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LATCH MECHANISM

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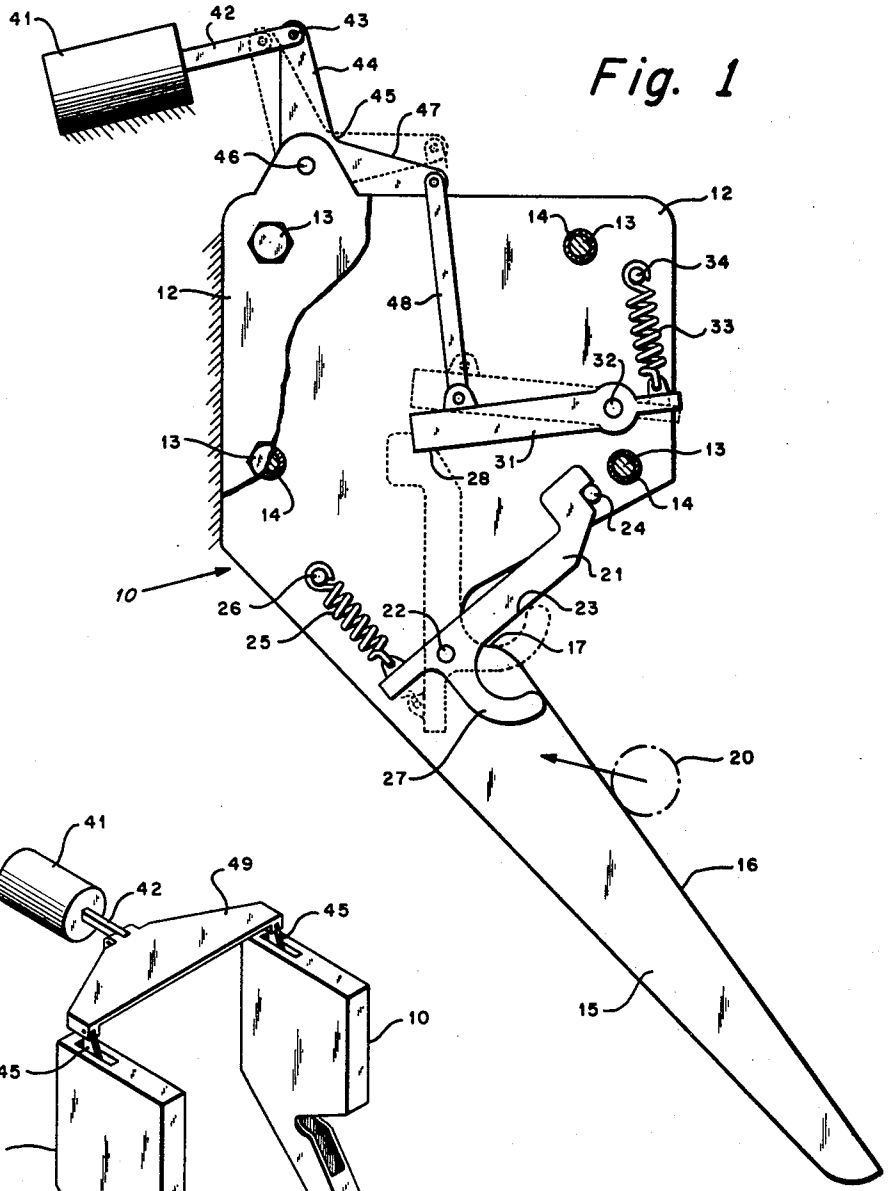


Fig. 1

Fig. 2

INVENTOR.
JOHN L. FELIX

BY

J. M. Smith, Jr.
ATTORNEYS

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LATCH MECHANISM

John L. Felix, Willow Grove, Pa., assignor to the United States of America as represented by the Secretary of the Navy

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3 Claims. (Cl. 74—2)

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The instant invention relates to a latch mechanism and more particularly to a latch mechanism arranged to automatically secure an object moved into engagement therewith and provided with means for guiding an object into engagement therewith.

Known types of mechanisms for fixedly securing an object attached to the end of a flexible support when such an object is disposed in a retracted position have characteristically included multiple latch mechanisms operatively interconnected for cooperative operation to form compound latching means for such an object. A more recently developed mechanism for controlling the position of an object attached to the end of a flexible support includes spaced engaging means for engagement with spaced attachment means on such an object arranged so that an object so supported may be maintained in a fixed retracted position by a simplified single acting latch mechanism.

The instant invention contemplates an automatically locking latch mechanism suitable for use in this application comprising a body member including guide means for directing an object into engagement with the latch mechanism, and object restraining means rotatably supported on the body member, and locking means effective to secure the object restraining means. In addition, the instant invention contemplates a latch mechanism which may effectively be used as a single unit, or, alternatively, may be ganged for concurrent use of two or more such units.

An object of the instant invention is the provision of a latch mechanism for automatically engaging and restraining a freely supported object.

Another object is to provide a latch mechanism for engaging and restraining a freely supported object, which latch mechanism includes guide means for directing a freely supported object into engagement with the latch mechanism.

Still another object is to provide a latch mechanism for restraining an object, automatically operable in response to engagement with the object to restrain the object.

The final object of this invention is the provision of a latch mechanism including two or more units concurrently releasable in response to a single actuating impulse.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a side elevation, partially broken away, showing the details of the preferred embodiment of the instant invention, and

Fig. 2 is a simplified isometric representation of a plurality of units constructed according to the teachings

of the instant invention ganged for actuation by a single actuating means.

Referring now to the drawings wherein like reference numerals refer to like or corresponding parts, Fig. 1 includes a showing of one unit of the preferred embodiment of the instant invention including a frame or body generally designated by the reference numeral 10 which may in fact consist of a pair of substantially identical flat plate members 12 fixedly secured by a plurality of attachment means such as bolts 13 and cooperating nuts provided with spacers 14 to maintain the proper fixed spaced relationship between the respective plate members 12. The respective body or plate members 12 include downwardly and rearwardly extending projections 15 comprising elongated guide means provided with elongated camming surfaces 16 for guiding an object 20, such as an elongated rod suitable for use as a striker element, into engagement with the latch mechanism, when the object 20 is subjected to a force applied in the general direction indicated in Fig. 1 by the arrow projecting from the object 20. The respective body members 12 rotatably support an object restraining member or means 21 pivotally mounted upon a suitable supporting pin 22 so that the restraining member 21 has an edge 23 intersecting the contour of a seat 17 when the member 21 is disposed in engagement with a stop 24 by operation of a tension spring 25 interconnecting the opposite end of the restraining member 21 and a pin 26 fixedly secured to the respective plate members 12. With the restraining member 21 disposed in engagement with the stop 24, a laterally projecting curved hook portion 27 projecting therefrom is disposed between the respective plate members 12 and below the camming surfaces 16 in order to permit ready engagement of an object 20 with the edge 23.

In addition, Fig. 1 shows a locking member 31 pivotally mounted upon a pin 32 for rotatable movement between the respective plate members 12 in a counterclockwise direction as seen in Fig. 1 in response to the biasing action of tension spring 33 connected at one end to one end of locking member 31 and at the other end to a post 34 fixedly secured between the plate members 12. Alternatively, locking member 31 may be rotated clockwise, as seen in Fig. 1, in response to displacement of an actuating means therefore such as solenoid 41 fixedly secured to the same supporting means as the body 10 of the latch mechanism and having an armature 42 connected pivotally by a pivot 43 to an arm 44 of a bellcrank 45 pivotally mounted for rotation about a shaft 46 supported by the body 10 and having a second arm 47 connected by a link 48 to the locking member 31.

Referring next to Fig. 2, it will be seen that a plurality of individual units of the type illustrated in Fig. 1 may be ganged for control by a single actuating means by being arranged side by side so that the locking members 31 of the respective units may be controlled by connection through their respective links 48 to a plurality of bellcranks 45 and thence to the armature 42 of a single solenoid 41 so that concurrent operation of the respective units is controlled by actuation of the single solenoid 41. In such a configuration, the pivot 43 must be substantially elongated to interconnect the respective bellcranks 45 and the armature 42, or be replaced by an element such as elongated member 49, illustrated in Fig. 2.

In operation, a member to be retained by the mechanism such as an elongated rod 20 disposed transversely of the latch mechanism and having a generally cylindrical cross section, may be drawn into operative engagement with the device of the instant invention by the application of a force in the general direction of the arrow,

shown in Fig. 1, projecting from the elongated member 20. Continuing application of a force in the general direction indicated, as by a towing cable, draws the member 20 into engagement with a point on the camming surfaces 16 of the projecting members 15 so disposed in relation to the direction of the force applied to the member 20 that the member 20 is drawn upwardly along the camming surfaces 16 toward the recess 17, at the end thereof, shaped to receive the member 20. As the member 20 is seated in the cooperating recess 17, it engages the edge 23 of the elongated member 21, biasing the member 21 about the supporting pin 22 against the restraining influence of spring 25. With the member 20 seated in the cooperating recess 17, the elongated member 21 is biased into the position shown in dotted lines in Fig. 1 and the member 20 is secured in the recess 17 by the curved hook portion 27 projecting laterally from the elongated member 21. The member 21 is maintained in the dotted line position indicated in Fig. 1 by engagement with the free end of locking member 31, initially biased clockwise about the pivotal support 32 by engagement with the free end of the elongated member 21 until the locking member 31 is biased into engagement with the notch 28 in the end of elongated member 21 by the tension spring 33 secured at its opposite end to post 34. With the restraining member 21 thus secured in its dotted line position, as shown in Fig. 1, the member 20 is secured in fixed relation to the latch mechanism.

When it is desirable to release the member 20 from the latch mechanism, an actuator such as solenoid 41 may be energized by remote control means therefor to displace the armature 42 thereof connected at its free end by pivotal connection 43 to the arm 44 of a bellcrank assembly 45 pivotally mounted on the latch mechanism and having a second arm 47 connected through a link 48 to the free end of the elongated locking member 31. Thus, actuation of the solenoid 41 produces a movement transmitted through the linkage described to the end of the locking member 31 moving it clockwise to the dotted line position illustrated in Fig. 1 and thereby clearing the notch 28 in the end of the elongated restraining member 21 allowing that member to be pivoted clockwise into engagement with the stop 24 therefor, in which position the hooked member 27 is retracted within the latch mechanism and beneath the camming surface 16 to permit free release of the member 20 from the latch mechanism.

As noted briefly above, the device comprising the instant invention is compactly designed for use in single or multiple installations where two or more units may be ganged in such side by side relationship as illustrated generally in Fig. 2 in an arrangement suitable for use in the system described in co-pending application Serial No. 735,075, filed May 13, 1958, of Samuel Rizzo.

Thus, the instant invention provides a relatively simple, compact latch mechanism provided with effective guide means for guiding a cooperating member into engagement with said latch mechanism, and having a highly reliable operating mechanism for repeated effective operation either as a single unit or as one of a ganged array of similar units.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A latch mechanism for automatically securing and releasing a flexibly supported striker element operable regardless of the spatial orientation of the latch mechanism and comprising, a flat latch frame having a guide portion with a trailing edge forming a striker element cam surface, an arcuate seat portion formed in said guide portion at the upper terminal end of said cam surface, a striker element latching member pivotally connected to said guide portion adjacent to and forwardly of said seat portion, said latching member having a rearwardly and upwardly inclined elongated portion with a rearwardly projecting arcuately curved hook portion at the lower end thereof, a first coiled spring connected at one end to said flat latch frame and at the other end to said latching member for normally biasing the same in a clockwise direction into an unlatched position, a latching member stop pin limiting the pivotal movement of said latching member due to the biasing action of said first coiled spring, said elongated portion of said latching member intersecting the contour of said seat portion when in unlatched position in such a manner that upon engagement of the striker element with said elongated portion of said latching member the latter will be forwardly biased in a counterclockwise direction and said arcuately curved hook portion of said latching member will engage and latch the striker element in said seat portion, an angular notch portion formed in the upper end of said latching member adapted to seat against said stop pin when in unlatched position, an elongated locking member pivotally connected to said frame above said latching member, a second coiled spring connected at one end to said frame and at the other end to said locking member for normally biasing the same in a counterclockwise direction to a locking position with said notch portion of said latching member for blocking the clockwise movement of the same to the unlatched position, a bell crank having two arms pivotally connected to the upper end of said frame, one arm of said bell crank being adapted to be connected to and actuated by a solenoid armature, and a link member connected at one end to the other arm of said bell crank and at the other end to said locking member, and said locking member being moved in a clockwise direction out of locking engagement with said latching member upon the solenoid armature moving said bell crank in a counterclockwise direction.

2. A latch mechanism for automatically securing and releasing a flexibly supported striker element operable regardless of the spatial orientation of the latch mechanism and comprising, a flat latch frame having a guide portion with a trailing edge forming a striker element cam surface, an arcuate seat portion formed in said guide portion at the upper terminal end of said cam surface, a striker element latching member pivotally connected to said guide portion adjacent to and forwardly of said seat portion, said latching member having an elongated portion with an upwardly opening hook portion at the lower end thereof, a coiled spring connected at one end to said flat latch frame and at the other end to said latching member for normally biasing the same in a clockwise direction into an unlatched position, a latching member stop pin for limiting the pivotal movement of said latching member due to the biasing action of said coiled spring, said elongated portion of said latching member intersecting the contour of said seat portion when in unlatched position in such a manner that upon engagement of the striker element with said elongated portion of said latching member the latter will be biased in a counterclockwise direction and said curved hook portion of said latching member will engage and latch the striker element in said seat portion, the upper end portion of said latching member being adapted to seat against said stop pin when in unlatched position, a locking member pivotally connected to said frame body above said latching member, biasing means connected at one end to said frame body and at the other end to said locking member for normally biasing the same in a counterclockwise direction to a locking position with said upper end portion of said latching member for blocking the clockwise movement of the same to the unlatched position, and means for moving said locking member in a clockwise direction for releasing said latching member and permitting said coiled spring to bias said latching member to the unlatched position and thereby releasing the striker element.

3. A latch mechanism for automatically securing and releasing a flexibly supported striker element operable regardless of the spatial orientation of the latch mechanism and comprising, a flat latch frame comprising a pair of plates in fixed parallel relationship with each other, each plate having a trailing edge guide portion forming a striker element cam surface, an arcuate seat portion formed at the upper terminal end of each said guide portion, a striker element latching member pivotally connected to each said guide portion adjacent to and forwardly of said seat portions, each said latching member having a rearwardly and upwardly inclined elongated portion with an arcuately curved hook portion, two coiled latch operating springs each connected at one end to a separate one of said parallel plates and at the other end to the corresponding one of said latching members for simultaneously normally biasing the same in a clockwise direction into an unlatched position, a latching member stop pin in each of said plates for limiting the pivotal movement of a corresponding one of said latching members due to the biasing action of said coiled springs, said elongated portions of said latching members intersecting the adjacent contours of said seat portions when in unlatched position in such a manner that upon engagement of the striker element with said elongated portions the latter will be biased forwardly in a counterclockwise direction and said arcuately curved hook portions of said latching members will engage and latch the striker element in said seat portions, the upper end of each of said latching members having a portion forming an angular notch adapted to seat against said stop pin when in unlatched position, an elongated locking member pivotally connected to each of said plates above said

latching members, two lock member operating springs connected at one end to a separate one of said plates and at the other end to the corresponding one of said locking members for normally biasing the same in a counterclockwise direction to a locking position with said notch portions of the corresponding ones of said latching members for blocking the clockwise movement of the same to an unlatched position, two bell cranks having two arms, one each pivotally connected to the upper end of said plates, a laterally extending elongated member interconnecting corresponding arms of said bell cranks and adapted to be actuated by a solenoid armature, and two link members, each connected at one end to the other arm of a separate one of said bell cranks and at the other end to a corresponding one of said locking members, and said locking members being moved in a clockwise direction out of locking engagement with said latching members upon the solenoid armature moving said bell cranks in a counterclockwise direction.

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