

Design Of Single Fork Of Folding Bicycle

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ABSTRACT:- In today's life the bicycle can play the very important role for daily transportation purpose in human life. The reason behind increase in the importance is because of increased pollution due to automobiles and cost of fuel which is continuously increasing now a day. Also the transport has been one of the most important issues to be deal with in the present day situation as commuting from place to place within the city has become a tedious and an expensive task. It is very difficult to reach the nearest public transport facility and in many cases the destination will be very far from the main roads where the public transport might not be able to commute or it might be very expensive. To overcome a common problem faced by the society, an idea is conceptualized to design a single fork foldable bicycle. The aim of our paper is to design and analysis of single fork of foldable bicycle which fold in compact form which facilitating easy transport and easily park. We already have seen many foldable bicycles in the global market but the main idea of this paper is to provide only one side fork to a foldable bicycle which is light & safe, easy to handle, easy to fold and easy to maintain. Unlike the conventional cycles, this bicycle will occupy very less space and also is very easy to be carried around.

Keyword:- conventional, conventional bicycles, fork, foldable bicycle, transport

I. INTRODUCTION

The Currently available bicycles are made up of heavy materials which make them difficult to carry. The prices of the bicycles are also not affordable to the common man. Many of them are not foldable in a configurable geometrical order, because of which their transportation becomes very difficult. It also leads to a lot of difficulty, when it is to be stored for future use. To propose a compact foldable bicycle this is weightless and overcomes all the limitations in the currently available bicycles. The proposed bicycle is designed in such a way that it is foldable by providing fasteners at the joints. The design structure imparts stable bicycle geometry. Transport has been one of the major issues in developing cities such as Bangalore since commuting from one place to another has become tedious and expensive. With the petrol and diesel prices increasing day by day, almost all the modes of transport are becoming expensive. It is difficult to reach the nearest public transport facility and in many cases the destination will be far from the main roads where the public transport might not be able to reach due to the small roads, to avoid which most people use vehicles of their own, which in turn leads to issues with parking, traffic, etc. But not all can opt for having own vehicles as it is expensive. With such issues in health, transport, space for parking, etc. one solution that comes to mind is bicycle. Bicycles are being promoted in the corporate and educational sectors. But how convenient is it to use a conventional bicycle? In many cases there is no special facility provided for locking the bicycles and even if one is present, it is probable to theft, which is one of the fears that obstruct use of bicycle. Conventional bicycles occupy sufficient space and hence providing one at work place or at home are quite difficult. They are probable to be exposed to the weather outside and do require frequent maintenance. With all such issues in the conventional bicycles, the next possible solution is the usage of foldable bicycle. With foldable bicycles, there is no issue since the bicycle can be folded and carried around to the work place or even it can be used to reach the nearest public transport facility and then folded and carried along. Since the bicycle is being folded, it occupies very less space and doesn't require any special parking space. They are not exposed to the weather since they can be carried inside buildings with ease and hence prone to less maintenance. The usage of foldable bicycle helps combine the different modes of transport as mentioned above, which helps in cutting down some cost involved in travelling.

II. COMPONENTS OF FOLDING BICYCLE

1. Folding body Frame:

It is a main supporting part of the bicycle. it is a main supporting part of the bicycle. On which wheels and other components are fitted. The modern and most common frame design for an upright bicycle is based on the safety bicycle, and consists of two triangles, a main triangle and a paired rear triangle. This is known as the diamond frame. Frames are required to be strong, stiff and light, which they do by combining different materials and shapes. At the time of folding the folding bicycle the main frame or folding body of the folding bicycle is folded in such manner that the horizontal axis of the front wheel and the horizontal axis of the back wheel are come in a same axis As the folding of the main frame or folding body of the folding bicycle is completed. The front wheel holder and back wheel holder are fixed with each other with the help of Velcro.

1. Compact Joint:

It is a joint which provides on the frame so that front and rear portion can be overlap.

2. Handle:

It is the front portion of bicycle which uses to control the direction of bicycle. Bicycle handlebar or often bicycle handlebars refer to the steering mechanism for bicycles; the equivalent of a steering wheel. Besides steering, handlebars also often support a portion of the rider's weight, depending on their riding position, and provide a convenient mounting place for brake levers, shift levers, cycle computers, bells, etc. Handlebars are attached to a bike's stem which in turn attaches to the fork.

3. Transmission mechanism:

It is the mechanism which transmits the power from pedal to rear wheel. A bicycle chain is a roller chain that transfers power from the pedals to the drive-wheel of a bicycle, thus propelling it. Most bicycle chains are made from plain carbon or alloy steel, but some are nickel-plated to prevent rust, or simply for aesthetic. Before the safety bicycle, bicycles did not have chains and the pedals were typically attached directly to the drive-wheel, thus limiting top speed by the diameter of the wheel and resulting in designs with front wheels as large as possible. Various linkage mechanisms were invented to raise the effective gear ratio, but with limited success. Using chain drive allowed the mechanical advantage between the drive and driven sprockets to determine the maximum speed.

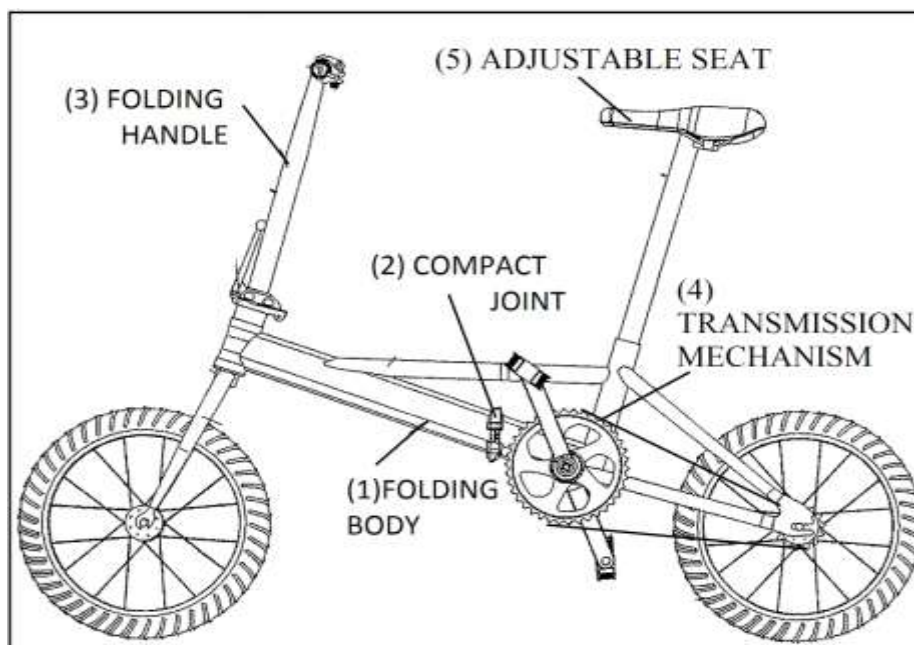


Fig 1. Components of folding bicycle

4. Adjustable seat:

It is the setting arrangement in the bicycle. The Saddle, Undo the lever, push the saddle right down, and re-clamp the lever. During this action, it is because of this that the rear frame remains folded, in turn retaining the front wheel in its folded position. So if you do not push the saddle fully down, it is possible for the folded

package to come apart when you pick the bike up. Folding pedal, It is best to fold this with the left hand crank as high as possible i.e. with the cranks turned so that the right hand pedal touches the front wheel also, the ridged side of the nylon latch plate on the pedal should face upwards. This is the arrangement used in the bicycle which is use for the carrying the bags or any kind of things on carriage we have to fixed it first on the carriage.

III. FOLDING BICYCLE MECHANISM

The proposed bicycle is designed in such a way that it is foldable by providing fasteners at the joints. For this bicycle must fold and unfold easily. In this mechanism two major operation taking place are as follows.

A. Folding of bicycle

1. Folding of frame

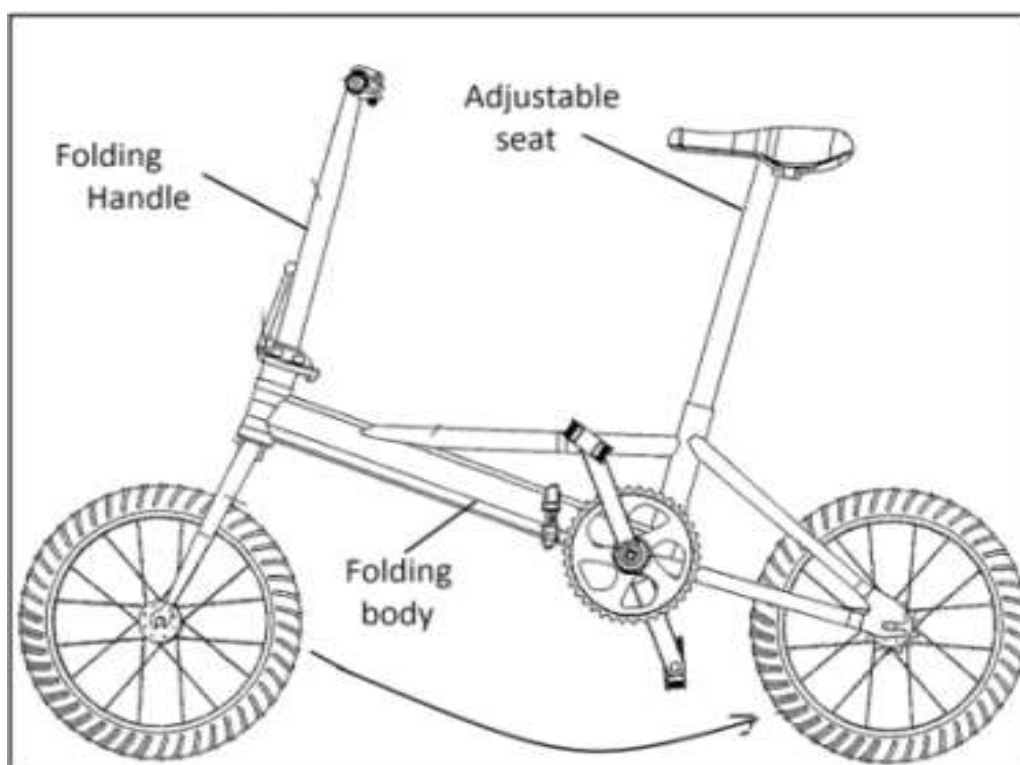
In this step, open the frame clamp of folding bicycle and the main frame or folding body of the folding bicycle is folded in such manner that the horizontal axis of the front wheel and the horizontal axis of the back wheel are come in a same axis.

2. Adjustment of Seat

In this step of the folding bicycle, open the seat clamp and allow to the adjusting seat of the folding bicycle as show in figure. The Saddle, Undo the lever, push the saddle right down, and re-clamp the lever. During this action, it is because of this that the rear frame remains folded, in turn retaining the front wheel in its folded position.

3. Folding of Handle

In this step of the folding bicycle, open the handle clamp and allow folding the handle of the folding bicycle as show in figure. Handlebar Undo the hinge clamp at handlebar stem. Swing the handlebars down to lie alongside the front wheel, and push home so that the nipple, engages in the clip, simply let the handlebars drop into position



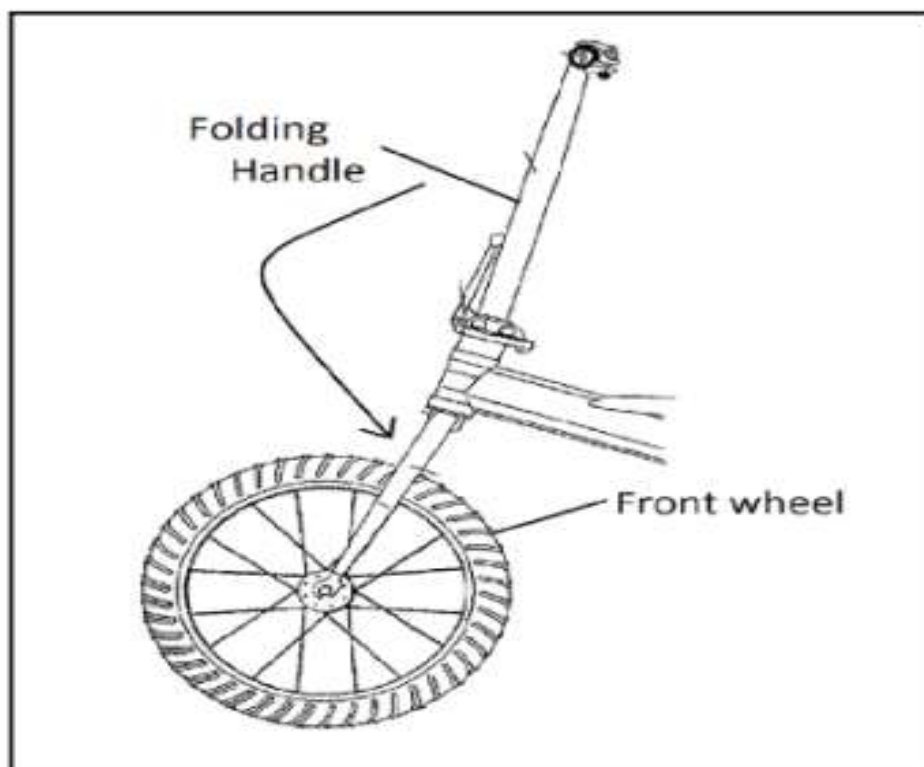
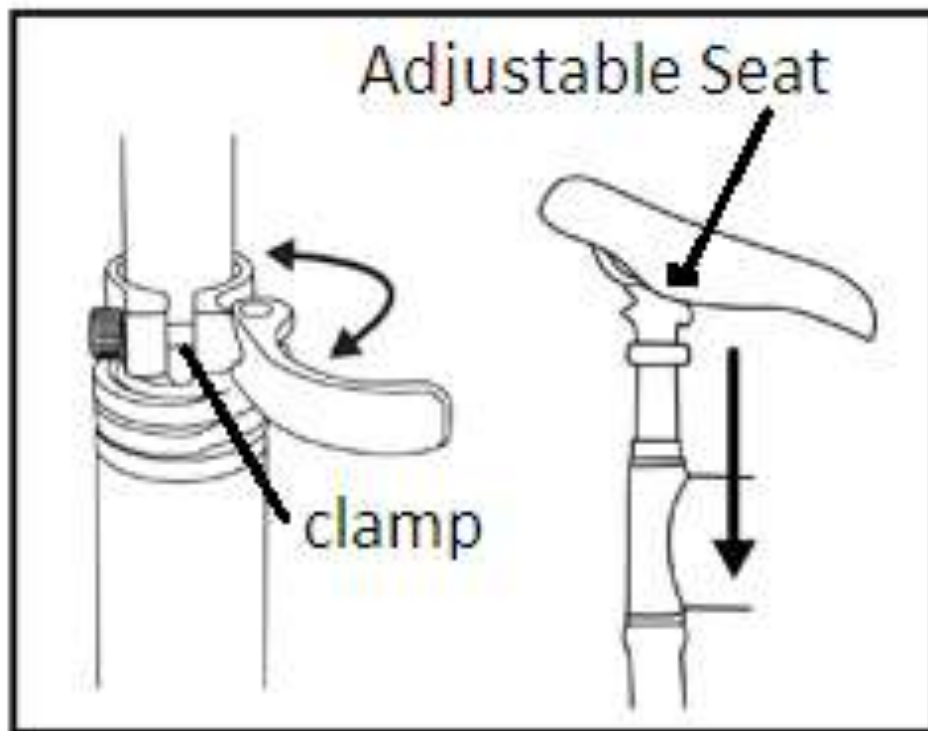


Fig 2. Folding mechanism of bicycle

B. Unfolding of bicycle

During the unwinding of the folding bicycle the following process is adopted.

1. Unfolding of handle

In this step of the unfolding the handle of bicycle taking place, open the handle clamp and allow the handle to regain its original position. The Unfolded position of the folding bicycle handle is as show in figure.

2. Unfolding the Frame

For unfolding of the main frame or folding body of the folding bicycle is started. Firstly the front wheel holder and back wheel holder attachment is removed by detached the Velcro and open the frame clamp of folded bicycle and the main frame or folding body of the folding bicycle is unfolded.

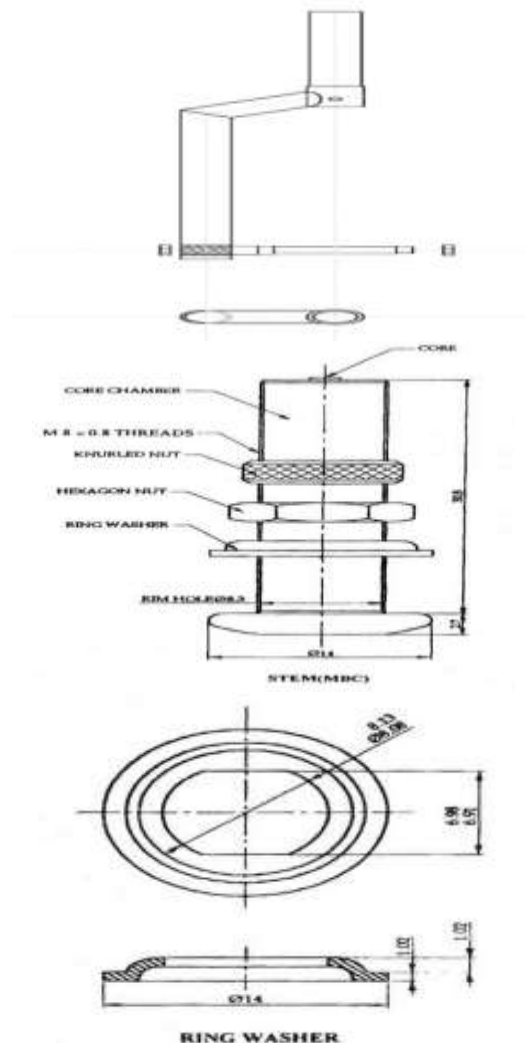
3. Adjustment of Seat

In this step of the unfolding bicycle, open the seat clamp and allow to the adjusting seat as per requirement. Adjustment the seat of folding bicycle as show in figure Height of the saddle: For the maximum height, draw the seat pillar up until it reaches a positive stop and for lower positions slide it down. If you wish to select a very low position, the saddle can be moved back by reversing its clip so that the seat pillar passes forward of the bolt.

IV. DESIGN OF SINGLE FORK

We use the simple design of fork for our bicycle; we selected the size 25 mm diameters of tube and 300 mm length as shown in the figure. A normal mild steel fork was to be converted into a member that can lock after the bicycle was unfolded. This was a challenging task. Once the required data was gathered regarding the dimensions of the fork and frame, the fork was modeled using 3D tools.

We analyze the mechanical properties on the single side fork by FEA using various material and investigate optimum and effective material based on results obtained by proposed analysis.



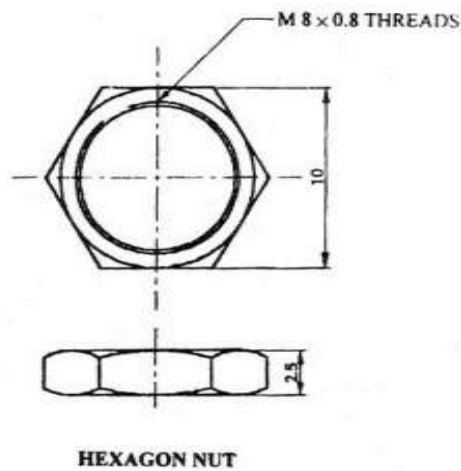


Fig 3. Design of single fork

V. 3D MODELING

It is basically the 3D modeling tool software in which modeling and drawing and drafting is taking place also it gives the tutorial-based introduction to creating parts, assemblies and drawings in Pro/ENGINEER. If you follow the complete series of procedures, you will learn how Pro/ENGINEER passes 3D design information to and from every design

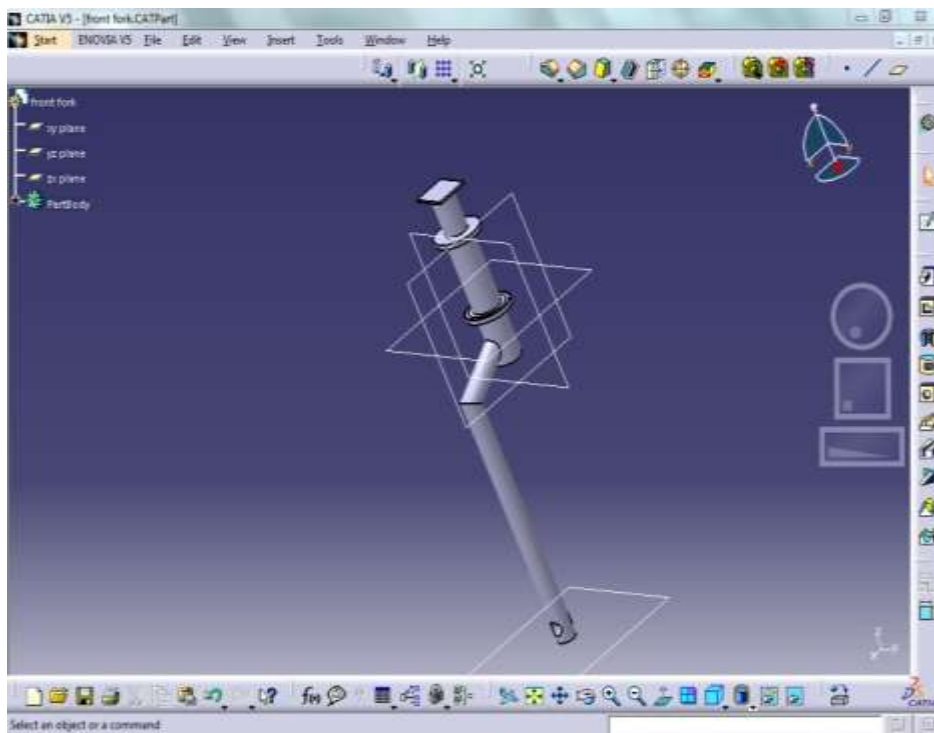


Fig 4. Modeling of single fork

VI. CONCLUSION

From the proposed concept we can conclude that single fork used in folding bicycle can be effectively employed in new upcoming bicycle for optimum design, flexibility in maintenance, good aesthetics and best design for improved structure of folding bicycle.

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