Aug. 23, 1960 W. J. WEINBERG 2,949,992

ANTI-FRICTION BALL TRANSFER

Filed Feb. 7, 1955

2 Sheets-Sheet 1

Fig. 1.

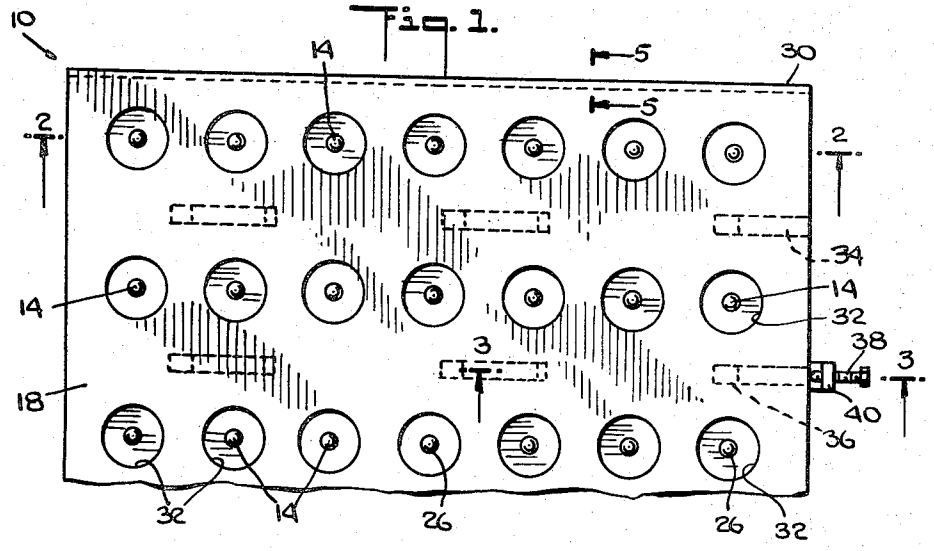


Fig. 2.

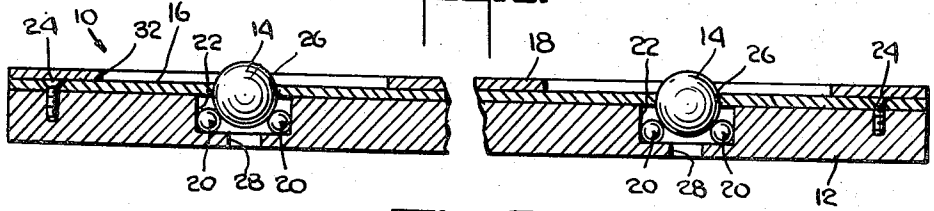


Fig. 3.

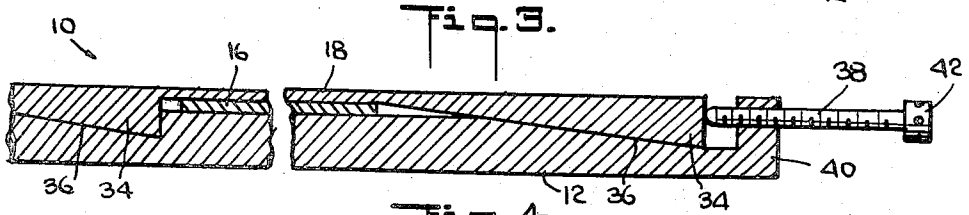


Fig. 4.

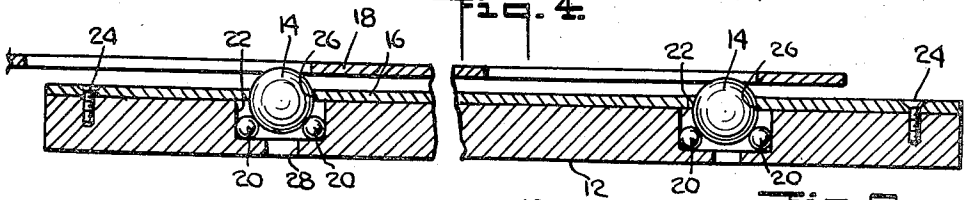


Fig. 5.

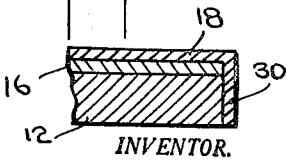


Fig. 6.

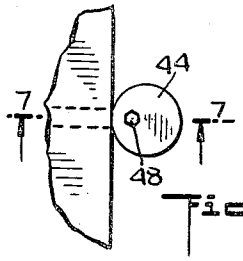
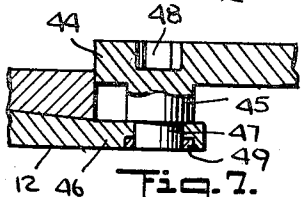


Fig. 7.



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Fig. 8.

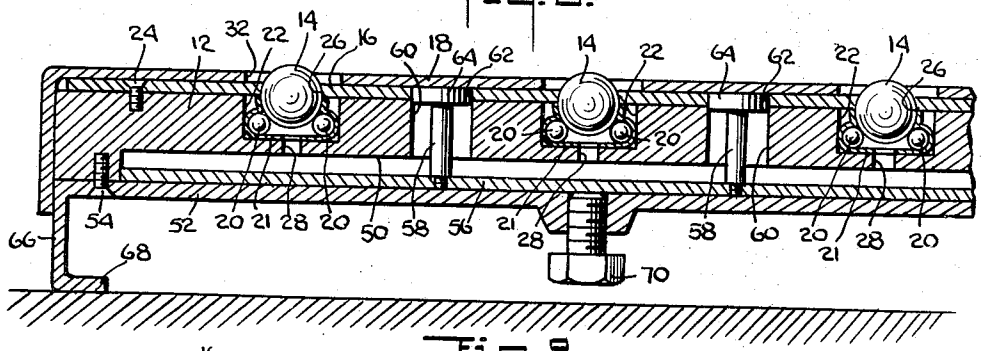


Fig. 9.

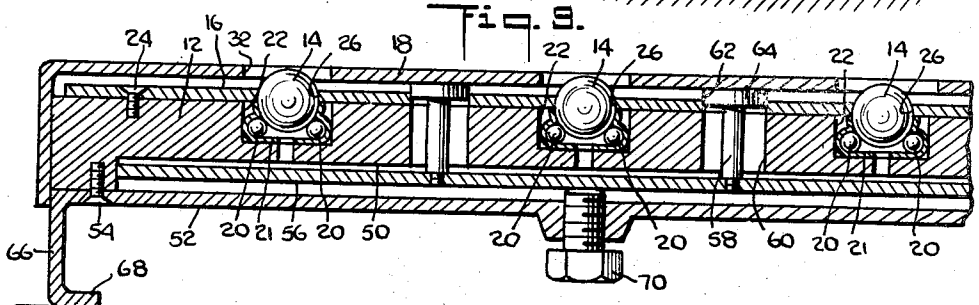


Fig. 10.

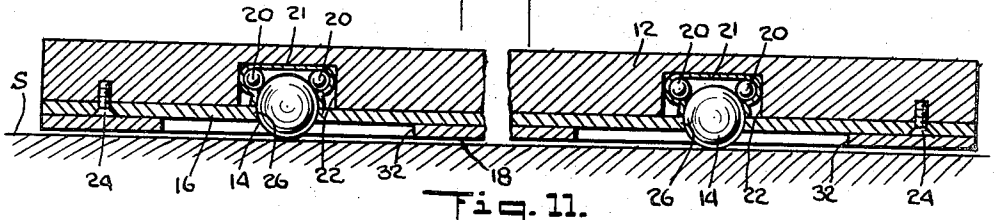
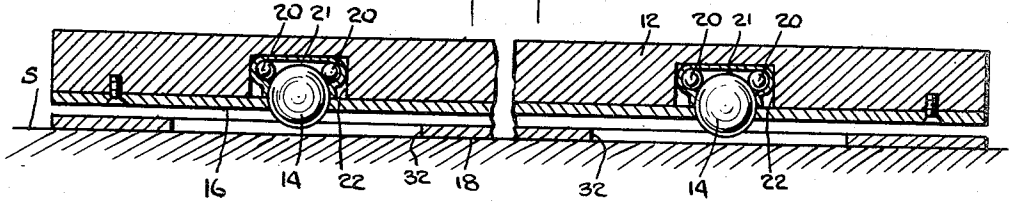


Fig. 11.



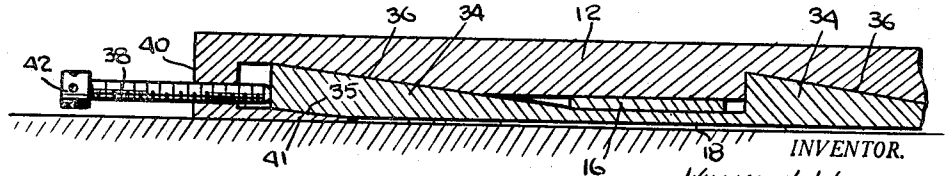


Fig. 12.

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ANTI-FRICTION BALL TRANSFER

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2 Claims. (Cl. 193—35)

This invention relates to pallets or platforms for moving heavy or bulky objects in trucks, airplanes, warehouses, etc., and is directed particularly to a platform having a normally substantially frictionless rolling surface convertible at will to a flat, non-rolling surface.

The principal object of my invention is to provide a platform of the above nature for use in close quarters that has a bed of ball bearings over which the object being moved can be rolled, and which has means for rendering the ball bearings ineffective so that a flat, anti-skid surface is presented to prevent further movement of the object.

Another object of my invention is to provide a platform of the character described which comprises a flat loading surface from which a plurality of rotatable steel balls protrude to present a rolling surface, and an auxiliary loading surface above the first-mentioned loading surface and normally below the upper surface of the steel balls but adapted to be moved upwardly selectively to render the rolling action of the steel balls ineffective and present instead an anti-rolling, flat, frictional surface.

Another object is to provide a platform of the above nature including means for inhibiting the accumulation of dirt in the steel ball retaining sockets.

Another object is to provide a platform of the above nature including simple manually operable mechanism for converting the platform from rolling surface to friction surface and vice versa.

Another object is to provide a platform of the above nature that can be used in upside-down position as a pallet wherein the steel balls or bearings will rotate against the floor or deck and the load rests against the upper flat surface.

Still further objects and advantages of the present invention will appear from the more detailed description set forth below, it being understood that this description is given by way of explanation only, and that various changes therein may be made by those skilled in the art without departing from the scope and spirit of the appended claims.

In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

Fig. 1 is a partial top view of an improved platform embodying the invention;

Fig. 2 is a vertical cross-sectional view, with a central portion broken away, of the platform shown in Fig. 1 taken along the line 2—2 thereof;

Fig. 3 is a vertical sectional view taken along the line 3—3 of Fig. 1, illustrating the mechanism for converting from one bed surface to another;

Fig. 4 is a vertical cross-sectional view, with sections broken away illustrating the platform shown in Fig. 1, in the condition presenting a flat, non-rolling friction surface.

Fig. 5 is a vertical cross-sectional view taken along the line 5—5 of Fig. 1, and illustrating a constructional detail of the improved platform;

Figs. 6 and 7 illustrate, in top and vertical section views respectively, an alternative mechanism for converting the platform from one surface to another;

Figs. 8 and 9 illustrate, in vertical cross-section showing the platform in each of its converted positions respectively, another mechanism for converting from one surface to another;

Figs. 10 and 11 show, in vertical cross-section how the platform illustrated in Figs. 1 through 4 can be used in upside-down position for rolling a load against a floor or deck; and

Fig. 12 shows, in cross-section, the mechanism illustrated in Fig. 3 in slightly modified form for using the platform in upside-down position.

Referring now to the drawings, the numeral 10 designates generally the improved platform embodying the invention, the same comprising a flat rectangular supporting base 12, a plurality of steel balls 14 rotatably seated in said supporting base at regularly spaced positions, a retaining plate 16 fixed to the supporting base 12 and adapted to hold the steel balls 14 in place, and an auxiliary supporting plate 18 parallel to the retaining plate 16 and adapted to be moved from a lower position below the top surfaces of the steel balls to an upper position above the top surfaces thereof to convert from a rolling non-frictional surface of the platform to a frictional or gripping surface.

The steel balls 14 each seated upon a plurality of ball bearings 20 circularly arranged about the bottom of respective cylindrical recesses 22 in the base 12. The retaining plate 16, fixed against the base 12 as by machine screws 24, has a plurality of circular openings 26 fitting closely over the upper ends of the steel balls 14 to hold them in place for rotational action and prevent, as far as possible, the entrance of dirt into the cylindrical recesses 22. Each of the cylindrical recesses 22 is further provided with central bottom openings 28 of reduced diameter serving to allow any dirt or foreign material entering through the top of the retaining plate 16 around the top of the steel balls 14 to fall through the bottom of the supporting base 12.

The auxiliary supporting plate 18 is provided with side skirt portions 30 (Figs. 1, 5) slidable against the side surfaces of the supporting base 12 and adapted to constrain sideward motion of said supporting plate to longitudinal movement with respect to the said supporting plate. The auxiliary supporting plate 18 is also provided with a plurality of openings 32 allowing the upper ends of the revolvable steel balls 14 to protrude above the top surface of said supporting plate when in its lowermost position as illustrated in Figs. 2 and 3. It is in this position of the auxiliary supporting plate 18 that the platform 10 presents a non-frictional rolling surface for easy movement of the object being loaded.

The means for raising the auxiliary supporting plate 18 so that its upper flat surface is above the upper ends of the steel balls 14 comprises a plurality of elongated aligned wedge portions 34 intermediate the rows of said steel balls 14 and integral with the underside of said supporting plate. The wedge portions 34 extend parallel with the side skirt portions 30 of the auxiliary plate 18 and in their lowermost position are seated respectively in individual ones of a plurality of complementary wedge-shaped recesses 36 in the top of the supporting base 12. It will thus be apparent that as the auxiliary supporting plate 18 is moved to the left with respect to the supporting base 12 (see Figs. 1 and 3), said auxiliary plate will be moved upwardly due to interaction between the inclined surfaces of respective pairs of the wedge portions 34 and the wedge-shaped recesses 36.

Manually operable means is provided to move the

auxiliary supporting plate 18 sidewards as described above, the same comprising a screw 38 horizontally threaded in a bracket 40 forming part of the supporting base 12 (see Figs. 1, 3). The screw 38 has its inner end abutting the end of the auxiliary supporting plate 18 and aligned with the end of one of the wedge portions 34. The head 42 of screw 38 is cross-bored to allow insertion of a rod for ease in turning the screw to raise the auxiliary supporting plate 18. Fig. 4 shows the auxiliary supporting plate 18 in raised position, wherein its upper surface is above the upper surface of the steel balls 14 to present a frictional, non-rolling surface to the object being handled. The platform can thus readily be converted from rolling surface to frictional holding surface even while the object is in place on the platform.

Figs. 6 and 7 illustrate an alternative mechanism for raising the auxiliary supporting plate, which comprises a horizontally mounted cam member 44 having its cam surface bearing against the end of said auxiliary supporting plate and adapted to move it sidewardly when turned. To this end the cam member 44 has a shaft 45 with an end portion 47 of reduced diameter journalled in an extension member 46 secured to the supporting base 12 and held therein in any suitable manner by means of a collar 49, for example. The cam member 44 is provided with an axial hexagonal recess 48 in its top surface for insertion of a tool facilitating turning of the said cam to raise the auxiliary supporting plate 18.

Figs. 8 and 9 illustrate still another mechanism for raising the auxiliary supporting plate. In the embodiment of the invention illustrated in Figs. 8 and 9, the supporting base 12 is recessed at its underside as indicated by the numeral 50 to provide a rectangular space, which space is enclosed by a bottom plate 52 secured against the edges of said base by a plurality of screws 54. A vertically movable control plate 56 is located within the rectangular space thus provided, said plate having fixed to its upper surface a plurality of push rods 58 extending through openings 60 and 62 in the supporting base 12 and the retaining plate 16, respectively, and terminating in head portions 64 bearing against the underside of supporting plate 18. The bottom plate 52 has a peripheral skirt portion 66 upon the lower inwardly-turned edge portion 68 of which the whole platform rests. The bottom plate 52 is further provided with a plurality of upwardly-extending screws 70 by means of which the control plate 56 can be raised to move the auxiliary supporting plate from the lower position below the surfaces of the steel balls 14 as illustrated in Fig. 8 to an upper position above the surfaces thereof as illustrated in Fig. 9 to convert from a rolling non-frictional surface of the platform to a frictional or gripping surface. Instead of using screws 70 for lifting the control plate 56, one or more hydraulic jacks could alternatively be used.

Figs. 10 and 11 illustrate how the platform can be used in upside-down position as a pallet. In using the platform this way, the steel balls or bearings 14 rotate against the surface S of the floor or deck and the load rests upon the upper flat surface of the base 12. In Figs. 8, 9, 10 and 11 the ball bearings 20 are shown as being retained in a race 21.

Fig. 12 shows a mechanism that can be used for converting the upside-down platform of Figs. 10 and 11 from one surface to another. The mechanism is similar to that illustrated in Fig. 3, differing only in that the bracket 40 forming part of the supporting base 12 has an inwardly extending retaining lip portion 41, inclined at its upper surface to allow sliding thereagainst of a correspondingly inclined lower surface 35 of the wedge portion 34. By this mechanism, the pallet can be converted from one position to another by actuation of the screw 48.

It is to be understood that the size of the steel balls 14 can be varied according to the use required of the devices herein disclosed: for heavy work comparatively large steel balls are preferred, whereas smaller steel balls would be satisfactory for lighter work.

Although but five embodiments of the invention have been shown and described it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. A platform for handling bulky objects comprising a base plate, a plurality of circular recesses arranged in rows in the top of said base plate, a plurality of steel balls, one in each of said recesses and protruding from said base plate, a retaining plate fixed to said base plate and having a plurality of circular openings, one surrounding each of said steel balls, an auxiliary plate disposed above said retaining plate and parallel with said base plate, and means to move said auxiliary plate from a position below the upper surface portions of said steel balls to a position above said surface portions to render their rolling action ineffective, said means comprising a plurality of wedge-shaped protrusions at the underside of said auxiliary plate having surfaces inclined with respect to the plane of said auxiliary plate, a plurality of wedge-shaped recesses in said base plate having inclined surfaces with respect to the plane of said base plate and complementary with respect to the respective ones of the inclined surfaces of said wedge-shaped protrusions, and mechanism for urging said auxiliary plate horizontally with respect to said base plate in the direction of said inclined surfaces.

2. The invention as defined in claim 1, wherein said auxiliary plate urging mechanism comprises a bracket fixed with respect to said base plate and a turn-screw threaded in said bracket, said turn-screw having one end abutting an edge of said auxiliary plate and the other end provided with cross-bores adapted to receive a turning lever.

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