

Automatic chain cleaning and lubrication system

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Abstract— *In a machine such as a motorcycle is driveable coupled to a rotatable output member by a pair of chain connected sprocket. The drive chain connecting the sprockets requires regular and periodic lubrication to assure optimized efficiency in operation and prolonged life of the chain. The modern day usage of two wheelers is such that the riders opt for smooth and frictionless ride. So, an apparatus for cleaning and lubricating a motorcycle chain is provided. It includes cleansing element reservoir, a lubricant reservoir and a device for transporting lubricant and cleansing element to an injecting device for injecting fluids onto the chain. One of the most obvious requirements of motorcycle maintenance is that of proper lubrication of the drive chain.*

Keywords: *cleansing element reservoir, lubricating reservoir*

I. INTRODUCTION

The most important requirements of motorcycle maintenance is that of proper lubrication of the drive chain. Inadequate lubrication, noticeably shortens the life of such chains and is a prime cause of chain breaks. Sprocket and chain system is mainly used for the power transmission from crank to the wheels. Therefore for proper functioning of the two wheeler this system should be effective and efficient. Hence proper lubrication and cleaning system is required for the chain. There would be a wear of chain without this system. It would also cause high friction in the chain drive system. Due to improper maintenance of chain, effective power transmission is not possible. Also due to the developed frictional heat, the sprockets and gear systems will be damaged. Chain hardening results in rough movement of the wheels. Due to these problems, smooth ride can't be offered by the vehicle. Therefore proper chain cleaning and lubrication system should be provided in every vehicles. Automatic chain lubricating devices are used extensively in industry in which the lubricant is applied automatically to the point of chain under pressure. The various types of commercially available chain lubricating devices can be classified as either a moving lubricator nozzle device or fixed lubricator nozzle device. The bicycle chains were protected from wear and corrosion by a coating of oil or grease . However, road dirt tends to adhere to the oil and the combination of the dirt and oil forms a grinding paste which increases the friction of the chain and accelerates wear thereof. It is very necessary to clean the chain often to prevent this from happening which, until now, requires the chain to be removed from the sprockets and immersed in a bath of oil-solvent. It often leads to staining of the cleaner's hands because it is a difficult task. Chain maintenance is one of the most important aspects of bicycle mechanics. Whether the bicycle is ridden in any conditional situations, type of soil in the local surfaces, type of lubricant, techniques used for lubrication, and the sizes and condition of the bicycle's sprockets ,the durability of the chain is affected by riding style and gear choice. Due to so many variables, it is impossible to do controlled experiments under real-world conditions. As a result, everybody's advice about chain maintenance is based on anecdotal "evidence" and experience. Experts give a negative opinion on this subject. This is sometimes considered as a "religious" matter in the bicycle community, and much characterized by verbal abuse rude and unpleasant things that people shout or anger with other people has been spoke in this matter between different schismatic cults.

1.1 Chains: Old And New

The past fifteen years [as of Sheldon's writing, in 1996] have seen many revolutions in bicycle design. The development of mountain bikes, disc wheels, new handlebar designs are Some of the conspicuously visible, Compare to clip less pedals, cycle computers, indexed shifting which are less visible. Derailers are much more interesting to look at and talk about, but the chain still has to do the shifting. Because People don't pay much attention to bicycle chains. After all, they all look basically alike. There has also been an invisible and little noted revolution in the construction of bicycle chains An old-style bicycle chain consisted ten parts per link. The 57-link chain used on multi-speed bike had 570 parts. The major revolution in chain design has been the introduction of the bushing less chain.

Bushing less chain has only eight parts per link. Different parts of the chain hide the bushings. Disassemble of the chain reveals the bushes. So we cannot identify by looking at a chain on a bike whether it is of bushing less design.

Sedisport was the first of this type, and other manufacturers have copied the design since it had acquired a good reputation.

1.2 Conventional Chain Construction

In a conventional chain, the tubular bushings hold the two inner side plates, which are like hollow rivets. The ends of the bushings flush with the outsides of the inner side plates are seen if you open a link of conventional chain. When the chain is assembled, the outer side plates hide the ends of the bushings. Since they are surrounded by the rollers, the middles of the bushings are not visible.

The link pins that hold the chain together run through the middle of the bushings, and the rollers roll around the outside of the bushings, so both the inside and the outside surfaces of the bushings are subject to wear.

II. DESIGN AND FABRICATION

2.1 Design

The model consists of a fixture which can be attached and detached to the bike as per our requirement. The support structure for the fixture is fastened to the bike's shock absorber bolt. This can either be fixed there permanently or removed as per the owner's requirement. The fixture has a brush which is attached to a bolt. Thus the brush can be engaged or disengaged to the chain by moving the bolt forward and backward. The fixture has two containers attached to it into which cleaner spray and oil lubricant spray can be slid in and out of the container. There is a nut and bolt arrangement on the containers which can be tilted in order to slide the spray cans inside the container.



Fig 1: Support Structure

The above figure shows a support structure, which is the main component of our project. The support structure for the fixture is fastened to the bike's shock absorber bolt. This can either be fixed there permanently or removed as per the owner's requirement. The support structure helps us to attach or detach the fixture to the bike as per our requirement. It does not cause any disturbance to the bike in any way. It just acts as a non-effective part which plays a role only in supporting the fixture.

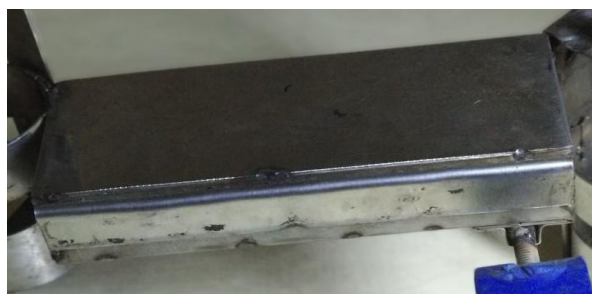


Fig 2: Fixture

The above figure shows a fixture. It has a groove like mechanism which enables it to be attached to the support structure. This fixture is attached to the support structure by just sliding onto it. This attaching process takes approximately 5 seconds time to be completed. The fixture has a brush which is attached to a bolt. Thus the brush can be engaged or disengaged to the chain by moving the bolt forward and backward. The fixture has two containers attached to it into which cleaner spray and oil lubricant spray can be slid in and out of the container.

The cleaning brush is attached to the main fixture with a bolt. The bolt mechanism helps us to actuate it front and back. When the bolt is pushed forward, the brush approaches the chain and is ready to clean the chain. And when the bolt is pulled back, it returns to its home position. Brush consists of fine hard bristles which can clean the chain effectively and efficiently. The bristles of the brush can be made to change periodically. This mechanism enables a hands free cleaning without any dirt on hand.



Fig 3: Spray bottle container

Spray bottle container is depicted by above figure. This container is attached to the fixture. It has a tilting mechanism in order to slide in and out the spray cans. The tilting mechanism contains a nut and bolt arrangement. Using this mechanism spray can be activated and deactivated as per the process of cleaning.



Fig 4: Spray Cans

We make use of two spray cans in our project. The first spray can is the cleaning agent, and the other is lubricating agent. The spray cans are placed in the containers whenever required. They can be easily added or removed due to the tilting mechanism provided on the containers.

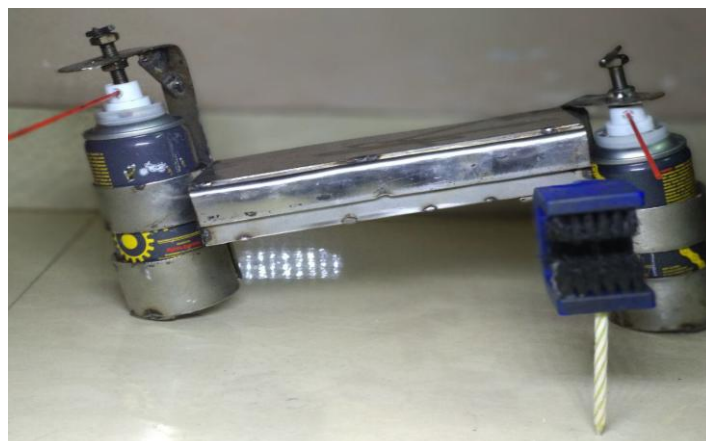


Fig 5: Final Assembly

The above figure shows final assembly of our mini project. The spray cans are in place in the container. Brush is facing the chain. The assembly is ready to be attached to the bike with the help of support structure.

2.2 Fabrication

1. Model is constructed from high strength stainless steel of thickness 1.8mm.
2. The fixture's dimension was measured and cut, folded and finally welded.
3. Brush had a different shape, which was modified as per our need.
4. Brush was attached to threaded bolt and fastened.
5. The brush was further welded to a to and fro bolt.
6. The containers are also made from stainless steel as per the dimensions of spray cans and welded to the fixture, one on either side.
7. The bolt and nut mechanism to activate the spray was welded on the tilting rod.
8. The tilting rod was riveted to the containers.

III.WORKING PRINCIPLE

The support structure is fastened to the bike's shock absorber bolt. The main fixture is positioned into the support structure. The spray cans are placed in their respective container holder and the tilting rod with spray activating mechanism is brought into the position. First the cleaning spray is activated by fastening the bolt and then the wheel is rotated to make sure that the cleaner is sprayed to every part of the chain. Then the brush is brought into action by moving the bolt forward. These two, namely, cleaner spray and the brush are in action for few rotations of the wheel to ensure proper cleaning of the chain. Once the chain is cleaned, cleaner spray and brush are deactivated by their respective means. Then the lubricant spray is activated so as to lube the chain. The speed of the wheel while lubing the chain is kept slow in order to make sure that the chain is lubed properly. Once the process is done, the fixture is removed from the support structure. The spray cans are also removed. The support structure can either be kept in its position or can be removed.

IV.RESULT AND DISCUSSION

The bike chain is cleaned properly with the help of cleaner spray and the brush. Once the chain is cleaned, it is lubed with the help of lubricant spray. Thus the bike chain is cleaned and lubricated effectively. Then the fixture is removed from the support structure.

V.CONCLUSION

The main aim of developing automatic chain cleaning and lubrication system is to provide comfort to the rider. User friendliness is the must that the rider should get during his ride with bike. Other important requirement is safety, reliability, smoothness, efficient drive and cleanliness.

The purpose of the project is to build a system to reduce the manual work for the maintenance of the chain drive system. It gives in detail ease of cleaning and lubing the chain. The project is a simple method system which ensures the purpose of its development.

VI.SCOPE FOR FUTURE WORK

Since this was our mini project, we have designed and fabricated the model keeping the concept purpose and cost in the mind and have successfully accomplished the main purpose.

For future work, our model which is semi-automatic in nature, can be upgraded with sensors, actuators, a programmed microprocessor chip with a battery and made to work automatically.

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