HINGE SUPPORT MECHANISM FOR A FOLDING BENCH

Inventor: John J. Allen, 56901 Grand River Avenue, New Hudson, Mich. 48165

Filed: Jan. 6, 1972

Appl. No.: 215,849

U.S. Cl. 297/94, 297/64, 5/47
Int. Cl. B60n 1/02
Field of Search 297/94, 101, 103, 297/363, 63, 64, 65, 5/47, 48, 37

References Cited

UNITED STATES PATENTS
3,107,363 10/1963 Simmons 5/48 X
2,736,267 2/1956 Spound 5/47 X
2,738,829 3/1956 Rowe 297/103 X
3,313,570 4/1967 McVeigh 297/103
831,877 9/1906 Kling 297/94
2,352,375 6/1944 Fox 5/47

ABSTRACT

A hinge support for a folding bench having seat and back portions arranged to tilt, lay flat in a horizontal bed-forming plane, and reverse directions, with the hinge support formed of two flat arms secured respectively to the ends of the seat and back portions, with the adjacent arm portion ends overlapping, and pivotally connected together and to a link whose opposite end is pivotally connected to a rail located beneath the arms. The end of one arm is formed as a cam rested upon the rail. The end portion of the other arm is pivotally connected to the rail by another link. The arms are releasably locked to each other by a pin slipped through aligned holes formed in their overlapped end portions. The seat portion is normally arranged at an inclined seating angle and the back portion may be arranged upright or tilted backwardly at an angle. The seat and back portion may be moved into reverse positions, facing in an opposite direction, and still supported upon the cam.

7 Claims, 9 Drawing Figures
HINGE SUPPORT MECHANISM FOR A FOLDING BENCH

BACKGROUND OF INVENTION
The invention herein relates to a hinge supporting mechanism for folding benches which may be used for seating or which may be folded flat to form half of a bed. Such type benches are commonly used in mobile homes, trailers, boats and the like wherein a pair of such benches are arranged facing toward each other, with a table between them, with the table being removable and the benches being foldable into horizontal positions so that the pair of benches together make up a full length double bed.

In such type benches as are conventionally used, the seating portions normally must be made horizontal or flat in order to permit the unit to be folded into the flat bed formation. However, since the seating portions are flat, they are generally uncomfortable.

Moreover, although the benches are arranged to face toward each other, it is desirable to permit at least one of them to reverse so that both face forwardly of the vehicle, with the table between them removed for more comfort and utility when they are used as seats in a moving vehicle.

Thus, the invention herein relates to an improvement in hinge mechanisms for such types of benches which will not only perform the foregoing functions but which are extremely simple and inexpensive in construction.

SUMMARY OF INVENTION
The invention herein generally contemplates providing a hinge mechanism for a folding bench of the type which may be folded flat to form a bed half, which mechanism includes a pair of flat hinge arms each secured face to face against an end of the bench seat and back portions. The adjacent ends of the arms are overlapped and one of such ends is formed as a cam rested and supported upon the upper surface of the rail. Each of the arms is connected to a support rail, located beneath them, by a pivoting link with one of the links having an end pivotally connected to both arms. The overlapped portions of the arms are locked together by a suitable releasable locking means such as a slide bolt engaged through aligned holes formed in the arms. Additionally, support posts or pegs may be provided at the opposite ends of the rail to additionally support the edge of the seat portion which is held by the hinge mechanism in a tilted or inclined position relative to the horizontal for greater comfort.

With this arrangement, the back portion of the bench may be arranged upright or in a tilted back angle for lounging. Alternatively, the seat portion may be slid forwardly and into a horizontal position with the back portion laid horizontally so that the upper surfaces of the seat and back portion are coplanar in a horizontal plane for forming a bed. Additionally, by further sliding the portions forwardly, the seat portion may be arranged upright to function as a tilted or upright back and the formerly arranged back portion will now form the seat of the bench, thereby reversing the direction of the bench. At all times, the arm cam supports the members upon the rail.

As can be seen, the hinge mechanism is essentially formed of four flat metal sheets or stampings and the rail which is part of the seat support frame. In actual use it is contemplated that a hinge mechanism will be arranged at each of the opposite ends of the bench.

These and other objects and advantages of this invention will become apparent, upon reading the following description, of which the attached drawings form a part.

DESCRIPTION OF DRAWINGS
FIG. 1 is a perspective view of the folding bench of the invention herein.
FIG. 2 is a perspective view of the hinge mechanism, with the parts disassembled.
FIG. 3 is a side view of the assembled hinge parts so arranged that the seat back portion is upright.
FIG. 4 is a view similar to FIG. 3, but with the seat back portion tilted rearwardly, and with the seat and back portions shown in dotted line.
FIG. 5 is a side view showing the parts arranged horizontally, with the seat and back portions forming the horizontal portion of a bed.
FIG. 6 is a side view showing the hinge mechanism reversed, that is, with the seat portion now functioning as a back and the back portion now functioning as a seat and also showing in dotted line the tilting of the bench back.
FIGS. 7–9 show a modification in various hinge positions.

DETAILED DESCRIPTION
FIG. 1 illustrates a conventional folding bench 10, of the type used in vehicles such as mobile homes, trailers, boats and the like, and formed of a seat portion 11 and a back portion 12, arranged to be used either as a bench or folded flat to form a bed part. In actual use, a second bench, like the one illustrated in FIG. 1, but arranged to open in the reverse direction, is also used and forms the opposite half of the bed. This type of seat construction is conventional, and hence, further description thereof is omitted.

The invention herein relates to the hinge support mechanism for tilting, supporting and holding the bench parts. This mechanism includes a support frame 13 located beneath the seat or bench and either rigidly or movably connected to a support floor. One portion of the frame forms a frame side rail 14.

The hinge mechanism 15 comprises flat, relatively wide, elongated sheet metal or stamped metal arms, with one of the arms 16 secured in some suitable manner to the end of the seat portion and the other arm 17 likewise secured to the end of the back portion. The adjacent ends of the arms are overlapped. A curved link 19 connects the seat portion arm 16 to the rail 14 by means of an opening 20 formed in the upper end of said link and aligned with an opening 21 in arm 16 and 21a in arm 17 through which a pin or rivet or other suitable fastener 22 is inserted. Thus, this pivotally connects the two arms together. The lower end of the link 19 is provided with an opening 24 through which a pin 25 or suitable rivet or fastener is inserted for securing the lower end of the link to the rail 14.

The back portion arm 17 is connected to the rail by a curved link 26 whose upper end is provided with an elongated slot 27 aligned with a short spacer bushing 28 and an opening 29 in the back portion arm through which a pin or rivet or the like 30 is fastened. This provides pivotal as well as endwise movability for the link. A similar pin or rivet 31 extends through an open-
The lower, back or rear end of the arm 16 is curved into a cam formation which generally has a flattened center portion and two bulges as illustrated. The lower end of the arm 17 is also curved at 33, but for purposes of clearance above the rail 14 which otherwise supports the cam formation 32.

The two arms 16 and 17 are releasably locked together in various positions by a suitable locking mechanism as for example, a slide bolt 35 (see FIG. 2) mounted upon a bracket 36 secured to the lower rear part of the back portion 12 in any suitable manner, with the bolt fitting through any pair of aligned openings 37 and 38, respectively formed in the two arms 16 and 17. The spacings of such openings 37 and 38 are such that the back may be tilted relative to the seat and locked in tilted position, as soon as a pair of holes align, by means of the slide bolt 35.

An upright peg or support member 40 is provided at the forward end of the rail 14 and another similar peg or support member 41 is provided at the rear of the rail. The arm 16 has a notch 42 formed in its lower edge for receiving the forward peg 40 in a manner to be described.

**OPERATION**

Referring to the seat back upright position, illustrated in FIGS. 1 and 3, the arm 16 is arranged with its cam portion 32 rested and supported upon the upper surface of the rail 14. The arm 17 is arranged upright and the slide bolt 35 is arranged through a pair of aligned openings 37 and 38 to lock the two arms in this relative position. Thus, the arms are held together by their common pivot pin 22 as well as by the slide bolt. In this position, the seat is tilted upwardly or inclined upwardly at an angle for comfortable seating, as contrasted with the conventional horizontal arrangement of such seat portions. The forward end of the seat portion is further supported by means of the forward end of the arm 16 rested upon the forward peg 40. This protects against breakage due to heavy load or jumping upon the seat by a child or the like.

As shown in FIG. 4, the seat back portion may be tilted rearwardly for lounge purposes, merely by withdrawing the bolt 35 from the aligned holes 37 and 38, tilting the back and then reinserting the bolt. More than one rearwardly tilted position can be provided by providing sufficient holes 37 and 38 in the respective arms.

To fold the bench flat for bed forming purposes, as illustrated in FIG. 5, the seat portion and the seat portion arm 16 are pulled forwardly until the peg 40 enters into the notch 42. Of course, the slide bolt 35 must be released before this. Simultaneously moving the seat portion forwardly, the seat back will swing downwardly and rearwardly until the arm 17 rests upon the upper edge of the rail 14 with the arm located between the two pegs 40 and 41. The lost motion connection or slot 27 in the link 26 permits this movement of the arm 17.

To reverse the direction of the bench, as illustrated in FIG. 6, the seat portion 11 with its arm 16, may be swung upwardly or upright, with the cam 32 still supporting the arm 16 upon the upper surface of the rail 14. Now, the arm 17 is arranged approximately horizontal, with its forward edge rested upon the peg 41 to give it a slight tilt for seating purposes. The slide bolt enters through a pair of aligned holes 37 and 38 to lock the arms in the position shown.

The seat portion 11, now functioning as the back as the back of the bench, may be tilted into the dotted line positions by releasing the slide bolt and re-engaging it into other pairs of aligned holes 37 and 38.

For suitable strength and support, a duplicate hinge mechanism is provided on the opposite end of the bench. However, this is not illustrated since its operation and construction duplicates the foregoing.

It should be noted that the upper link pins 22 and 30 are so arranged that there is an overcenter locking arrangement in each of the positions of the hinge to prevent accidental swinging or movement of the seat relative to the back portion. It can be seen, that the hinge mechanism is simple in construction, comprising only a few parts which may be easily and inexpensively stamped out of flat sheet metal and it requires no maintenance or complicated operation.

**MODIFICATION — FIGS. 7—9**

FIGS. 7—9 illustrate a modification, wherein the links are modified for additional positioning of the hinge arms as well as to move the back forwardly of the rail during tilting of the backs so that the seat can be positioned close to a wall or bulkhead.

The arms 16 and 17 are the same as that described above, except that an additional notch 45 is formed in arm 16 and a similar notch is formed in the arm 17 for positive locking with the pegs 40. Also a notch 46 is formed in the arm 17, similar to notch 42 formed in arm 16 for the same purpose.

Link 26a is modified to include a lower extension portion 50 having an opening 51 through which an end of a coil spring 52 is connected. The opposite end of the spring is connected to a suitable bracket 53 secured to the rail 14.

Also, link 19a is modified by forming it in the shape of a flattened plate so that its pin 25 receiving opening 24 is elongated into a slot. Both links 19a and 26a are provided with bolt receiving holes 55, 56 and 57 respectively for receiving the bolt 35 (illustrated in FIG. 2) when they are aligned therewith.

In operation, the hinge is shown in the back-upright position in FIG. 7, spaced a short distance in front of a wall or bulkhead 58, which is schematically shown. For tilting the back, the seat arm 16 is pulled forwardly into the position shown in FIG. 8 where notch 45 receives peg 40. The seat arm can be further pulled forwardly until notch 42 receives the peg. The movement of the back, i.e., arm 17 is forwardly of the wall 58, so that it is spaced from the wall despite being tilted. Further movement of arm 16 will position the hinge so that the back and seat are horizontally arranged to form a bed.

As illustrated in FIG. 9, the mechanism may be reversed for opening rearwardly, this position being useful when there is no adjacent wall of the type described in connection with FIGS. 7 and 8. When opened rearwardly, the structure may be similarly tilted and laid flat.

Having fully described an operative embodiment of this invention, I now claim:

1. A support hinge mechanism for a folding bench having a roughly horizontally arranged seat forming portion and a roughly vertically arranged back forming portion, comprising:
3,743,350

an elongated base rail arranged beneath and aligned
with one end of the seat and back portions;
a pair of elongated, thin, flat metal hinge arms ar-
anged above and approximately coplanar with
the rail, with one arm secured to the end of the seat
portion and the other secured to the end of the
back portion;
said seat portion arm having its back end portion ar-
ranged in overlapping relationship with the lower
portion of the back portion arm, and having is
lower back edge curved into a cam formation which
is rested and supported upon the upper edge
of said rail in all fixed positions of said seat portion;
each of said arms being connected to the rail by
means of a respective link having one end pivoted
clearly connected to its respective arm and its opposite
end pivotally connected to the rail, with the same
pivot connecting the seat portion arm to its link
also connecting the back portion arm to the seat
portion arm;
and means for releasably locking the overlapped por-
tions of the arms together in predetermined angu-
larly related positions;
whereby upon releasing said locking means, the back
portion may be selectively moved to either an up-
right position or a slightly tilted position relative to
the seat portion for seating in a first direction, or
alternatively, said seat portion arm with the seat
portion may be slid forwardly in said first direction
with the upper surface of the seat portion arranged
in a horizontal plane and the back portion corre-
spendingly pivoted downwardly into a horizontal
position aligned edge to edge with its upper surface
coplanar with the seat portion and with its arm
rested upon the rail, or the forward edge of said
seat portion may be pivoted upwardly from its for-
ward slid position and supported upon its cam
formation in a generally upright position to assume
the function of the seat portion, for thereby revers-
ing the seating direction of the bench;
with said cam portion thus supporting the seat por-
tion arm when the seat portion functions either as
a seat or as a back.

2. A construction as defined in claim 1, and said lock-
ing means being arranged to lock the two arms together
at a relative angle for holding the seat portion and alter-
atively, the back portion when it functions as a seat
portion, in an upward incline from back to front
thereof for comfortable seating position.

3. A construction as defined in claim 2, and including
upright support members formed upon the opposite
ends of the rail for additionally supporting the forward
dge of the portion functioning as the seat portion
above the level of its rear edge, for cooperating with
said locking means in maintaining said seat forming
portion inclined.

4. A construction as defined in claim 3, and said back
portion arm being of a length to fit between the space
between said upright supports when resting upon said
rail, and said seat portion arm having a vertically ar-
ranged notch formed in its lower edge between its op-
posite ends for receiving the forward upright support of
the rail and positioning the seat portion arm, with its
seat portion, horizontally, rather than inclined.

5. A construction as defined in claim 1, and said links
each being curved between their ends, with the pivoted
connection between the upper end of the link con-
ected to the back portion arm having a lost motion
type connection movable in the vertical plane for
swinging and slight endwise movement of the back por-
tion arm relative to the seat portion arm.

6. A construction as defined in claim 1, and said lock-
ing means comprising a number of holes formed
through the back edge portion and the overlapping
lower edge portion of said arms, the holes in each said
arm portions being spaced so that at least one hole in
one portion is horizontally aligned with one hole in
the other portion, and a pin slidably movable into and out
of such aligned holes for releasably locking the arms.

7. A construction as defined in Claim 1, and wherein
the link pivotally connecting the seat portion arm to the
rail is formed with an elongated slot receiving a pin se-
cured to the rail, with the pin being axially normal to
said link and to the plane of the seat portion arm, so
that said link may pivot about its pivotal connection to
both of said arms and both slide and pivot relative to
said pin secured to the rail.

* * * *