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LATCH MECHANISM

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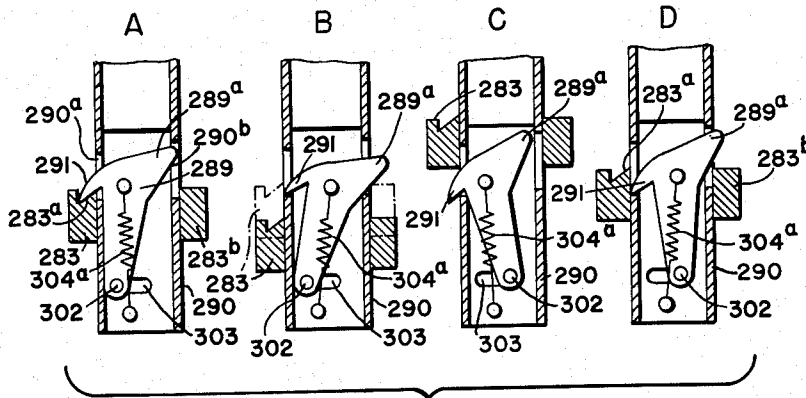


FIG. 1

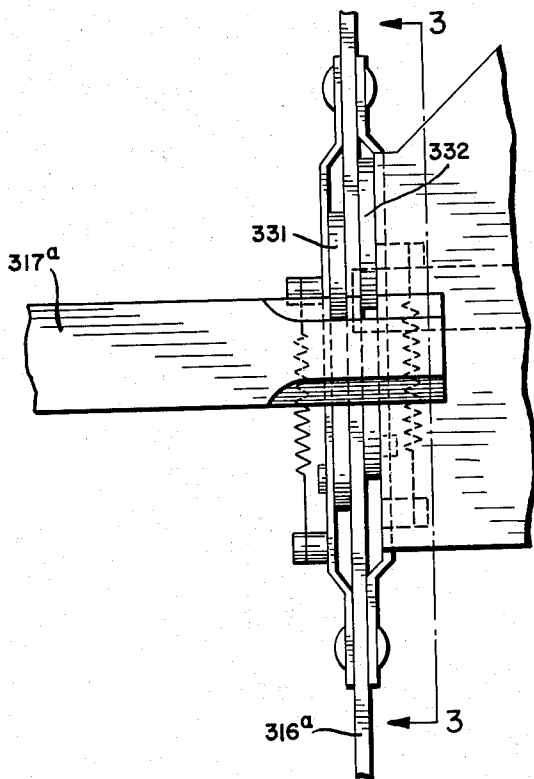


FIG. 2

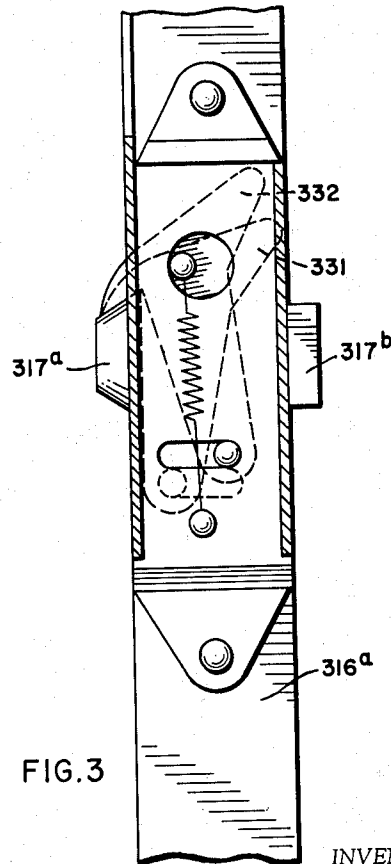


FIG. 3

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LATCH MECHANISM

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Original application March 26, 1946, Serial No. 657,238, now Patent No. 2,697,605, dated December 21, 1954. Divided and this application February 7, 1952, Serial No. 270,372

11 Claims. (Cl. 74—527)

The present invention relates to latching mechanisms for latching one member to another.

This is a division of applicants' prior application Serial Number 657,238, filed March 26, 1946, now Patent No. 2,697,605, issued December 21, 1954.

The primary object of the invention is to provide a new and improved latch which is movable between latching and non-latching positions solely by relative movement between the latch and the member to be latched thereto and thus self-latching.

Another object of the invention is to provide a tiltable latch which is operable solely by relative movement between the latch and the member to be latched, wherein the latch is pivotally mounted in an elongated slot and is tilted by means of an over-center spring.

Other objects will become apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 shows a group of four vertical sectional views of a latch exemplifying the invention and in various positions thereof.

Fig. 2 is a side view showing another application of the latching mechanism of this invention.

Figure 3 is a sectional view as taken on line 3—3 of Figure 2.

While there is shown in the drawings and hereinafter described in detail a preferred form of the invention, it is to be understood that the invention is not limited to the particular form and arrangement shown. It is contemplated that various changes may be made by those skilled in the art without departing from the spirit and the scope of the appended claims.

In the prior application referred to above, of which this is a divisional application, the invention is illustrated in connection with an automatic pin setter of the type disclosed therein, although it will be apparent that the invention in the same or in other forms may be readily embodied in other machines where automatic self-latching is desired.

Referring now to Fig. 1, in a preferred form, a sleeve 290 is slidably mounted for back and forth movement in a rigid annular bearing or collar 283. A latch 289 is arranged within the sleeve 290. The sleeve is provided with two apertures 290a and 290b, respectively, through which a latch lug 291 and a throw or cam lug 289a may protrude. The bearing 283 is provided with a notch 283a to co-operate with the latch lug 291.

The various positions of latch 289 are attained through the medium of a pivot 302 slidable in a transverse slot 303 in sleeve 290 and an over-center spring 304a by means of which the latch is held in tilted position in either latching or non-latching position.

Four positions of the latch are shown in Fig. 1, namely positions A, B, C, and D. Assuming the parts are in the C position, on movement of the sleeve 290 upwardly with respect to the bearing 283, the upper surface of the latch lug 291 engages the bearing 283 to pivot the latch to the D position. After the latch lug passes by the bear-

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ing 283, the latch is returned to the C position by the spring 304a.

Now when the sleeve 290 is moved downwardly with respect to the bearing 283, the latch engages the notch 283a in the bearing to latch the sleeve and bearing together. At the same time, this latching shifts the pivot pin 302 in the notch 303 so that the parts are in position A.

If the sleeve is again moved upwardly with respect to bearing 283, this releases the latch and the spring 304a pivots the latch to the B position. With the latch in this position, on subsequent downward movement of the sleeve with respect to the bearing, cam or throw lug 289a engages the bearing to reposition the pivot pin 302 in the D position, and on further downward movement of the sleeve, the parts return to the C position.

One structural environment for the latch mechanism has been disclosed above. Another is illustrated in Figures 2 and 3. In these figures, fingers 317a and 317b are moved up and down together by means not shown, and the bar 316a is to be latched thereto. The bar 316a is provided with two latches 331 and 332. These latches are the same as the latch 289 in Fig. 1 and are vertically spaced slightly on the bar 316a.

With this arrangement, and assuming the fingers 317a and 317b are above the latches and both latches are in a position corresponding to the position C of Fig. 1, on movement of the fingers downwardly, the finger 317a engages the upper surface of both latch lugs to pivot the latches to positions corresponding to position D in Fig. 1. When the finger 317a passes both latches, they return to the C position, the fingers now being below the latches. On upward movement, the finger 317a engages the latch lug of the lower latch 331 to shift its pivot pin in its slot as shown in Fig. 3 to the position corresponding to position A of Fig. 1. After a subsequent downward movement of the fingers, on a succeeding upward movement, the finger 317a engages the latch lug of latch 332 to shift its pivot pin in its slot. Latch 332 is only slightly above latch 331 since too great a distance in the relative positions of the latches would cause a shifting of latch 331 to latching position C by engagement of finger 317b with its cam or throw lug.

After a subsequent downward movement, on a succeeding movement upwardly, finger 317a passes both latch lugs, but finger 317b engages both throw lugs to reposition both pivot pins to positions corresponding to position D of Fig. 1. When the fingers pass above the latches, they are returned to the C positions by the springs.

It is thus clearly seen that we have devised a novel latch mechanism which engages a movable member on one stroke of said member and which will not engage on the subsequent stroke of said member and which is operable solely by relative movement between the parts.

We claim:

1. A latch mechanism comprising an annular member having a notch in its upper surface, a tubular member slidable up and down within the other member and having opposed side wall apertures which move from a position above to a position below the annular member in operation of a device with which the latch mechanism is associated, a transverse slot in the tubular member located below said side wall apertures, a latch device having a body portion located within said tubular member and carrying a pivot pin at the lower side engaging in said transverse slot, a spring member connected at its upper end to the latch device and at its lower end to said tubular member below the mid portion of said slot, a lug extending from one side of the top of the body portion through one of said side wall apertures and adapted for engagement in said notch, and a cam lug extending from the other side of the top of the body portion and through

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the other side wall aperture for cam engagement with said annular member.

2. Mechanism for latching a first element to a second element which lies on two sides of and moves relative to the first element, comprising an elongated slot in the first element extending substantially normal to the direction of relative movement between said first and second elements, a latch element comprising a body portion having a pivot pin slidable in said slot, a tapered downwardly inclined latch lug and an upwardly inclined throw lug on said body portion for shifting said pivot pin and an over-center spring for tilting the latch lug into latching relation with said second element when said pivot has been shifted by the throw lug.

3. Mechanism for latching a first member to a second member wherein the first member having an elongated slot lies within and moves relative to the second member, said slot extending substantially normal to the direction of relative movement between said first and second members comprising latch means including a body portion having a pivot pin slidable in said slot, a tapering downwardly inclined latch lug and an upwardly inclined throw lug on said body portion for shifting said pivot pin, and spring means for withdrawing the latch lug from latching position.

4. Mechanism for latching a first member to a second member wherein the first member lies within and moves relative to the second member, comprising an elongated slot in the first member extending transversely to the direction of relative movement between said first and second members, latch means comprising a body portion having a pivot pin slidable in said slot, a tapering downwardly inclined latch lug on said body portion, an upwardly inclined throw lug on said body portion for shifting said pivot pin and an over-center spring for tilting the latch lug into latching relation with said second element when said pivot has been shifted by the throw lug.

5. Mechanism for latching a first member to a second member wherein the first member lies within and moves relative to the second member, comprising an elongated slot in the first member, said slot extending transversely of the direction of relative movement between the members, latch means comprising a body portion having a pivot pin at one end slidable in said slot, a tapering downwardly inclined latch lug extending from one side of the other end of the body portion and an upwardly inclined throw lug for shifting said pivot pin extending from the opposite side of said other end, a notch in said second member and over-center spring means for tilting the latch lug into latching relation with the notch in said second member when said pivot has been shifted by the throw lug.

6. A latch mechanism comprising a member having a notch portion and a camming surface, an elongated member mounted within said first member for movement relative thereto and having an elongated slot positioned transverse to the direction of relative movement, a latch having a body portion, a pivot pin carried by the lower part of said body portion and slidable in said slot, a latch lug extending from an upper side of the body portion and shaped to engage the notch in said first member and to shift said pivot pin in said slot in one direction upon such engagement, a throw lug extending from the opposite side of said body portion and engageable by the camming surface for shifting said pivot pin in another direction and an over-center spring connected between the upper part of the body portion and said second member at a point below and between the ends of the elongated slot for tilting the latch about the pivot.

7. A latch mechanism comprising a first member carrying a latch and a second member to be engaged by the latch, said latch having a body portion including a pivot pin slidable in a slot extending laterally in said first member, a latch lug extending from one side of the body portion, a throw lug extending from the other side of the body portion, said second member having a camming sur-

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face for engagement with the throw lug to shift said pivot pin in said slot to place the latch lug in latching position, said second member also having a latch lug engaging portion for latching of one member to the other and for shifting the pivot as a result thereof and an over-center spring connected between the upper part of said latch body portion and the first member at a point below the slot for maintaining the latch in latching position after said camming surface has shifted said latch and for tilting said latch away from latching position after it has been released.

8. A latch mechanism comprising a first member carrying a latch and a second member to be engaged by the latch, said latch having a body portion including a pivot pin slidable in a slot extending laterally in said first member, a latch lug extending from one side of the body portion, a throw lug extending from the other side of the body portion, said second member having means for engagement with the throw lug to shift said pivot pin in said slot to place the latch lug in latching position, said second member also having means for engaging the latch lug and for shifting the pivot pin as a result thereof, and an over-center spring connected between the upper part of said body portion and the first member at a point below the slot for maintaining the latch in latching position after said camming surface has shifted said latch and for tilting said latch away from latching position after it has been released.

9. A latch mechanism comprising a pair of fingers movable back and forth in a path of movement, a member mounted between said fingers and having an elongated slot therein which extends in a direction transverse to said path of movement, latch means including a body portion having a pivot pin slidable in said slot, a latch lug extending from one upper side of said body portion, spring means for urging the latch lug into engaging position with one of said fingers and allowing pivotal movement of the latch as said finger moves downwardly by the latch lug into engaging position, said latch lug being so shaped that upon engagement with said finger the pivot pin is shifted in said slot, said spring means being connected to said second member below the mid-point of the slot so that release of the latch will permit the spring means to swing the latch lug out of latching position, a cam lug extending from the other upper side of the body portion and positioned to be engaged by the second of said fingers upon upward movement thereof for shifting the pivot pin in said slot and thus allowing said spring means to return the latch lug to latching position.

10. A latch device for controlling the relative back and forth movement between first and second elements comprising a slot in the first element, a latch member having a pivot pin shiftable in said slot, an over-center spring for pivoting said latch member about said pivot pin in a direction dependent upon the position of said pin in said slot, a first cam surface on said latch member adapted to engage the second element on relative movement in one direction to pivot said latch member in opposition to the spring, a latch surface on said latch member adapted to engage the second element on a succeeding relative movement in the other direction to latch the elements and shift said pivot pin in said slot, the spring pivoting said latch member when released on a succeeding relative movement in said one direction, a second cam surface on said latch member adapted to engage the second element on a succeeding relative movement in the other direction to reposition said pin in said slot.

11. A latch device for controlling movement of one element with respect to another comprising an elongated slot in one element, said slot extending substantially normal to the direction of relative movement between said elements, a latch member having a pivot pin mounted in said slot, a latch lug extending from one side of the latch member and a throw lug extending from the opposite side of the latch member adapted on relative movement of said

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elements to shift said pivot pin to opposite extreme positions in said slot, and an over-center spring connected to said latch member for tilting the latch member in either of opposite directions, depending on the position of the pivot pin in said slot.

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