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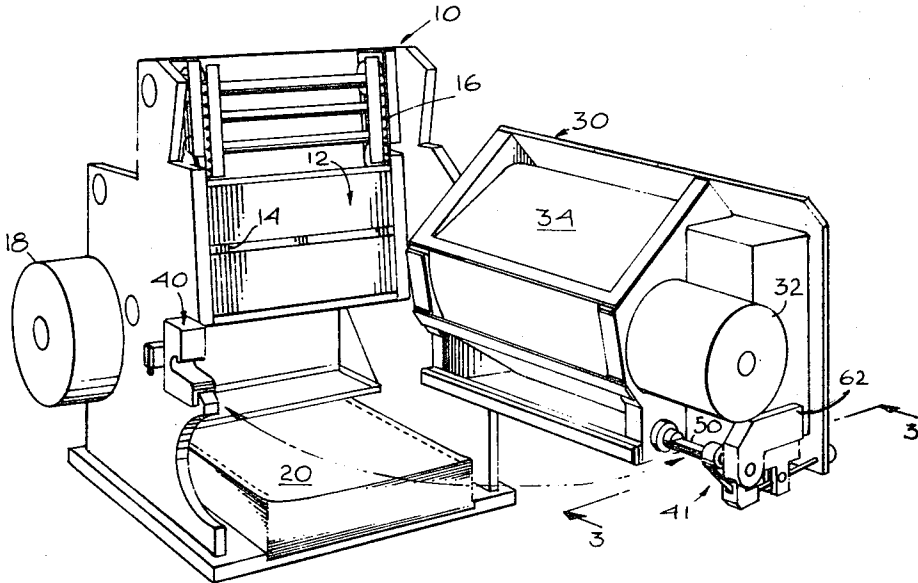
[54] **ASSEMBLY FOR LATCHING A HINGED PRINTING DRUM INTO ALIGNMENT WITH A HAMMER BANK**
5 Claims, 5 Drawing Figs.

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E05c 3/04
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44; 101/93, 93 RC

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ABSTRACT: A latch assembly useful in a high speed printing apparatus for latching a hinged drum gate into alignment opposite to a hammer bank. The latch assembly is comprised of a bracket fixedly mounted on the hammer bank frame. The bracket defines a slightly inclined entrance ramp leading to a substantially semicylindrical vertically oriented shaft receptacle. A substantially semicylindrical shaft is mounted for rotation on the drum gate. A lever is provided for rotating the shaft between a horizontally oriented position and a vertically oriented position in which the shaft can be nested in the receptacle. Detent means are provided to retain the shaft in either position. A switch is mounted on the hammer bank frame for sensing the shaft orientation and position.



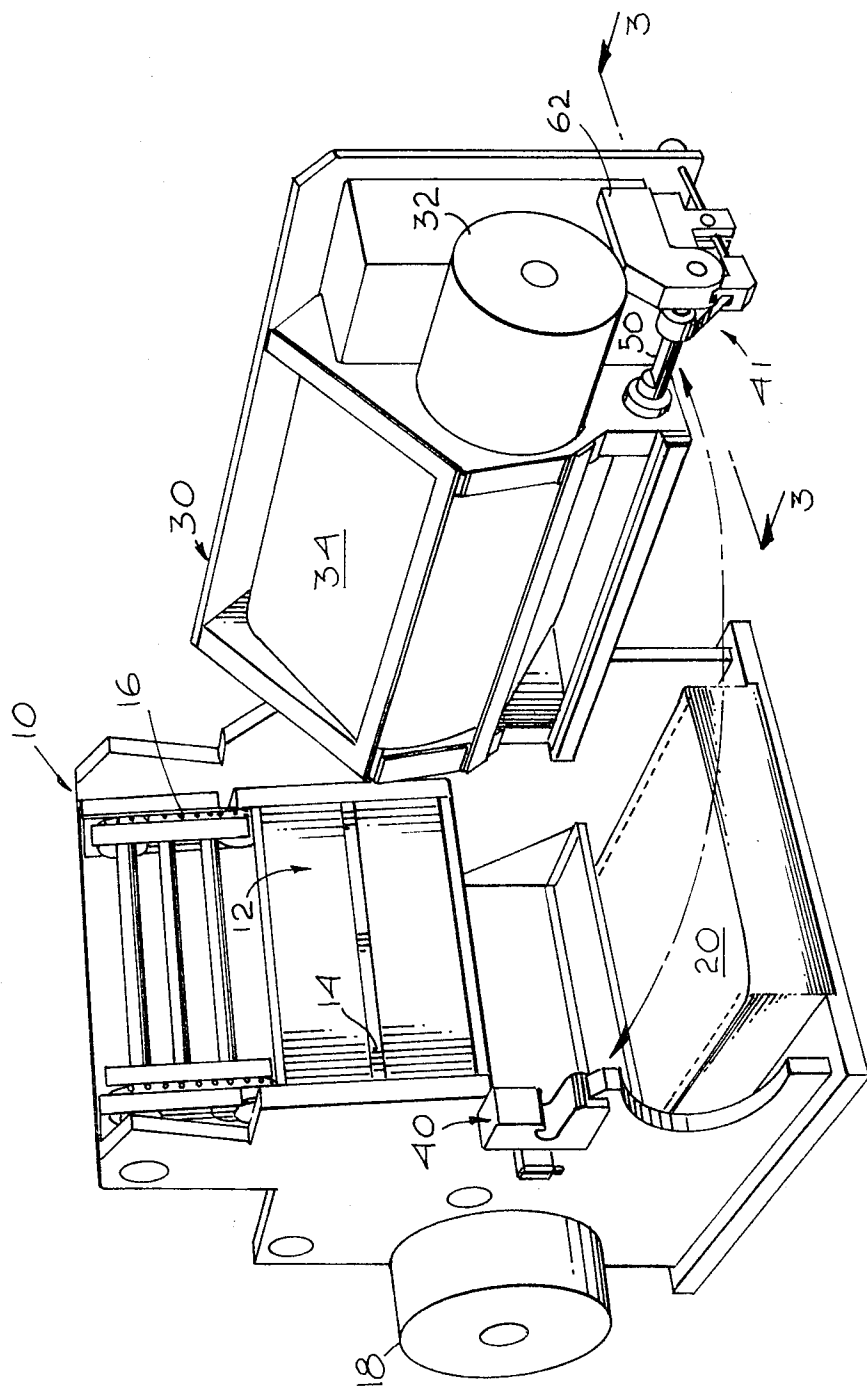


Fig. 1

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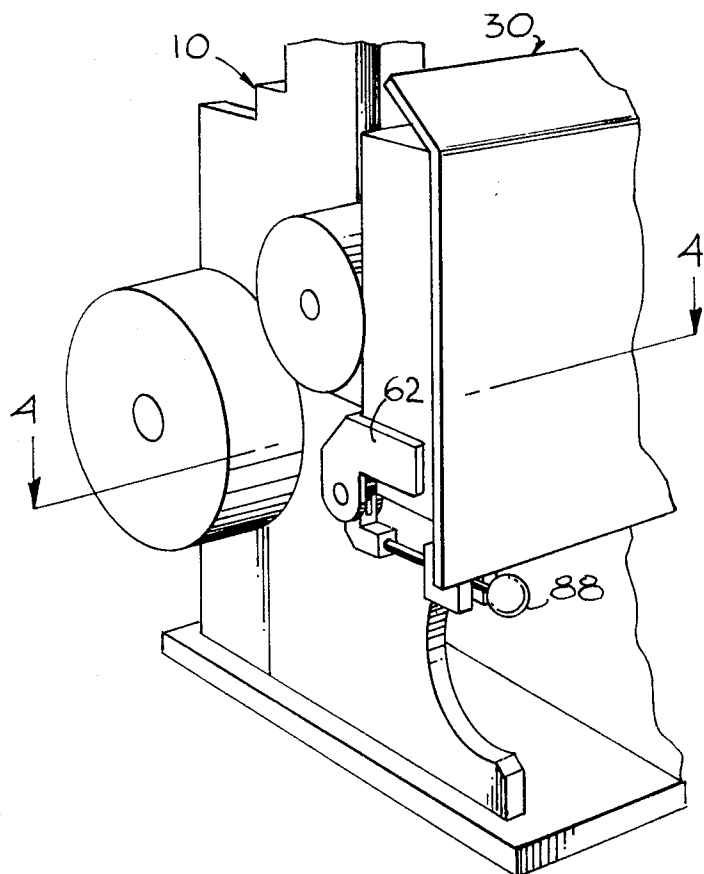


Fig. 2

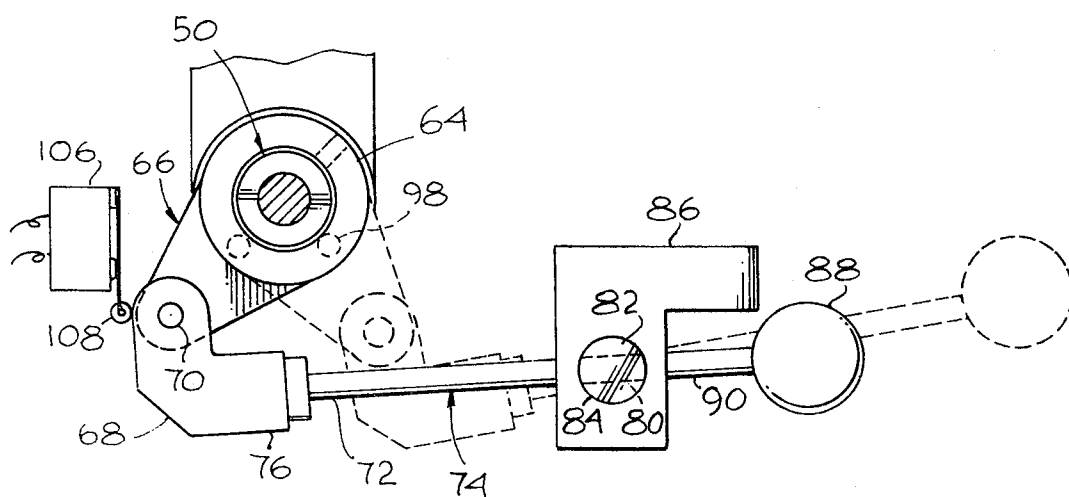


Fig. 3

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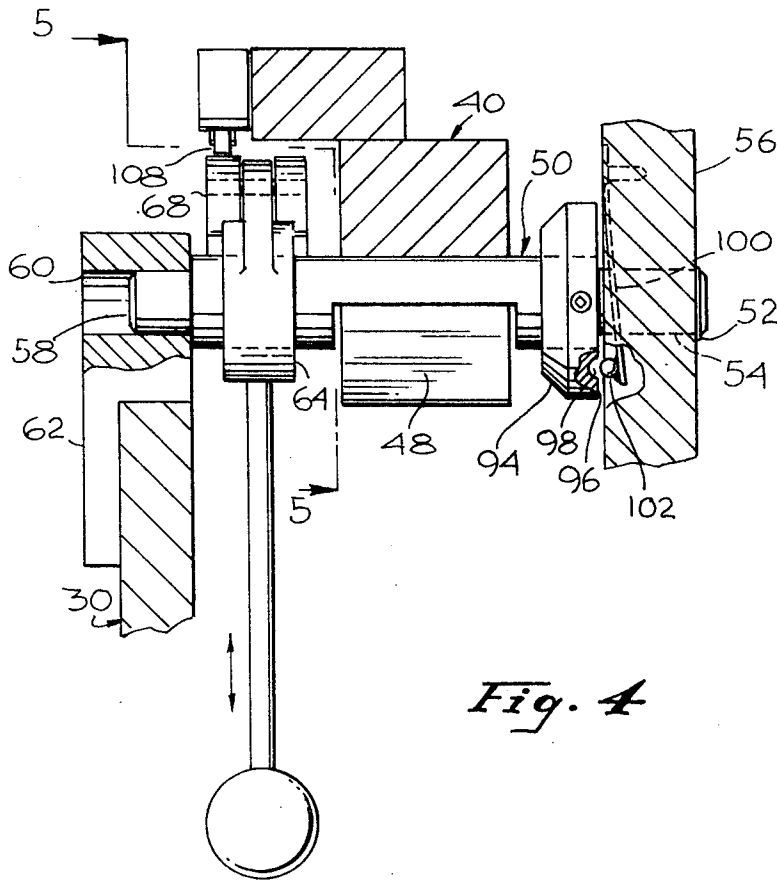


Fig. 4

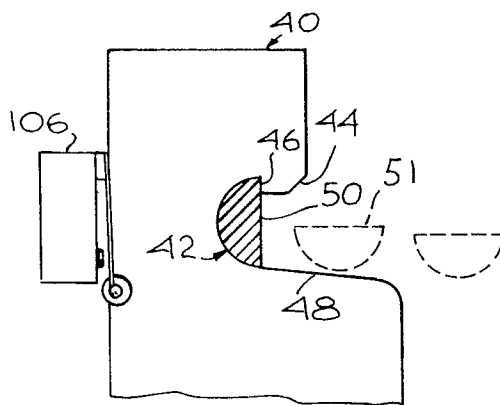


Fig. 5

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ASSEMBLY FOR LATCHING A HINGED PRINTING DRUM INTO ALIGNMENT WITH A HAMMER BANK

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a latch assembly useful in a high speed printing apparatus for aligning and latching a drum gate opposite to a hammer bank.

Many high speed printers used in data processing systems employ a hammer bank positioned opposite to a rotating character drum. The hammer bank is comprised of a plurality of individually actuatable impact hammers and the character drum has raised characters formed on the peripheral surface thereof. Paper and printing ribbon webs pass between the hammer bank and the drum. In order to print a selected character in a particular position on the paper, the particular hammer disposed adjacent that position is energized when the selected character on the drum moves into alignment therewith. The hammer strikes the paper against the ribbon and drum character to thus print the character on the paper surface adjacent the ribbon. It will be appreciated that in order to achieve high quality printing at high speeds, it is imperative that the drum and hammer bank be precisely positioned relative to one another.

In order to provide easy accessibility to the hammer and drum and to facilitate paper loading, it has become common practice to mount the drum on a frame or gate which is hinged relative to the hammer bank frame. Utilizing such a structural configuration, it is essential to provide some means for latching the gate in alignment with the hammer bank frame to compensate for hinge wear.

In view of the foregoing, a primary object of the present invention is to provide a latch assembly suitable for latching and precisely aligning a high speed printer drum gate relative to a hammer bank.

SUMMARY OF THE INVENTION

Briefly, in accordance with the present invention, a latch shaft or irregular cross section is mounted on a drum gate for rotation about a precisely defined axis. A bracket is fixedly mounted on the hammer bank frame and is provided with a receptacle having a cross section corresponding to the shaft cross section, for receiving the shaft. A fixedly mounted retaining member projects in front of the bracket receptacle so as to retain the shaft in the receptacle when it is nested therein. In order to nest the shaft in the receptacle, it must be oriented so as to avoid the retaining member upon initial partial entry into the receptacle. After the shaft has moved past the retaining member, it can then be rotated into nesting relationship within the receptacle.

In accordance with a preferred embodiment of the invention, the shaft is semicircular in cross section and is rotatable between essentially horizontal and vertical orientations. The receptacle is, for example, vertically oriented and the shaft must initially be horizontally oriented to partially enter the receptacle and avoid the retaining member. After the initial partial entry, the shaft is rotated to the vertical orientation to nest in the receptacle.

In accordance with a feature of the invention, detent means are provided to retain the shaft in either the vertical or horizontal orientation.

In accordance with a further feature of the invention, switch means are provided for sensing the position and orientation of the shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a printing apparatus incorporating a latch assembly in accordance with the present invention;

FIG. 2 is an enlarged perspective view, partially broken away, illustrating the latch assembly in latched position;

FIG. 3 is a sectional view taken substantially along the plane 3-3 of FIG. 1;

FIG. 4 is a sectional view taken substantially along the plane 4-4 of FIG. 2; and

FIG. 5 is a sectional view taken substantially along the plane 5-5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Attention is now called to FIG. 1 of the drawing which illustrates a high speed printing apparatus incorporating a latch assembly in accordance with the present invention. The printing apparatus of FIG. 1 is basically comprised of a first frame 10 supporting a bank of individually actuatable impact hammers 12. The hammer tips 14 are disposed in horizontal alignment. The number of hammers normally provided is equal to the maximum number of characters it is desired to print in a single line. Thus, if it is desired to print lines having up to 120 character positions, then it is normally necessary to provide 120 hammers.

The frame 10 also supports a paper drive tractor mechanism 16 driven by a motor 18. The printer apparatus of FIG. 1 normally prints on fan-folded edge perforated paper 20 which is pulled by the tractor mechanism 16 from the supply stack 20 past the hammer bank 12.

The printer apparatus of FIG. 1 also includes a second frame or gate 30 which is hinged relative to the first frame 10 for movement about a substantially vertical axis. The frame 30 supports a character drum (not shown) for rotation about its own axis. The drum is driven by motor 32 and is supported behind a printing ribbon web 34 illustrated in FIG. 1. The circumferential surface of the drum is provided with a plurality, (e.g. 120) of tracks, each track including a set of raised printing characters. Each track corresponds to a different character position in a line of print the number of different characters in each track of course determines the number of different characters which can be printed in the corresponding character position.

In the use of the apparatus of FIG. 1, the gate 30 is moved from the open position shown in FIG. 1 to a closed position in which the printing ribbon web 34 is immediately opposed to the hammer bank 12. The paper is drawn by the tractor mechanism 16 from the stack 20 through the space between the hammer bank 12 and printing ribbon 34. Printing is accomplished by incrementally moving the paper web, line by line, and by actuating each hammer when the appropriate character on the drum moves into alignment therewith to thus propel the hammer against the paper to urge the paper against the ribbon and drum.

From the foregoing brief description of the operation of the apparatus of FIG. 1, it will be readily recognized that in order to achieve high quality printing, it is essential that the character drum be precisely positioned with respect to the hammer bank 12. On the assumption that the individual hammers can all be precisely positioned with respect to the frame 10 and that the drum axis can be precisely located with respect to the gate 30, it will be recognized that it is essential to precisely position the gate 30 with respect to the frame 10 when they are moved into operative relationship. The present invention is primarily directed to a latch assembly for latching together and precisely aligning the frames 10 and 30.

The latch assembly in accordance with the present invention is basically comprised of a bracket subassembly 40 rigidly secured to the hammer bank frame 10 and a latch shaft subassembly 42 carried by the gate 30.

As is best shown in FIG. 5, the bracket 40 constitutes a metal block defining a semicylindrical receptacle 42 extending inwardly from the front face thereof. A projection 44 formed on the bracket extends along the diameter of the semicylindrical receptacle 42 to thus define a shoulder 46. Thus, the projection 44 partially blocks the opening to the receptacle 42. The lower end of the receptacle 42, as shown in FIG. 5, terminates in an inclined entrance ramp 48 which, as

will be seen hereinafter, guides the latch shaft (shown dotted in FIG. 5) into the receptacle 42 thereby eliminating any misalignment caused by wear of the hinge on gate 30.

The latch subassembly 41 is comprised of a shaft 50 having essentially semicircular cross section. As shown in FIG. 4, a first end 52 of the shaft 50 is journaled for rotation within a passage 54 formed in a wall 56 of the frame 30. A second end 58 of the shaft 50 is journaled for rotation within a passage 60 defined in a shaft support member 62, best illustrated in FIG. 4. The shaft support member 62 is fixedly mounted on the frame 30.

As is best shown in FIG. 3, a collar 64 of a crank 66 is fixedly secured to the shaft 50 proximate to the end 58 thereof. One end of a link 68 is pivotally secured to the crank 60 by a pin 70. The first end 72 of a lever 74 is secured to the second end 76 of the link 68.

The lever 74 extends through a passage 80 in a cylindrical plug 82 mounted for rotation in an opening 84 of a lever support member 86 fixedly secured relative to the frame 30. A handle 88 is fixedly mounted on the second end 90 of the lever 74.

As is best shown in FIG. 3, the handle 88 can be moved between the full line and dotted line positions indicated. When the handle is pulled to the dotted line position of FIG. 3, the shaft 50 is rotated to the substantially horizontal orientation, shown in dotted lines in FIG. 5. As will be apparent from FIG. 5, this horizontally oriented position extends substantially perpendicular to the orientation of the receptacle 42 in bracket 40. On the other hand, when the handle 88 is moved inwardly to the full line position shown in FIG. 3, the shaft 50 is rotated to a substantially vertical orientation as is also shown in FIG. 5.

Detent means are provided, as is best shown in FIG. 4, for retaining the shaft in either the horizontal or vertical orientation. The detent means includes a collar 94 mounted on the shaft 50 proximate to the end 52 thereof. First and second depressions 98 are formed in the face 96 of the collar 94 opposed to the plate 56 of frame 30. The depressions are displaced from each other by substantially 90°. A spring-urged ball assembly is carried by the plate 56 to engage and detain the collar 94 in either of two positions. More particularly, a leaf spring 100 is secured to the face of the plate 56 opposite to the face 96 of collar 94. A ball or projection 102 is terminally carried by the spring 100 and is adapted to engage either of the two depressions formed in the face 96. Thus, the shaft 50 can be manually rotated by the lever 74 to either the horizontal or vertical orientation and will be retained thereat by the spring-urged ball 102 being received in one of the two depressions 98.

In order to latch the gate 30 in operative relationship relative to the frame 10, the lever handle 88 is initially pulled outwardly to the dotted line position shown in FIG. 3 to rotate the shaft 50 to the dotted line orientation shown in FIG. 5. With the shaft oriented horizontally, the gate 30 can be swung to a closed position and the shaft 50 will tangentially ride up the inclined entrance ramp 48 as shown in FIG. 5 so that its leading edge will move past the vertical plane of shoulder 46 to thus partially enter the receptacle 42. As the gate 30 is being swung into closed relationship, and after the leading edge of the shaft 50 has entered the receptacle 42, the lever handle 88 can be pushed inwardly to thus rotate the shaft 50 to a vertical orientation into nesting relationship within the receptacle 42. When the shaft 50 is nested within the receptacle 42, the flat portion 51 thereof abuts against the shoulder 46 of the bracket 40. Consequently, the shaft will be locked in the receptacle and the gate 30 will be tightly latched and fully aligned in all planes to frame 10. It should of course be appreciated that as the shaft is rotated to the vertical orientation shown in full line in FIG. 5, the collar 94 of FIG. 4 will rotate to move the ap-

propriate depression 98 into engagement with the spring-urged ball 102. Inasmuch as the bracket 40 can be precisely positioned and mounted on frame 10 and further inasmuch as the position of the shaft 50 can be precisely fixed relative to the gate 30 and thus relative to the axis of a character drum, alignment of the hammer bank 12 with respect to the character drum is assured, regardless of any sagging which might occur in the hinge coupling the gate 30 to the frame 10.

In order to assure that operation of the printer occurs only when the frame 10 and gate 30 are properly latched, a switch assembly 106 is mounted on the bracket 40. The switch assembly 106 is provided with an actuator 108 which is engaged by the link 70 only when the shaft 50 is properly oriented within the receptacle 42.

From the foregoing, it should be appreciated that a latch assembly has been disclosed herein suitable for use in a high speed printing apparatus for latching and precisely aligning a character drum relative to a hammer bank.

What I claim is:

1. In a high speed printing device including a first frame supporting a plurality of individually actuatable impact devices and a second frame hinged about a vertical axis to said first frame and supporting a movable raised-character surface, means for latching said first and second frames in horizontal alignment with one another, said latching means comprising:

a bracket fixedly mounted on said first frame;

said bracket defining an elongated receptacle extending perpendicular to said vertical hinge axis and having a semicircular cross section and a projection extending along the diameter of said cross section and in a direction parallel to said vertical hinge axis partially blocking the opening to said receptacle;

an elongated shaft means having a semicircular cross section defined in part by a planar side extending along the diameter thereof;

means mounting said shaft means on said second frame for rotation about an axis therethrough extending perpendicular to said vertical axis; means for rotating said shaft means between a first orientation wherein said side lies in a plane perpendicular to said vertical hinge axis and a second orientation wherein said side lies in a plane substantially parallel to said vertical hinge axis, whereby in said first orientation said shaft means is able to move past said projection into said receptacle and in said second orientation said shaft means can nest in said receptacle with said projection preventing said shaft means from movement thereof; and

detent means for retaining said shaft means in either said first or second orientation.

2. The latching means of claim 1 wherein said bracket includes an inclined entrance ramp extending substantially perpendicular to said diameter of said receptacle cross section.

3. The latching means of claim 1 wherein said shaft means includes a crank;

lever means coupled to said crank for rotating said shaft means; and

means restricting said lever to substantially translational motion perpendicular to said shaft means.

4. The latching means of claim 1 including a switch means having a switch actuator;

means mounting said switch actuator on said first frame for engagement by said shaft means only when said shaft means is nested in said receptacle.

5. The latching means of claim 1 wherein said detent means includes a plate coupled to said shaft means and having first and second depressions formed therein; and

a spring-urged projection mounted on said second frame adapted to project into said depressions.