

Human Power & Human Powered Machines: A Review

Mr. Anup Ghurde¹, Prof. T. A. Koli², Prof. V. H. Patil³

PG Scholar, Dept. Of Mechanical Engg., Godavari COE, Jalgaon, M.S., India¹

Professor, Dept. Of Mechanical Engg., Godavari COE, Jalgaon, M.S, India²

HOD, Dept. Of Mechanical Engg., Godavari COE, Jalgaon, M.S, India³

ABSTRACT— Human Powered generators have been of enthusiasm at many spots where no other option power generator has been accessible. While utilizing pedal power is not another idea in itself, it has not been effectively utilized on more extensive scale. Control created by human can be changed over from mechanical to electrical vitality by utilizing either a dynamo or an alternator. This standard can be reached out to Air Conditioners control mobiles, iPods', portable PCs home apparatuses and so forth. Power can likewise be created from the human endeavors or human vitality. This human vitality can be given to the driving haggles this driving wheel to alternator can deliver the control lastly we can utilize this power for diverse applications like as ahead of schedule as expressed. In this paper we proposed one new framework for producing the power with the assistance of this framework the individual can keep up a decent physic and alongside it control can likewise be created. This paper presents strategies to create power by accelerating. It likewise clarifies in detail the strategy utilizing alternator to produce the control.

KEYWORDS— Human Powered Machines, Alternator, driving wheel, pedaling, AC, VCR cycle.

I. INTRODUCTION

All through history human vitality has for the most part been connected using the arms, hands, and back. With minor special cases, it was just with the innovation of the sliding-situate paddling shell, and especially of the bike, that legs moreover started to be considered as an "ordinary" method for creating power from human muscles. A man can produce four circumstances more control (1/4 torque (hp)) by pedaling than by hand-turning. At the rate of 1/4hp, nonstop pedaling should be possible for just brief periods, about 10 minutes. Notwithstanding, pedaling at a large portion of this power (1/8 hp) can be supported for around a hour. Pedal power empowers a man to drive gadgets at an indistinguishable rate from that accomplished by hand-wrenching, be that as it may, with far less exertion and exhaustion. Pedal power additionally lets one drive gadgets at a speedier rate than before, or work gadgets that require excessively control for hand-wrenching. Throughout the hundreds of years, the treadle has been the most basic technique for utilizing the legs to deliver control. Treadles are still basic in the lowpower extend, particularly to sew machines. Verifiably, two treadles were utilized for a few assignments, be that as it may, and, after its all said and done the greatest yield would have been very little, maybe just 0-15 percent of what an individual utilizing pedal worked wrenches can create under ideal conditions.

Be that as it may, the mix of pedals and wrenches, which today appears an undeniable approach to create power, was not utilized for that reason until recently. It was just about 50 years after Karl von Kraus developed the steerable foot-moved bike in 1817 that Pierre Michaud included pedals what's more, wrenches, and began the huge flood of eagerness for bicycling that has kept going to the exhibit. The principle utilization of pedal power today is still for bicycling, at any rate in the powerful range (75 watts or more of mechanical power). In the bring down power extend there are various employments of pedal power- - for horticulture, development, water pumping, and electrical era - that appear to be conceivably beneficial, in any event when electrical or interior burning motor power is inaccessible or exceptionally costly.

India is the second most crowded country in the world. In the same way as other different nations where farming is the primary movement, biomass and other non-business energizes constitute around 40% of vitality necessity in India. Around 85.49% of Indian towns are charged; many won't be charged for impressive time. The utilization of power in the

nation is expanding at the rate of 10% every year. The vitality use has been expanding through years, yet there has been no adequate increment in the generation.

II. LITERATURE REVIEW

Sharad Kumar Chandrakar, Ankit Aditya, Ruchika Sinha, Sourabh Mohre, Vinod Dubey and Sourav Majumdar (2015) The paper gives a mechanical gadget to creating power for home lighting utilizing the natural vitality of the muscles of human. The venture objective was to configuration, manufacture also, tentatively examined of mechanical gadget to charge a battery with a 12 volt DC yield for 1.5 billion individuals who depend on lamp oil for light. This objective must be met inside the requirements of a low creation cost and high security. The extend brings to the table a sturdy item with moderately great productivity. This is additionally inferred that created mechanical gadget is itself a little scale industry for charging batteries at country and detached ranges.

M. P. Mohurle, D.S. Deshmukh, P. D. Patil (2016) In this human power there is tremendous extension in efficient utilization of Bicycle instrument as an elective vitality Source consequently renewable vitality era and also practicing for good wellbeing cause. In this paper a vitality searching framework manufactured with reused, free parts and focused at vitality expended while practicing is displayed. The measure of gathered vitality is more than adequate to rouse us not to give it a chance to be squandered into warmth or different types of un-helpful vitality. While building the rummaging framework creators watched a couple of issues identified with both interconnections amongst mechanical and electrical frameworks, also as interconnection between the searching framework furthermore, the electrical system. Answers for these issues are evaluated. Efficient point of view demonstrates fundamental utility due to the reused segments, the framework is moderate. Every one of the segments can still be utilized independently.

Prasad A.Hatwalne, Sushil T.Ambadkar, R.V.Paropate,Vivek R.Gandhewar, A.M.Wankhade (2011) The primary target behind improvement of pedal worked flour factory was on delivering shabby, simple to work framework which can be effortlessly manufactured by promptly accessible material and in this manner we proposed a oversimplified outline that can convey proficient, gainful also, solid flour process which can be utilized as a part of country as well as urban regions. this gear can be effortlessly worked by semi rather lowskilled administrator. Encourage this gear can without much of a stretch discover its place where there is no or constrained power supply.

Kajogbola R. Ajao, Kadiri Mustapha, Modupe R. Mahamood and Muritala O. Iyanda(2010) In designing the pedal-powered soap mixer, the focus was on cheap, readily-available materials and we proposed a simplistic design that can deliver productive, efficient, and reliable mixer for use in local factory shop floor. This equipment can adequately replace electric motor-driven mixer in rural areas where there is no or limited supply of electricity, saves cost that would otherwise be spend to service utility bills and equipment is almost maintenance free.

III. WHY PEDAL POWER

We investigated parcel of various methods for lighting the rooms. The necessities were very insignificant, just lighting was the essential need. We considered sun oriented photovoltaic, weight lamp oil lights, fluid petroleum gas terminated mantle lights and so on. Perfect would have been the photovoltaic framework yet it is restrictively costly in India. In this manner we chose to build up a power era framework with pedaling or human vitality for battery charging. Pedal power independent from anyone else is not another idea in any case, is not broadly utilized. The essential thought was to pedal at an agreeable speed and still produce enough energy to make it advantageous. We felt a proportion of 1:3 to 1:5 of pedaling time to gently time would be urging enough to utilize along these lines of lighting and we felt this could be accomplished by utilizing smaller fluorescent lights.

IV. HUMAN POWERED AIR CONDITIONER PARAMETERS

Pedaling Rate: How quick ought to a man pedal? Human creatures are exceptionally versatile and can deliver control

over an extensive variety of pedaling paces. Be that as it may, individuals can deliver more power- - or the same measure of force for a more drawn out time- - in the event that they pedal at a specific rate. This rate shifts from individual to individual relying upon their physical condition, however for every person there is a pedaling speed somewhere close to straining and thrashing that is the most agreeable, and the most effective in terms of force generation. (For quite a long time, this reality was clearly not perceived. The transcendent technique for human power generation was to strain with most extreme quality against a gradually yielding resistance. This is not one or the other agreeable nor productive. Nor is the inverse extraordinary of thrashing at full speed against a little resistance. A straightforward decide is that a great many people locked in in conveying power persistently for 60 minutes or more will be most productive when pedaling in the scope of 50 to 70 cycles for each moment (rpm).

Gear Ratios: The relationship between the pivoting speed of whatever is being driven and the pedaling rate (both communicated in cycles every moment) is called the apparatus proportion. Most commonsense uses of Pedal power will utilize bike chain drives, which on bikes extend from 1:1 (the back wheel turns at the same speed as the turns at five circumstances the speed of the wrenches) for high apparatuses.

Control era utilizing pedaling: There are different renewable vitality sources for example, sunlight based, wind, hydro control and so on. What's more, individuals utilize fossil fills which are non-renewable. These assets are extremely costly; in this way there is a requirement for shabby, renewable vitality source. As long as we are pedaling and the framework is working fine, we can get the power at whatever point required. Control era utilizing bike is extremely shoddy and eco-accommodating. Despite the fact that individuals have been utilizing pedal power for different everyday works.

The rotational vitality that is produced at the point when the pedaling turns on account of the utilization of constrain on the pedals can be utilized as a part of two ways. This vitality can likewise be utilized as a part of dynamo/ alternator, which is then changed over to electrical vitality.

Dynamo: Dynamos are alternators outfitted with lasting magnets, which produces air conditioning current. Two sorts of dynamos are accessible i.e., center point dynamo and jug dynamo. Center point dynamo is assembled into the center point of the bi-cycle wheel. Here era of power is finished by utilizing the turn of the bike wheel. A jug dynamo is likewise a little electric generator like center dynamo. It is by and large set to the genuine wheel of the bi-cycle. A jug dynamo acts like a little alternator. Dynamo can be utilized to change over mechanical vitality to electrical vitality rotating current can be created ordinarily utilizing the dynamo. This current can control gadgets which chip away at AC specifically and can be changed over and utilized for gadgets chipping away at DC. The measure of force produced from a dynamo by pedaling is adequate to control the gadgets, which require low power. The majority of the electronic gadgets including cell phones and iPods can be fueled utilizing this. These gadgets can be charged while either riding the bi-cycle or by keeping the bi-cycle stationary and pedaling. Dynamo is little light weight and is best to use in bi-cycles.

Alternator: An alternator is only an AC generator which is machine that proselytes mechanical vitality into electrical vitality. Generators are subdivided into two classes contingent on whether the electric current created is exchanging current (AC) or direct current (DC). The essential rule on which both sorts of alternators work is the same, in spite of the fact that the points of interest of development of the two may contrast to some degree.

V. PROPOSED WORK

In 1986, David Gordon Wilson presented the Understing of Pedal Power in which he described various aspects regarding human efforts applied on pedal, its power output with respect to time. In 1998, J.P. Modak & S.D. Moghe has developed human powered machine for the manufacturing of lime-flyash-sand bricks. In 2010 Kajogbola et al devoloped Pedal Powered Soap Mixer. In 2011 Prasad A. Hatwalne et al Designed and developed Pedal operated flour mill. In 2013 Umesh Bokade et al Designed and Developed manually energised water distillation device. In 2013, P.B.Khope & J.P.

Modak Developed and evaluated the performance of Human powered Flywheel motor operated Forge Cutter. Based upon above mentioned researched carried out it is proposed that human power can also be used to run Air Conditioning System working on VCR cycle.

System setup for power supply & transmission: In this work we fundamentally utilize the human vitality i.e. a man can put his push to bicycle pedals, this we can call it as pedaling. This pedaling gives the rotational work or mechanical vitality. This mechanical vitality is then supplied to compressor by using chain and sprocket as a part of the framework.

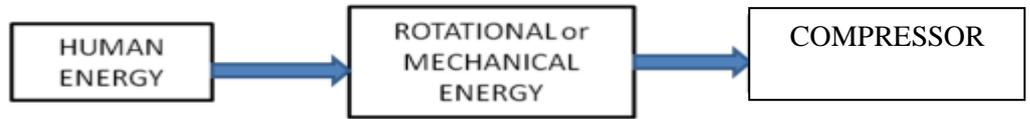


Fig.1 Line Diagram of Human Power Conversion upto Compressor



Fig.2 Line diagram of Working of System

Fig. 3 demonstrates the framework set up, we utilized this framework to run compressor. In this framework, bicycle is connected to the compressor with help of chain and sprocket mechanism. At the point when the individual gives the movement to the pedals, that pedal movement exchanged to the driver, and this driver is specifically associated with the pedals, and this driver is additionally in contact with the driver and this supporter is straightforwardly associated with the compressor, with this compressor compresses refrigerant present in the air conditioning system working on VCR cycle. Hence the main power required for the gas compression in VCR cycle is supplied by Human Power in form of pedaling, system is proposed as Human Powered Air Conditioning System.

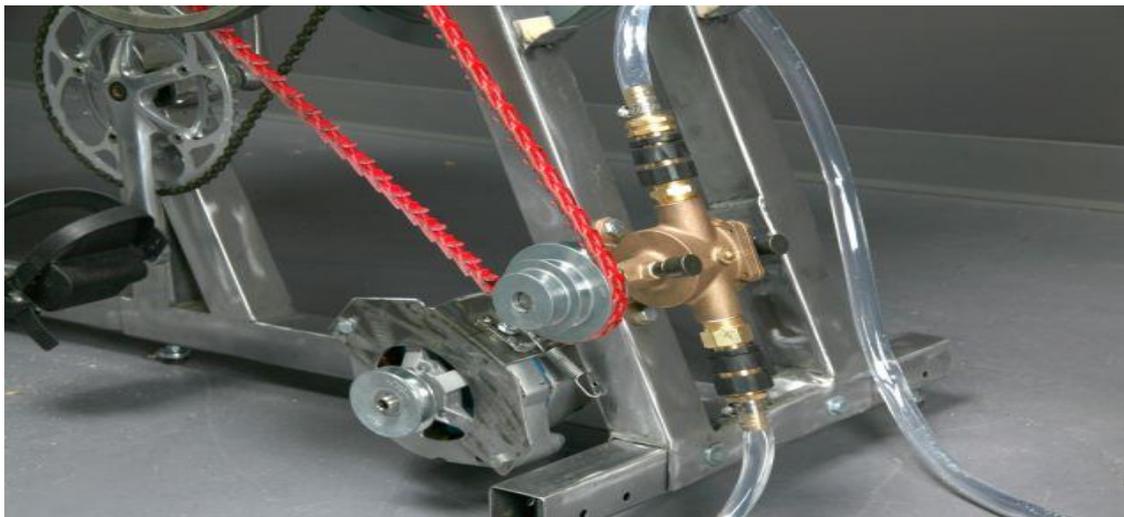


Fig. 3 system setup

Components used in the system:

The following are the basic components we used to convert the rotational or human power to the Compressor Input.

Sr.No.	Name of Component
1.	Bicycle
2.	Chain Drives
3.	Driver 2 No.
4.	Driven/Follower 2 No.
5.	Ball Bearing
6.	Car AC Compressor
7.	VCR Kit

Model Calculations:

Let diameter of the driver 1 = $D_1 = 210$ mm

Diameter of the follower = $d_1 = 70$ mm

Diameter of the driver 2 = $D_2 = 250$ mm

Diameter of driven 2 = $d_2 = 90$ mm

Considering average speed of Driver 1 = $N_1 = 60$ rpm

$$\begin{aligned} N_1 / N_2 &= D_1 / d_1 \\ N_2 &= (210/70) * 60 \\ N_2 &= 180 \text{ rpm} \end{aligned}$$

Similarly, Speed of Compressor $N_4 = 500$ rpm

Starting rate required is 60 to 100 rpm and which is given by pedaling, up to certain time (10seconds) to achieve certain speed and afterward after in the event that we increment the pedaling speed the power created is moreover expanded and that power we can store in a battery what's more, this created power can be used wherever required for a few applications. When we give 60 rpm at first and this can be expanded to 100rpm by the breadth proportion or adapt proportion and as per the model figuring it demonstrates that the fundamental suspicion estimations of the driver and the determined/devotee width and the speed of the devotee can be expected as 210mm, 70 mm and 60 rpm and which relies on the suitable speed required to run the compressor.

VI. APPLICATIONS

Comprehensively, uses of pedal power are conceivable when the power level required is underneath a fourth of a torque (that is, beneath around 200-500 watts). Normal uses of stationary pedal power incorporate Air Compressor, Fan Motor, pumping water, crushing grains or metals, destroying, or sifting. Pedal power can likewise be utilized to produce power for individual uses- - to work room lights, a TV, or a projector, for instance. Excess power could be redirected to a battery-charging circuit. The least demanding approach to do this is basically to drive either a DC generator or an AC alternator through a circuit encouraging a battery in parallel with the heap. A similar circuit could be utilized for an alternator of higher power, chain-driven from the wrenches, through a fitting apparatus proportion. The same circuit could be used for an alternator of higher power, chain-driven from the cranks, through an appropriate gear ratio.

Other pedal power applications include:

- Air Conditioner
- Cassava graters
- Coffee pulpers
- Coffee/grain hullers
- Cracking of oil palm nuts
- Fiber decorticators--sisal, manila, hemp, etc.
- Winches or hoists
- Balers
- Potter's wheels
- Flexible shaft drive for portable grinders, saws, etc.
- Tire pumps

- Sewing machines

The utilization of pedal power for Air Conditioner actualizes that need to run with more power is suggested. A trimmer portrayed what's more, outlined in *Bicycling Science* required so much vitality to move the trimmer over the ground that a little extent of the rider's aggregate vitality went into g. This loss of vitality would happen for any utilization - like furrowing, developing, or nerve racking - in which the vehicle needed to move over the ground. McCullagh's *Pedal Power* depicts a few outlines in which the pedaling unit is stationary at one edge of the plot, while the furrow or other execute, guided by a moment laborer, is pulled by a rope or chain. This guideline ought to be gone for further.

VII. CONCLUSION

The absence of accessible electrical power is a noteworthy issue and it influencing correspondence, instruction and security. a solid wellspring of renewable vitality could give answers for these basic issues. Correspondence could be enhanced by permitting individuals to charge the portable telephones. a reasonable wellspring of electric power could give light, permitting kids' to consider after dull. the electric lighting could decrease the requirement for possibly perilous candles, fires, and lamp oil lights. The framework portrayed above is being created in light of these issues. it is being planned with particular objectives to make the best affect conceivable with multy assignments. ease, versatility, unwavering quality, and convenience are all basic to the accomplishment of the framework.

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