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ANTI-SIDE-SLIP MEANS
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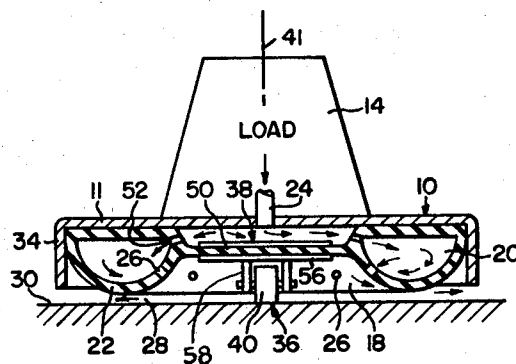
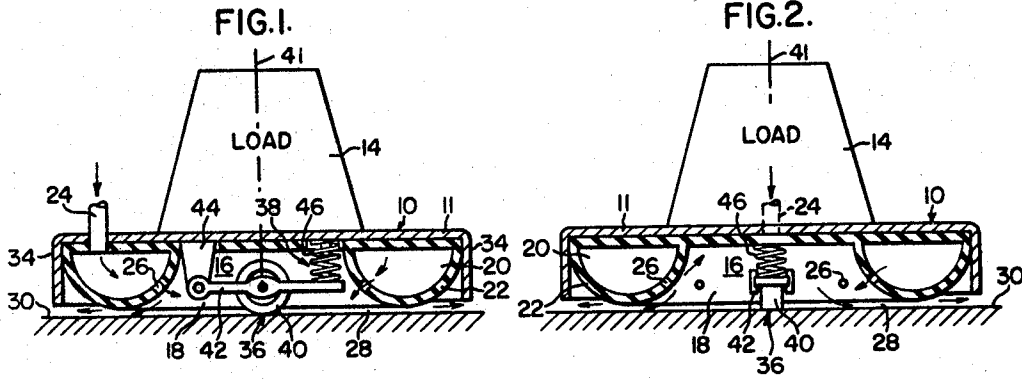


FIG. 3

WITNESSES

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AIR CUSHION LOAD TRANSLATING DEVICE INCLUDING ANTI-SIDE-SLIP MEANS

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ABSTRACT OF THE DISCLOSURE

A pneumatic air cushion load translating device having a single guide wheel vertically aligned with the center of gravity of the device for anti-slide-slip cooperation with the surface over which such device travels.

Other objects, features and advantages of the invention will become apparent from the following detailed description of illustrative embodiments thereof, when taken in connection with the accompanying drawing in which:

FIGURE 1 is a side elevation view, partly in outline and partly in section, of an illustrative embodiment of the invention;

FIG. 2 is a front elevation view, partly in outline and partly in section, of the embodiment shown in FIG. 1; and

FIG. 3 is a front elevation view, partly in outline and partly in section, showing an alternate embodiment of the invention.

Referring to the several figures in the drawing, the usual air-cushion load-translating device 10, or ground effect pad, comprises the usual load support member 11, which often takes the form of a flat plate or platform which is often circular, on which a load 14 is carried, together with air-cushion-providing means 16 to establish a floating-type pneumatic support for the platform 11 and its load 14. Such air-cushion-providing means 16 can take the form, for example, as exemplified in the several figures of the drawing, wherein an air support chamber 18 is formed at the center of an annular pressurized air manifold 20 formed in a diaphragm 22 of resilient material which distributes pressurized air admitted through an inlet port 24 into such air support chamber 18 by way of a plurality of ports 26 opening radially inward from such manifold chamber at circumferentially-spaced-apart locations therearound. The diaphragm 22 is attached to the bottom of the load support member 11, and upon introduction of pressurized air into the manifold chamber 20, the walls thereof will inflate to cause the ejection of pressurized air into the support chamber 18. The effective area of the diaphragm 22 and the pressure of the air in chamber 18 is such that the platform 11, or load support member, is caused to float under the influence of such pressure such that the diaphragm has a clearance 28 of a fraction of an inch above the surface 30 along which the device is to move. During such levitation of the device, air admitted to the support chamber 18 will escape by way of the clearance 28 between the wall of the air supply manifold 20 and the floor or ground surface 30, which air is continuously made up by air admitted via the inlet port 24 to such air manifold. Such support is frictionless, as is desirable, but normally affords freedom of movement for the translating device 10 in all horizontal directions, and this introduces an element of difficulty in steering and positioning such device in view of susceptibility to side-slip, particularly where the surface 30 is sloped somewhat.

Upon termination of supply of pressurized air to the

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air manifold 20 and opening of such manifold to the atmosphere by means (not shown), such as shutting down a motor-operated blower, the load support member 11, including its load, lowers onto the floor, bringing the inflatable diaphragm into contact therewith and collapsing the walls of the manifold 20 under influence of the load 14 and the weight of the load support member 11 to the extent of lowering permitted such support member. In FIGS. 1 and 5 the extent of such lowering is defined by downwardly extending repose-support means 34 which, in the case where the load support member is circular in plan, such repose-support means 34 may take the form of an annular skirt extending downwardly around the circumference thereof. In other cases the repose position of the load support member can be defined in any one of numerous other ways.

In accord with the prime feature of the present invention, the air-cushion load-translating device 10 is provided with guide wheel means 36 urged by yieldable wheel biasing means 38 into rolling engagement with the surface 30 along which the device 10 is to be translated. Such wheel means 36 is so arranged as to afford guidability of the device and sufficiently biased by the yieldable wheel biasing means to provide a sufficient degree of frictional resistance to sidewise sliding movement as to offset the tendency for lateral movement of the device. The guide wheel means 36 so urged against the floor or ground surface 30 tends to give some support to the load support member 11, however, it is intended that primary support of the load 14 and the support member 11 be afforded by the air-cushion-providing means 16, and accordingly the yieldable wheel biasing means urging the guide wheel means 36 into engagement with the floor surface 30 affords only sufficient force to satisfactorily obtain resistance to lateral movement of the device without contributing significantly to support of the load 14.

In the FIG. 1 and FIG. 3 embodiments, the guide wheel and anti-side-slip means 36 takes the form of a single wheel 40 disposed beneath the support member within the air support chamber 18 and in contact with the ground or floor surface 30 in alignment with the vertical axis 41 passing through the center of gravity of the device including the load 14. In FIG. 1 the wheel 40 is rotatable on an axle carried by a yoke arm 42 pivotally supported at one end of a vertical post 44 attached to and extending downwardly from the bottom of the load support member 11. Such axle-carrying yoke member is biased downwardly by a helical compression spring 46 interposed between the opposite end of such yoke member 42 and the bottom of the support member to urge such a yoke member downwardly about its pivot point at the post 44, thereby acting as a yieldable wheel biasing means urging the wheel into rolling and lateral-wise frictional engagement with the floor surface 30. The yoke member 42 has freedom for pivotal movement in a vertical plane about its pivotal connection with the post 44, but is not free to move in a horizontal direction. Accordingly, a force exerted on the load during levitation of the device by pressurization of the air support chamber 18 in the direction along which the wheel is free to roll affords no opposition to such movement. Sidewise effort directed to the device 10 tending to move same along the axis of the wheel 40, however, is opposed by the frictional engagement of such wheels with respect to its being slid sidewise over such surface. Turning movement of the device 10, however, meets with very little opposition, inasmuch as the device 10 is free to swivel about the point of contact of the wheel 40 with the floor surface 30 which can be at the center of the device. The force of the spring 46 can be made adjustable, such as by providing springs of different

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pick-up value to suit the weight conditions of the load affiliated with the device.

In the embodiment shown in FIG. 3, the yieldable wheel biasing means 38 takes the form of an air spring and comprises a central portion 50 of the diaphragm 22 which is subject to pressurized air from inlet port 24 prior to transferral to the air manifold 20 via pressure-reducing orifice means 52. Such portion 50 creates a downward force which is transferred to the wheel 40 via a diaphragm follower means 56 and attached wheel-and-axle-carrying arms 58.

Having now described the invention, I claim:

1. A pneumatic ground effect load translating device for substantially friction free movement along a surface thereunder, comprising a load-supporting member, air-cushion-providing means adapted to receive a flow of air at superatmospheric pressure and cooperable with such surface to derive a pneumatic levitating support for the member and its load, a single guide wheel, means mounting said guide wheel on said device for rotation about a horizontal axis and cooperation with the aforesaid surface in vertical alignment with the center of gravity of the device so as to afford readily guidable non-side-slip movement characteristics to the device, and yieldable bias means between said mounting means and said load-supporting member and reactive therebetween to yieldably urge said guide wheel into rollable anti-side-slip frictional engagement with said surface.

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2. The ground effect load translating device of claim 1, wherein said air-cushion-providing means comprises a resilient annular air manifold encircling a central air support chamber into which such manifold empties, and said guide wheel is disposed at the center of said central air support chamber.

3. The ground effect load translating device of claim 1, wherein said yieldable bias means is in the form of an air spring availed of air at superatmospheric pressure conjointly with supply thereof to said air-cushion-providing means.

4. The device of claim 3, wherein said air spring is availed of such pressurized air while enroute to said air support chamber, and pressure-drop-providing means are interposed in such air flow route.

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