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Design and Fabrication of Automatic Hand Brake System

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Abstract - The most critical aspect of a vehicle's braking mechanism is the parking brake system, which we are fabricating here. Since most drivers do not use the parking brake due to driving stress, we use an automatic hand brake release mechanism to prevent this issue. In automobiles, the hand brake is one of the most important features. A ratchet locking mechanism is used in the traditional handbrake system. as a way to maintain it engaged until a release button is pressed. Driver blunders can cause injuries wherein handbrake isn't always engaged. To overcome this, an Automatic Hand Brake attractive and disengaging system is proposed. A combination of rack and pinion association and Solenoid Valve controller is used to activate and disengage the hand brake. An electric motor is connected to an automatic braking device for a car, which transmits motion from the motor to a brake lever that moves the restraint. This project presents a modern concept style of pneumatic parking brakes with genuine and cost-effective characteristics. This project entails the design and manufacture of a pneumatic breaking device.

Keywords: Hand break, Pneumatics, Air Compressor,
Pressure regulators.

I. INTRODUCTION

The hand brake also known as the emergency brake, e-brake, or parking brake is a latching brake in vehicles that is used to keep the vehicle desk safe. Automobile e-brakes typically contain a cable normally adjustable in length that is immediately connected to the brake system on one side and to some kind of mechanism that is actuated by the intent force at the other. The system is either a hand-operated lever on the floor on both sides of the motive power, or a pull manipulate located under and near the steering wheel column, or a (foot-operated) pedal positioned a long way apart from the other pedals. While it is often referred to as an emergency brake, using it in any emergency while the footbrake is still active is likely to severely degrade the brake function of the vehicle and greatly increase the risk of losing control of the vehicle, such as when starting a rear wheel skid. Furthermore, the stopping pressure provided when using the handbrake rather than or in addition to the footbrake is typically minimal and may not be a significant help in stopping the vehicle, again because it often works at the rear wheels, which have less resistance than the front wheels when braking. The emergency brake is often designed for use in the event of a mechanical breakdown in which the regular footbrake is inoperable or compromised, with the intention of being able to deploy the brake in a safe

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fashion to bring the vehicle to a calm, if mild, halt before seeking carrier assistance Since modern brake systems are normally very stable and designed with failsafe (e.g. Dual-circuit hydraulics) and failure-caution (e.g. Low brake fluid sensor) structures, the handbrake is seldom used for its intended purpose.

The most common usage for a car emergency brake is to keep the vehicle motionless when it is stationary, hence the alternate term, parking brake. A ratchet locking mechanism is used in car emergency braking to keep them engaged before the launch button is pressed. This is usually used in live average results with a parking pawl inside the transmission on cars with computerised transmissions.

II.METHODOLOGY

Pneumatics: The term "pneuma" is derived from the Greek word "pneuma". which means "wind". The term pneumatics refers to the study of air motion and its phenomenon. It comes from the Greek word pneuma, which means "air". Today, pneumatics refers to the use of air as a running medium in industry, especially for the operation and control of machinery and equipment.

Pneumatics has been used for a long time for performing only mechanical tasks, but in more recent times, it has played a much more important role in the development of pneumatic generation for automation.

Pneumatic systems depend on compressed air, which must be available in adequate quantities and at a pressure that matches the device's capacity. However, by using a pneumatic device for the first time, it would be important to fix the issue of compressed air delivery by way of approach, the use of a reciprocating compressor is an essential feature of any compressed air supply facility. A compressor is a device that brings in air and gas at a positive pressure and pushes it out at a high pressure .the degree expressed is that of the air at intake conditions, especially at ecosystem pressure and natural atmospheric temperature, and the compressor capacity is the actual quantity of air compressed and applied.

Robot Boyle researched the compressibility of air for the first time in 1962, and found that the produced from tension and quantities of specific amount of fuel. The standard form is written as,

$$PV = C \text{ (or) } PiVi = P2V2$$

The pressure in this equation is the total stress, which is around 14.7Psi at no expense and is capable of holding a column of mercury nearly 30 inches long in a normal barometer. Every gas may be used in a pneumatic device, but air is the most commonly used gas nowadays.

*Selection of Pneumatics***:** Mechanization is a general term that refers to the use of mechanical electricity to direct effort. Pneumatic is a popular low-cost mechanisation medium, particularly for sequential (or) repetitive operations. A compressed air device is now installed in several factories and flora. that is capable of delivering energy (or) energy requirements, as well as managing the device (although equally pneumatic manipulate systems can be financial and can be advantageously applied to other styles of power).

Pneumatic Power: Pressurized gases are used in pneumatic devices to distribute and control electricity. Pneumatic systems often use air as the fluid medium because it is safe, low in value, and easily accessible.

*Production of Compressed Air***:** Pneumatic systems depend on compressed air deliveries, which must be made usable. In appropriate quantities and at a pressure that matches the system's capability. When using a pneumatic device for the first time, it is absolutely necessary to address the issue of compressed air supply.

The use of a reciprocating compressor is a critical component of every compressed air service facility. A

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compressor is a system that sucks in air and fuel at a certain pressure before releasing the air at a high pressure. The real quantity of compressed and applied air is expressed as compressor capability, and the extent expressed is that of the air. In consumption conditions, especially when the environment is stressed and the ambient temperature is consistent. One of the considerations that goes into deciding whether or not a compressor is required is the cleanliness of the suction air. Warm and wet suction air can result in prolonged condensate precipitation from compressed air.

Compressor :

The types of wonderful compressor,

1. Reciprocating kind compressor
2. Rotary type compressor

Turbo compressors; Where a large amount of air is needed at low discharge pressures, they are employed. They can't achieve the necessary tension for pneumatic manipulate usefulness until they're built in multistage designs, and they're uncommon in pneumatic carriers.

Reciprocating Compressors: The reciprocating compressor is by far the most common type, designed for both desk-bound (and) transportable operation. Reciprocating compressors are available in a variety of sizes, ranging from the smallest capacities to more than 500m3/min. The air pressure in a single-stage compressor can be as high as 6 bar, with a discharge pressure of up to 15 bar. Excessive stress reciprocating compressors of 3 and 4 degrees will achieve discharge strains in the range of 250bars. Models with a single level and 1200 levels are particularly suitable.

Where the discharge stress reaches 6 bars, the two-stage design is preferred because it can equal the output of a single-stage device at lower rates based on driving forces within the range.

Description of Equipments**:**

Pneumatic Cylinder: All of the strange names and words associated with pneumatics have evolved over the course of about 100 years of production use. Double emerging, four-way join, and short join are all terms that have been coined to describe (as clearly as possible) the differences between the elements. Don't let the titles scare you away. It's just a matter of titles. When it comes to pneumatics, I've used some pretty descriptive words myself, much of which we won't use here. The first thing to note is that pneumatics are very easy. It seems because all of the various titles and sections are confusing. But enough about that, let's get down to it.

This isn't the place to go over any unique form of component available - it would take a lot of space. But what I'd like to focus on are the basic aspects that a haunter can remember when 'playing' with pneumatics.

*Air Cylinders***:** The two most basic types of air cylinders are double performing and single performing**.** They come in a variety of models, shapes, and types. For hang-out jobs, all styles are useful. When you need to drive in both directions, double acting cylinders are helpful, and single acting cylinders are useful when you only need to push in one direction.

The three most critical values for air cylinders are "strain rating", "bore" and "stroke". There are several calculations to properly parent the power of a cylinder, but most haunt pop-up packets should be handled by air cylinders with bores ranging from 3/four to "one-half" and strokes ranging from three to "eight".

The air pressure (the higher the tension, the more electricity) and the bore are both taken into account when measuring power (the bigger the bore - the more electricity). During times of greatest tension, the energy rankings are often cited. So, if a cylinder creates 180 kilos of 'push,' it can deliver the more effectively at high tension (typically 250 psi for industrial cylinders). Haunters must put their props to use and reduce stresses

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significantly. When running props, a proper aim isn't always to reach 60-70psi. Going even higher puts more strain on the prop and all other parts of the air engine, and makes the compressor work more often. Air cylinders can still flow very quickly and have a lot of push even at lower pressures, so constantly be very cautious round pneumatics.
Double Acting manner the air cylinder rod is 'driven' out, and 'driven' in.

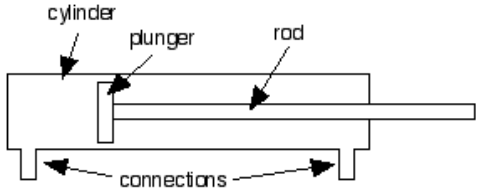

Fig 1 A typical double acting air cylinder

Those simple components can be found in any double-appearing air cylinder. A cylinder to keep it together, a 'plunger' to where the air pushes, two links to get the air in and out, and a rod that goes in and out. That is what there is to it. Here's a simple animation to demonstrate the motion.
When air is pumped into the left attachment (shown in yellow), it presses against the plunger, causing the rod to pop out. Air is shot out of the correct link at the same time. To reverse the motion, air is pushed back into the right connection, pressing the plunger on the opposite facet and forcing the rod back in.
The trick to making a double-appearing cylinder is to let air out of one face while keeping air in the other. This is a crucial feature of the double-acting cylinder, as well as a perk that gives you complete control over the rod's movement (but, more on that later).
*TIP***:** found that a double performing cylinder with ¼ contacts, 6-8 stroke, 1 bore, and stop clevis mounts is the most advantageous. About any cylinder can be optimised for use in a haunt.
*Single Acting Cylinder***:** The air cylinder rod is only pushed in one direction, either out or in, in the Single Acting method. There is only one air link, and a small hollow within each stop to allow air to flow in and out. After the air pressure is eliminated, a spring is used to drive the rod inside the opposite direction.

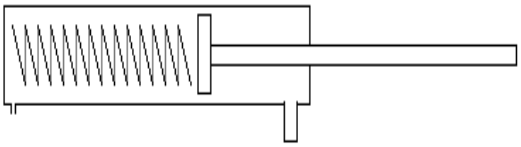

Fig 2 Single Acting Air Cylinder, with the rod normally out without pressure

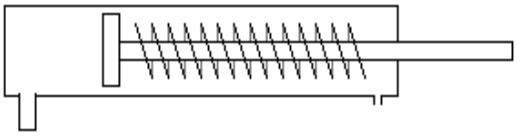

Fig 3 Single Acting Air Cylinder, with the rod normally in without pressure

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The plunger continues to transport and compress the spring as air is introduced into the partnership. On the alternate stop, exhaust air escapes through the exhaust hole. As air is released, it leaves the relationship and is sucked into the exhaust hollow while the spring lowers the plunger to its resting position. When choosing a cylinder for a utility, keep in mind that a double acting cylinder will push in both directions at the same time, while a single acting cylinder can only push in one direction.

*Mounting***:** There are just as many ways to position an air cylinder as there are different kinds of air cylinders. This is attributed to all of the makes use of once more. The clevis mount is my personal favourite. (See image below) Over other mounts, clevis mounts have the most movement, stability, and mounting ease.

III SOLENOID VALVES

A pneumatic device's directional valve is one of its most important elements. This valve, also known as a DCV, is used to regulate the path of air flow in a pneumatic system. The directional valve accomplishes this by repositioning its internal movable parts.

This valve was chosen for its speed and ability to reduce guide effort, as well as for the conversion of the machine to an automatic unit with the use of a solenoid valve.

A solenoid is an electrical device that transforms electrical power into direct line motion and pressure. This are often used to perform a mechanical operation that controls the valve function. The plunger is pulled as the solenoid is energised in a solenoid.

The names of the solenoid's components should be discovered so that they can be known when called upon to make maintenance or provide service.

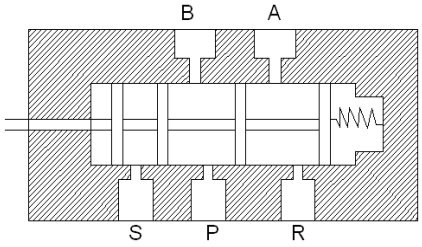

Fig 4 Solenoid Valve

*Working of Solenoid Valve***:** There are five holes on the solenoid valve. These ensure that the five/2Valve is properly vented. The spool of the five/2 valve slides inside the main bore in accordance with the spool feature, which connects and disconnects the ports.

The operating principle is as follows.

Position-1

When the spool is actuated in the direction of outer course port ‘P’ gets
Connected to ‘B’ and ‘S’ stays closed whilst ‘A’receives linked to ‘R’.

Position-2

When the spool is driven in the inner direction port ‘P’ and ‘A’
Gets connected to every different and ‘B’ to ‘S’ whilst port ‘R’stays closed.

*Solenoid Valve (Or) Cut Off Valve***:** Cut off valve or solenoid valve is the name for the control valve that

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governs the drift direction. The electronic control unit is used to operate the solenoid cutoff valve. For the drift path of the vice cylinder, we use a separate solenoid valve in our mission. Its aim is to move air from the compressor to a single performing cylinder.

*Flow control valve***:** Drift manipulate valves are used to adjust the rate of actuators in any fluid strength circuit. Changing the position of glide in which the air passes will complete the flow manipulation.

As the position is improved, more air can be delivered to the actuator, resulting in a faster rate. The velocity of the actuator is lowered as the amount of air entering the actuator is reduced.

*Pressure control valve***:** The restraint is the main feature of the strain manipulate valve (or)Control the amount of tension that a pneumatic circuit needs.

Depending upon the method of controlling they may be labeled as

1. Pressure alleviation valve
2. Pressure decreasing valve

Hoses: This pneumatic system's hoses are made of polyurethane. The maximum stress level that these hoses can withstand is 10 x105N/m2.

*Connectors***:** Connectors of various types are used in our unit. The hose adapter is one, and the reducer is the other. An undertake hose nipple and a cap nut are popular components of hose connectors. Brass, titanium, or reinforced pneumatic steel are used to make these connectors.

Motor**:**

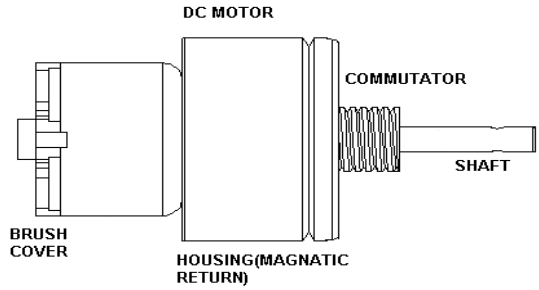

Fig 5 DC Motor

Principles of Operation: The functioning of every electric motor is entirely dependent on electromagnetism. When a cutting-edge-sporting conductor is placed in an external magnetic field, it can feel a force proportional to the modern within the conductor as well as the energy of the externa l magnetic topic. As you're nicely aware of from gambling with magnets as a kid, opposite (North and South) polarities appeal to, even as like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction among a modern-day-wearing conductor and an external magnetic area to generate rotational movement. Start by looking for a simple 2-pole DC electric motor (here pink represents a magnet or winding with a "North" polarization, whilst green represents a magnet or winding with a "South" polarization). The axle, rotor (armature), stator, commutator, field magnet(s), and brushes are the six primary components of a DC motor. The outside magnetic field is formed by excessive-strength permanent magnets in most common vehicles. The stator is the motor's stationary component, which includes the motor casing and any extra permanent magnet poles. The rotor (along with the axle and commutator) rotates in lockstep with the stator. The rotor is made up of windings (normally in the middle),

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which are electrically connected to the commutator. The above diagram suggests a commonplace motor format with the rotor in the stator (discipline) magnets.

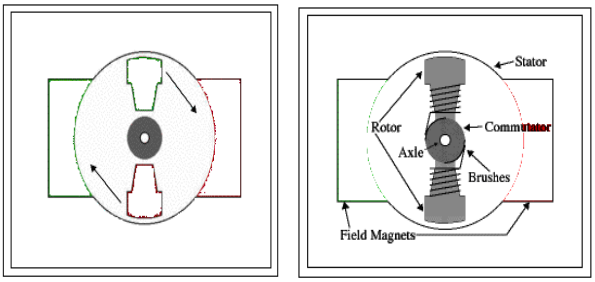

Fig 6(Two Magnets Assembly)

As electricity is applied, the polarities of the energised winding and the stator magnet(s) are misaligned, and the rotor rotates until it is nearly ordered with the stator's discipline magnets. The brushes pass to the next commutator contacts as the rotor aligns, energising the following winding. In our two-pole motor, the rotation reverses the path of current through the rotor winding, causing the rotor's magnetic area to "transform," allowing it to continue spinning.

However, in practise, DC vehicles will still have more than two poles (three is a very not unusual wide variety). This eliminates "dead points" in the commutator, which is a first. You will see how, with our example -pole motor, if the rotor is perfectly aligned with the sphere magnets in the centre of its spin, it can get "caught" there. Meanwhile, with a two-pole engine, the commutator shorts out the power supply at some point. This would be disastrous for energy delivery, power, and motor additive damage. Another disadvantage of such a simple motor is that it can exhibit a large amount of torque "ripple" (the amount of torque it may generate is cyclic with location).
Since most tiny DC motors have a three-pole configuration, let's play around with the inner workings of one using an interactive animation(Javascript Required).

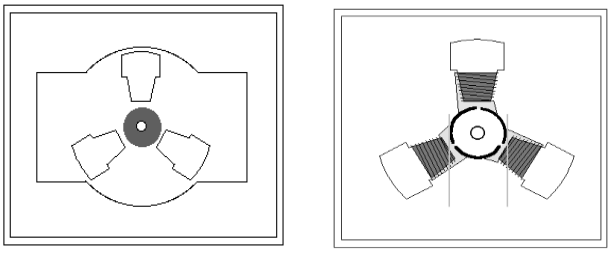

Fig 10(Three Magnet Assembly)

A few points to consider here: one pole is totally energised at a time (but others are "in part" energized). As each brush moves from one commutator touch to the next, the discipline of one coil will quickly fall apart, while the field of the next coil will quickly fee up (this happens within a Few microsecond). We'll talk more about the implications later, but in the meantime, you can see that it's a direct product of the coil windings'

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series wiring. There's really no better way to see how a typical DC motor is fitted together than to simply start one up. Unfortunately, it is time-consuming job that often necessitates the loss of a perfectly precise engine. For (on 10 strains / cm graph paper), the guts of a disassembled Mabuchi FF-030-PN motor (the same one that Solarbotics sells) are accessible. With two brushes and three commutator contacts, this is a main three-pole DC generator.

In small cars, an incentive configuration with a 'coreless' armature winding is often used. The structural stability of this configuration is dependent on the coil cord itself. As a result, the armature is pierced, allowing the permanent magnet to be mounted inside the rotor coil. The armature inductance of coreless DC motors is much lower than that of iron-core vehicles of comparable duration, extending brush and commutator life.

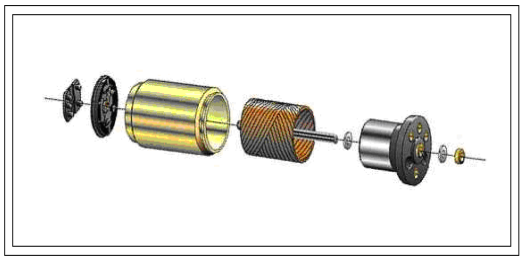

Fig 11(DC Motor Assembly)

The coreless design also allows producers to build smaller automobiles; in the meantime, due to the lack of iron in their rotors, coreless motors are particularly susceptible to overheating. As a end result, this layout is generally used just in small, low-power motors. Beamers will most customarily see coreless DC automobiles in the shape of pager vehicles. Again, disassembling a coreless motor may be instructive -- in this situation, my hapless sufferer was a reasonably-priced pager vibrator motor. The guts of this disassembled motor are available (on 10 strains / cm graph paper). This is (or greater appropriately, become) a three-pole coreless DC motor.

*Limits Switch***:** A mechanical restriction switch interlocks a mechanical motion or function with an electrical circuit. A properly place to begin for limit-switch selection is contact arrangement. The most commonplace restriction transfer is the unmarried-pole touch block with one NO and one NC set of contacts; but, restriction switches are to be had with up to four poles. Limit switches are also available with time-delayed touch switch. This kind is beneficial in detecting jams that purpose the restrict switch to stay actuated beyond a predetermined time c language. Other limit switch contact arrangements include impartial-function and -step. Limit switches function a impartial-function or middle-off kind transfers one set of contacts with motion of the lever in a single course. Lever motion within the contrary path transfers the other set of contacts. Limit switches with a -step arrangement, a small motion of the lever transfers one set of contacts, and further lever movement within the identical route transfers the opposite set of contacts.

*Air Compressor***:** The air compressor is the instrument that produces air. They obtain the airs from the

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atmosphere when going for walks with the unit. Air compressors are used to increase the pressure of a large volume of air. Air compressors are available in a number of settings and can operate at a wide range of flow rates and pressures. Compressed air was ejected by primitive man in order to provide sparkling embers with enough fuel to ignite into a fire. Because of the increased stress, the temperature will rise during compression. Polytypic compression is the term for this.

Because the temperature rises, the amount of compression energy increases as well. Compressors are staged to reduce temperature upward push while increasing compression efficiency. Prior to entering the next step, the temperature of the air exiting each level is cooled. Intercooling is the term for this cooling process. Multi-level compression improves volumetric efficiency so the pressure ratio over the primary level is minimised.

The selection of an air compressor is the first step in building a green and efficient compressed air system. Since the air leaving the compressor is filled with moisture, lubricants from the compressor will be available (lubricated compressors best). Other chemical compounds that could have been drawn into the compressor intake may have been a blessing in disguise. This virus has harmed many operations, pneumatic machinery, computers, and processes used individually or in conjunction, air purification devices, filters, air dryers, respiration air purifiers, and control devices can eliminate such toxins. Other chemical compounds that could have been drawn into the compressor intake may have been a blessing in disguise. Many procedures, pneumatic machines, servers, and processes have been harmed by this virus. To extract such toxins, air purification systems, filters, air dryers, respiration air purifiers, and control equipment can all be used individually or in combination.

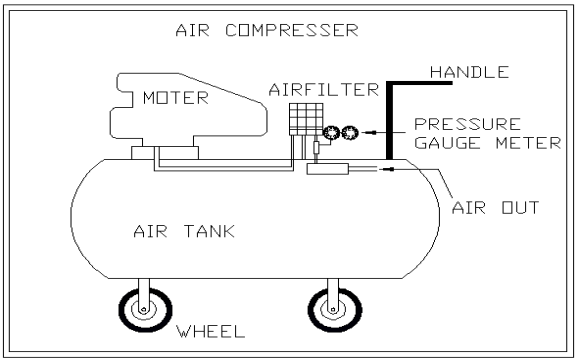

Fig 12 Air Compressor

IV CONTROL UNIT

Microcontroller

A general MICROPROCESSOR, ROM, RAM, I/0, CLOCK, TIMERS, and SERIAL PORTS are all implemented in the microcontroller. Microcontrollers are also known as "machine on a chip", "single chip microprocessor system," and "laptop on a chip".

A microcontroller is a single-chip device or, if you choose, a Computer-On-A-Chip. The word micro denotes a small tool, while controller denotes that the tool is most often used to manage objects, processes, or

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operations. Another term to explain a microcontroller is embedded controller, because the microcontroller and its aid circuits are regularly built into, or embedded in, the devices they manipulate.

Microcontroller is a fashionable-purpose device, which integrates some of the components of a microprocessor gadget on to single chip. It has inbuilt CPU, memory and peripherals to make it as A minicomputer. A microcontroller combines directly to the identical microchip.

Micro controller is a stand-on my own unit, that may perform capabilities on its own with none requirement for added hardware like i/o ports and external reminiscence. The heart of the microcontroller is the CPU center. In the beyond, this has historically been based totally on a eight-bit microprocessor unit. For example, Motorola makes use of a simple 6800 microprocessor middle of their 6805/6808 microcontroller gadgets.

Relay: A relay is an electrically operated transfer. Current flowing via the coil of the relay creates a magnetic discipline which draws a lever and adjustments the switch contacts. The coil modern may be on or off. So, relays have two switch positions and they may be double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely cut loose the first. The hyperlink is magnetic and mechanical. The coil of a relay passes a pretty huge modern, usually 30mA for a 12V relay, however it is able to be as lots as 100mA for relays designed to function from decrease voltages. Most ICs (chips) can't offer this modern-day and a transistor is usually used to amplify the small IC contemporary to the larger fee required for the relay coil. The maximum output cutting-edge for the popular 555 timer IC is 200mA so these gadgets can deliver relay coils immediately with out amplification.

V RESULT AND DISCUSSION

Pneumatic Components and Its Specification**:**

The automated hand brake launch is including the following additives to full fill the necessities of complete operation of the gadget.

1. Double acting pneumatic cylinder
2. Solenoid vale
3. DC motor
4. Limits transfer
5. Compressor
6. Control unit

Block Diagram

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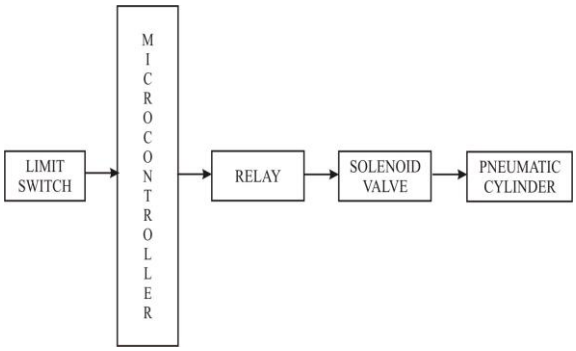

Fig 13 (Block Diagram)

Drawing for Automatic Hand Brake Release

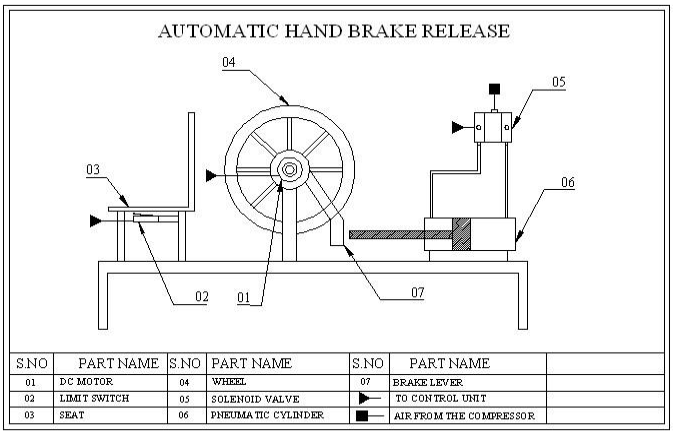

Fig 14(2D Sketch)

Working Principle

The compressed air from the compressor is used as a medium for this operation. Pneumatic double performing cylinder is used. The air from the compressor enters to the float control valve. The different manner of air enters to the solenoid valve. The feature of Solenoid valve is to allow air at accurate time c program language period. The air passes to outlet via the exhaust valve cylinder because of pressure difference in the compressor by using pneumatic head into the piston by using longitudinal unit used. The intention is to design and expand a manipulate machine primarily based on smart electronically managed automobile braking gadget is known as computerized braking gadget. This braking system consists of limits transfer, control unit and pneumatic braking system. The limits switch is area underneath the diver seat whilst ever driver gets up from the seat the boundaries switch will release and the signal is given to microcontroller and it'll set off the pneumatic cylinder to apply the brake via lifting the hand brake lever upwards. If the motive force is in seat the limit transfer is set off and the sign is given to the control unit to off the strength deliver to the solenoid valve to release the brake with the aid of pressing it downward. All the above procedure is managed with the aid of the manage unit it's miles nothing however the small chip called microcontroller it’s already programmed and feed inside the chip for operating of our challenge.

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CALCULATION

DC MOTOR

100=RPM ,12 =VOLT,100 =WATT

Torque of the motor = (P X 60) / (2 X 3.14 X N)

= (100 X 60) / (2 X 3.14 X 100)

= 9.554 Nm,

Torque = 9.554 x 10^3 N.

The shaft is made of MS and its allowable shear stress = 42 MPa .

Torque = 3.14 x fs x d^3 / 16 9.554 x 10^3

= 3.14 x 42 x d^3 / 16

D = 10.50 mm.

The nearest standard size is d = 11 mm.

BALL BEARING CALCULATION

Radial load of ball bearing (Fr) = 700 N.

Thrust load of ball bearing (Fa) = 300 N

Service factor(s) = 1.2 Hours in use per week = 35

Number of years = 3

Speed N = 500 Rpm

Diameter of Shaft = 15 mm.

LIFE OF BEARING

Total life of bearing = 35 x 3 x 52 = 5460 hrs.

Equalent Load = P = (X Fr + y F a) S

Load factor = x = 0.56

Trust factor = 1.4

(FROM PSGDB 4.4 AND 4.6) P = (0.56 X 700 + 1.4 x 300)

1.2 = 812 N

Loading ratio = C/P (FROM PSGDB 4.14) = 6.2

C = 6.2

X P = 6.2 X 81 = 5034 N 28

C = 880 Kg

f = 8800 N.

Since C = 8800 > 5034, the Selected bearing is suitable. Selected bearing = SKF6302.

DESIGN CALCULATION FOR PNEUMATIC CYLINDER (25 x100)

Mini pressure applied in the cylinder ,

(p) =1.5 kgf/cm2

=1.47099 x 105 n/m2.

Diameter of the cylinder (D) = 25 mm

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Stroke length = 100 mm

Area of cylinder (A) = (3.14/4*(D2)

= (.785x.0252)

=4.90 x10-4 m2.

Force exerted in the piston (F)

=Pressures applied X area Of cylinder Force

= (1.47099 x 105 n /m2) (4.90 x10-4 m2)

= 72.17 N.

For lifting one kg weight, the force required is given by,

Force = m x a

= 1 x9.81

= 9.81 N.

And the pressure required for one pneumatic cylinder to lift I kg is given by,

Pressure, P =Force/ Area = 9.81 N/4.90 x10-4

m =20020.40 N/m2

Pressure = 0.200204 bar.

Maximum load in the cylinder = Pressure*area

= 20020.40 N/m2 x 4.90 x10-4 m2

= 9.80N.

Total load in the cylinder = m x a = 9.80 x 9.81

= 96.23 kg.

DESIGNING OF SHAFT

Following stresses are normally adopted in shaft design Max tensile stress = 60 N/mm2 .

Max shear stress = 40 N/mm2

Considering 25 % overload

T max= 1238 x 1.25

= 1.525 x 10 3 N-mm.

The shaft is subject to pure torsional stress

we know T= 3. 14/16 x fs x d3 15250

= 3. 14/ 16 x 70x d3

D =10.20mm.

MATERIALS

Factors Determining the Materials:

The different factors which determine the selection of fabric are discussed beneath.

1.Properties: The material decided on ought to posses the important homes for the proposed utility. The various necessities to be satisfied

Can be weight, surface finish, tension, capability to resist environmental attack from chemical compounds, carrier lifestyles, reliability and many others.

The following four types of precept homes of materials decisively affect their choice

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a. Physical
b. Mechanical
c. From production point of view
d. Chemical

The numerous physical residences worried are melting factor, thermal conductivity, specific warmness, coefficient of thermal growth, unique gravity, electric conductivity, magnetic functions etc.

The numerous Mechanical properties Concerned are strength in tensile, Compressive shear, bending, torsional and buckling load, fatigue resistance, impact resistance, elastic limit, staying power limit, and modulus of elasticity, hardness, put on resistance and sliding homes.

*2. Manufacturing case***:** Sometimes the demand for lowest viable manufacturing value or surface qualities available by way of the software of appropriate coating substances might also call for the usage of unique materials.

3. Quality Required: This commonly impacts the producing system and in the end the material. For instance, it would by no means be proper to go casting of a much less variety of additives which can be fabricated a good deal more economically by way of welding or hand forging the metal.

4. Availability of Material: Some materials can be scarce or in quick supply. It then turns into obligatory for the fashion designer to apply a few different cloth which although might not be a great replacement for the cloth designed. The transport of materials and the shipping date of product ought to additionally be stored in mind.

5.Space consideration:

Sometimes excessive strength substances have to be selected due to the fact the forces worried are high and space barriers are there.

6. Cost:

As in some other hassle, in choice of cloth the cost of material performs an crucial component and need to now not be not noted.

Sometimes elements like scrap utilization, look, and non-maintenance of the designed part are involved inside the selection of proper materials.

VI. WORKING MODEL

Fig 15(side view)

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Fig 16(top view)

Fig 17(front view)

VII. CONCLUSION

The undertaking accomplished with the aid of us made an impressing challenge inside the field of vehicle production industries. It is very beneficial for the employees paintings within the lath and small-scale industries. This project will lessen the fee concerned in the challenge. Project has been designed to carry out the complete requirement project on the shortest time to be had. This might also supply secure braking is assured in slopes and hill begins with the help of "HOLD" carry out. The working of assignment is as per predicted due to the fact the brake is applied by shift off the key and brake is loose as soon as key is on. This may reduce human efforts and human errors whereas parking or starting the vehicle. This approach has complete automated operation for trustworthy drivability and safety. This device moreover gets some advanced selections like preserve carry out in head to head visitors and inclined roads, which may promise the drivers and vehicle owners with a relaxed pleasure drive and stops. The machine has larger relative benefits over the conventional parking device and may recognize maximum utility within the future as a result of its significance. The device is a smaller quantity pricey and greater realistic consequently are regularly tailor-made to any car.

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