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A PATH FOR HORIZING YOUR INNOVATIVE WORK

CONCEPTUAL INTRODUCTION OF HUMAN DISCOMFORT FACTOR FOR GROUND AMBULANCE DESIGN

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Abstract: Indian road transport is developing day by day, in that case road quality varies distance to distance i.e. level, continuity, speed barkers, smoothness of road, ups and downs, etc. which makes the journey uncomfortable and full of jerks. Practically for normal person these road barriers are not a big issue but for the patients, he needs more comfort while traveling through an ambulance. To provide that all comfort which patient needs is given by shock absorber like shock absorbers, dampers, etc. but in case of ambulance which always use to speedy transport. In all these transportation process patients are not ready to accept more pain, more discomfort than already they have. To provide that type of comfort we are designing system which will interact between Vehicle and Stretcher, which will work on the principle of Hover Craft & it make to glide Stretcher, by which contact between Vehicle and Stretcher will break, and all the vibration jerks from road can stop. System will take a power from battery which rotates the motor. To support this system in future the Ergonomic approach with the help of study of the vibration and its effects on human body in normal condition with the help of vibration chair can be done. Vibration chair will provide the real condition of vehicle, and test done on human body gives the results which supports that the designed system is more comfortable than conventional way. it can be the way to further study this topic in future.

Keywords: Floating Stretcher, Vibration, Motor, Blower, Thrust, Stretcher Lift, Bellows

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INTRODUCTION

Ergonomics:-

"Ergonomics applies information about human behavior, abilities and limitations and other characteristics to the design of tools, machines, tasks, jobs and environments for productive, safe, comfortable and effective comfort to human" (McCormick and Saunders 1993).

Ambulance on Road:-

Whenever An ambulance carry the patient 90% it is an emergency case. The condition in front of driver is to cover a distance upto hospital in possible minimum time. In that minimum time no of speed brakers; roads provide the jerks, vibrations which makes patient more imbalance & make him reeling discomfort able at his place most of the cases of patients like accident case money people got fractures and give s more pain on the movement in that part which makes to feels more pain.

Now the aim of this study is to reduce the discomfort for that we are going to base cause the property of vibration is vibration flows or transfer from the part to another part through the Joints." Hence up to when there will be a contact there will be vibration and if there is no contact vibration of the vehicle to stretcher of patient will not or unable to reach it will improve the comfort level for patient.

Hovercraft:-

A hovercraft is a vehicle that floats over the ground or water by means of an air cushion. A propeller installed on the hovercraft forces the air above and around the hovercraft to go down below the vehicle, forming an air cushion which is trapped in the 'skirt' of the vehicle. The air pressure above the hovercraft becomes lower whilst the air pressure below the craft becomes higher. This difference in pressure causes a lift which elevates the craft. A fan pushes air out from the back of the craft, which propels the vehicle forward. This is a result of Newton's Third Law which states that for every action there is an equal and opposite reaction.

When an object is placed on a surface, there is friction which opposes movement. Energy, or force, needs to be applied in order to overcome friction and move the object. To reduce friction, the area of contact between the object and the surface should be minimized. In a hovercraft, this is achieved by the air cushion which lifts the craft off the ground, thus minimizing friction. Since friction is reduced, less energy is required to move the craft forward.

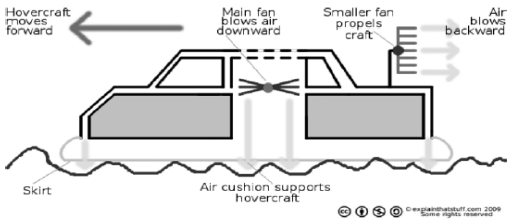

Fig. No. 1 Hovercraft

MATERIAL & METHOD

Basic Principle:-

As we have seen working principle of hovercraft, In which the whole body or hovercraft get lifted from surface of the earth i.e. here hovercraft is moving part and earth surface is stationary part new we have to just reverse the role in compare to stretcher (say [A]) and system surface [say (B)].

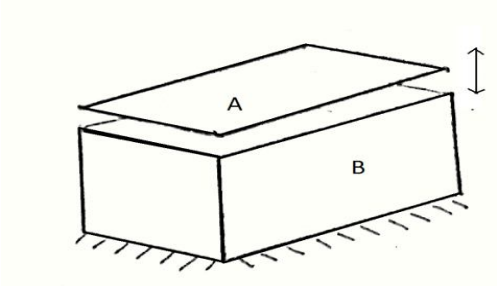

Fig. No. 2 stretcher & system surface

Now we have to make the a system (A) as a stationary and stretcher (B) as moving part along vertical axis as shown in Figure. In system (A) arrangement will be there to produce the life it has to create pressure with the help of air blower, by maintaining the air flow against stretcher which will make stature lift up from the system with patient's and its won weight.

Arrangement:-

The total arrangement has shown in the rough layout figure No.3 In which the information has given sequentially.

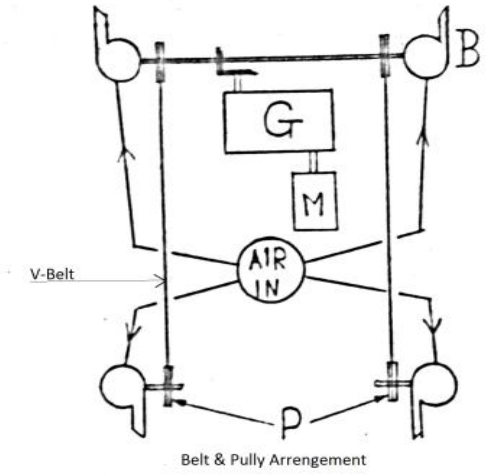

Fig. No.3 Rough Layout

Motor:-

The easiest way of getting the power supply or source of energy in vehicle is DC Power supply we can use the D.C. supply of 12 volt to drive the motor. We can use Dc shunt motor mostly used to start vehicle as a starter of vehicle having good starting torque and RPM up to 100 to 120

Gear system:-

The output of motor will be supplied to the gearing system Gears are arranged of shown in the figure No. 4 It is an integrated type of signal purchase winch scrub arrangement. In the ratio like 100:20, 100:40, 100:50 If we consider The power multiplication at each gear wheel will 5 then 25 then 125 and so on for ratio, 100:20 This type of arrangement have only 1 problem which is “This type of arrangement need very high torque to start for this we are using DC Shunt motor otherwise other motor like Brushless DC motor but with low torque are also available with 1000 to 1100 rpm.

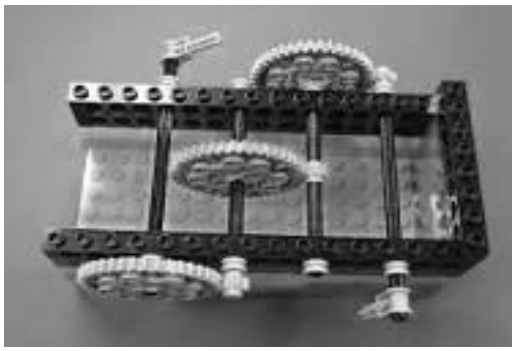

Fig. No. 4 Gear system

Now this rotational energy as output has to provide for further linkages i.e. The 4 blower fans placed at 4 canners with the help of gear arrangement using Bevel gear arrangement or single helical gear in which both works in 90^0 and These are able to supply all energy to the blower fans in equal amount i.e. we are multiplying energy by 4 indirectly.

Blower:-

The blower is made up of 4 main parts like impeller, casing, and suction pipe delivery pipe. Impeller & casing both are very important part which gives the direction and change in velocity and pressure of air it suck air from center of impeller and gives or deliver air at circumferential cortex casing with high velocity. These types of blowers has high discharge rate. The flow path of air and blower both are shown below in figure No. 5

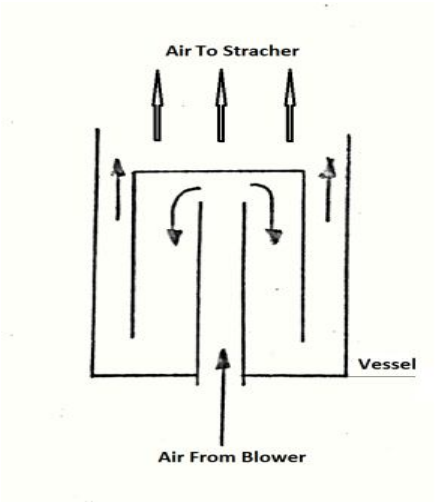

Fig. No.5 Thrust (Increase in Air Pressure)

The arrangement shown at the outlet of blower is just a cylindrical vessel close at one and arranged shown in fig. No.5 Which will help to create thrust at its outlet And this created thrust will be applied on the bottom surface of stretcher surface and it will make stretcher to glide on the air flow we can vary thrust on the basis of input power supply which will provide flexibility to vary the output power in the form of thrust and other lift distance adjustment from system.

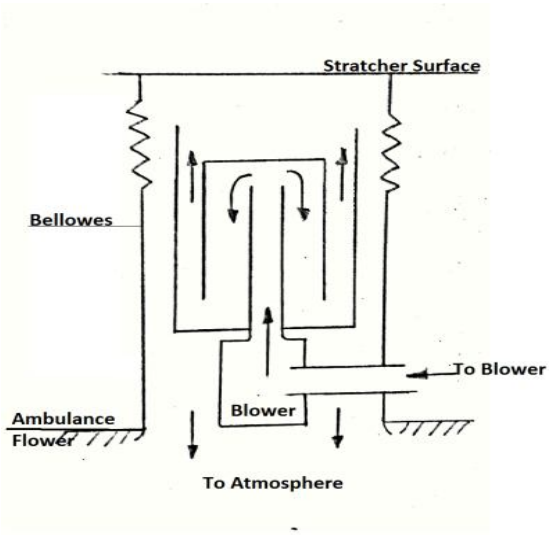

fig. No. 6 Air Flow Path

Outlet pipe: when thrust will reply on stretcher and stretcher will get lifted then the path of air from fig. No. 6 shows the way to exit the air form system to the surrounding.

The main function of the flexibility of cylinder is to provide damping action to the movement of stretcher due to acceleration & deceleration which create the forward and backward motion. As the flexibility of the tubes will be limited the movement will also be limited.

RESULT & DISCUSSIONS

In the study presented above about the conceptual introduction of floating stretcher can be compared according to the Design process. The design process of any new improved system (product) is consisting of following steps.

1) Reorganization of Need

2) Define the problem

3) Synthesis (Forces Applied)

4) Analysis & Optimization

5) Presentation

Reorganization of Need : In sector of road transportation for ambulance due to emergency cases, speedily driving and effect of road condition of quality on Ambulance indirectly affect to the comfort level for patient traveling through it . According to the ergonomics the aim or need to "how to feel patient comfortable, than he feels in (ambulance with) i.e. current condition comfort facility provided for patient.

Define the problem: Main problem we got in the current system is vibrations. As in modern Ambulance also famous point is to make system or Ambulance back mach or shell vibration & sound proof which will to feel comfortable inside but the Ambulance are in used has not yet modified up to that level that at least patient showed be free from vibration. In the definition of problem we have the need is stop the vibrations and as we have motioned earlier is vibration transfer from are link to other link through contact point or edge. So as a solution we are trying to break the contact between patient and ambulance for that we can lift the stretcher with patient in air using air and thrust of air using fluid pumping device (blower, with high discharge rate.)

Synthesis: In the problem synthesis the study of forces has been done and main two types of forces found which can act on the stretcher as a moving part are

1) Degree of Freedom (Move ability of stretcher)

2) Acceleration of deceleration

1) Degree of Freedom:- Mainly for the understanding we are dividing the movement in main direction only a) Up & down motion b) Oscillating motion about its legs or pillars of support.

2) Acceleration & Deceleration :- As the stretcher get lifted up then it starts gliding on air films and has no contact (suppose) then due to inertia force stretcher move forward & backward during acceleration and deceleration respectively and also during taking a turn it will glide at opposite side of turn.

The next steps like evolution and the presentation need more details software's and Analysis part after that we can go for presentation. As we have done the study of Road condition Ambulance facility, problem with them and solution on focus point i.e. vibration contacts. We will make continue the further study including the Design and Analysis.

FUTURE SCOPE

As before we have only design the layouts deices the components needed and focus to disconnect the patient from road jerks. As an aim the improvement needs a proof, comparison, study, analysis & then we can say or conclude the success of the experimental setup or system. As this was an introductory concept. The future work can be done with this as stetted below.

- The Manufacture can be done of this system.
- The Ergonomic approach can be taken in current condition ambulance test and ambulance having new setup with new designed system. Ergonomically we can study the result on different subjects (human)which will provide us a comparative date about comfortless and then Ergonomically we can prove that the new designed system is better than old or not.
- The similar concept can be used for no of application where we want to reduce or stop the vibration to transfer from one part to other parts.

To support this system in future the Ergonomic approach with the help of study of the vibration and its effects on human body in normal condition with the help of vibration chair can be done. Vibration chair will provide the real condition of vehicle, and test done on human body gives the results which supports that the designed system is more comfortable than conventional way. It can be the way to further study this topic in future.

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