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[54] LATCHING MECHANISM

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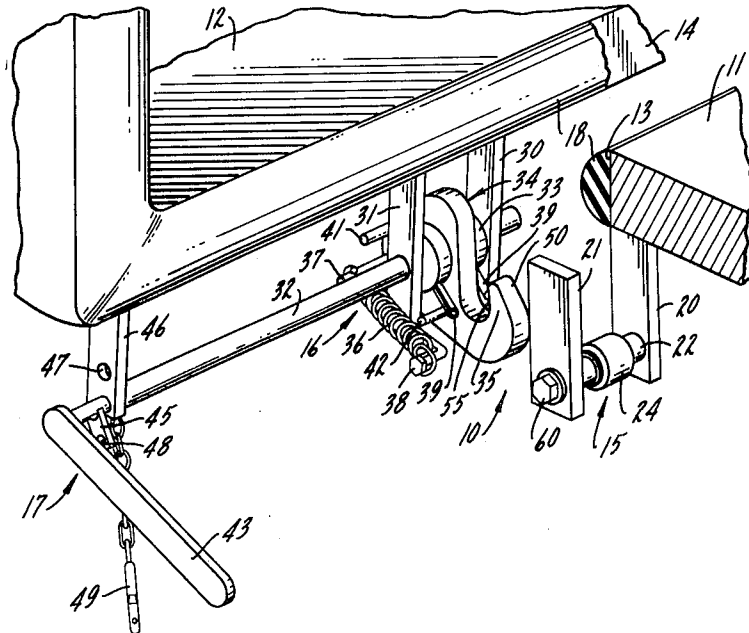
Attorney—Charles M. Kaplan and Joel E. Siegel

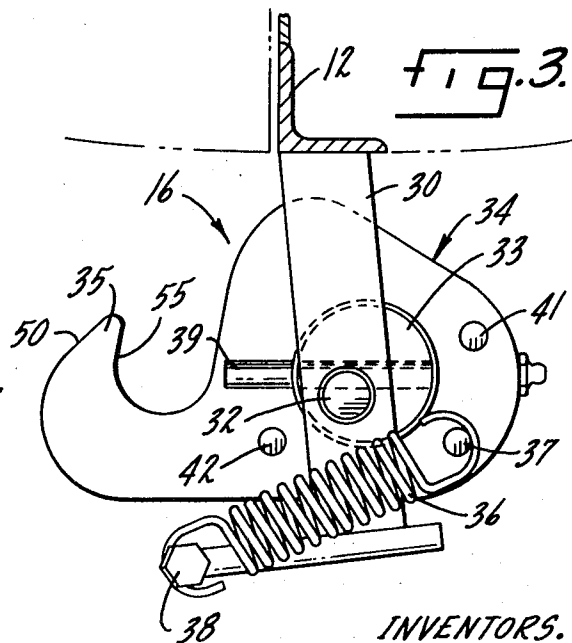
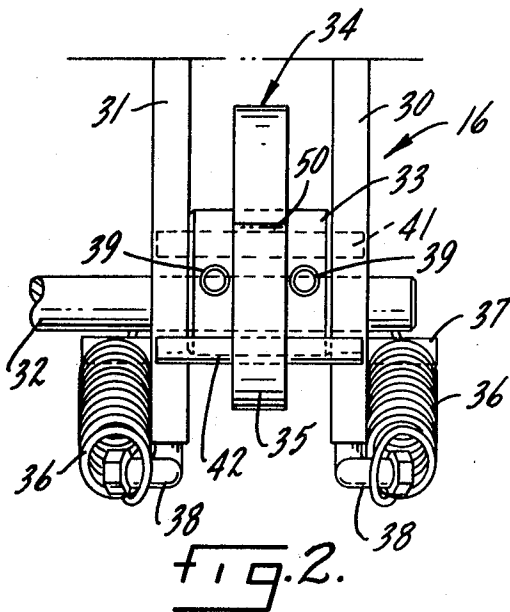
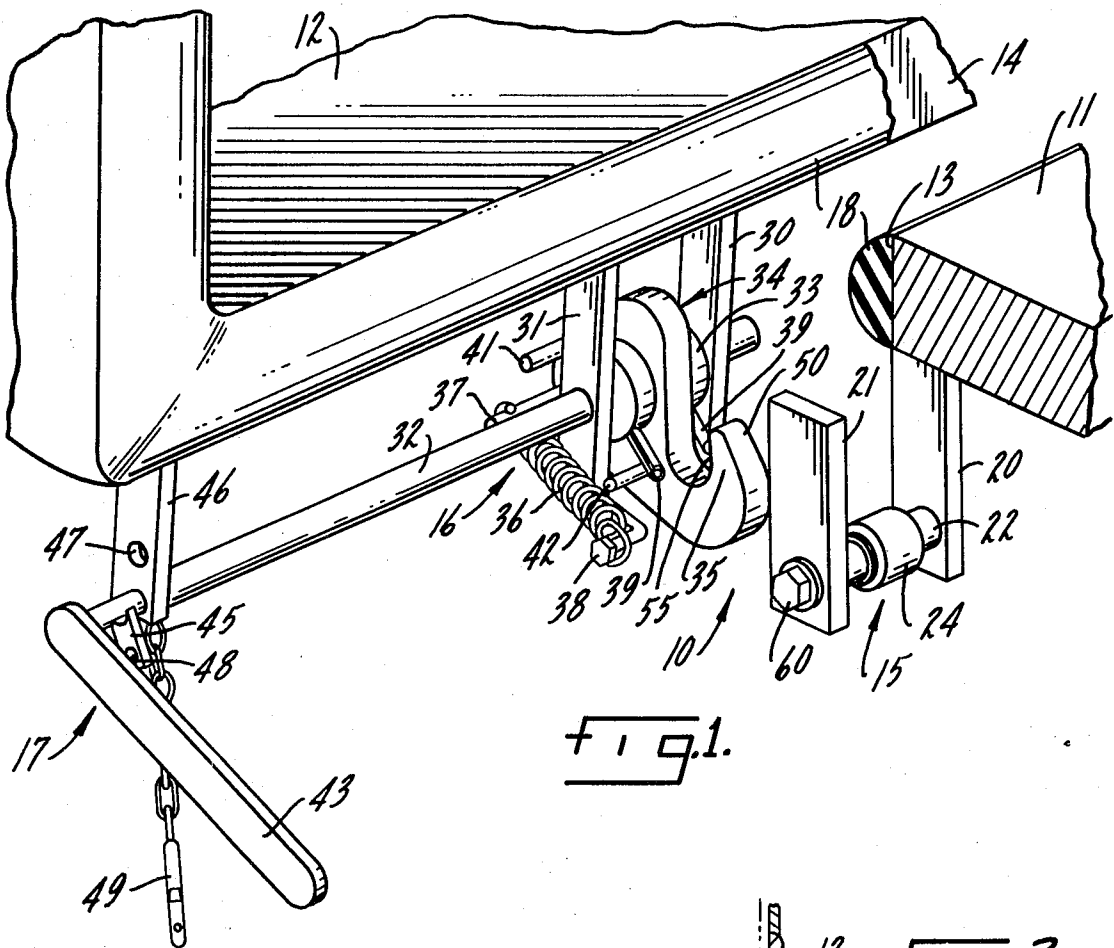
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ABSTRACT

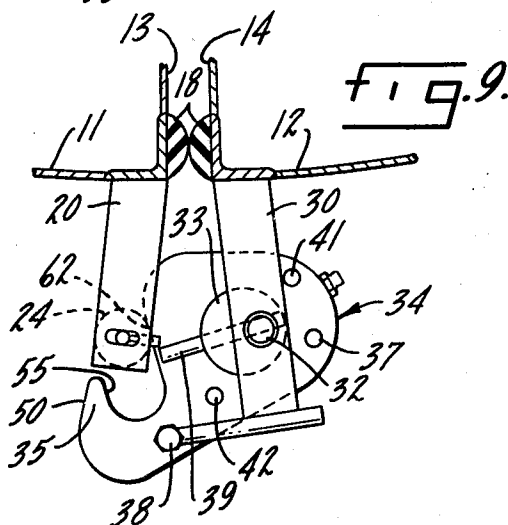
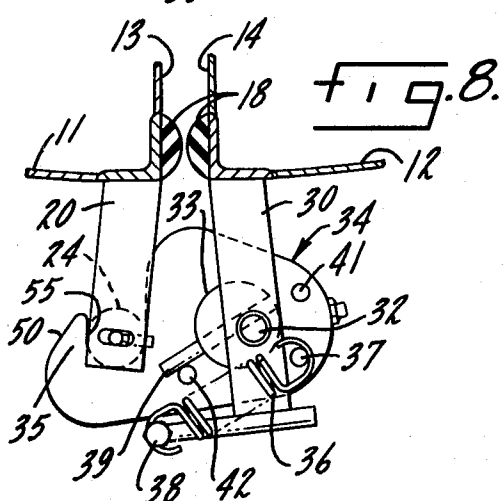
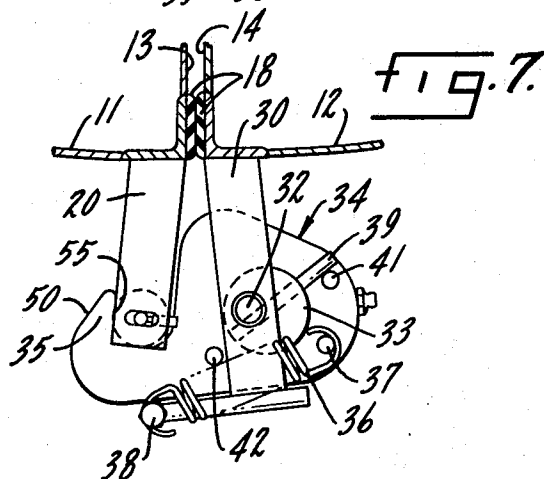
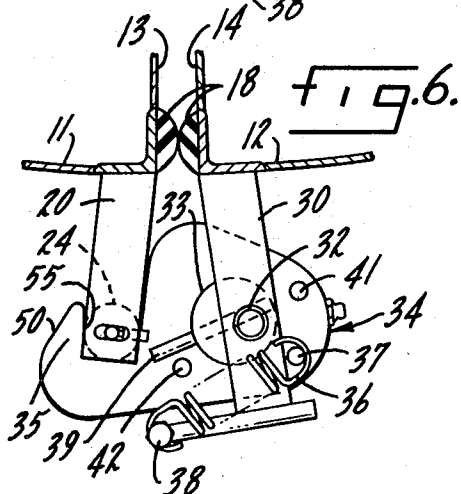
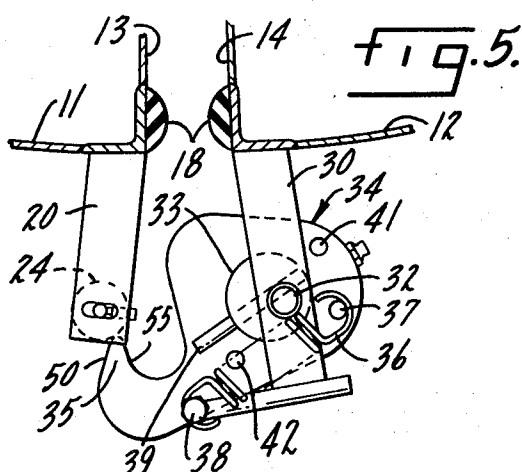
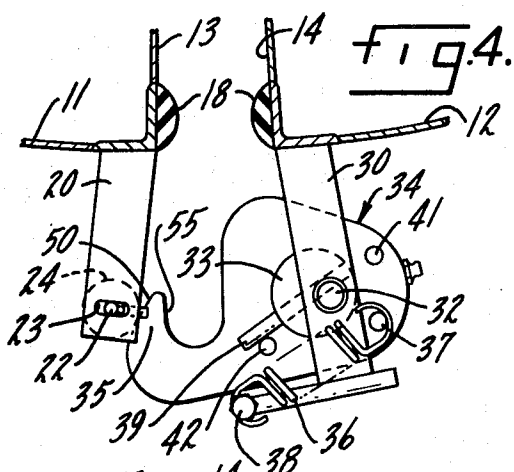
A latching mechanism which comprises a latch pin, an operating rod parallel to the latch pin, an eccentric sleeve secured about the operating rod, a hook-shaped catch means rotatably secured about the eccentric sleeve, and spring means biasing the catch means such that as the catch means is moved against the latch pin the catch means automatically engages the latch pin. The eccentric sleeve is positioned such that upon rotation of the operating rod the catch means exerts a closing force on the latch pin.

5 Claims, 9 Drawing Figures





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LATCHING MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to a latching mechanism and more particularly pertains to a latching mechanism to secure and seal a cover assembly in a closed position.

Cover assemblies are frequently provided to protect critical parts of an apparatus from outside elements, i.e., the bottom unloading valve of a railway tank car. These cover assemblies include at least one movable cover member which contacts either a second cover member or a structural part of the apparatus. In order to ensure sealing of the cover assembly, resilient gasket means are provided at the point of contact between the cover members or where the cover member contacts the apparatus.

The heretofore latching mechanisms include separate single purpose latches for initial latching and for tightening to seal the gasket. In the present invention the initial latching, the tightening to seal the gaskets and the release of the latch are all incorporated in a single mechanism. Opening and closing of the latch mechanism is attained with a single operation and by means of a single lever.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a latching mechanism that automatically catches on closing.

Another object is to provide a latching mechanism for a cover assembly that is capable of sealing the cover assembly into a closed position after the latch has caught.

A further object of the invention is to provide a latching mechanism that will remain securely latched under varying conditions.

Still another object is to provide a latching mechanism that is conveniently and easily unlatched.

A still further object is to provide a latching mechanism that has all operations controlled from a single and conveniently located operating lever.

Another object is to provide a latching mechanism for a cover assembly that increases the closing forces on the latch mechanism as the cover assembly tries to open when in its locked position.

These and other objects are attained by the latching means of the present invention, which comprises a latch pin, an operating rod parallel to the latch pin, an eccentric sleeve secured about the operating rod, a hook-shaped catch means rotatably secured about the eccentric sleeve, and spring means biasing the catch means such that as the catch means is moved against the latch pin the catch means automatically engages the latch pin. The eccentric sleeve is positioned such that upon rotation of the operating rod the catch means exerts a closing force on the latch pin.

DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the annexed drawings, which illustrate a preferred embodiment, and wherein:

FIG. 1 is a perspective, partially broken-away, schematic view of the latching means including a portion of a pair of cover members;

FIG. 2 is a plan view of the catch assembly;

FIG. 3 is a elevational view of the catch assembly;

FIG. 4 is an elevational view of the latch assembly and the catch assembly as the catch means contacts the latch pin means during closing of the present invention;

FIG. 5 is an elevational view similar to FIG. 4 showing the catch means passing under the latch pin means just prior to engagement of the catch means with the latch pin means;

FIG. 6 is an elevational view similar to FIG. 5 showing the catch means and the latch pin means in the locked position prior to being squeezed;

FIG. 7 is an elevational view similar to FIG. 6 showing the catch means and the latch pin means in the locked and squeezed position;

FIG. 8 is an elevational view similar to FIG. 7 showing the catch means and the latch pin means just prior to unlatching; and

FIG. 9 is an elevational view of an alternative catch assembly as the catch means contacts the latch pin means during closing of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows latching mechanism 10 attached to cover members 11 and 12, of the type which move towards each other into a closed cover position and away from each other into an open cover position. First cover member 11 has an edge 13 which is in an edgewise abutting relationship with edge 14 of second cover member 12 when the cover members are in the closed position. Resilient sealing means 18 are secured to and define the outer extremities of edges 13 and 14 to facilitate the sealing of covers 11 and 12.

Latching mechanism 10 comprises a latch assembly 15 attached to the underside of cover 11, a catch assembly 16 attached to the underside of cover 12 and a locking assembly 17.

As seen in FIGS. 1 and 4 latch assembly 15 includes a pair of support members 20 and 21 attached to the underside of cover 11. Pin 22 passes through a pair of horizontally elongated slots 23 in support members 20 and 21, and is releasably fastened thereto in a conventional manner. Roller 24 is rotatably mounted about pin 22. Pin 22, and roller 24 mounted thereon, may be horizontally adjusted by releasing fastening means 60 and sliding pin 22 in slots 23.

As best seen in FIGS. 1-3 latch assembly 16 includes support members 30 and 31 attached to the underside of cover 12. Operating rod 32 passes through horizontally aligned apertures in members 30 and 31 and is thereby rotatably supported by members 30 and 31. An eccentric sleeve 33 is rigidly secured about operating rod 32. Rotatably secured about eccentric sleeve 33 is a hook-shaped catch member 34, shaped so as to permit engagement of hook portion 35 around roller 24 when latching mechanism 10 is in its closed position.

Catch member 34 has a first position, in which hook portion 35 passes around roller 24, as seen in FIG. 5, and a second position wherein hook portion 35 engages roller 24, as seen in FIG. 6. A pair of spring means 36 are attached at one end to rod 37, passing through an aperture in catch member 34, and at their other end to a pair of lugs 38, attached to support members 30 and 31. Springs 36 bias catch member 34 towards its second or latch assembly engaging position.

Eccentric sleeve 33 has a first position, as seen in FIG. 6, wherein upon engagement of catch member 34 with roller 24 edges 13 and 14 of covers 11 and 12 are not in edgewise abutting engagement and a second position, as seen in FIG. 7, wherein after engagement of catch member 34 with roller 24, edges 13 and 14 are in edgewise abutting engagement squeezing sealing means 18 therebetween. Sleeve 33 is provided with a pair of outwardly projecting pins 39, sandwiching catch member 34 therebetween. Stop pins 41 and 42 pass through apertures in catch member 34, and extend outwardly therefrom, so as to limit movement of pins 39 therebetween, thereby limiting rotation of sleeve 33. Pins 41 and 42 are spaced so as to limit rotation of sleeve 33 to approximately 180°. When sleeve 33 is in its first position, pins 39 are either in contact with, or spaced a small distance from, pin 42. When in its second position, pins 39 are either in contact with, or spaced a small distance from, pin 41.

To facilitate operation of latching mechanism 10, operating rod 32 is attached to the outer extremity of cover 12, and is provided with an operating handle 43. Support member 46, affixed to the underside of cover 12 near its outer extremity, rotationally receives operating arm 32 through an aperture therein. Locking lug 45, having an aperture 48 therein, is affixed to operating rod 32 in the vicinity of support 46. Lug 45 is positioned on operating rod 32, such that after operating rod 32 is rotated so as to rotate sleeve 33 from its first to its second position, aperture 48 is in horizontal alignment with

aperture 47 in support 46. Locking pin 49 may then be passed through apertures 47 and 48 to lock sleeve 33 in its second position.

In operation, cover 11 is first moved towards cover 12 and held in its closed position either manually or by any conventional latch means. Cover 12 is then moved towards cover 11, with eccentric sleeve 33 in its first position and catch member 34 in its second position, as shown in FIG. 4. In this position pins 39 are in contact with stop pin 42. Cam surface 50 of hook portion 35 contacts roller 24 causing catch member 34 to rotate about sleeve 33, as shown in FIG. 5. Surface 50 is angled so as to transmit a rotational force to catch member 34 upon contact with roller 24. Catch member 34 continues to rotate about sleeve 33 until hook portion 35 reaches its second position. It should be noted that stop pin 42 moves away from pins 39 and springs 36 increase in tension biasing catch member 34 towards its first position. After hook portion 35 passes under roller 24, the force extended by springs 36 rotates catch member 34 about sleeve 33, thus resulting in locking engagement of catch member 34 about roller 24, as shown in FIG. 6. In this position sealing means 18 is not squeezed between edges 13 and 14.

Operating handle 43 is then rotated approximately 180° until pins 39 contact stop pin 41. This rotates eccentric sleeve 33 causing edges 13 and 14 of covers 11 and 12 to move towards each other and squeeze sealing means 18 therebetween, as shown in FIG. 7.

If an external force tries to open covers 11 and 12, roller 24 exerts a force on surface 55 of catch member 34. Since roller 24 is free to rotate, the force it exerts on surface 55 must act normal to that surface. Surface 55 is inclined such that this force vector passes under the axis of rotation of catch member 34. This produces a moment on catch member 34 that tends to rotate it about its axis of rotation to the locked position. Thus, the more covers 11 and 12 try to open, the greater the force retaining catch member 34 in the locked position. Springs 36 also exert a closing moment which is additive to the roller force moment holding catch member 34 in the locked position.

To unlatch covers 11 and 12, operating handle 43 is rotated approximately 180° until pins 39 contact stop pin 42, as shown in FIG. 8. Further rotation of handle 43 causes catch member 34 to rotate about sleeve 33 until roller 24 is released from hook portion 35 allowing covers 11 and 12 to be moved apart.

As shown in FIG. 4, pin 22 and roller 24 are movable within slot 23 thereby allowing adjustment of roller 24 through a plane substantially perpendicular to a plane passing through edges 13 and 14. By adjusting the position of roller 24 the distance between edges 13 and 14 when latch mechanism 10 is in its closed position, may be selectively increased or decreased.

An alternative embodiment is illustrated in FIG. 9. This embodiment is substantially identical to the previously discussed latching mechanism with the exception of the removal of springs 36. In operation, cover 11 is first moved towards cover 12 and held in its closed position. Cover 12 is then moved towards cover 11, with eccentric sleeve 33 in its first position and catch member 34 positioned such that pin 41 contacts supports 30 and 31. When roller 24 strikes catch member 34 at surface 62, a force normal to surface 62 results producing a turning moment on catch member 34, which causes it to rotate to its locked, or roller-engaging, position. Once in the locked position, corresponding to that shown in FIG. 6, the roller force on surface 55 retains catch 34 in position. Operating handle 43 is then rotated until pins 39 contact stop pin 41, thereby causing edges 13 and 14 to move towards each other

squeezing sealing means 18 therebetween, corresponding to the relationship shown in FIG. 7.

Various modifications are contemplated and may obviously be resorted to by those skilled in the art without departing from the spirit and scope of the invention, as hereinafter defined by the appended claims, as only preferred embodiments thereof have been disclosed.

What is claimed is:

1. A latching mechanism for selectively securing together first and second cover members, having resilient sealing means therebetween, in an edgewise abutting engagement, said latching mechanism comprising:

- a. latch pin means secured to said first cover member, including a roller rotatably mounted about an axis substantially parallel to the abutting edge;
- b. operating rod means rotatably secured to said second cover member, substantially parallel to said latch pin means;
- c. an eccentric sleeve secured about said operating rod means;
- d. a hook-shaped catch means rotatably secured about said eccentric sleeve; and
- e. spring means biasing said catch means, such that as said second cover member is moved toward said first cover member said catch means automatically engages said latch pin means, due to the bias of said spring means;
- f. said eccentric sleeve positioned such that upon rotation of said operating rod means said catch means exerts a closing force on said latch pin means, thereby drawing said first and second cover members into an edgewise abutting engagement, with said sealing means squeezed therebetween; said eccentric sleeve has a first position wherein upon engagement of said catch means with said latch pin means said sealing means is not squeezed between said first and second cover members and a second position wherein upon engagement of catch means with said latch pin means said first and second cover members are in edgewise abutting engagement with said sealing means squeezed therebetween;
- g. said eccentric sleeve is provided with a pin, projecting outwardly therefrom, and said catch means is provided with first and second stop means, positioned so as to contact said pin and thereby limit rotation of said eccentric sleeve between its first and second position;
- h. said catch means is provided with an inclined surface which, during engagement, contacts said latch pin means, such that the force vector exerted on said catch means by said latch pin means when said members try to separate passes under the axis of rotation of said catch means, thereby tending to rotate said catch means towards said second position.

2. A latching mechanism as defined in claim 1 wherein said operating rod means is provided with lock means to selectively secure said eccentric sleeve in said second position.

3. A latching mechanism as defined in claim 1 wherein said catch means includes a cam portion, which when moved against said latch pin means exerts a force which rotates said catch means about said eccentric sleeve, thereby permitting said catch means to engage said latch pin means.

4. A latching mechanism as defined in claim 3 wherein said latch pin means includes a roller rotatably mounted about an axis substantially parallel to said abutting edge.

5. A latching mechanism as defined in claim 1 wherein said latch pin means is selectively adjustable along a plane substantially perpendicular to a plane passing through said abutting edge.

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