

Design of Stretcher Which Automatically Adjust To Horizontal Position While Moving Along Elevation

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ABSTRACT

In this approach we went on in search of a stretcher which can adjust the top to maintain the horizontal position all the time and wheels of stretcher should be made efficient to ease the handling. In this we are demonstrating clearly the design of stretcher which can adjust its top while moving along the elevation. For this the bed of stretcher with lever attachment is connected to D.C. motor. This D.C. motor is connected to the MOSFET. Potentiometer will sense the angle of elevation and send signal to IC, which in turn is connected to MOSFET. According to this signal the D.C. motor adjust the bed to horizontal position.

Keywords: D.C. Motor, Resistors, Capacitors, Transformers, Diode, MOSFET, Bipolar junction transistors, Bridge rectifier, Potentiometer, Worm gear.

I INTRODUCTION

A Stretcher is a Medical Device used to carry casualties or an incapacitated person from one place to another. It is a simple type of lifter, and still called by the name in some cases. A stretcher is usually moved by two people, one at the head and the other at the feet. The casualty is placed on the stretcher and can then be carried or wheeled away. Stretchers are used if a person is unable to walk by themselves or if other requirements mean a "stair chair" (wheel chair), or similar device can be used. Most modern civilian stretchers include straps to avoid further injury to the patient. The casualty must be lifted (scoop) to be put on the stretcher. This lifting can be made manually, but it is also possible to use specific devices. These devices can also be used as stretchers, but only for short distances. A long spine board can be used to scoop and carry the victim to the stretcher, in case a spine trauma is suspected, the victim is left on the board and tied to it and the board is simply put on the stretcher. The spine and overall immobilization can also be performed by a vacuum mattress put on the stretcher. When there is no suspicion of spine trauma, the vacuum mattress can be used as a stretcher (it has handles), which is best in narrow places when the stretcher cannot be kept horizontal. It is more secure and comfortable than strapping the casualty to the stretcher. Some lifting devices are as stressful as manual lifting. Equipments need to be evaluated for ergonomics as well as user acceptance.

II FUNCTIONS OF MAIN PARTS

The details of main parts that are used here are shown in the table below:

Table 1
Function of various parts

| SL NO | DESCRIPTION OF PARTS | FUNCTIONS |
|-------|------------------------------|---|
| 1 | D.C. Motor | Uses electrical energy to produce mechanical energy. |
| 2 | Resistors | Two terminal electronic components that produce a voltage across its terminal. |
| 3 | Capacitors | Stores electricity or electrical energy. |
| 4 | Printed Circuit Board | Mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. |
| 5 | Transformers | Transfers alternating (AC) electric energy from one circuit into another through electromagnetic induction. |
| 6 | Diode | Two terminal electronic component which conducts electric current in only one direction. |
| 7 | MOSFET | (MOSFET) is a transistor used for amplifying or switching electronic signals. |
| 8 | Bipolar junction transistors | It is a type of transistor that relies on the |

| | | |
|----|---------------------|--|
| | | contact of two types of semiconductor for its operation. BJTs can be used as amplifiers, switches, or in oscillators. BJTs can be found either as individual discrete components, or in large numbers as parts of integrated circuits. |
| 9 | Bridge rectifier | Bridge rectifier is an electronic component which converts an input AC current in to a DC current as an output. |
| 10 | Integrated circuits | The function of an integrated circuit (IC) is to be a single component that can perform high-level tasks such as amplification, signal processing, or even sophisticated digital calculations as in the case of microprocessors. |
| 11 | Thyristors | They act exclusively as bitable switches, conducting when their gate receives a current trigger, and continue to conduct while they are forward biased (that is, while the voltage across the device is not reversed). |
| 12 | Potentiometer | A potentiometer is a resistor composed of three terminals and a voltage divider, and is typically used to control electrical devices. |
| 13 | Worm gear | It reduces rotational speed or allows higher torque to be transmitted. |
| 14 | Micro switch | A micro switch is an electrical switch which can be operated using a very small force and also possibly using a small movement. |

III SPECIFICATIONS

| | |
|-----------------------------|---------------------------------|
| Resistors | R1, R15 = |
| | 100 K Ω |
| | R2, R7, R10, R11, R12, R13 = 10 |
| | K Ω |
| | R3, R9, R14 = 47 |
| | K Ω |
| | R4 = |
| | 220K Ω |
| R5 = | |
| 470K Ω | |
| R6 = | |
| =33K Ω | |
| R8 =12 | |
| K Ω | |
| Capacitor | C1 =10 |
| | nF |
| | C2 =100/63 nF |
| | C3 =100 |
| nF | |
| Diodes | D1, D2 = |
| | 1N4148 |
| | D3 = |
| 1N4004 | |
| Bipolar Junction Transistor | Q1, Q2 = |
| | BC547 |
| | Q3, Q5 = |
| | IRF4905 |
| | Q4, Q6 = |
| IRFZ44 | |
| Integrated Circuit | IC = LM |
| | 324 |
| Potentiometer | P1 =100K |
| Motor | M =500 |
| | rpm |

Photos



Fig:1 Test Model

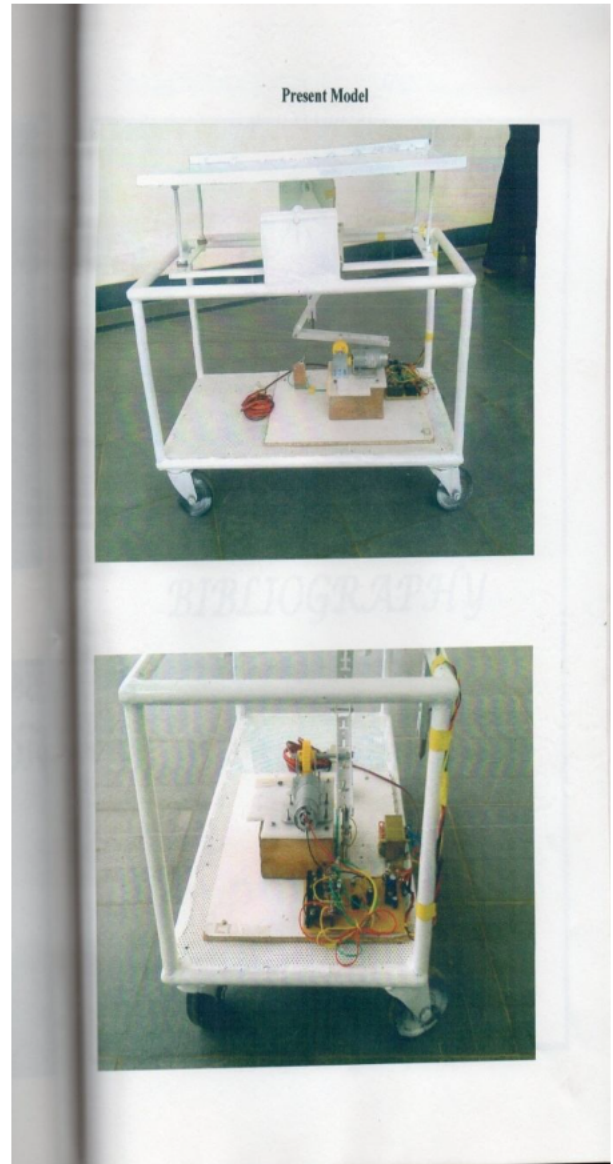


Fig:2 Present Model

IV CONCLUSION AND FUTURE SUGGESTION

We conclude that the project gives a small contribution to solve the present situation of a patient in hospital by replacing a normal stretcher by automatic level adjusting stretcher. It is a prototype and when it is tuned to the real world it would find a very wide implementation. This type of equipment could be installed in any type of hospitals.

In this work we are using both mechanical and electronic linkages. Hence we get accurate adjustment of stretcher to horizontal position.

The development of this type of stretcher play an important role, as it provides high degree of comfort to patient and also it can be easily moved without any disturbance.

As all of us know I design is an iterative process, even the stretcher can be designed/features to more sophisticated and advanced to increase the comfortness and patient safety.

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