March 15, 1960 W. R. GARRETT 2,928,294

LATCH MEANS

Filed Oct. 8, 1956

2 Sheets-Sheet 1

FIG. 1.

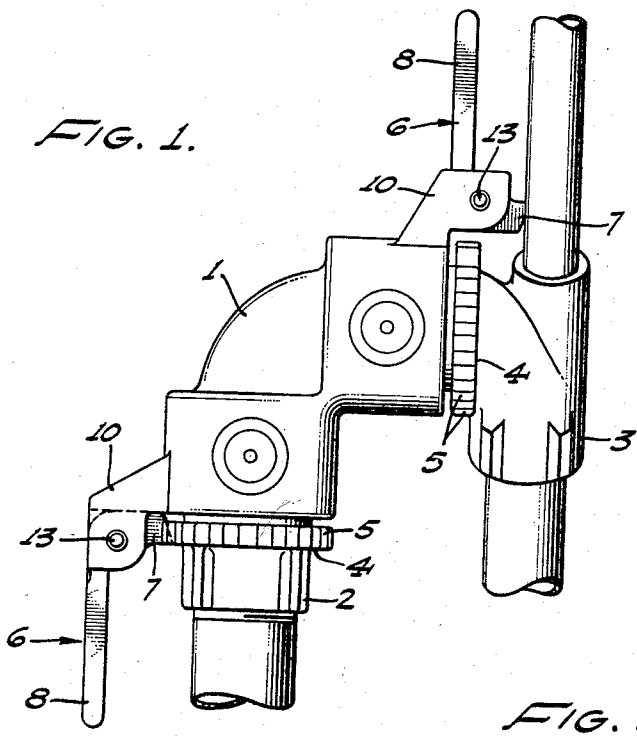
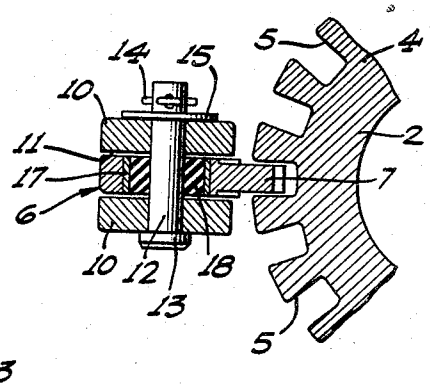


FIG. 5.



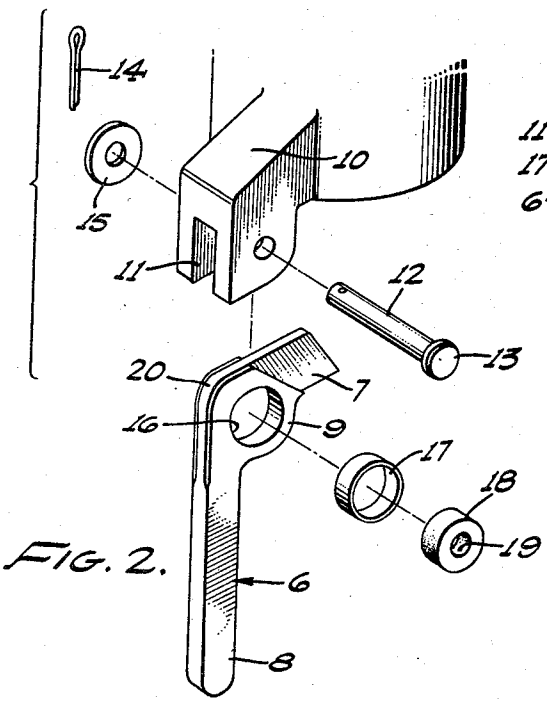


FIG. 2.

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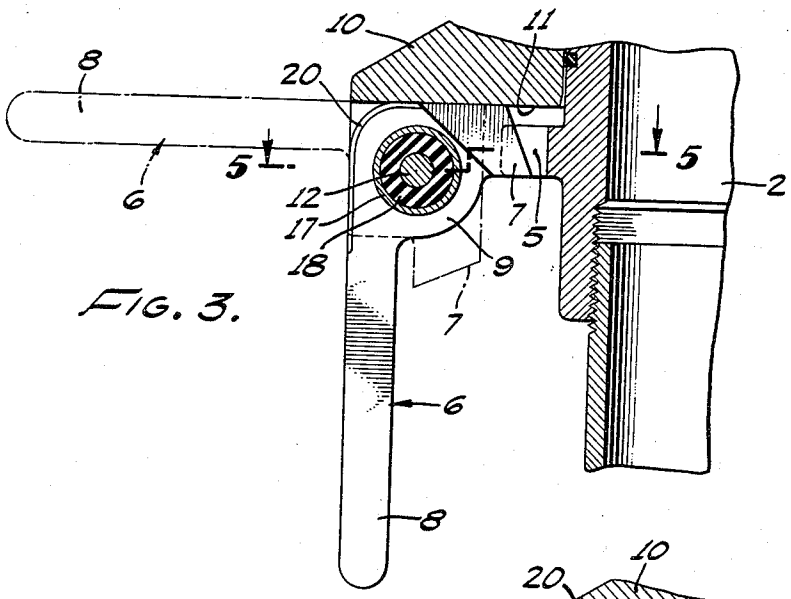


FIG. 3.

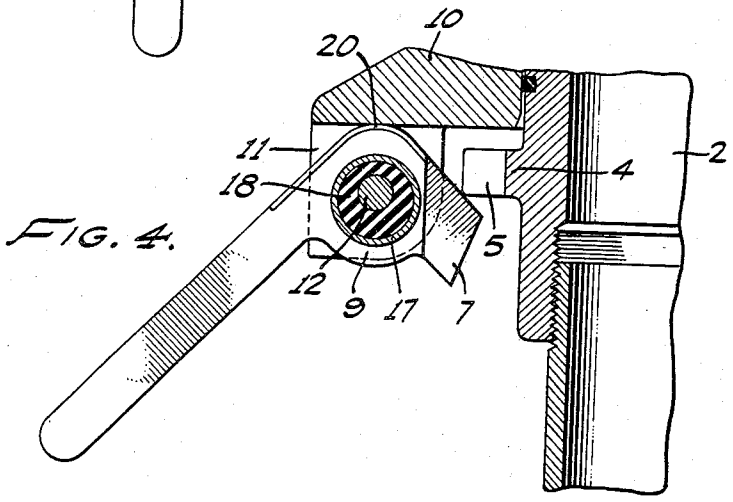
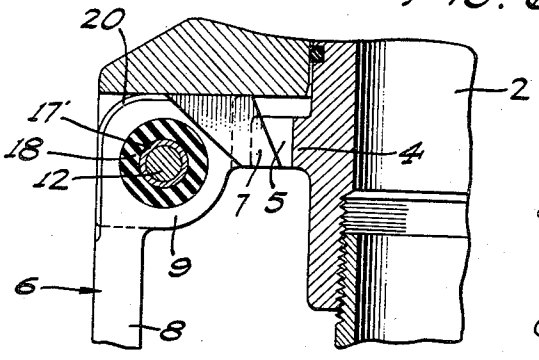


FIG. 4.

FIG. 6.



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United States Patent Office 2,928,294 Patented Mar. 15, 1960

2,928,294

LATCH MEANS

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Application October 8, 1956, Serial No. 614,507

9 Claims. (Cl. 74—527)

The present invention relates to latch mechanisms, and more particularly to a pivotal latch mechanism having unique means for retaining the pivotal latch member in an operative position or in an inoperative position.

Heretofore, latches have commonly been provided with means for retaining a pivotal latch member in an operative latching position and in an inoperative non-latching position. Such retaining means have generally been in the form of a spring pressed detent or spring toggle or the like, for resiliently opposing movement of the pivotal latch member when said latch member assumes a latching and/or a non-latching position.

An object of the present invention is to provide novel retaining means for accomplishing such results, said novel retaining means being exceedingly simple to manufacture, assemble and maintain, as well as quite durable and efficient.

In accordance with the foregoing objective, it is a further object of the invention to provide a pivotal latch mechanism in which the pivotal latch element is pivotally mounted upon a resilient or compressible bushing and thus has a floating center, said pivotal latch member also having a cam surface engageable with a complemental surface of the supporting structure to compress the resilient bushing as the cam surface approaches center, while allowing the resilient bushing to expand as the cam surface passes over center in either direction; thus, the tendency of the bushing to resiliently resist compression will retain the latch member in a latching or non-latching position at opposite sides of the center of the cam surface.

Other objects and advantages will be hereinafter described or will become apparent, and the novel features of the invention will be defined in the appended claims.

In the drawings:

Fig. 1 is a fragmentary view in plan of a compound swivelled pipe joint having the novel latch means hereof applied to each swivel joint, with one latch mechanism latched and the other unlatched;

Fig. 2 is an enlarged exploded detail view of the latch mechanism;

Fig. 3 is an enlarged fragmentary view, partly in section and partly in elevation, as taken axially through a swivelled pipe joint, and showing the pivotal latch member in full lines in a latching position and in broken lines in a non-latching position;

Fig. 4 is a view in section similar to Fig. 3, showing the pivotal latch member in an on-center position with the resilient bushing compressed at one side;

Fig. 5 is a fragmentary view in section, as taken on the line 5—5 of Fig. 3; and

Fig. 6 is a view in section similar to Fig. 3, showing a modified construction embodying the invention.

Like reference characters in the several figures of the drawings and in the following description designate corresponding parts.

Referring to Fig. 1, there is shown a compound pipe joint, including an elbow 1, at the opposite ends of which a pair of swivel joint members 2 and 3 are mounted for rotation. These swivel joint members may be of any desired form and are merely illustrative in the present case of two forms of swivel joint connections to which the invention may be advantageously applied. The member 2 is in the nature of a swivelly-mounted reduction coupling, whereas the member 3 is generally in the nature of a swivelly-mounted T connector.

However, each of the swivelled joint members 2 and 3 is provided with a radially extended flange 4, which is notched, as at 5, in circumferentially-spaced relation therearound. This flange 4 of each swivel joint constitutes a relatively fixed latch part having recesses 5 adapted to receive a shiftable latch member, as is customary.

The shiftable latch member, generally designated 6, is preferably generally L-shaped in form and has a latching arm or projection 7 and an operating arm 8 disposed approximately at a right angle with relation to one another. At the juncture of the latching arm 7 and the operating arm 8 the member 6 is provided with an enlarged supporting portion 9 adapted to pivotally mount the member 6 in a stationary support. Such a stationary support preferably comprises an outstanding bracket, as at 10, having a laterally projecting bifurcated or slotted portion 11 adapted to receive the member 6 in the slot. A pivot pin 12 extends through the opposite sides of the bifurcated end 11 of the bracket 10, is preferably provided at one end with an enlarged head 13 and is adapted to be retained in place by a cotter key 14 extending through the other end of the pivot pin 12, with a washer 15 disposed about the pin 12 between the cotter key 14 and the side wall of the bracket 10.

In order to pivotally mount the member 6 upon the pivot pin 12, the member 6 is provided with an enlarged opening 16 in the enlarged supporting portion 9 thereof, and in the form of the invention shown in Figs. 2 through 5, an annular bearing 17 is fit into the opening 16 so as to be freely rotatable therein. Disposed in the bearing 17 and closely fitting therein is an annular resilient or compressible bushing 18 which may be made of rubber or other materials having similar properties of resiliency. The bushing 18 is provided with a central opening 19, through which the pivot pin 12 is adapted to project, so that the pivotal latch member 6 is supported upon the bushing 18 for pivotal movements about the bearing 17. However, it will be noted that the pivotal latch member 6 is substantially mounted upon a floating center which may be shifted laterally responsive to pressure applied to the member 6 in a direction normal to its axis of rotation.

In order to apply such pressure to the pivotal latch member 6, it is provided with a rounded cam surface 20 at the juncture of the latching and operating arms thereof. The cam surface 20 is adapted to cooperate with the bracket 10 at the base of the slot 11 so as to shift the latch member 6 on its floating axis and compress the resilient bushing 18 upon pivotal movement of the latch member. In this connection, the elements thus far described will be so constructed that the distance between the crest or center of the cam surface 20 and the axis of the pivot pin 12 is greater than the distance between the base of the slot 11 and the axis of the pivot pin 12, while the surface of the latching arm 7 and the operating arm 8 of the latch element 6 which merge with the cam surface 20 are approximately the same distance from the axis of the pivot pin 12 as the distance between the base of the slot 11 and the axis of the pivot pin 12.

Therefore, when the latch element 6 is in a latching position as shown in full lines in Fig. 3, with the latching arm 7 engaged in one of the slots 5 of the relatively

fixed latch part, the center of the pivotal latching member 6 is in axial alignment with the axis of the pivot pin 12, and the resilient bushing 18 and the bearing 17 are in concentric relation to the pivot pin 12. The same concentric relationship exists when the pivotal latch element 6 is in the broken line position shown in Fig. 3, with the latching arm 7 thereof released from engagement with the notches 5 of the relatively fixed latch part. Under such conditions the bushing 18 is substantially uncompressed. Referring to Fig. 4, however, it will be observed that when the latch element 6 is swung about the pivot pin 12 to a position where the cam surface 20 rides over the base of the slot 11, the center of the pivotal latch element 6 is shifted relatively away from the axis of the pivot pin 12, and the resilient bushing 18 is compressed between the pivot pin 12 and the bearing 17. Accordingly, the tendency of the bushing 18 to resiliently resist such compression will retain the pivotal latch element 6 in either a latching or unlatched position. Only light manual pressure on the latch arm 8 will be required to rotate the member 6, however.

In the modified construction of Fig. 6 the structure is substantially identical except for the fact that a bearing 17' is disposed about the pivot pin 12 between the bushing 18 and the pivot pin, instead of about the outer periphery of the bushing 18, as in Figs. 2 through 5. In the construction of Fig. 6 the bushing 18 and bearing 17' rotate about the pivot pin 12 along with the latch element 6, whereas in the form first described, the bushing 18 and bearing 17 remain stationary, while the latch element 6 pivots about the bearing 17.

It will now be apparent that a very simple structure which is easy to manufacture, assemble, and repair has been provided, and such a structure has particular advantage in applications where the latch assembly is subjected to vibration or other factors which would ordinarily tend to cause inadvertent latching or unlatching of the latch.

While the specific details of the invention have been herein shown and described, changes and alterations may be resorted to without departing from the spirit thereof as defined in the appended claims.

I claim:

1. Latch mechanism for selectively permitting and preventing relative movement of a pair of members, comprising a pair of cooperative latch elements respectively carried by said members, means including a pivot pin pivotally supporting one of said latch elements for movements into and out of latching engagement with the other latch element, said pivotal latch element having a cam surface, said supporting means having a surface cooperative with said cam surface for causing lateral displacement of the center of pivotal movement of said pivotal latch element with relation to the pivot pin, and means for resiliently resisting such lateral displacement including a resilient member interposed between said pivot pin and said pivotal latch element for retaining said latch elements in engagement and for supporting said pivotal latch element on a floating center.

2. In latch mechanism for selectively permitting and preventing the relative movement of a pair of members, comprising a pair of cooperative latch elements respectively carried by said members, one of said latch elements being relatively stationary, means including a pivot pin pivotally supporting the other latch element for movements into and out of engagement with the stationary latch element, resilient means for maintaining said latch elements in engagement, and means for moving said pivotal latch element to overcome said resilient means, that improvement wherein said pivotal latch element has an opening therethrough larger in diameter than said pivot pin, said pivot pin extending through said opening, and said resilient means being interposed in said opening and engaged with said pivotal latch element and said pivot pin for normally maintaining said pivot pin concentrically

disposed in said opening when the latch elements are engaged, and means for shifting said pivotal latch element laterally with respect to the opening therethrough to compress said resilient means upon disengagement of said latch elements.

3. Latch mechanism as defined in claim 2, wherein said resilient means comprises a compressible annular bushing encircling said pivot pin.

4. Latch mechanism as defined in claim 2, wherein said resilient means comprises a compressible annular bushing encircling said pivot pin, and including means for preventing said resilient bushing from frictionally resisting pivotal movements of said pivotal latch element.

5. Latch mechanism as defined in claim 2, wherein said resilient means comprises a compressible annular bushing encircling said pivot pin, and including a bearing sleeve interposed between said pivot pin and said resilient bushing for preventing frictional engagement of said bushing and pin.

6. Latch mechanism as defined in claim 2, wherein said resilient means comprises a compressible annular bushing encircling said pivot pin, and including a bearing sleeve interposed between said resilient bushing and said pivotal latch element for preventing frictional engagement of said pivotal latch element and said bushing.

7. Latch mechanism as defined in claim 2, wherein said pivotal latch element includes a latching arm and an operating arm extending at an angle with relation to one another, said means for shifting the pivotal latch element to compress said resilient means comprising a cam formed at the juncture of said arms, said supporting means having a surface engageable by said cam and by said arms when said pivotal latch member is swung about its pivotal support in opposite directions, and said resilient means being free of compression when said latch is disengaged and engaged and being compressed by said cam when the pivotal latch element is swung about its pivotal support in opposite directions to and from a latching position.

8. Latch mechanism, including a pivotal latch element having means for limiting pivotal movements thereof in opposite directions to a latching and non-latching position, a relatively stationary latch element engageable by said pivotal latch element, and means pivotally supporting said pivotal latch element, said supporting means including a pivot pin, said pivotal latch element having an opening of larger diameter than said pivot pin through which said pivot pin extends, a resilient bushing disposed between said pivot pin and said opening in the pivotal latch element and normally maintaining said pivot pin in concentric relation to said opening when the pivotal latch element is at the limit of its movement in either direction, and said pivotal latch element and said supporting means having cooperative means for relatively displacing said pivot pin and said pivotal latch element upon pivotal movement of said pivotal latch element to a position where said pivot pin is eccentrically disposed in said opening so as to compress said resilient bushing.

9. Latch mechanism as defined in claim 8 wherein the means for relatively displacing said pivot pin and said pivotal latch element comprises a cam on said pivotal latch element for shifting said pivotal latch element in a radial direction with respect to said pivot pin.

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