DEADLOCKING LATCHBOLT FOR CYLINDRICAL LOCK

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This invention relates to deadlocking latchbolts for cylindrical locks.

As will be understood by those persons skilled in the art, latchbolts of the particular class move in a latch tube between projected and retracted positions, and are automatically deadlocked when the door on which the lock is mounted moves to closed position. The deadlocking is effected by a dog on the latch tube, with a trigger bolt utilized as a part of the control for the dog. That trigger bolt in a projected position holds the dog out of dogging relation to the latchbolt so that the latchbolt can be retracted, but when the trigger bolt is depressed by a strike, it effects deadlocking movement of the dog.

Naturally, the latchbolt is equipped also with means that can move the dog to release position even though the trigger bolt is depressed by the strike, so that the latchbolt can then be retracted through knob action when the door is in closed position. Thus, the latchbolt requires for its functioning several parts that move within the latch tube. While mounted in the relatively small space that is available in the latch tube, it is very important that those parts operate in an effective and dependable manner.

The prior art contains many examples of latchbolts of the particular class. In those earlier latchbolts, it is customary to utilize one tail member through which the latchbolt is retracted, together with a further tail member that is arranged to have a certain movement relatively to the first member. That relative movement between the tail members is utilized to move the deadlocking dog out of dogging position. In other words, the earlier latchbolts of the particular class are equipped with a tail through which knob action will retract the bolt, together with a further tail through which the knob action first moves the dog out of dogging position. In effect, therefore, those latchbolt mechanisms have double latchbolt tails.

Through the extremely novel construction that I have now conceived, I achieve an operation like that of the earlier deadlocking latchbolts, but I do this through extremely novel means that are relatively simple and that require for their efficient operation merely a single tail member for the latchbolt. In addition, my construction enables me very effectively to multiply the bolt movement relatively to the tail member.

As a very important feature of my invention, I utilize a deadlocking dog that moves to three different positions. Thus, the deadlocking dog when in a first position will dog the latchbolt in projected position. The single tail member is then in camming relation to the dog, so that the tail when retracting the latchbolt will cam the dog to a second or intermediate position. The latchbolt is then in camming relation to the dog, so that the latchbolt by its retracting movement will cam the dog to a third position. The dog when in that position will ride over the latchbolt so that the bolt can move to full retracted position. Further, I equip the trigger bolt with a portion that cams the dog to its second position when the trigger bolt is projected, whereby the latchbolt can then be depressed by a strike, with the dog again riding over the latchbolt.

As a further feature of my invention, I utilize means through which I multiply the movement of the latchbolt, but that enables me to reduce the bearing pressures on the bolt. More particularly, I utilize between the single tail member and the latchbolt a multiplying link. That link in bearing relation to the latchbolt through a slider that applies the retracting pressure over a very considerable area on the latchbolt, thus enabling me to reduce wear between the link and bolt.

As a still further feature, I so form my novel bolt deadlocking and retracting mechanism that it may very readily be assembled through the positioning of the mechanism in the latch tube. Thus, I need merely place the parts of my mechanism in their assembled relation to one another, and then insert those parts into the latch tube. The parts will then be held in the tube simply through the assembly of a front plate to the tube.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better understood.

There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claims appended hereto.

Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings:

Fig. 1 is a longitudinal section showing parts of my novel deadlocking mechanism in the position they occupy when the door is open.

Fig. 2 is a section taken at right angles to Fig. 1.

Fig. 3 is like Fig. 1, but with the parts in the position they occupy when the trigger bolt is held depressed by a strike.

Fig. 4 shows the trigger bolt depressed, with the tail member moving preparatory to retracting the latchbolt.

Figs. 5 and 6 are cross sections on the lines 5—5 and 6—6 of Fig. 1.

Figs. 7 and 8 are perspective views showing the trigger bolt.

To facilitate a description of my invention, I shall first call attention to the fact that I utilize in my extremely novel construction a latch tube 10, a latchbolt 11 and trigger bolt 12 that slide in the latch tube 10 between projected and retracted positions, and a tail member 13 for retracting the latchbolt. This general arrangement is quite similar to that utilized in prior latchbolts of the particular class, and those skilled in the art will understand that the latch tube 10 is adapted to be assembled to a spindle housing 14, Fig. 1, with a retractor 15 in that housing in retracting relation to the tail member 13.

In the form of my construction that I prefer, I utilize an end piece 16, Figs. 1 and 2, that is assembled through the front end of the latch tube 10 and that lies against transverse portions 17 on the rear end of the tube. I equip opposed sides of the end piece 16 with spring guides 18, best seen in Fig. 2, and on those guides I assemble coil springs 19 that press the latchbolt 11 toward projected position. One of those springs 19 actually presses the trigger bolt 12, but that spring also can press the latchbolt 11 since the trigger bolt has a part 20, Figs. 5 and 8, adapted to lie against the rear end of the latchbolt.

The rear portion of the tail member 13 slides in an open-
It is important to realize that I achieve the deadlocking and release action that I have described while utilizing merely a single tail member for retracting the bolt, and am able to do this through the utilization of a novel deadlocking dog or lever that moves to three positions, with the lever adapted to be cammed from dogging position to intermediate and full release positions.

I shall now describe, while referring to Figs. 1, 2, and 6, the novel means through which the tail member 13 acts to multiply the movement of the latchbolt 11. On opposed sides of tail member 13 I assemble a pair of links 35 through a pivot 36, best seen in Fig. 1, that is engaged in a slot 37 at the shoulder of the tail member. As shown in Figs. 2 and 5, the links 35, together with the tail member 13, are arranged to move in the space between the slots 38 that I form on latchbolt 11. I equip the links 35 at their lower ends with a pivot 39, Figs. 1 and 5, on which the links rotate relatively to the latch tube 10. For mounting the pivot 39, I prefer to utilize a pivot plate 40 having a portion 41 that interlocks with an arm 42 on the end piece 16. As will be understood from Fig. 1, the inner surface of latch tube 10 holds pivot plate 40 assembled to arm 42, with an end portion 43 then supporting the pivot 39.

The upper ends of links 35 I utilize particularly a pair of sliders 44, Figs. 1, 2, and 6. These sliders 44 are pivoted to opposed sides of links 35 through pivot plates with the sliders in position to coat with bearing surfaces 46 that I form on the side portions 38 of the latchbolt. It will naturally be understood that the tail member 13 will act through the links 35 and sliders 44 to retract latchbolt 11, with the bolt movement multiplied relatively to that of the tail 13. It is extremely important to realize, however, that I am able through the sliders 44 to apply the retracting pressure over a rather considerable area on the latchbolt 11. Thus, the sliders 44 have a relatively long contact with the bearing surfaces 46, and a very little wear will take place between the sliders and bearing surfaces.

In assembling my novel latchbolt mechanism, the sliders 44 and links 35 will be preassembled to the tail member 13 through the pivot's 36 and 45, with the tail member then assembled to the end piece 16. It will then be a simple matter to apply the sliders 44 to the latchbolt 11 through a transverse movement, and also to place the lever bolster 12, deadlocking lever 21, and pivot plate 40 in position.

Then, after inserting the mechanism into the latch tube 10, the inner surface of the tube will hold the mechanism assembled, and thus the mechanism in the tube, I utilize simply a rather slender rod 47 that is riveted to flanges 48 on latch tube 10, that plate engaging shoulders 49 on the bolt, as shown in Fig. 1.

Through the exceedingly novel construction that I have described, I am able to achieve full deadlocking control of a latchbolt through very simple means. I utilize in that novel construction merely a single tail member and a simple moving dog, yet I contribute very effective and dependable bolt control. In addition, I achieve a multiplying bolt action, yet I eliminate excessive wear on the bolt or retraction links. I believe, therefore, that those skilled in the art will appreciate the very considerable contribution that I have made by my invention.

I now claim:
1. In a lock of the class described, a latch tube, a latchbolt moving in the latch tube between projected and retracted positions, a single tail member through which said bolt is moved to retracted position, a lever mounted for movement on said latch tube, a spring pressing said lever to a first position relative to said bolt, a single tail member, said lever formed with a dogging surface that is in opposed relation to a part on the latchbolt when the lever is in its said first position whereby to dog the latchbolt in projected position, said lever further formed with a cam surface incoacting relation to a shoulder on the tail member when the lever is in first position, said tail member when retracting the bolt with the lever in first position acting through said shoulder
5 cam surface to move the lever to a second position, said lever in its second position lying with its dogging surface out of opposed relation to the latch bolt part and with its cam surface in opposed relation to said part whereby said cam surface will ride over the part as the latch bolt moves to retracted position, a trigger bolt moving on the latch tube between projected and retracted positions, a portion on said trigger bolt holding the lever in second position when the trigger bolt is in projected position so that the latch bolt can then be depressed by a strike, and said lever formed with a further cam surface whereby the said trigger bolt portion will move the lever to second position in the event the lever is not in that position when the trigger bolt moves to projected position.

2. In a lock of the class described, a latch tube, an end piece inserted through the front end of the tube into assembled position on the rear end of the tube, a tail member mounted to slide in an opening in said end piece, a latchbolt and a trigger bolt sliding between projected and retracted position on the tube, a link assembled to the tail member from pivotal movement and equipped at one end with a pivot pin, a pivot plate inserted with the end piece into the latch tube and held assembled relatively to the end piece by the inner surface of the tube, a portion on said pivot plate acting when the plate is assembled to hold the pivot pin whereby to mount the link to pivot at a fixed point on the tube, a slider pivoted to the end of said link that is opposed to said pivot pin, a bearing portion on the latchbolt against which the slider bears whereby the tail member by acting through the link will retract the bolt with a multiplying movement, and said slider engaging the bearing portion of the bolt over a relatively large area whereby to reduce the retracting pressure applied to the bearing portion of the latchbolt.

3. In a lock of the class described, a latch tube, a latchbolt and a trigger bolt mounted in said latch tube for movement between projected and retracted positions, a bearing portion formed on the latchbolt to extend in a direction transverse to the latchbolt axis, a slider coating with said bearing portion, link means pivoted to said slider, means whereby link means are in pivoted relation to the latch tube, a tail mounted for movement on the tube, means through which the tail when moving in one direction actuates said link means whereby to slide the slider on the bearing portion of the bolt to retract the bolt with the link means multiplying the movement of the bolt relatively to the tail, said slider engaging the bearing portion of the bolt over a relatively large area whereby to reduce the bearing pressures on said portion, a deadlocking lever spring pressed toward a docking position relatively to said latchbolt and movable to a release position, a cam surface on the deadlocking lever, said tail formed with a surface that is in opposed relation to the cam surface on the deadlocking lever when the lever is in docking position whereby the tail when moving to retract the bolt will move the lever from docking position to a second position, a portion on the latchbolt in opposed relation to the cam surface on the lever when the lever is in said second position so that the latchbolt when retracted will cam the lever to release position, and a portion on said trigger bolt acting when the trigger bolt is in projected position to hold the lever in its second position.

4. In a lock of the class described, a latch tube, a latchbolt moving in said latch tube between projected and retracted positions, a tail adapted to be moved longitudinally in the latch tube by a retractor and through which the retractor moves the latchbolt to retracted position, a deadlocking lever spring pressed toward a docking position and movable against the spring pressure to a release position, a surface on said lever in opposed relation to a part on the latchbolt when the lever is in docking position whereby to dog said latchbolt, an inclined cam surface on said deadlocking lever, a trigger bolt moving in the latch tube between projected and retracted positions, and a portion on said trigger bolt acting when the trigger bolt is in projected position to hold the deadlocking lever with its cam surface in opposed relation to a part on the latchbolt, whereby a retracting movement of said latchbolt then will be effective through said cam surface to move said deadlocking lever to its release position.

5. In a lock of the class described, a latch tube, a latchbolt moving in said latch tube between projected and retracted positions, a tail adapted to be moved longitudinally in the latch tube by a retractor and through which the retractor moves the latchbolt to retracted position, a deadlocking lever spring pressed toward a docking position and movable against the spring pressure to a release position, a surface on said lever in opposed relation to a part on the latchbolt when the lever is in docking position whereby to dog said latchbolt, an inclined cam surface on said deadlocking lever, a trigger bolt moving in the latch tube between projected and retracted positions, and a portion on said trigger bolt acting when the trigger bolt is in projected position to hold the deadlocking lever with its cam surface in opposed relation to a part on the latchbolt, whereby a retracting movement of said latchbolt then will be effective through said cam surface to move said deadlocking lever to its release position.

6. In a lock of the class described, a latch tube, a latchbolt moving in said latch tube between projected and retracted positions, a deadlocking lever, a spring pressing said lever to a position dogging the latchbolt in projected position and yielding to enable the lever to move away from dogging position, a tail adapted to be moved longitudinally in the latch tube by a retractor and through which the retractor moves the latchbolt to retracted position, a portion on said tail in camming relation to said deadlocking lever when said lever is in dogging position, said tail portion camming said deadlocking lever in a second position when the tail moves longitudinally to retract the latchbolt, a portion on the latchbolt moving into camming relation to the deadlocking lever when said lever is in said second position as the latchbolt moves toward retracted position, and said portion on the latchbolt then effective to cam said lever from its second position to a release position relatively to the latchbolt so that the retractor by acting solely through said tail will impart full retracting movement to said bolt.

7. In a lock of the class described, a latch tube, a latchbolt mounted in said latch tube for movement between projected and retracted positions, a flat bearing surface formed on the latchbolt to extend in a direction transverse to the latchbolt axis, a slider having a flat surface coating with said bearing surface of the latchbolt, a tail member mounted for longitudinal movement relatively to said latch tube, link means supporting said slider and through which said tail member moves said slider whereby to retract the latchbolt with the link means multiplying the movement of the bolt relatively to the tail member, said slider when retracting the bolt sliding its flat surface longitudinally on the flat bearing surface of the bolt, a pivot on which said slider rotates relatively to said link means, and said flat slider surface effective through rotation of said slider and pivot to maintain contact with a relatively large area of the flat bearing surface of the latchbolt in the different positions to which the slider moves while retracting the latchbolt.

8. In a lock of the class described, a latch tube, an end piece inserted through the front end of the tube into
assembled position on the rear end of the tube, a tail member mounted to slide in an opening in said end piece, a latchbolt and a trigger bolt sliding in the latch tube between projected and retracted positions, a link through which said tail member acts to retract the latchbolt and trigger bolt, pivot means on which said link rotates, including a part formed to interlock relatively to said end piece and inserted with said end piece into the latch tube, the inner surface of the latch tube holding said part in its interlocking relation to the end piece whereby to hold the pivot means and link in assembled position, a deadlocking lever formed to interlock relatively to said end piece and inserted with the end piece into the latch tube, said lever and end piece having coating pivot surfaces, the inner surface of the tube holding said deadlocking lever in its interlocked relation whereby to hold said lever assembled to the end piece for pivotal movement thereon, and said deadlocking lever formed with surfaces coating with said tail member, said trigger bolt, and said latchbolt.

9. In a lock of the class described, a latch tube, an end piece inserted through the front end of the tube into assembled position on the rear end of the tube, a tail member mounted to slide in an opening in said end piece, a latchbolt sliding in the latch tube between projected and retracted positions, a link through which said tail member acts to retract the latchbolt, pivot means on which said link rotates relatively to the latch tube, including a part formed to interlock relatively to said end piece and inserted with said end piece into the latch tube, and the inner surface of the latch tube juxtaposed to said part to hold it in its interlocking relation to the end piece when inserted in the tube whereby to hold the pivot means and link in assembled position.

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