FABRICATION OF SUPERCHARGER IN TWO WHEELER ENGINE

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ABSTRACT

A super charger is an air compressor used for forced injection of an internal combustion engine. The purpose of a super charger is to increase the density of air entering the engine to create more power. A supercharger is the compressor is powered by the rotation of chain sprocket in the bike. In addition to the foregoing advantages the supercharger gives greater mechanical efficiency and fuel economy .Moreover, the engine can be made smaller ,the compression can be well below that at which detonation occurs and still afford a surplus of power ,heat losses in the water jacket are reduced because larger chargers of mixture in the cylinders

Keyword: - *carburetor, chain sprocket etc….*

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1. INTRODUCTION

A supercharger is an air compressor that increases the pressure or density of air supplied to an internal combustion engine. This gives each intake cycle of the engine more oxygen, letting it burn more fuel and do more work, thus increasing power.

Power for the supercharger can be provided mechanically by means of a belt, gear, shaft, or chain connected to the engine's crankshaft. When power is provided by a turbine powered by exhaust gas, a supercharger is known as a turbo supercharger – typically referred to simply as a turbocharger or just turbo. Common usage restricts the term supercharger to mechanically driven units.

There are two main types of superchargers defined according to the method of gas transfer: positive displacement and dynamic compressors. Positive displacement blowers and compressors deliver an almost constant level of pressure increase at all engine speeds (RPM). Dynamic compressors do not deliver pressure at low speeds; above a threshold speed, pressure increases with engine speed

2. DESCRIPTION OF EQUIPMENTS

2.1 CARBURETOR

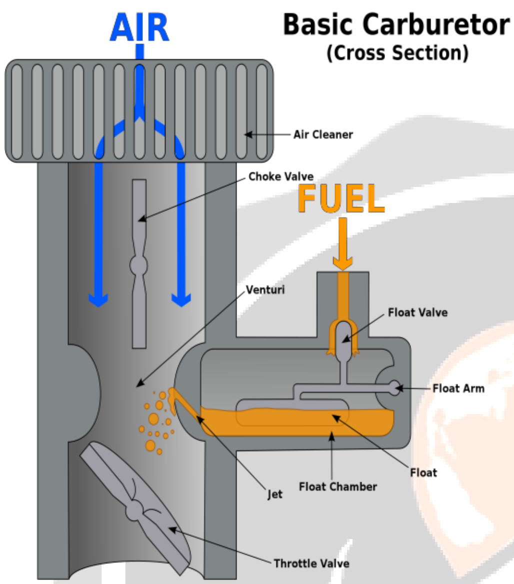
The carburetor works on Bernoulli's principle: the faster air moves, the lower its static pressure, and the higher its dynamic pressure. The throttle (accelerator) linkage does not directly control the flow of liquid fuel. Instead, it actuates carburetor mechanisms which meter the flow of air being pulled into the engine. The speed of this flow, and therefore its pressure, determines the amount of fuel drawn into the airstream.

When carburetors are used in aircraft with piston engines, special designs and features are needed to prevent fuel starvation during inverted flight. Later engines used an early form of fuel injection known as a pressure carburetor.

Most production **carburetor** (as opposed to fuel-injected) engines have a single carburetor and a matching intake manifold that divides and transports the air fuel mixture to the intake valves, though some engines (like motorcycle engines) use multiple carburetors on split heads. Multiple carburetor engines were also common enhancements for modifying engines in the USA from the 1950s to mid-1960s, as well as during the following decade of high performance muscle cars fueling different chambers of the engine's intake manifold.

Older engines used updraft carburetors, where the air enters from below the carburetor and exits through the top. This had the advantage of never "flooding" the engine, as any liquid fuel droplets would fall out of the carburetor instead of into the intake manifold; it also lent itself to use of an oil bath air cleaner, where a pool of oil below a mesh element below the carburetor is sucked up into the mesh and the air is drawn through the oil-coveredmesh; this was an effective system in a time when paper air filters did not exist.

Outboard motor carburetors are typically sided raft, because they must be stacked one on top of the other in order to feed the cylinders in a vertically oriented cylinder block.



Beginning in the late 1930s, downdraft carburetors were the most popular type for automotive use in the United States. In Europe, the side draft carburetors replaced downdraft as free space in the engine bay decreased and the use of the SU-type carburetor (and similar units from other manufacturers) increased. Some small propeller-driven aircraft engines still use the updraft carburetor design.

The main disadvantage of basing a carburetor's operation on Bernoulli's principle is that, being a fluid dynamic device, the pressure reduction in a venturi tends to be proportional to the square of the intake air speed. The fuel jets are much smaller and limited mainly by viscosity, so that the fuel flow tends to be proportional to the pressure difference. So jets sized for full power tend to starve the engine at lower speed and part throttle. Most commonly this has been corrected by using multiple jets. In SU and other movable jet carburetors, it was corrected by varying the jet size. For cold starting, a different principle was used in multi-jet carburetors. A flow resisting valve called a choke, similar to the throttle valve, was placed upstream of the main jet to reduce the intake pressure and suck additional fuel out of the jets.

2.2 ENGINE

Motorcycle engines may be two-stroke or four-stroke internal combustion engines, but other types have been used in small numbers. The engine typically drives the rear wheel. Most engines have a gearbox with two to six ratios, reverse gear is rare but does exist for sidecar use. Power is sent to the driven wheel by belt, chain or shaft. In Europe, before the 1969 Honda CB750, engine capacities typically ranged from about 50 cc to 750 cc; but since then machines with capacities up to 2,300 cubic centimeters (140 cu in) Triumph Rocket 3 have become common. In the USA, motorcycles with large capacities have been common for much longer

Two-stroke engines have fewer moving parts than four-stroke engines, and produce twice the number of power strokes per revolution; consequently, two-stroke engines are more powerful for their mass. Two-strokes offer stronger acceleration, but similar top speed compared to a four-stroke engine. They are also easier to start] Two-stroke engines have shorter life due to poorer piston lubrication, since lubrication comes from the fuel-oil mix.

Four-stroke engines are generally associated with a wider power band making for somewhat gentler power delivery, but technology such as reed valves and exhaust power-valve systems has improved ride-ability on two-strokes. Fuel economy is also better in four-strokes due to more complete combustion of the intake charge in four-stroke engines. Nevertheless, two-strokes have been largely replaced on motorcycles in developed nations due to their environmental disadvantages. Cylinder lubrication is necessarily total-loss and this inevitably leads to a smokey exhaust, particularly on wide throttle openings. Two-stroke-engined motorcycles continue to be made in large numbers, but mostly low-power mopeds, small scooters and step-through underbones where they still compete strongly with four-strokes (including the highest-selling motorcycle of all time, the 50 ccHonda Super Cub). The major markets of two-stroke motorcycles are in developing nations.

Single-cylinder engines (aka "singles" or "thumpers") have the cylinder vertical, inclined or horizontal, the last type most common in step-through motorcycles. Single-cylinder engines require both a larger flywheel and a heavier-duty gearbox than multi cylinder engines. Small singles are cheap to build and maintain and are suitable as cheap utility motorcycles.

Until the mid-1960s, road-racing machines (such as Matchless, AJS and Norton) tended to be large singles, but since then multi cylinder racers have become the norm. Off-road and dual-sport bikes tend to use single-cylinder engines. The simplicity of these engines, often relying on a single carburetor, makes them relatively easy to maintain and repair in remote locations with few tools. Because the more modern category of on/off road Adventure bikes tends to be larger and have higher power demands, they often require multi cylinder engines that forgo simplicity in exchange for the reliability of modern fuel injection and better power to weight ratios.

2.3 BEARING

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Many bearings also facilitate the desired motion as much as possible, such as by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

The term "bearing" is derived from the verb "to bear"; a bearing being a machine element that allows one part to bear (i.e., to support) another. The simplest bearings are bearing surfaces, cut or formed into a part, with varying degrees of control over the form, size, roughness and location of the surface. Other bearings are separate devices installed into a machine or machine part. The most sophisticated bearings for the most demanding applications are very precise devices; their manufacture requires some of the highest standards of current technology.

The first modern recorded patent on ball bearings was awarded to Philip Vaughan, a British inventor and ironmaster who created the first design for a ball bearing in Carmarthen in 1794. His was the first modern ball-bearing design, with the ball running along a groove in the axle assembly.[8]

Bearings played a pivotal role in the nascent Industrial Revolution, allowing the new industrial machinery to operate efficiently. For example, they saw use for holding wheel and axle to greatly reduce friction over that of dragging an object by making the friction act over a shorter distance as the wheel turned.

The first plain and rolling-element bearings were wood closely followed by bronze. Over their history bearings have been made of many materials including ceramic, sapphire,glass, steel, bronze, other metals and plastic (e.g., nylon, polyoxymethylene, polytetrafluoroethylene, and UHMWPE) which are all used today.

Watch makers produce "jeweled" watches using sapphire plain bearings to reduce friction thus allowing more precise time keeping.

Even basic materials can have good durability. As examples, wooden bearings can still be seen today in old clocks or in water mills where the water provides cooling and lubrication. Early Timken tapered roller bearing with notched rollers

The first patent for a radial style ball bearing was awarded to Jules Suriray, a Parisian bicycle mechanic, on 3 August 1869. The bearings were then fitted to the winning bicycle ridden by James Moore in the world's first bicycle road race, Paris-Rouen, in November 1869.

In 1883, Friedrich Fischer, founder of FAG, developed an approach for milling and grinding balls of equal size and exact roundness by means of a suitable production machine and formed the foundation for creation of an independent bearing industry.

The modern, self-aligning design of ball bearing is attributed to Sven Wingquist of the SKF ball-bearing manufacturer in 1907, when he was awarded Swedish patent No. 25406 on its design.

Henry Timken, a 19th-century visionary and innovator in carriage manufacturing, patented the tapered roller bearing in 1898. The following year he formed a company to produce his innovation. Over a century the company grew to make bearings of all types, including specialty steel and an array of related products and services.

Erich Franke invented and patented the wire race bearing in 1934. His focus was on a bearing design with a cross section as small as possible and which could be integrated into the enclosing design. After World War II he founded together with Gerhard Heydrich the company Franke & Heydrich KG (today Franke GmbH) to push the development and production of wire race bearings.

Richard Stribeck's extensive research on ball bearing steels identified the metallurgy of the commonly used 100Cr6 (AISI 52100) showing coefficient of friction as a function of pressure.

Designed in 1968 and later patented in 1972, Bishop-Wise carver's co-founder Bud Wise carver created vee groove bearing guide wheels, a type of linear motion bearing consisting of both an external and internal 90-degree vee angle. In the early 1980s, Pacific Bearing's founder, Robert Schroeder, invented the first bi-material plain bearing which was size interchangeable with linear ball bearings. This bearing had a metal shell (aluminum, steel or stainless steel) and a layer of Teflon-based material connected by a thin adhesive layer.

Today ball and roller bearings are used in many applications which include a rotating component. Examples include ultrahigh speed bearings in dental drills, aerospace bearings in the Mars Rover, gearbox and wheel bearings on automobiles, flexure bearings in optical alignment systems, bicycle wheel hubs, and air bearings used in Coordinate-measuring machines.

2.4 CHAIN DRIVE

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles.

Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Another type of drive chain is the Morse chain, invented by the Morse Chain Company of Ithaca, New York, USA. This has inverted teeth.

Sometimes the power is output by simply rotating the chain, which can be used to lift or drag objects. In other situations, a second gear is placed and the power is recovered by attaching shafts or hubs to this gear. Though drive chains are often simple oval loops, they can also go around corners by placing more than two gears along the chain; gears that do not put power into the system or transmit it out are generally known as idler-wheels. By varying the diameter of the input and output gears with respect to each other, the gear ratio can be altered. For example, when the bicycle pedals' gear rotate once, it causes the gear that drives the wheels to rotate more than one revolution.

Chain drive was a popular power transmission system from the earliest days of the automobile. It gained prominence as an alternative to the SystèmPan hard with its rigid Hotchkiss driveshaft and universal joints.

A chain-drive system uses one or more roller chains to transmit power from a differential to the rear axle. This system allowed for a great deal of vertical axle movement (for example, over bumps), and was simpler to design and build than a rigid driveshaft in a workable suspension. Also, it had less un sprung weight at the rear wheels than the Hotchkiss drive, which would have had the weight of the driveshaft and differential to carry as well. This meant that the vehicle would have a smoother ride. The lighter un sprung mass would allow the suspension to react to bumps more effectively.

Frazer Nash were strong proponents of this system using one chain per gear selected by dog clutches. The Frazer Nash chain drive system, (designed for the GN Cycle car Company by Archibald Frazer-Nash and Henry

Ronald Godfrey) was very effective, allowing extremely fast gear selections. The Frazer Nash (or GN) transmission system provided the basis for many "special" racing cars of the 1920s and 1930s, the most famous being Basil Davenport's Spider which held the outright record at the Shelsley Walsh Speed Hill Climbin the 1920s.
The last popular chain drive automobile was the Honda S600 of the 1960s.

2.5 MOTOR CYCLE FRAME

A motorcycle frame includes the head tube that holds the front fork and allows it to pivot. Some motorcycles include the engine as a load-bearing, stressed member. The rear suspension is an integral component in the design. Traditionally frames were steel, but titanium, aluminium, magnesium, and carbon-fiber, along with composites of these materials, are now used. Because of different motorcycles' varying needs of cost, complexity, weight distribution, stiffness, power output and speed, there is no single ideal frame design

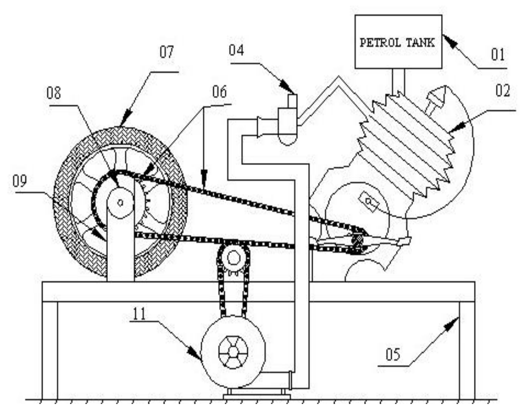
2.6 WHEEL

A wheel is a circular device that is capable of rotating on its axis, facilitating movement or transportation or performing labor in machines. A wheel together with an axle overcomes friction by facilitating motion by rolling. In order for wheels to rotate a moment needs to be applied to the wheel about its axis, either by way of gravity or by application of another external force. Common examples are found in transport applications. More generally the term is also used for other circular objects that rotate or turn, such as a Ship's wheel and flywheel. The wheel most likely originated in ancient.

The wheel is a device that enables efficient movement of an object across a surface where there is a force pressing the object to the surface. Common examples are a cart drawn by a horse, and the rollers on an aircraft flap mechanism.

The wheel is not a machine, and should not be confused with the wheel and axle, one of the simple machines. A driven wheel is a special case that is a wheel and axle. Wheels are used in conjunction with axles, either the wheel turns on the axle or the axle turns in the object body. The mechanics are the same in either case. The normal force at the sliding interface is the same. The sliding distance is reduced for a given distance of travel. The coefficient of friction at the interface is usually lower.

3. DRAWING FOR FABRICATION OF SUPER CHARGER FOR TWO WHEELER ENGINE



1	**FUEL TANK**	6	**CHAIN & SPROCKET**
2	**MOEL ENGINE**	7	**WHEEL**
3	**GEAR LEVER**	8	**BEARING BLOCK**

4	**CARBURETOR**	**9**	**SUPPORTING FRAME**
5	**FRAME BASE**	**10**	**CLUTCH WIRE**

4. WORKING PRINCIPLE

A supercharger is a small radial fan pump driven by the chain sprocket arrangement which is connected to the chain sprocket in the bike wheel. A super charger consists of a turbine which is rotated by the shaft attached to the chain sprocket. When the atmospheric air is passed into the turbine, the rotating turbine compresses the atmospheric air. Then the compressed air is allowed to enter in to the carburetor at increased pressure resulting in a greater mass of air entering the cylinders on each intake stroke. A naturally aspirated automobile engine uses only the downward stroke of a piston to create an area of low pressure in order to draw air into the cylinder through the intake valves. Because the pressure in the atmosphere is no more than 1atm (approximately 14.7 psi), there ultimately will be a limit to the pressure difference across the intake valves and thus the amount of airflow entering the combustion chamber. Because the super charger increases the pressure at the point where air is entering the cylinder, a greater mass of air (oxygen) will be forced in as the inlet manifold pressure increases.

5. LIST OF MATERIALS

FACTORS DETERMINING THE CHOICE OF MATERIALS

The various factors which determine the choice of material are discussed below.

5.1. PROPERTIES

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc. The following four types of principle properties of materials decisively affect their selection

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

The various physical properties concerned are melting point, thermal

Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc.

The various Mechanical properties Concerned are strength in tensile,

Compressive shear, bending, torsional and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties. The various properties concerned from the manufacturing point of view are,

Cast ability
- Weld ability
- Surface properties
- Shrinkage
- Deep drawing etc.

5.2. MANUFACTURING CASE

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

5.3. QUALITY REQUIRED

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

5.4. AVAILABILITY OF MATERIAL

Some materials may be scarce or in short supply, it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

5.5. SPACE CONSIDERATION

Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

5.6. COST

As in any other problem, in selection of material the cost of material plays an important part and should not be ignored.

Sometimes factors like scrap utilization, appearance, and non-maintenance of the designed part are involved in the selection of proper materials.

6. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and economical. This project "SUPER CHARGER" is designed with the hope that it is very much economical and help full to automobile vehicles.

This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

7. ACKNOWLEDGEMENT

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