clearance at 13 between the adjacent portion of the surface 12 of the key and the cam surface 8. At either end of the key 6 are projections 14 which are arranged to engage surfaces 15 at the ends of the recess 7 to limit the inward movement of the key. With this construction, when the lock comprising the members 1, 2 and 6 is removed from the support 5, the key 6 will not drop out through the aligned openings 3, 4 but will be held in place in the groove 9.

The members 1 and 2 may be separable, or they may be locked together so that the members 1, 2 and 6 will form a permanent assembly. In the construction illustrated, the member 1 is made in the form of a hollow cylinder, and the member 2 is counterbored at 16 (Fig. 1) to receive the upper end of the member 1. The groove 9 previously referred to is formed at the top of the counterbore. The lower end of the member 2 may be tapered inwardly as at 17, forming a downwardly extending tapered flange 18. Opposite the lower end of this flange the member 1 is provided with a circumferential groove 19, and the edge of the flange 18 of the member 2 is peened over or rolled into this groove, as at 18', so as to hold the members 1 and 2 together but with sufficient looseness to permit relative rotation of these members.

Fig. 5 illustrates the application of my locking device to supporting means for the lamp-housing of photographic enlarging apparatus. Such apparatus may comprise, for example, a baseboard 20, supporting column 5 and lamp housing 21 to which is secured a supporting bracket 22. If desired, the supporting bracket 22 may be made integral with the locking member 1 or may be secured thereto in any convenient manner. Adjustment of the elevation of the lamp housing 21 is effected by turning the member 2 relative to the member 1, raising or lowering the unit and tightening the lock by turning the member 2 in either direction, as indicated by the arrow b in Fig. 3 which shows the parts in unlocked position. From the fully unlocked position shown in Fig. 3 to the locked position shown in Fig. 2, the members 1 and 2 rotate through an angle of approximately 90°, or one-quarter of a turn. However, if desired, the degree of eccentricity of the cam surface 8 and the initial clearance between the locking parts may be adjusted to limit the locking movement to less than one-quarter of a turn, or to increase it to more than one-quarter of a turn.

In Fig. 6, I have illstrated another embodiment of the invention in which the locking device is applied to the clamping together of telescopic tubular members so as to be relatively adjustable. In this form of locking device, the relatively rotatable members 23 and 24 correspond respectively to the members 1 and 2 of the embodiment previously described. The locking element or key 6 may be of the same form. The member 24 is provided with a groove 9 at the base of which is a cam surface 8 eccentrically arranged with respect to the center of the aligned openings 3 and 4 of the two members. The member 23 is counterbored at 25 to receive a tubular supporting member 26, the inner surface of which may be aligned with the opening 3 so that a cylindrical member such as the tube 27 passing through the openings 3 and 4 may have a sliding fit with the interior of the member 26. If desired, however, there may be a clearance provided between the two tubular members 26 and 27. The member 23 of the locking device may be secured to the top of the member 26 in any convenient manner, as by means of a setscrew 28 or by means of a threaded or welded connection. The supporting member 26 may be attached to a suitable base such as the base 20 which has been described with reference to Fig. 5, and the adjustable member 27 may be used to support apparatus such as the lamp housing 21 of a photographic enlarger, or a loud speaker, microphone, fan, etc. For this purpose a suitable mounting bracket 29 may be fastened to the upper end of the adjustable member 27, the design of this bracket being suited to the apparatus which is to be supported. The operation of this form of the invention is substantially the same as has been described with reference to Figs. 1 to 4: relative rotation of the members 23 and 24 brings the locking element 6 into gripping relationship with the member 27 or frees the member 27 for vertical adjustment. However, the locking device comprising the members 23, 24 and the key 6 remains in a fixed position while the member 27 moves up or down, whereas in the previous embodiment, the member 5 remains in a fixed position while the locking device moves up or down. By eliminating the supporting member 26 and extending the adjustable member 27 downwardly to a supporting base, the locking device may be used as a supporting bracket

which moves up and down on the support **27**. In this case, the apparatus to be supported would be attached to the locking device instead of to the member **27**. Thus, if we invert the apparatus of Fig. 6, the member **29** may be utilized as a supporting base and the member **26** as a supporting bracket for suitable apparatus. In this case the locking device moves up and down instead of remaining stationary.

The terms and expressions which I have employed are used in a descriptive and not a limiting sense, and I have no intention of excluding such equivalents of the invention described, or of portions thereof, as fall within the purview of the claims.

I claim:

1. Locking means for mounting apparatus in adjustable relationship to a cylindrical support, said means comprising a pair of relatively rotatable members having aligned openings therein adapted to receive a support having a cylindrical outer surface, a locking element associated with said members, one of said members having a recess to receive said locking element and limit relative circumferential movement of said member and locking element, and the other of said members having a circumferential groove in which the locking element is slidably arranged so as to be bodily movable both circumferentially and radially relatively to said last-named member, the groove having a cam surface eccentrically arranged with respect to said aligned openings for engagement with the locking element to force it against the outer cylindrical surface of said support upon relative rotation of the two members.

2. Locking means for mounting apparatus in adjustable relationship to a cylindrical support, said means comprising a pair of relatively rotatable members having aligned openings therein adapted to receive a cylindrical support, a locking element associated with said members, cam means associated with one of said members and arranged to engage the locking element, and means on the other of said members for producing positive relative movement between the locking element and the cam means upon relative rotation of the two members, said last-named means comprising a shoulder arranged for engagement with the locking element, and said shoulder having at least a portion thereof arranged at an acute angle to a tangent to said aligned openings so as to urge the engaging end of the locking element inwardly.

3. Locking means comprising a pair of relatively rotatable members having aligned openings therein adapted to receive a support having a cylindrical outer surface, one of said members having a recess to receive a locking element, and the other of said members having a cam surface arranged to wedge the locking element inwardly against the cylindrical outer surface of said support upon relative rotation of the two members, the locking element having opposed arcuate surfaces for engagement respectively with the cylindrical outer surfaces of said support and said cam surface.

4. Locking means comprising a pair of relatively rotatable members having aligned openings therein adapted to receive a cylindrical support, one of said members having a recess to receive a locking element, and the other of said members having an arcuate cam surface arranged to wedge the locking element inwardly against the cylindrical support upon relative rotation of the two members, the locking element having opposed arcuate surfaces for engagement respectively with the cylindrical support and said cam surface, said arcuate surfaces converging toward each end of the locking element so as to conform substantially to the converging arcuate surfaces of the cylindrical support and the cam.

CHARLES CASTELLI.