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[21] Appl. No. **718,765**
[22] Filed **Apr. 4, 1968**
[45] Patented **June 22, 1971**
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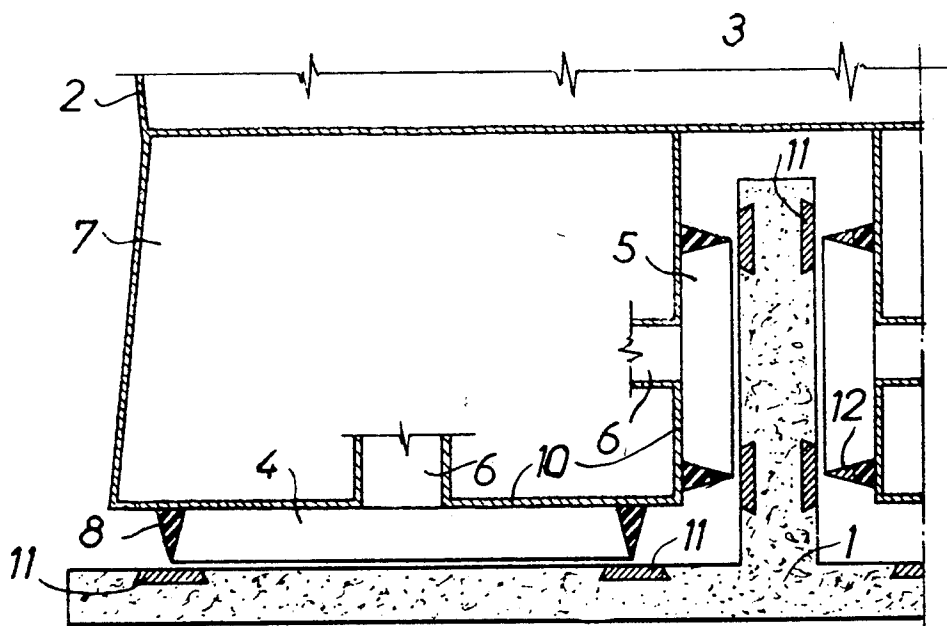
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[54] **TRANSPORT SYSTEM COMPRISING A TRACK
AND A BODY MOVABLE THEREALONG**
2 Claims, 7 Drawing Figs.

[52] U.S. Cl..... **104/23 FS,**
104/120, 105/145
[51] Int. Cl..... **B60v 3/04**
[50] Field of Search..... 104/23,
120, 138, 134, 23 FS; 180/7

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ABSTRACT: An arrangement for reducing leaks in machine, chiefly ground effect machines such as vehicles running over or under a fluid cushion, this being obtained by providing a friction reduced to a minimum between the free edges of the walls which peripherally confine the fluid cushion and the cooperating vertical or horizontal track surfaces, as provided by laying a strip of friction-reducing material within or along the track surface in registry with the paths of said free edges. Said material may be constituted by hard steel, bronze, polytetrafluorethylene among others.



SHEET 1 OF 3

Fig. 1

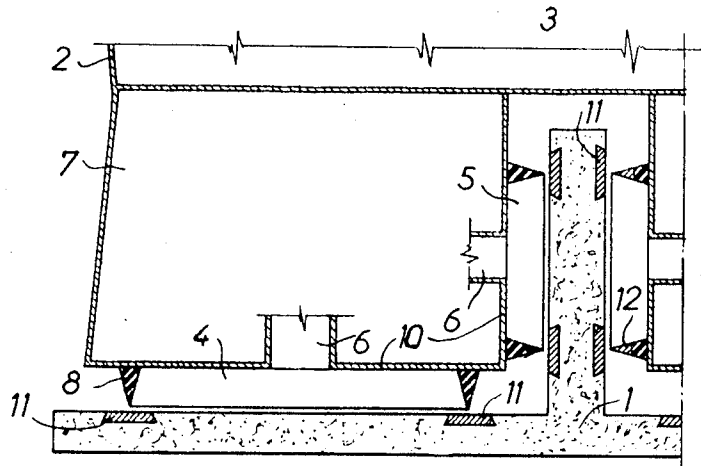


Fig. 2

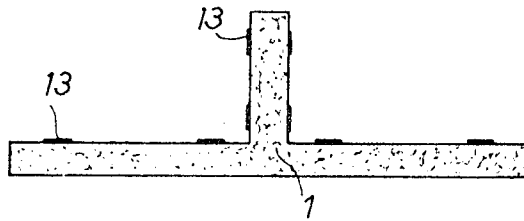
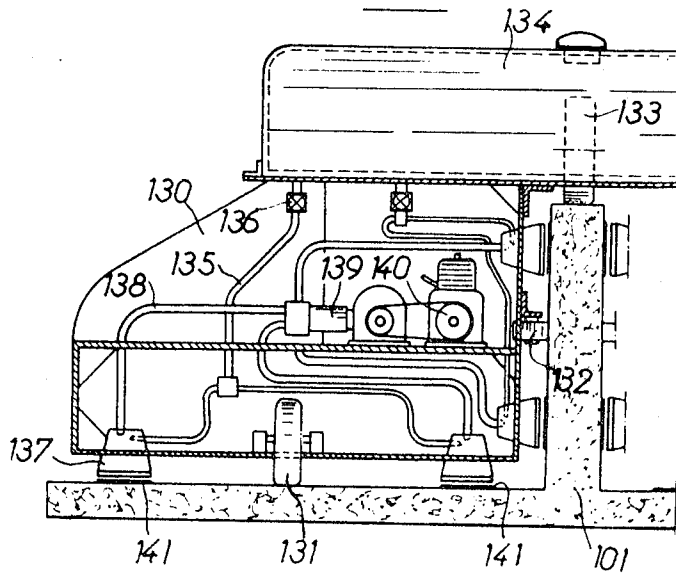


Fig. 3



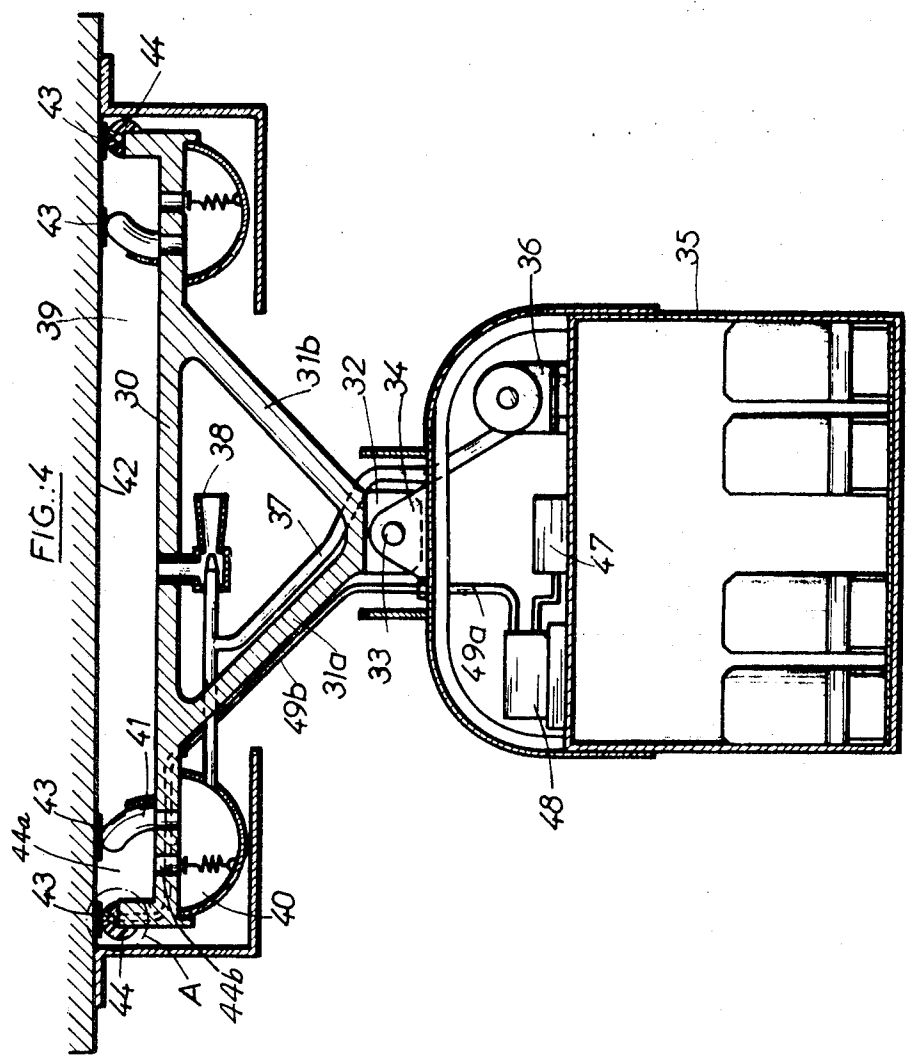
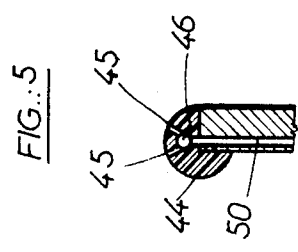


FIG. 6

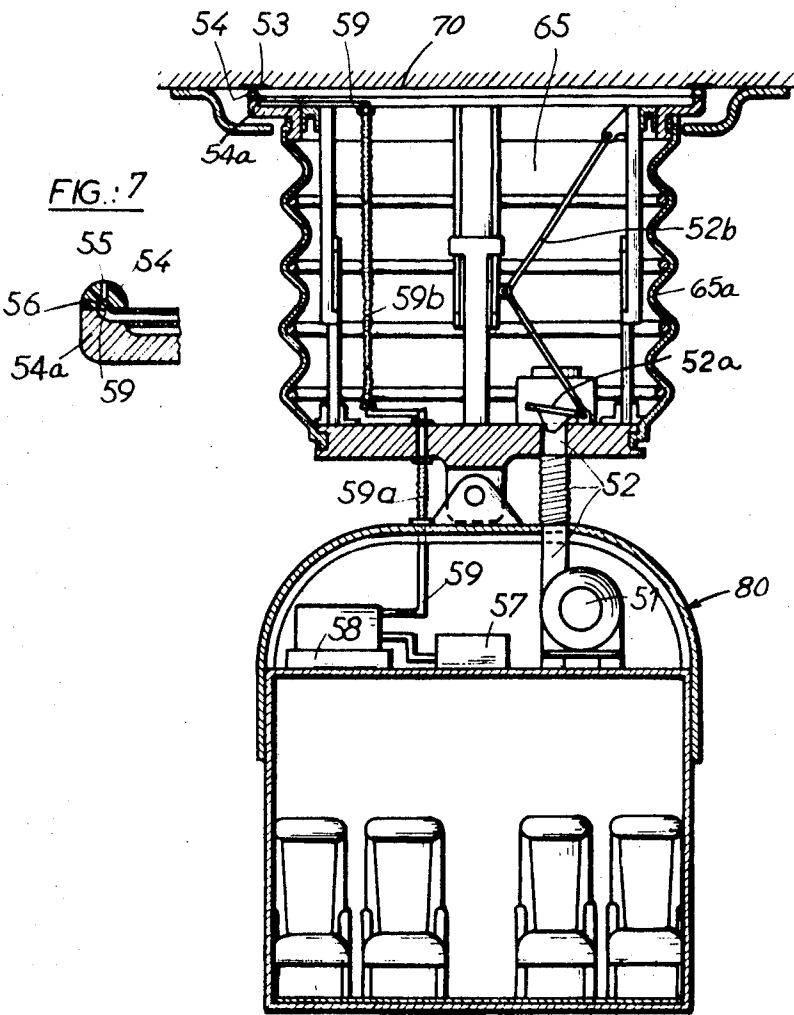
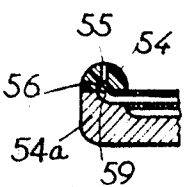


FIG. 7



TRANSPORT SYSTEM COMPRISING A TRACK AND A BODY MOVABLE THEREALONG

BACKGROUND OF THE INVENTION

The present invention has for its object a transport system comprising a track and a body or machine movable therealong, with the interposition of a fluid volume such as a fluid cushion wherein a pressure prevails which is different from the ambient pressure, said fluid volume or cushion being confined peripherally by walls or skirts carried by the movable body or machine and extending into proximity with the track.

The track generally includes a substantially horizontal operation surface facing the machine and may also include substantially vertical operative surfaces subjected to the transverse stresses acting on the machine so as to ensure the guiding of the latter. The free edges of the confining walls carried by the machine leave between them and the track surface a gap through which leaks arise which are taken into account in the calculation of the position of equilibrium of the machine, said gap cutting out also friction and wear of said free edges.

However such leaks of fluid into or from the atmosphere lead to losses of power required for the maintenance of the pressure in the fluid volume or cushion and it is therefore desirable in order to reduce the expenditure of energy to limit or even cut out the gap between said free edges and the operative track surface.

If said surface were perfectly smooth and the machine were never subjected to sudden modifications in the stresses affecting it, the size of the gap, even very small, would remain constant and there would be no untimely wear of the confining walls. In practice, the machine is subject to varying stresses, due for instance to centrifugal force in turns or to gusts of wind. Furthermore, numerous unevennesses of the track ascribable in particular to the bankings in turns or to the interconnection between successive track elements may appear.

Thus, such unevennesses or a sudden modification in the stresses may cause the confining walls to engage the generally rough surface of the track and lead to a premature wear of said walls.

The invention has therefore for its object to make the free edges of the confining walls lie as near as possible to the track surface so as to reduce the leaks through the gap down to a minimum, while nevertheless preventing any premature wear of said walls.

SUMMARY OF THE INVENTION

It has been found that when the contact pressure between the free edges of the confining walls and the track drops underneath certain values which depend on the nature of the cooperating materials, the wear may be very reduced, provided said cooperating materials are suitably chosen. Since the choice for the track material depends chiefly on the requirements as to resistance and on economical considerations, it may occur that the material thus selected is not suitable for a friction contact with the free edges of the confining walls.

Taking into account the fact that the major part of the possible friction is that produced along the longitudinal confining walls of the fluid volumes or cushions, the present invention provides a local superficial modification of the track in the area thereof which may be engaged during operation by the free edges of said walls.

To this end, the operative track surface comprises a solid strip area extending longitudinally of the track in substantial registry with the free edge of a confining wall, said strip area and said free edge forming a pair having a coefficient of friction which is lower than the coefficient of friction of the pair formed by said free edge and the remainder of the track surface. Said strip area is advantageously constituted by hard steel, bronze, certain synthetic materials such as polytetrafluorethylene among many others. Materials of great interest are constituted by shaped bronze or steel members cooperating with bronze rims secured to the free edges of the confining walls.

According to an embodiment of the invention, it is possible to locally modify the track surface by embedding therein or glueing thereon strips of the selected material.

According to another embodiment of the invention, the local modification of the track surface may be obtained by simply by painting longitudinal strips with a suitable paint on the latter or by applying longitudinal strips of a suitable coating material thereon. The application and upkeep of such a paint or coat can be performed advantageously by means of an auxiliary carriage provided with nozzles spreading the selected material onto the track along which it is caused to run. In order that the invention may be well understood there will now be described some embodiments thereof, given by way of example only, reference being had to the accompanying drawing in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates cross-sectionally a ground effect machine running over a track incorporating friction-reducing shaped members.

FIG. 2 illustrates a track the surface of which is lined with friction-reducing strips.

FIG. 3 is a diagrammatic view of an auxiliary carriage adapted to form friction-reducing strips by spreading paint onto the track.

FIG. 4 illustrates the application of the invention to a transport system comprising a body or machine movable along an overhead track with the interposition of a fluid volume under subatmospheric pressure.

FIG. 5 is a cross-sectional detail of a connection feeding a lubricating channel in the last-mentioned machine.

FIG. 6 illustrates a modification of FIG. 5.

FIG. 7 is a modification of a detail of FIG. 6.

DESCRIPTION OF A PREFERRED EMBODIMENT

Turning first to FIG. 1 a track 1 is adapted to cooperate with a ground effect machine 2 designed so as to convey passengers for instance in its section 3. The machine is sustained and guided by fluid, generally air cushions, to wit sustaining cushions 4 and lateral guiding cushions 5. Said cushions are fed by compressors housed in spaces 7 and feeding outlets 6 formed through bottom walls 10 of the structure of the machine. Longitudinal confining walls 8 and transverse confining walls carried by the machine define the peripheral boundaries of the fluid cushions 4 and 5.

In FIG. 1, the structure of the track 1 is modified by embedding therein longitudinal shaped members 11. The track proper may be constituted for instance by concrete which is highly abrasive, in which case the shaped members 11 are positioned in the casting of the track. Said shaped members may advantageously be constituted as already mentioned by materials having a low coefficient of friction such as hard steel, bronze, polytetrafluorethylene among many others.

The breadth of the shaped members is selected so as to be preferably equal to the height of the confining walls. With a view to further reducing the friction coefficient, the free edge of the confining wall 8 may be provided with a rim fast therewith and made of a substance, e.g. bronze, different from that of the remainder of said wall, as illustrated diagrammatically on the right-hand side of FIG. 1.

In the modification illustrated in FIG. 2 the shaped members are replaced by thin strips 13 glued to the operative surfaces of the track.

FIG. 3 illustrates diagrammatically a carriage 130 for coating the track surface with paint or the like so as to form a plurality of friction-reducing strips which carriage is provided for this purpose with paint nozzles 137. The carriage 130 running over the track 101 with the interposition of rollers 131, 132, 133 supports a container 134 carrying a suitable liquid feeding through pipes 135 controlled by valves 136 to the nozzles 137. The latter receive through pipes 138 atomizing air from a compressor 139 driven by a power unit 140. The carriage may thus, as it progresses, lay paint strips 141 over the track sur-

face, said strips registering with the free edges of the confining walls.

FIG. 4 illustrates a machine which is suspended from an overhead track 42 through the agency of a fluid volume 39 wherein, in operation, a subatmospheric pressure prevails.

Said machine includes an upper plate 30 carrying at least one pair of arms 31a and 31b interconnected by a yoke 32 through which a pivot 33 passes which connects said yoke to a plate 34 carrying a passengers compartment 35.

The fluid-volume 39 is bounded by confining walls comprising hollow inflatable bodies 41 connected with an inflatable chamber 40. Further confining walls 44 bound, in cooperation with the confining walls 41 peripheral spaces 44a also connected with said inflatable chamber 40 through passages 44b.

A subatmospheric pressure is brought about in the fluid volume 39 by means of a venturi-type suction pump 38. A compressor 36 carried by the compartment 35 is connected with the suction pump 38 through a flexible pipe 37 so as to feed said pump with an inducing jet of pressure fluid. The flexible pipe 37 is also connected with the inflatable chamber 40.

In operation, the chamber 40 and the bodies 41 are inflated, a superatmospheric pressure prevails in the peripheral volumes 44a and a subatmospheric pressure prevails in the volume 39. The use of the inflatable chamber 40 and of the peripheral spaces 44a under superatmospheric pressure is to improve the operational stability of the machine.

The track surface 42 under which the machine is adapted to run carries thin strips 43 having a low coefficient of friction for engagement by the upwardly directed confining walls 41 and 44. The walls 44 may be provided, as illustrated in detail in FIG. 5 with at least one lubricating channel 45 opening in registry with the strips 43, so as to further lubricate the gap between the walls 44 and the track surface. These channels are fed by ducts 46, 50 from a lubricant carrying container 47. A pump 48 delivers the lubricant from the container 47 through pipes 49a, 49b and ducts 50 and 46.

FIG. 6 is somewhat similar to FIG. 4 and shows a machine 80 which is suspended from an overhead track 70 through the agency of a fluid volume wherein, in operation, a subatmospheric pressure prevails.

The fluid volume is formed by a variable volume chamber 65 bounded by a bellows 65a. A suction-pump 51 is connected

with the chamber 65 through a duct 52 which may be controllably closed by means of a flap 52a in response to height variations of the bellows, as sensed by means of a mechanism 52b, whereby the operational stability of the machine is improved.

5 The track surface 70 is similarly provided with friction-reducing strips 53 similar to those illustrated at 43 in FIG. 4 and cooperating with the free edges 54 of confining walls 54a fixed to the bellows 65a. Said free edges may also be provided with a lubricant discharging channel 55 (FIG. 7) fed by tubes 56 and 59. The latter is fed from a lubricant container 57 by a pump 58 and a system of pipes including two deformable sections 59a and 59b.

The above-described arrangements provide substantial technical and economical advantages by reducing the mechanical and thermic friction and wear. The replacement of the confining walls is required more seldom while an important saving in power is obtained since it is now possible to reduce under good operative conditions the gap between the track and the confining walls or skirts of the machine.

20 Obviously, the embodiments disclosed are given by way of mere examples and numerous modifications may be made thereto within the scope of the accompanying claims.

I claim:

1. A transport system comprising a track having an operative surface, a machine movable along said surface, said machine having confining wall means adapted to confine between said machine and said operative track surface a fluid volume, means for generating in said volume a fluid pressure which is different from the atmospheric pressure, said confining wall means including at least one seal projecting towards said operative track surface and ending with a protruding free edge spacedly adjacent to said surface, said operative track surface comprising in juxtaposition a body portion formed of a first material having a relatively high coefficient of friction with respect to said free edge, and a solid strip area extending longitudinally of the track in substantial registry with the said free edge, said strip area being formed of a second material having a relatively low coefficient of friction with respect to said free edge.

40 2. A system as claimed in claim 1, wherein said seal extends substantially parallel to the centerline of the track.

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