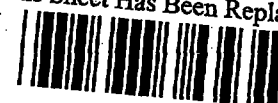


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[TITLE OF THE INVENTION]

SUITCASE

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[FIELD OF THE INVENTION]

5 The present invention relates to a suitcase having casters assembled thereon.

[BACKGROUND OF THE INVENTION]

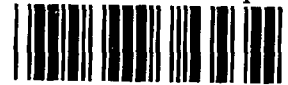
10 Recently increasing people travel by air over long distances, and large suitcases are used in ever increasing occasions.

In order that the travelers can carry large and heavy suitcases by themselves with less labor, casters have been attached onto the bottom of the suitcase.

15 When carrying a suitcase by using the casters, generally a handle of the suitcase is pulled or the suitcase is pushed from behind with the flat surfaces of the suitcase being directed in the traveling direction (this mode of travel shall be called longitudinal travel hereinafter).

20 The casters are attached in such an arrangement, similarly to the four wheels of an automobile, that a pair of casters attached at the rear side in the traveling direction have wheel bearings fixed on the bottom of the suitcase to stabilize the travel thereby preventing the wheels from swiveling to the right
25 or left, and a pair of casters attached at the front side in the

REPLACED SHEETS	SG
☒ Description : paged ...1... to paged ...12...	
☒ Claim(s) : paged ...11... to paged ...13...	
☒ Drawing(s) : paged ...47... to paged ...77...	
☒ Abstract : paged ...48... to paged ...78...	
[RECEIPT]	



traveling direction have wheel bearings which can rotate over 360 degrees to the right and left around vertical rotary shafts thereof, thereby making it easy to change the moving direction of the suitcase. Also because positions of the axles of the front
5 casters are offset from the vertical rotary shafts of the bearings, changing the moving direction of the suitcase causes the casters to be spontaneously oriented in the same direction.

When carrying a suitcase by using the casters, depending on the situation, it is easier to move it with the flat surface
10 directed perpendicular to the moving direction (this mode of travel shall be called lateral travel hereinafter) than the longitudinal travel. In the lateral travel, because the distance between the right and left wheels is greatly increased, capability to move straight is significantly improved while the
15 suitcase is less liable to tumble when moving over uneven surface or cornering, thus making it possible to carry the suitcase far more easily.

To make it possible to move the suitcase both in lateral and longitudinal directions to suit the situation of the place
20 to move, it is necessary to make all the four casters, which are attached on the four corners of the bottom surface of the suitcase, rotatable.

In case all the four casters are made rotatable, however, the function of the rear casters to keep straight movement is
25 lost when the suitcase is carried in longitudinal travel in order



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to pass through crowded people or other reason, resulting in extremely poor stability of the suitcase movement.

In the case of the conventional suitcase having the rear casters fixed, the rear wheels cannot be oriented in the direction perpendicular to the flat surface of the suitcase, making it impossible to move the suitcase in the far easier lateral travel.

(OBJECT AND SUMMARY OF THE INVENTION)

The object of the invention is to provide a suitcase which can be moved in either longitudinal travel or lateral travel as required, and has good stability of movement during longitudinal travel.

The suitcase according to the invention has a caster, of which axle position is offset from a vertical rotary shaft of a bearing, being provided on each of the four corners of a side face which becomes the bottom surface during travel, wherein a pair of front casters, which are located on both sides of the front edge when moving in a direction parallel to the flat surface of the suitcase, have wheel bearings assembled freely rotatably around the vertical rotary shaft, while a pair of rear casters, which are located on both sides of the rear side, are installed in such an arrangement as the right and left axles oppose each other and wheel bearings are assembled to be capable of swinging over a specified range of angles around the vertical rotary shafts thereof, so that the suitcase can be moved either in longitudinal



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travel or lateral travel and has good stability of movement during longitudinal travel.

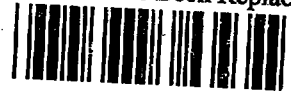
The range of specified angles is preferably about 180 degrees.

5 A caster base of the rear casters is provided with a guide groove of substantially semi circular shape, while a projected portion of the bearing is fitted therein so that the swing range of the bearing can be regulated by the groove walls to about 180 degrees.

10 Swing regulating means which regulates the swing range of the bearing to about 180 degrees may also be installed on the caster base of the rear casters.

According to the invention, moving direction of the suitcase can be freely changed by means of the pair of front
15 casters which are located on the front side in the moving direction and can freely rotate over 160 degrees, when moving in the direction parallel to the flat surface of the suitcase. And a pair of rear casters, which swing only within a range of about 180 degrees so that the axes of the casters are directed
20 inwardly, work similarly to the rear wheels of an automobile to keep the moving direction straight, and therefore good traveling stability is ensured.

The rear casters are not fixed, unlike the prior art, and the wheels thereof can be directed to a direction perpendicular
25 to the flat surface of the suitcase, and therefore the suitcase



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can be easily moved also in this direction.

[BRIEF DESCRIPTION OF THE DRAWINGS]

Figure 1 is a perspective view of one embodiment of the
5 invention.

Figure 2 is a bottom view of one embodiment of the
invention.

Figure 3 is a bottom view of rear casters of one embodiment
of the invention.

10 Figure 4 is a longitudinal sectional view of rear casters
of, one embodiment of the invention.

Figure 5 is a side view showing a state of a suitcase
according to one embodiment of the invention being tilted forward
to move in the direction parallel to the flat surface.

15 Figure 6 is a side view showing a state of a suitcase
according to one embodiment of the invention being capable of
moving in the direction perpendicular to the flat surface.

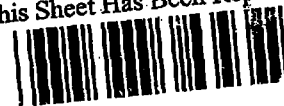
Figure 7 is a bottom view of rear casters of another
embodiment of the invention.

20

[DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS]

The invention will now be described below in the cases of
preferred embodiments thereof with reference to the accompanying
drawings.

25 The suitcase of the invention has a basic construction



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similar to an ordinary suitcase, as shown in FIG. 1. The main body 1 comprises a body portion 11 and a lid portion 12, each provided with a reinforcement frame 2 attached on the periphery of the opening thereof. The body portion 11 and the lid portion 12 are
5 Linked to each other via hinges 3. The hinges 3 also serve as a fastener of the suitcase. The reinforcement frame 2 has a clamp 4, which keeps the lid portion 12 onto the body portion 11, and handles 5, 6.

The main body 1 has, on the bottom thereof, two front
10 casters 7A located at the right and left on the front side when moving in X direction shown in the drawing, and two rear casters 7B located at the right and left on the rear side.

The front casters 7A are freely rotatable over 360 degrees similarly to those used in conventional suitcases, while
15 positions of the axles are offset from the vertical rotary shafts of the bearings so that, when the moving direction of the suitcase is changed, the direction of the casters is spontaneously changed accordingly.

The rear casters 7B have bearings 73 which can swing within
20 a range of about 180 degrees around a vertical rotary shaft 72 installed on a caster base 71, wherein a wheel 75 is fitted in an axle 74 of the bearing 73. The bearing 73 has a projecting portion 731 in the direction of the axle 74.

The caster base 71 is made of a hard synthetic resin with
25 the top surface thereof being formed in such a configuration that



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conforms with the curves of four corners of the bottom surface of the main body 1 of the suitcase 1, and is attached to the main body 1 of the suitcase by means of bolts 79. A guide groove 76 of substantially semi-circle shape is provided on the bottom surface. And provided at the center of the semi-circle shape is a shaft hole for the vertical rotary shaft 72 to penetrate therethrough.

Provided at the bottom end of the vertical rotary shaft 72 is a retainer head 721, while a ball bearing 77 is assembled in the intermediate portion for the bearing 73 and the top end is fixed on the caster base by means of the nut 78.

The projecting portion 731 of the bearing 73 fits in the guide groove 76. When the bearing 73 rotates, the projecting portion 731 moves in the guide groove 76. Range of swinging angle is limited to about 180 degrees by groove walls 761 of the guide groove 76.

The front casters 7A can be made freely rotatable over 360 degrees in case the bearing 73 without projecting portion is used, while the same parts as those of the rear casters 7B can be used for the rest, making it possible to reduce the manufacturing cost. Even when the projecting portion 731 is provided on the bearing 73 of the rear casters 7B, range of swinging angle can be limited to about 180 degrees by swing regulating means 711 of the caster base 71 on side face of the bearing 73 as shown in FIG.7.

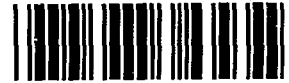
Actual operation of the suitcase will be described below.



Bottom view of the suitcase of the invention is shown in FIG. 2. The two front casters 7A located at the right and left on the front side when moving in the direction indicated by arrow X in the drawing can rotate over 160 degrees similarly to those used in the conventional suitcases. On the other hand, the two rear casters 7B located at the right and left on the rear side oppose each other and swing within a range of about 180 degrees inwardly.

When carrying the suitcase by using the casters, in case the suitcase is pushed or pulled on the handles 5, 6 or the main body to move it in X direction of the drawing, the front and rear wheels spontaneously change their directions thereby to be directed parallel to the X direction. In case the pushing or pulling direction fluctuates while carrying or the suitcase passes over uneven floor causing the wheels 75 of the casters to deviate from the X direction, the wheels 75 of the front casters 7A deviate but the two wheels 75 of the rear casters 7B oppose each other and swing only within about 180 degrees inwardly, therefore at least one of the wheels 75 is prevented from deviating by the groove wall 761 of the guide groove 76 which regulates the projecting portion 731 of the bearing 73, so that the suitcase is maintained parallel to the X direction.

Thus an effect of suppressing fluctuation of the moving direction is exerted so that the suitcase of the invention has good stability of travel, similarly to the conventional suitcases where the front casters are made freely rotatable and the rear



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casters are fixed.

When the suitcase is tilted forward (backward) with only the front (rear) casters 7A (7B) on the floor as shown in FIG.5, total resistance exerted on the wheels 75 are greatly reduced, and therefore the suitcase can be carried easily even on a thick-piled carpet. Also the tendency to fluctuate during cornering is reduced due to the smaller traveling resistance.

When the suitcase is moved in a direction indicated by arrow Y in FIG.1, the user can pull it on the handle 5 by tilting the suitcase so that either only the right or left ones of the front casters 7A and the rear casters 7B are on the floor as shown in FIG.6. While the conventional suitcase with fixed rear casters cannot be moved in this direction, the suitcase of the invention can be moved also in Y direction because the rear casters can swing within a range of about 180 degrees.

When moving on two wheels as described above, because total traveling resistance acting on the wheels 15 is less than that of the time when all four wheels are on the floor, the suitcase can be easily carried and the direction can be changed easily even on a thick piled carpet. Also because the distance between the right and left wheels is greater enough compared to that of during longitudinal travel in forward (backward) tilted attitude on two wheels, such a phenomenon does not occur as the suitcase tumbles as in the case of longitudinal travel, when moving on an uneven floor while changing the direction.

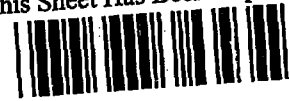


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According to the invention, as described above for the preferred embodiments, such a suitcase can be provided that is capable of moving both in the direction parallel to the flat surface and in the direction perpendicular to the flat surface, and has good straight traveling characteristic and good traveling stability when moving in the direction parallel to the flat surface.



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[CLAIMS]

[Claim 1]

A suitcase provided with a caster of which axle position is offset from vertical rotary shaft of a bearing, being provided
5 on each of the four corners of a side face which becomes the bottom surface during travel; wherein a pair of front casters located at the right and left on the front side when traveling in the direction parallel to the flat surface of the suitcase are made in such a configuration as bearings of the wheels thereof are
10 assembled freely rotatably around the vertical rotary shaft, and a pair of rear casters located at the right and left on the rear side are made in such a configuration as axles of the casters move in a direction to oppose each other and bearings of the axles thereof are assembled to swing only within a specified range of
15 angle around the vertical rotary shaft.

[Claim 2]

The suitcase of claim 1 wherein the specified range of angle is about 180 degrees.

[Claim 3]

20 The suitcase of claim 2 wherein a substantially semi circular guide groove is provided on the caster base of the rear casters, while a projecting portion of the bearing fits in the guide groove so that the range of swing of the bearing is limited to about 180 degrees by the groove walls.

25 [Claim 4]



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The suitcase of claim 2 wherein a swing regulating means for regulating the range of swing of the bearing to about 180 degrees is provided on the caster base of the rear casters.