

Aug. 10, 1948.

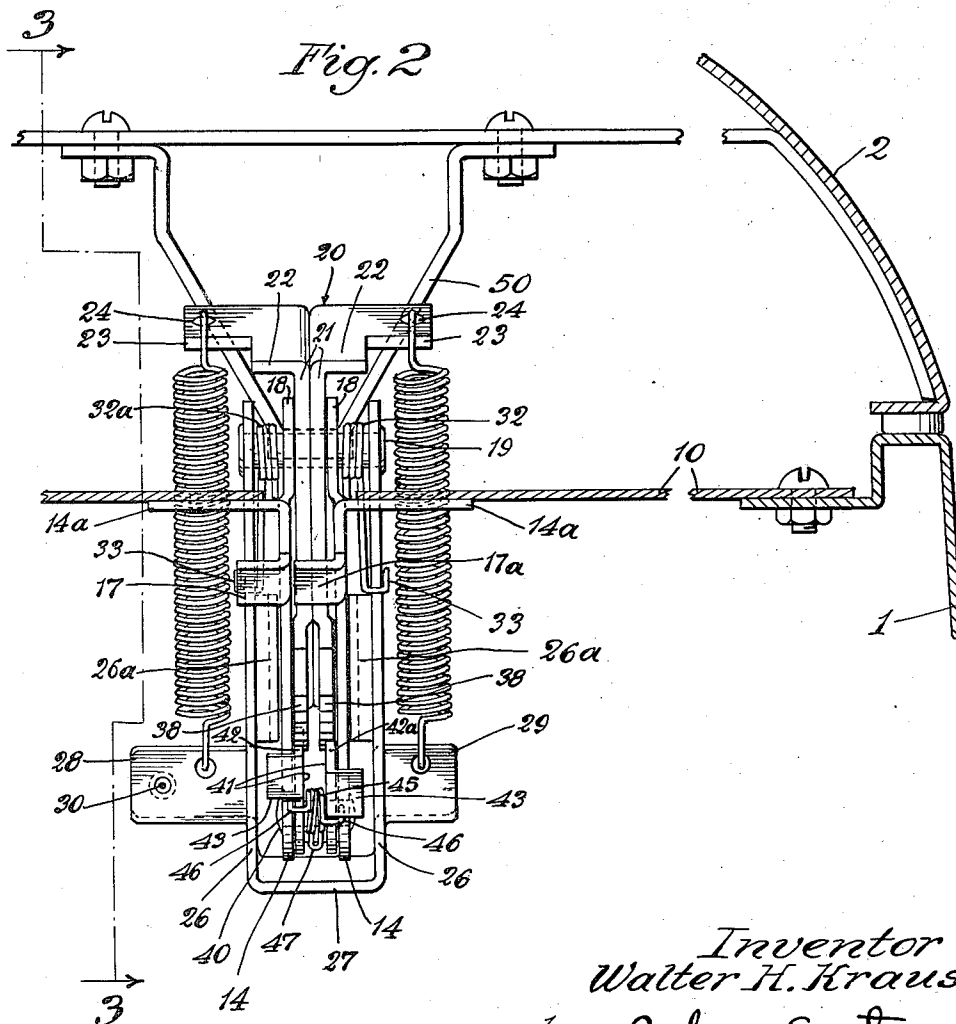
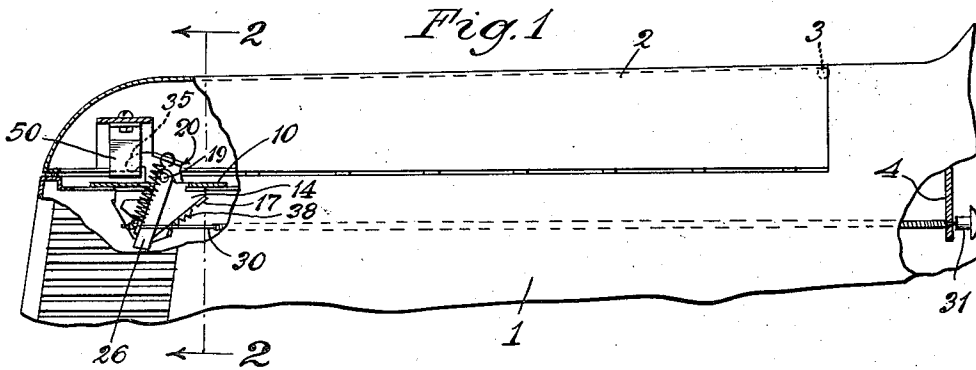
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2,446,934

RATCHET TYPE LATCH

Filed Feb. 7, 1946

3 Sheets-Sheet 1



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Aug. 10, 1948.

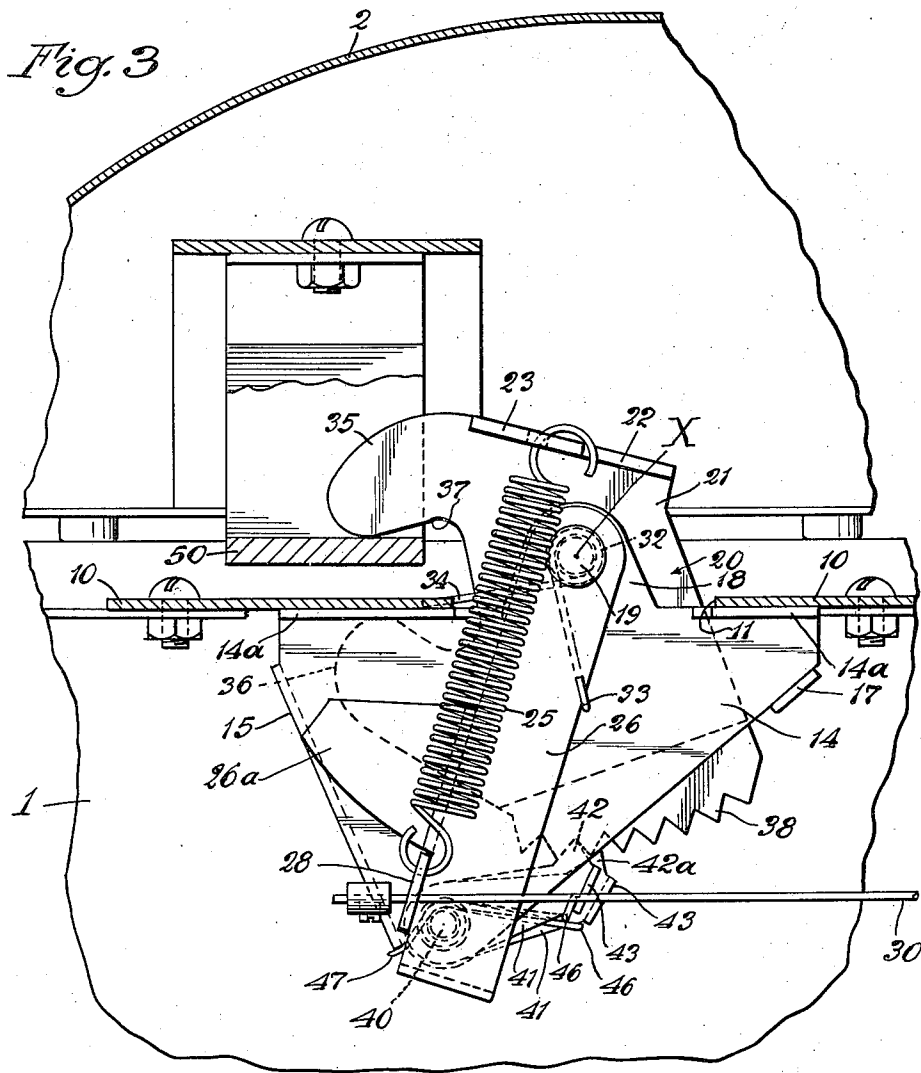
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RATCHET TYPE LATCH

Filed Feb. 7, 1946

3 Sheets-Sheet 2



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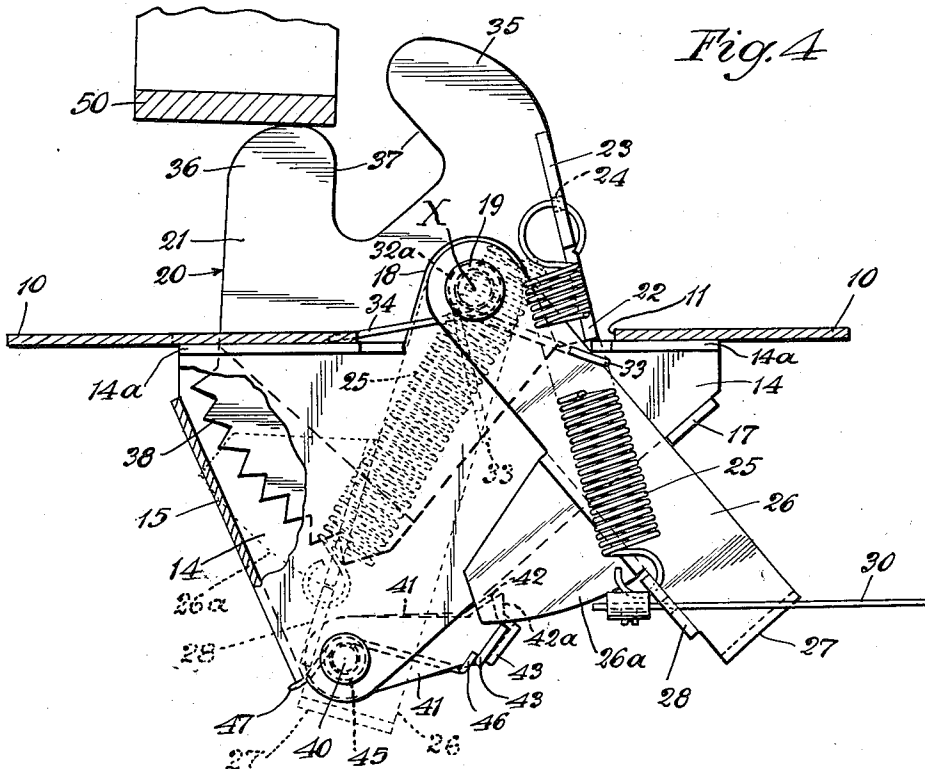


Fig. 4

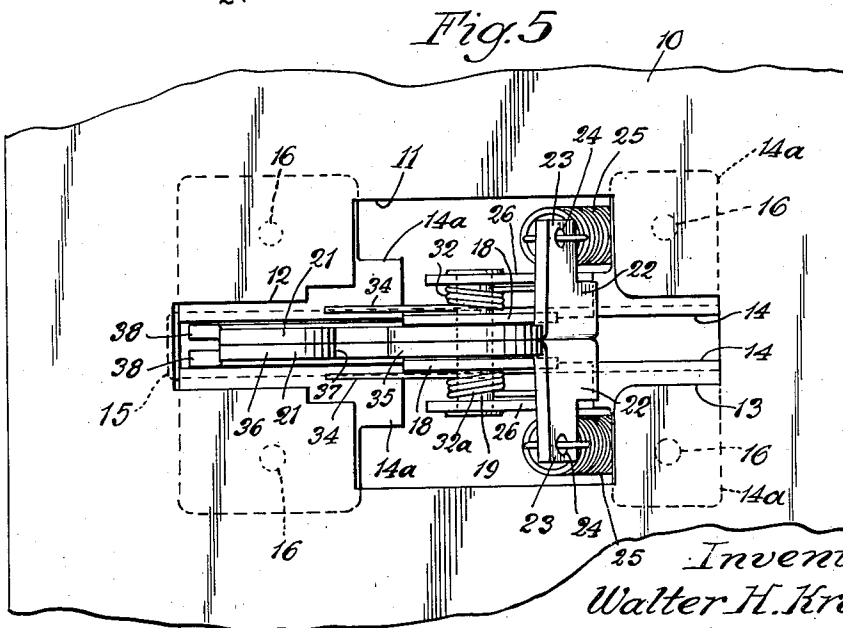


Fig. 5

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UNITED STATES PATENT OFFICE

2,446,934

RATCHET TYPE LATCH

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Application February 7, 1946, Serial No. 646,138

12 Claims. (Cl. 292—332)

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My invention relates to an improvement in latches and is particularly adaptable for use in connection with the hood latches of automobiles.

Another purpose is to provide a latch which is particularly adapted for use in latching a hood or bonnet used in connection with automobile engines.

Another purpose is to provide a latch structure of maximum simplicity and flexibility.

Another purpose is to provide a latch which will latch effectively at a variety of positions of the keeper.

Another purpose is to provide a ratchet latch having an actuating latch and ratchet structure effective to lock the keeper throughout a substantial range of positions of the latch.

Another purpose is to provide a ratchet latch which can be easily and readily released, for example from the interior of a vehicle.

Another purpose is to provide a latch assembly having a plurality of ratchets and pawls effective to hold the keeper efficiently throughout a substantial range of positions or penetration of the keeper.

Another purpose is to provide an over-center ratchet latch, with spring means effective to hold it at either the latched or the unlatched limit of its possible movement.

Other purposes will appear from time to time in the course of the specification and claims.

Referring to the drawings, I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a side elevation of an automobile hood with parts broken away and parts in vertical sections;

Figure 2 is a section on an enlarged scale on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a view similar to Figure 3, with the parts in a different position; and

Figure 5 is a top plan view of the lower member of Figure 4, with the parts indicated in the position in which they are shown in Figure 4.

Like parts are indicated by like symbols throughout the specification and drawings.

Referring to the drawings, the base includes a top plate 10 which may be suitably mounted on the hood 1. The plate 10 is provided with an aperture 11 having a forward extension 12 and a rearward extension 13. Extending downwardly from the plate is a base portion having generally parallel generally triangularly shaped side members 14. In the form herein shown the side

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members 14 are provided with a connecting wall 15, which may be integral with the side members 14. Any suitable ears 14a may be provided for securing the side members 14 to the top plate 10. The parts may be welded together as at 16, or any other suitable securing means may be used. One of the walls 14 is shown with an offset lug 17 and the other with an offset lug 17a, which limits the movement of the member 20. The said members are also provided with upwardly extending lobes 18 through which extends a pivot pin 19. Rotating about the center X, defined by the pivot pin 19 is the latch member, generally indicated as 20. It is herein shown as formed by two abutting sheet metal members 21, which may for example be welded together. Outwardly extending from the top of each member 21 is a flange 22 having an ear or lateral enlargement 23 apertured as at 24 to receive the upper end of a coil spring 25. Pivoted for rotation about the same center X is a yoke including side members 26, secured together at their lower ends by a cross piece 27. The side members 26 are provided with laterally extending ears 28 and 29, and pawl tripping cams 26a, for tripping the below described pawls 42, 42a. One of the springs 25 is secured at its lower end to said ear 28 and the other to the ear 29. Additionally secured to the lug 28 is an actuating tension member 30 which may extend to any suitable manually operable control knob 31 on the dash board 4. 32, 32a are coil springs formed about the pivot pin 19 having one end 33 secured to one of the side members 26 and another end 34 abutting against a portion of the plate 10 or ears 14a.

The latch 20 is formed with a keeper engaging nose 35 and an actuating nose 36, the two being separated by a space or notch 37. A lower portion of the latch 20 is provided with a series of ratchet teeth 38 arranged in an arc generally concentric with the center X.

Pivoted to the triangular side members 14 as at 40 are two pawls 41 each having a tooth engaging member 42, 42a and an offset lug 43. It will be noted that the parts 42 and 42a are staggered apart, separated by a distance less than the width of one of the teeth 38. Two sets of teeth 38 are employed, one on each of the plates 21 of the latch 20. The teeth of the two sets are in parallel. It will be understood that, if desired, the teeth may be staggered, and the members 42 and 42a may be arranged in parallel or of equal radial length in relation to the center 40. I provide spring means 45 having ends 46 in engagement with each of the pawls 41 and

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anchored as at 47 to the end wall 15 of the latch piece. Thus both pawls are normally urged toward the engaging position in relation to the ratchet teeth 38.

With reference to the position of the parts as shown in Figure 3, the locking nose is engaging any suitable keeper 50 mounted on the hood closure 2, which is pivoted as at 3 to the hood 1. The spring 25 is effective to hold the latch nose 35 downwardly against the keeper 50 with substantial force. The spring 45 holds the pawls 41 in locking engagement with the teeth 38, and the springs 32, 32a hold the yoke 26 in the forward position in which it is shown in Figure 3.

When the operator pulls on the tension member 30, the yoke 26 is moved counterclockwise, with reference to the position as shown in Figure 3, and one result of that movement is to cause the cams 26a of the members 26 to engage the offset lugs 43 of the pawls 41, and move them against the spring 45, releasing the pawl members 42 and 42a from the teeth 38. As the side members 26 are moved counterclockwise, the lower ends of the springs 25 are moved to the right and across the center X. The result is that the springs 25 are then effective to urge the latch 20 into the release position in which it is shown in Figure 4. The clockwise movement of the latch 20 is terminated or limited by the engagement of the members 22 of the latch 20 with any suitable limiting abutments such as the ears 14a of the side members 14. Thus the springs 25 are effective to hold the latch 20 either in the latched position or in unlatched position, depending upon whether the tension effect of the springs 25 is to one side or the other of the center of rotation X of the latch 20.

When the user moves the keeper downwardly toward the closed position, the actuating portion of the latch 20 is in the position in which it is shown in Figure 4 with the locking nose 35 out of alignment with the downward path of movement of the keeper. As the downward movement continues the downward thrust of the keeper rotates the latch 20 about the center X until the springs 25 have been moved across the center X. They are then effective to urge the nose 35 downwardly against the keeper 50. As the latch rotates, the teeth 38 override the pawls, and the pawls engage the teeth in locking relationship. The yoke side members 26 remain in the position in which they are shown in Figure 3. The staggering of the teeth, or of the pawls, maintains a locking effect throughout a substantial variation in position of the latch 20 about its center X, and the use of coarser teeth is permitted. It will also be understood that the employment of a series of teeth permits a substantial variation in relative position of the keeper 50 and the latch, thus simplifying the manufacturing problem and making close tolerances and great accuracy in assembly unnecessary. With the employment of coarse teeth, having large pawl engaging faces, the chance of unintentional releasing or slipping of pawls and teeth due to vibration or misalignment of parts is virtually eliminated.

It will be realized that whereas I have described and claimed a practical and operative device, nevertheless many changes may be made in size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative and diagrammatic, rather than as limiting me to the specific disclosure herein made.

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The use and operation of my invention are as follows:

I illustrate a latch which may be employed to secure a wide variety of doors and closures. In the present instance I illustrate it as applied to the closure of an alligator type automobile hood cover. The parts are shown in the closed position in Figures 1 and 3. In that position, the yoke 26 is at the forward limit of its possible movement about the center X, and the springs 25 are effective to hold the latch nose 35 in locking position downwardly against the keeper 50. The pawls 42 are held in engagement with the teeth 38 by the spring structure 45. The engagement between the opposed teeth 38 and 42 provides a takeup for the latch.

When the user wishes to release the latch he may employ the control knob 31 to draw in on the tension member 30. The result is to free the pawls from the teeth 38, and to move the yoke 26 to the position in which it is shown in full line in Figure 4. The springs 25 can then rotate the latch 20 to the unlocked position in which it is shown in Figure 4. In that position the latch portion 36 actually raises the keeper 50 towards the released position. When the user releases the tension on the member 30 the springs 32, 32a are effective to return the yoke 26 to the dotted line position of Figure 4, which is the same as the initial yoke position of Figure 3. However, the latch 20 still remains in the full line position of Figure 4, and it will be noted that even in the dotted line position of Figure 4, the springs 25 are still to the right of the center X. However, if the user flexes the keeper downwardly against the latch portion 36, the result is to initiate the rotation of the latch about the center X. The springs 25, still referring to the position of the parts as shown in Figure 4, move to the left of the center X, and then become effective to rotate the latch into the position shown in Figure 3, with the latch nose 35 overlying and pressing downwardly against the keeper 50.

I claim:

1. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member, pivoted on said base, having a set of ratchet teeth, a lever pivoted on said base concentrically with said latch member, a pawl on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, means for releasing said pawl from said ratchet teeth during unlatching movement of said lever and an over-center yielding connection between said lever and said latch member, adapted to hold said latch member selectively in open or closed position in response to the relative positions of said lever and said latch member.

2. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member, pivoted on said base, having a set of ratchet teeth, a lever pivoted on said base concentrically with said latch member, a pawl on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, means for releasing said pawl from said ratchet teeth during unlatching movement of said lever, an over-center yielding connection between said lever and said latch member, adapted to hold said latch member selectively in open or closed position in response to the relative positions of said lever and said latch member, and yielding means adapted normally to urge said lever toward the latching end of its possible path of movement.

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3. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member, pivoted on said base, having a set of ratchet teeth, a lever pivoted on said base concentrically with said latch member, a pawl on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, means for releasing said pawl from said ratchet teeth during unlatching movement of said lever and an over-center yielding connection between said lever and said latch member, adapted to hold said latch member selectively in open or closed position in response to the relative positions of said lever and said latch member, said yielding connection extending between an outer portion of said lever and a part of said latch member located on the side of the center of movement of the latch member and lever opposite to the area of contact between said pawl and said ratchet teeth.

4. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member, pivoted on said base, having a set of ratchet teeth, a lever pivoted on said base concentrically with said latch member, a pawl on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, means for releasing said pawl from said ratchet teeth during unlatching movement of said lever, an over-center yielding connection between said lever and said latch member, adapted to hold said latch member selectively in open or closed position in response to the relative positions of said lever and said latch member, and an actuating connection between said actuating member and said lever, adapted to move said lever from the latching to the unlatching position.

5. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member, pivoted on said base, having a set of ratchet teeth, a lever pivoted on said base concentrically with said latch member, a pawl on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, an over-center yielding connection between said lever and said latch member, adapted to hold said latch member selectively in open or closed position in response to the relative positions of said lever and said latch member, an actuating member, and an actuating connection between said actuating member and said lever, adapted to move said lever from the latching to the release position, and means for releasing said pawl from said ratchet teeth during said movement of the lever, and for thereby releasing said latch member for movement to the release position in response to action of said yielding connection between said lever and said latch member.

6. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member, pivoted on said base, having a set of ratchet teeth, a pawl movably mounted on said base and adapted to engage said teeth, and yielding means adapted to hold said latch member in latching position at one end of its movement and in unlatching position at the other end of its movement, said yielding means including an over-center spring connection between said latch member and said base, including a spring supporting yoke, pivoted to said base concentrically with said latch member, and having means thereon for releasing said pawl from said ratchet teeth when moved to its unlatching position.

7. In a latch assembly adapted releasably to

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secure relatively movable members, a base, a latch member pivoted on said base and having a set of ratchet teeth, a pawl pivoted on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, and an over-center yielding connection between said latch member and said base, adapted to hold said latch member in released position at one end of the arc of movement of the latch member and to hold the latch member in latched position at the other end of its arc of movement, said connection including a lever pivoted to said base concentrically with said latch member having means for disengaging said pawl from said teeth by movement of said lever, and a spring tensioned between an outer end of said lever and said latch member.

8. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member pivoted on said base and having a set of ratchet teeth, a pawl pivoted on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, and an over-center yielding connection between said latch member and said base, adapted to hold said latch member in released position at one end of the arc of movement of the latch member and to hold the latch member in latched position at the other end of its arc of movement, said connection including a lever pivoted to said base concentrically with said latch member having means for disengaging said pawl from said teeth by movement of said lever, and a spring tensioned between an outer end of said lever and said latch member, and means for releasing said latch, including means for moving said lever from the latching end to the release end of its path of movement.

9. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member pivoted on said base and having a set of ratchet teeth, a pawl pivoted on said base, adapted to oppose said ratchet teeth, yielding means for urging said pawl toward said teeth, and an over-center yielding connection between said latch member and said base, adapted to hold said latch member in released position at one end of the arc of movement of the latch member and to hold the latch member in latched position at the other end of its arc of movement, said connection including a lever pivoted to said base concentrically with said latch member, and a spring tensioned between an outer end of said lever and said latch member, and means for releasing said latch, including means for moving said lever from the latching end to the release end of its path of movement, said lever having a cam adapted to release said pawl from said ratchet teeth in response to the movement of said lever toward the release position.

10. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member pivoted on said base and having a set of ratchet teeth, a pawl pivoted on said base, yielding means for urging said pawl toward said teeth, and an over-center yielding connection between said latch member and said base, adapted to hold said latch member in latched position at one end of its arc of rotation, and to hold it in release position at the other end of its arc of rotation, including a lever pivoted to said base having means for releasing said pawl from said ratchet teeth and a yielding connection between an outer part of said lever and said latch member.

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11. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member pivoted on said base and having a set of ratchet teeth, a pawl pivoted on said base, yielding means for urging said pawl toward said teeth, and an over-center yielding connection between said latch member and said base, adapted to hold said latch member in latched position at one end of its arc of rotation, and to hold it in release position at the other end of its arc of rotation, including a lever pivoted to said base, a yielding connection between an outer part of said lever and said latch member, means for moving said lever from latching to release position, and cam means, actuated by said lever, adapted to move said pawl to release position in response to the movement of the lever toward release position.

12. In a latch assembly adapted releasably to secure relatively movable members, a base, a latch member pivoted on said base and having a set of ratchet teeth, a pawl pivoted on said base, yielding means for urging said pawl toward said teeth, and an over-center yielding connection between said latch member and said base, adapted to hold said latch member in latched position at one end of its arc of rotation, and to hold it in

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release position at the other end of its arc of rotation, including a yoke pivoted to said base, a yielding connection between an outer part of said yoke and said latch member, means for moving said yoke to release position, and cam means, on said yoke, adapted to move said pawl to release position in response to the movement of the yoke toward release position.

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