A car jack is a mechanical device engineering

Contents

A auto doodly-squat is a mechanical device used to easy raise heavy tonss autos, to derive an easy entree to subdivisions underneath vehicles or to merely merely alter a wheel. The most of import fact of a doodly-squat is that it gives the user a mechanical advantage by altering rotational force into additive, leting the user to raise heavy constructions up that would be impossible to make without this tool.

There are different types of auto doodly-squat constructions, some consists in holding a prison guard threaded constituent that allows the alterations in tallness, others are more “ automatic ” as they use a hydraulic or pneumatic system that pump fluid and pressured air to do constituents lift and coerce the construction to run ; some constructions require more mechanical force than others.

SCISSOR CAR JACK – a scissor auto doodly-squat is a type of device that helps to raise a vehicle off the land ; it ‘ s called a scissor doodly-squat as the construction consists in holding diagonal metal constituents that expand and contract in the same manner of a brace of scissors. It works by raising tonss vertically and applies the force per unit area on the bottom supports of the construction. It has a really compact diamond form when it ‘ s closed and the operation of the doodly-squat can besides be motorised. The scissor doodly-squat is able to raise great forces as it turns rotary gesture into additive ; this is because of the prison guard threaded constituent. This constituent is situated where the two underside supports are attached to the two top 1s

(see fig. 1.) , as this constituent as rotated either clockwise or anticlockwise, it forces the two meeting points of the supports to travel on an horizontal plane, doing them to pull or spread out ; this operation forces the full construction of the doodly-squat to higher or lower depending on which manner the threated constituent is turned. This constituent is easy turned as the operator can attach a long grip to it, leting an easier rotational motion. As the yarn is really all right, it does take many rotational rhythms to derive the right tallness of the vehicle but the thicker the yarn is, the more input force would be needed for its operation.

hypertext transfer protocol: //www. ehow. co. uk – Car doodly-squat specifications-2012

Figure 1 – Scissor doodly-squat – www. walmart. com – 2012 hypertext transfer protocol: //i. walmartimages. com/i/p/00/61/52/68/10/0061526810152_500X500. jpg

Fig. 1. shows a image of a scissor jackconsisting in the base construction, the lower and upper weaponries, the prison guard constituent which connects the two supports and operates the doodly-squat, and the top bracket which is the portion that the auto is attached to.

AIR POWERED/PNEUMATIC JACK – Pneumatic knuckleboness have a really different construction compared to scissor knuckleboness. This type of construction requires much less input force by the user to run the merchandise. Alternatively of utilizing a simple mechanical construction, it uses pressurised gases to make mechanical gesture. It consists of a Piston that when pressurised gases are let into this Piston, it expands, coercing the

construction to lift. This construction besides consists in holding an air control valve that controls the sum of tight air traveling into the Piston. This valve is so opened to allow the gases flight and lower the construction.

These types of knuckleboness have an mean lifetime of 10 old ages if operated decently and on a regular basis serviced.

The efficiency of pneumatic knuckleboness is lower when compared to other structured such as hydraulic ; this is because pneumatic knuckleboness are powered by air and the wet in the air can do pneumatic tools to stop dead up, doing them unserviceable. These knuckleboness are besides loud to utilize and non every bit precise as some others because the air that is used is more compressible therefore can non be controlled as exactly. There is besides another issue with these types of knuckleboness, the hosiery that connects the air compressor to the doodly-squat construction, if non tightened decently, can interrupt free and move in the air at high velocities, this could be potentially unsafe to the operator.

There is besides a newer version of this type of doodly-squat which consists in holding a hosiery that connect the fumes pipe of a auto to the chief organic structure and by holding the auto running, the exhausts from the fumes, alternatively of get awaying into the ambiance, they are collected by this pipe and forced to travel in the chief organic structure of the doodly-squat (balloon) , doing it to blow up and raise the auto ; the vehicle can stay upraised for up to 45 proceedingss. As the construction of this is made from really soft stuffs, it would do the vehicle really unstable during operation.

Fig. 2. shows a image of an air powered doodly-squat with departers to command the sum of tight air traveling into the lifting mechanism.

Fig. 3. shows the new type of air powered doodly-squat, with hose attached to the fumes of a auto.

hypertext transfer protocol: //www. engadget. com – Colossus ' s air doodly-squat raise your auto with hot air-2012

hypertext transfer protocol: //www. ehow. com – Car doodly-squat specifiations-2012

hypertext transfer protocol: //www. liftandshift. com. au/product_pic/pictures/1002340. jpg

hypertext transfer protocol: //www. blogcdn. com/www. engadget. com/media/2008/09/titan-470. jpg

Figure 2 – air powered doodly-squat – www. liftandshift. com – 2012

Figure 3 – New compressed air doodly-squat – www. engadget. com – 2012

HYDRAULIC JACK – A hydraulic doodly-squat has a construction that uses a liquid to force and run a Piston for the lifting of the construction. This type of mechanism uses Pascal ' s rule which states that if there are two cylinders connected to each other, by using a force to the smaller cylinder, would ensue in the same sum of force in the big cylinder but as the larger cylinder has a bigger country, the end product force would be greater. The more the difference in size of the cylinders, the higher the end product forces.

The mechanism of this is represented by the undermentioned equation:

F= PA F= force P= Pressure A= Area

As shown above, the force per unit area that would be applied in the little cylinder is the same as the 1 in the larger cylinder but by holding a bigger country to be multiplied by, it creates a larger force.

This type of construction consists in the reservoir which shops the hydraulic fluid, a pump which draws the fluid that is operated by a departer: by drawing the departer up, it allows the fluid to come in the little cylinder and by forcing the departer back down, it forces the fluid to come in the chief Piston doing it to spread out, leting the construction to lift. There is besides a valve that stops fluids from get awaying from each cylinder. When the doodly-squat needs to be lowered back down, a release valve is opened which allows the fluid to travel back in the reservoir.

Fig. 4. represents a hydraulic doodly-squat with the departer that allows the circulation of the fluid from the pipes to the little and chief cylinder.

hypertext transfer protocol: //www. ehow. co. uk/ – Car doodly-squat specifications – 2012

hypertext transfer protocol: //www. physlink. com – How does a hydraulic doodly-squat work? -2012http: //merchantmachinery. com/wp-content/uploads/2010/04/three-ton-hydraulic-jacks. jpg

Figure 4 – Hydraulic doodly-squat – www. merchantmachinery. com – 2010

ADVANTAGES AND DISADVANTAGES OF DIFFERENT JACKS

TYPE OF JACK

Advantage

Disadvantage

SCISSOR JACK

Cheap.

Easy to run.

Compact construction.

Universal design.

Low input force for operation.

No escape.

No cost to run.

Supports less weight when compared to others.

Material can snag under force per unit area.

HYDRAULIC JACK

Lift heavier burden compared to others.

Low input force.

Less power needed compared to Pneumatic.

Stronger than pneumatic.

High initial cost.

Heavy construction.

Occupies a batch of infinite.

Hazards of leaks.

Possible fire jeopardy (oil leaks) .

High force per unit area fluid can leak at high speed and cause injury.

Oil must be filtered on a regular basis.

Complex structure/operation.

AIR POWERED/PNEUMATIC JACK

Quieter compared to hydraulic doodly-squat.

Stronger than scissor doodly-squat.

Lower initial cost compared to hydraulic.

If leaks occur, there is no muss as its tight air.

More expensive than scissor doodly-squat.

Expensive to run.

Occupies a batch of infinite.

Some systems use gas that could be toxic alternatively of tight air.

Table – Advantages/disadvantages of auto knuckleboness

hypertext transfer protocol: //www. ei. org/ – Engineering information-2012

hypertext transfer protocol: //www. enme. umd. edu/ – ‘ Portable contrsuction rubbish compactor’-2012

All the types of auto knuckleboness researched portion the same jobs that were stated in the proposal papers.

The jobs that will be attempted to work out are:

The operation of the auto doodly-squat on un-even, away route surfaces every bit good as on the route.

The operation of the auto doodly-squat in hapless or no light conditions.

The easiness of usage of the auto knuckleboness (the purpose is to plan an fond regard that would do the operator cognize how to utilize the tool, even if they have no experience in the operation.

Sustainability is a large job in the universe of today ; an purpose that would assist to work out this job by planing a doodly-squat construction that is really sustainable, but at the same clip, demands to hold equal or better belongingss than bing merchandises.

EXISTING OFF-ROAD JACKS DESIGNS

HI-LIFT JACK

The high lift doodly-squat is a mechanical device used to raise autos in a perpendicular way while being off route. They are normally built with a combination of dramatis personae and stamped steel. They have a really big construction that varies from 36 to 60 inches in tallness.

As shown in fig. 5. the doodly-squat consists in a long saloon that allows the high to happen, a steel grip for its operation, a handle spring cartridge holder which holds the grip in place, a big base unit for stableness and an extruded constituent that is hooked to the auto that needs lifting. The long saloon besides has mounting pins which allow the mechanism to lift and non fall down to its original place.

The maximal weight that this type of doodly-squat can keep is 2273kg.

Even if this type of doodly-squat can keep a big sum of weight, there are some of import jobs with the construction ; being such a big tool, it ca n’t be stored in an mundane auto as highs can make up to 4ft. Another job with this merchandise is its weight ; being such a big tool it weighs 14kg which means that non everyone is able to run it with easiness. It is besides an expensive tool and holding so much stuff, non every bit sustainable as it could be. http: //shoreline4x4. com. au/images/60 % 20high % 20lift % 20jack. png

hypertext transfer protocol: //shoreline4x4. com – High lift heavy responsibility 60 ” jack-2012

Figure 5 – Hi-lift doodly-squat – www. shoreline4x4. com – 2012Fig. 5 shows an image of the Hi-lift auto doodly-squat, dwelling of the base unit, the height saloon and the departer that allows the lifting due to the mounting pins.

Sand CAR JACK

The name of this type of auto doodly-squat explains its intent ; this is an off route doodly-squat that is easy operated on sand.

There is n’t much information on this peculiar tool but the information gathered show that it has broad, anti-flotation Surs for easy motion on the sand and capable of raising the weight ; it can raise a construction up to 1. 5 metric tons and it has a 14 inch shot for easy lifting.

Its axels are made from 1 A? inch diameter steel and hubs made from 6061 with pressed in oil-lite bushings to manage the weight.

Sing the size of the tool, it can be comparatively light when compared to the hi-lift doodly-squat.

This is a good tool for the operation on sand, but it excessively has some jobs and disadvantages:

Like the hi-lift doodly-squat it has a big construction that can non be stored in a auto easy, it ‘ s merely suited on sand surfaces and cost between ? 100 and ? 200.

The chief job with this type of construction is that it would n’t be able to be operated on different surfaces as the wheel might get down to turn over as this type of doodly-squat does non hold a brake, and besides it would n’t be suited for un-even harder surfaces such as clay or Fieldss where the wheels can non drop in every bit much as they would on sand. Finally, holding such a big construction, the merchandise is non every bit sustainable as it potentially can be.

hypertext transfer protocol: //www. duneguide. com/ – Merchandise reappraisal – Sand auto jack-2010

hypertext transfer protocol: //www. duneguide. com/images/DirtDemon-Jack-002. jpg

Fig. 6. shows a image of the sand auto doodly-squat being operated (raising an off route roadster on sand) .

Figure 6 – Sand auto doodly-squat – www. duneguide. com – 2010It shows the wheels that are sunk in the sand for stableness of the construction ; as stated above, this would non be the instance on different types of surfaces.

MATERIALS CURRENTLY USED FOR MANUFACTURING OF JACKS

MEDIUM CARBON STEEL

Low ALLOY STEEL

ALUMINIUM ALLOY

Monetary value

(GBP)

0. 44-0. 484

0. 55-0. 612

1. 46-1. 61

Density

(kg/m3)

7. 8e3-7. 9e3

7. 8-7. 9

2. 5e3-2. 9e3

Output STRENGTH

(MPA)

305-900

400-1500

30-500

Hardness

(HV)

120-565

140-693

12-151

FRACTURE TOUGHNESS

(MPA. m0. 5)

12-92

14-200

22-35

EMBODIED ENERGY

(MJ/kg)

25. 1-27. 8

28. 7-31. 7

198-219

Carbon dioxide

(kg/kg)

1. 72-1. 9

1. 93-2. 13

12. 2-13. 4

RECYCLE?

Yes

Yes

Yes

Table 2 – Properties of stuffs – CES Edupack – 2012

After researching bing auto doodly-squat merchandises it came to the decision that there is a large market for off route knuckleboness usage on uneven evidences.

This is because, all the bing auto knuckleboness that autos are equipped with are designed to be operated on the route, and the 1s that are designed for off-road usage have limited operations ; for illustration the sand doodly-squat is limited for use merely on sand surfaces as the wheels would non give the same support on different surfaces ; this is because if it is operated

on a different surface, the wheels might turn over, doing the doodly-squat to travel, and they would n’t be able to drop in the land decently to derive stableness. The Hi-lift auto doodly-squat, even being able to be operated on different surfaces, it has a really big construction and it could be potentially hard and unsafe to manage and run. Both of these types of knuckleboness are non really sustainable as they use a batch of stuffs to be manufactured. The biggest job that all the above knuckleboness have besides in common is that they can merely be operated on comparatively level surfaces ; they would non be able to be operated if the surface is un-even.

There are besides some other minor jobs which when solved, would better the quality and usage of the merchandise ; for illustration, an off route doodly-squat would be used off route, which means that the milieus of the country where it would necessitate to be operated could hold low/no light ; this could perchance be solved by holding little LED visible radiations attached to its construction. Another rebuff job is the cognition of operation ; some users might non hold any cognition on how to utilize a auto doodly-squat and might attach it to the auto in the incorrect manner, so by holding a really simple and clear fond regard it could do the operation much easier.

All these major jobs could be solved by holding a smaller construction which requires less material, holding a base unit that would be suited for all different types of evidences (on and off route) and analyzing stuffs to detect the most efficient one tantrum for its occupation, sing cost, strength and the environment.

More in deepness, possible solutions rating will be carried out to finalize the different solutions and work out the jobs.

PATENTED METHODS

When researching for new possible solutions to work out jobs, the user has to be careful that the new design is “ legal ” . This means that some general research has to be done on bing patents to do certain that the design is non copied from patents. This includes every portion of the construction, from the full frame, to smaller parts such as the fond regard of the doodly-squat for autos.

These are a twosome of illustrations of bing patents that interior decorators have patented for copyright grounds:

Google patents, 1936 ‘ vehicle doodly-squat ‘ Patent num. 2054211

Figure 7 – Car doodly-squat fond regard patent -1936- Google patents.

Fig. 7. shows some proficient drawings of a patented constituent of a auto doodly-squat. This specific constituent is an fond regard for vehicles. It shows different positions of the constituent and includes subdivision positions to explicate farther how the portion works. This is patent 2054211 which has an issue day of the month of the 15th of September 1936. It besides has a description of the constituent saying what it is and how it works included within the patent papers. (see appendix aˆ¦.. for full patent)

Figure 7 – Car doodly-squat construction patent – 1974 – Google patents

Fig. 7. shows a drawing of another patented design ; this is a patent for the full construction of the doodly-squat. It explains how the construction works to raise vehicles up. The full patent besides has different positions of the design and different subdivisions such as the background and sum-up of the innovation.

At the beginning of the patent there is besides an abstract which is a twosome of sentences explicating what the patent consists in and how the merchandise works. (See appendixaˆ¦ . for full patent.)

Google patents, 1974 ‘ Extendable mechanism ‘ Patent num. 3806093

POSSIBLE SOLUTIONS

As stated before, the current knuckleboness that are out in the market of today have some jobs ; to seek and get the better of the jobs some possible solutions were generated in footings of new designs. These possible solutions will so be evaluated utilizing specific quality tools that will be researched to detect which possible solution is the most suited 1 for this undertaking.

OPERATING AT NIGHT

The first job that was evaluated was the operation of the doodly-squat in hapless or no light conditions ; this is a large job as the type of doodly-squat that will be designed is for off route usage, which means that there would be a high opportunity that the operator would hold to utilize the doodly-squat in a ailing illuminated country.

There are a twosome of possible solutions that can potentially be used to get the better of this job ; the first solution is to hold a construction that would glow in the dark ; this manner the user can see where the doodly-squat is placed and attached to the auto. There are besides more executable solutions such as attaching some LED visible radiations to the base of the construction ; this would let the user to easy see both the doodly-squat and the subdivision of the auto that the doodly-squat needs to be attached to. The fond regard of the LED visible radiations besides split into more possible solutions when the power to run them is considered ; the beginning of power used could be from a simple battery placed inside the base of the doodly-squat, another more sustainable beginning of power could be utilizing kinetic energy ; the LEDs would be connected to a mechanism that generates energy by turning a grip multiple times, attached to the base. The concluding possible solution is holding solar powered LEDs. This would consists in the LEDs being connected to little solar panels attached to the doodly-squat ‘ s supports which would bring forth energy ; this solution does hold a job as usually, the doodly-squat would be stored in the auto where it can non acquire any sun-light to bear down the battery that would run the LEDs.

OPERATING ON OFF-ROAD/UN-EVEN SURFACES

Another job that was looked at is the most of import job for the use of this type of doodly-squat ; the job of operation on off-road/un-even surfaces. The first possible solution was to hold a bigger base unit that would assist to distribute the weight of the vehicle, leting the doodly-squat to stay on the surface and non drop in, this would work off-road but non on un-even

surfaces ; this job was solved by puting six legs perpendicular to the base of the doodly-squat to let a stable construction.

Another solution was to attach a tripod type construction to the base ; it would hold three legs at an angle which are attached by a big (20-30mm diameter) threaded constituent ; the base unit would hold a threaded hole to let the tripod to be screwed on and off easy. This would do all the emphasis of the construction to concentrate on the fond regard of the legs, so the legs would hold to be designed in a really strong construction that would back up the weight.

A different type of legs fond regard was besides sketched ; this is a simpler design ; it is similar to the tripod construction but all it consists in is three legs with a threaded country at the top that would merely sleep together in the base unit thanks to the threaded holes

Adjustment Mechanism

Suiting mechanisms can change in autos so this is a job that could potentially be solved by bettering the adjustment of the doodly-squat.

The first solution was to plan a simple long round constituent which would be for good attached to the underside of the auto (male) and holding another fond regard on the doodly-squat (female) that would slot in the constituent on the auto, making a tight and stable tantrum. This would do the operation clearer and easier to make.

The other possible solution was to plan a constituent attached to the doodly-squat that started with a large surface fond regard that would bit by bit

diminish until the two terminals would run into ; this would let the fond regard to be a cosmopolitan tantrum, at different sizes of auto fond regards can be attached to this doodly-squat thanks to the alteration of length of this peculiar constituent.

Type OF STRUCTURE

Many different types of constructions were considered such as hydraulic and pneumatic powered doodly-squat, but merely simple mechanical constructions were used in the possible solutions, as one of the purposes of this undertaking is to maintain the merchandise, inexpensive and sustainable.

One type of construction method is to utilize cogwheels, by holding a chief cogwheel that is powered by a grip operated by the user would coerce a 2nd or even a 3rd cogwheel to revolve which would be attached to a constituent that would lift and contract harmonizing to the rotary motion. This turns rotary gesture to linear gesture but it does non alter horizontal force to perpendicular.

The other type of construction consists in utilizing a simple construction made with standard back uping weaponries that would utilize a threaded constituent to the operation ; this uses the same method as a scissor doodly-squat. This type of construction besides turns rotary gesture to linear, and alterations horizontal force to perpendicular.

(includeaˆ¦aˆ¦ ” refer to appendixaˆ¦.. “) (scan studies to set in appendix)

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