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Development and Fabrication Pedal Operated Butter Churner for Rural Area

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ABSTRACT

Now days we tend to see pedal operated tools are helpful in day to day life. In this paper we target the planning of pedal operated butter churner that will be helpful and cheap to normal milkman. This will assist to extend the productivity of worker in rural area. Many devises are available in the market for production butter for large quantity at the same time domestic mixer may be use for very low quantity and it also required electric power. Current manual process of developing butter is the long, taking several hours to complete and needs most physical efforts. The demand of butter is increases day by day. In order to meet this demand a more robust mechanism is required. This project seeks to develop butter by means that of combination using bicycle & mechanism.

Keywords : Bicycle, Butter, Churner.

I. INTRODUCTION

In Production process challenge of improving productivity means to improve efficiency at all stages i.e. efforts taken, machinery, process, money etc. Effort taken means manpower which is major factor for contributing the success of any manual process. To convert human energy pedal operated technology is commonly use which is either hand operated or foot operated. Bicycle is most commonly use device which is operated on foot pedal technology. As bicycle is cheapest as well as easiest mechanical device that's why it is also known as lifeline of rural area. The use of bicycle is comfortable for human being and gives appropriate power for running our mechanism. So we decide to use bicycle as power source for our mechanism. So the next task is to develop a mechanism which will run on bicycle.

This work seeks to develop a butter suggests that of combining using a manually operated machine. Their current production method is physically hard and lacks in quality and potency. Without normal steps to follow or guidelines for procedure, the current process is tough to replicate. From a social perspective, the rural communities are terribly poor. The average Milkman makes less money per day, and this income should cowl the cost of drugs, food, and clothing for an entire family. Women work terribly arduous in these communities to maintain the health of their families

Our goal is to design a butter churner that may profit the agricultural community by reducing the butter churning time and increasing production rate and human comfort. The churner design can be reasonable and elements can be available from native markets. The churner will be manufactured from usually accessible materials and will not use a custom manufactured instrumentation. Fabrication should be moderately easy, using ways of cutting and welding that a native machine shop will perform. The machine shall produce enough butter for personal consumption and to sell in local and international markets, thus providing an chance to earn a regular source of financial gain.

1.1 What is churner?

The Churner is the mechanism which is used to stern creamy mixture or curd and turn out butter. In churning process the fatty particles from creamy mixture gets separated and forms layer at the top of the pot due to density difference. This layer is then collected and known as butter.

II. CONCEPT

To develop pedal operated mechanism system for Butter production by using bicycle, steel drum, external rim and mechanical component such as pulley, bearing, blade, rod, belt. Line diagram shown in fig.

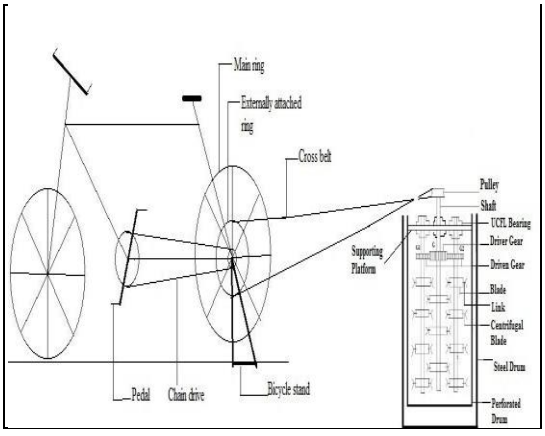


Fig.1 Line diagram of Pedal Operated butter churner

In this mechanism we used pulley belt mechanism which is drive by bicycle. We refer the traditional method for the development of mechanism. In every type of butter churning process we have to stern the creamy mixture inside a pot, so we develop a stainless steel tank which have tap at the bottom for removal of waste. Tank is equipped with a proper blade arrangement fixed on the shaft which is able to rotate the blade along vertical axis inside the tank. The shaft is rigidly supported at top of the tank with the help of metal strip which is fixed to the tank through bolts. Also two sets of pedestal bearing for smooth rotation of shaft and perfect alignment. At the top end of shaft we attached a pulley for power transmission (belt drive).External ring is attached at the rear wheel of bicycle concentricallybut it gives us motion along horizontal axis so we decided to use cross belt drive(circular leather belt) in order to give motion along vertical axis at the tank.

2.2 Components

Following are the various components which are primarily used to fabricate the Pedal operated butter churner.

1) Crossed belt drives 2) Pulley 3) UCFL Bearings 4) Steel Drums 5) Bicycle 6) Clincher rim 7) Metal rod 8) Metal Strip 9) Blade 10) Stand 11)L-clamp

III. FABRICATIONOF PROTOTYPE/MODEL

We develop a project where bicycle could be used as power source without losing its mobility. So we design a mechanism which could be run on bicycle and should give better churning results with minimum efforts. Development of mechanism was focused on reducing human efforts, increasing production rate, time reduction in most economic ways. We refer the traditional method for the development of mechanism. In every type of butter churning process we have to stern the creamy mixture inside a pot, so we develop a stainless steel

tank which have tap at the bottom for removal of waste. Tank is equipped with a proper blade arrangement fixed on the shaft which is able to rotate the blade along vertical axis inside the tank. The shaft is rigidly supported at top of the tank with the help of metal strip which is fixed to the tank through bolts. Also two sets of pedestal bearing for smooth rotation of shaft and perfect alignment. At the top end of shaft we attached a pulley for power transmission (belt drive). External ring is attached at the rear wheel of bicycle concentrically but it gives us motion along horizontal axis so we decided to use cross belt drive (circular leather belt) in order to give motion along vertical axis at the tank. This tank is fixed and supported by the stand which is made by welding of different size of metal strip.

Fig. 2 Prototype/Model

IV. WORKING

As per expert point of view farmers should try to develop some sort of side business, in this dairy production is most suitable and economical business for the farmer. Man & mostly Women in poor rural areas play the key role in most of daily activities of dairy production whether inside house or outside in the field. The traditional butter producing processes are physically exhausting and time demanding as well as it required certain expert. This project seeks to develop a better means of mixing using a manually operated machine.

After thoroughly researching, designing and experimenting, a final machine was developed optimizing the mixing process. The mixing time was successfully reduced from some hours to few minutes. After identification of problem we did survey among fifty peoples. We found that most of them are having bicycle. So we decided to develop a project where bicycle could be used as power source without losing its mobility. We found that every milk vender has their own bicycle which is used only for milk vending so we decided to use that vending bicycle for making the butter from the cream. We select the bicycle from one of the vender and next task was to design a mechanism which could be run on bicycle for separating the butter from the cream and should give better churning results with minimum efforts compare to other machines use for making butter from the cream. Development of mechanism was focused on reducing human efforts, increasing production rate, time reduction in most economic ways. As we saw that by the other processes human need more power or efforts for doing work with high production rate and high efficiency. So the prime task was to develop a churning arrangement on bicycle which reduces the human effort and reduce the time consumption for the production of butter from the cream. Then we refer the traditional method for the development of mechanism of butter churner.

In every type of butter churning process we have to stern the creamy mixture inside a pot or tank, the creamy mixture is nothing but a cream collected from the milk. So we develop a stainless steel tank which contains maximum amount of creamy mixture for churning it is about 10 litres and the tank have tap at the bottom for removal of slurry which contain most of part water. The tank is equipped with a proper blade arrangement fixed on the shaft which is able to rotate the blade along vertical axis inside the tank. The blades are made up of the mild steel and they are weld periphery on the shaft or rod. The shaft is rigidly supported at top of the tank with the help of metal strip which is made up of the mild steel and

which give strength to rod and create resistance opposite to force exerted by the rim or belt drive. It is fixed to the tank through bolts for getting the required rigidity. Also two sets of pedestal bearing for smooth rotation of shaft are perfectly aligned to metal strip. At the top end of shaft we attached a pulley for power transmission (belt drive) which is connected to belt drive. External ring is attached at the rear wheel of bicycle concentrically and it will gives required power for rotating the shaft and it gives us motion along horizontal axis so we decided to use cross belt drive (circular leather belt) in order to give motion to the pulley which is connected to the shaft along vertical axis at the tank.

V. 5.OBSERVATION AND DATA COLLECTION

Unfortunately our Yavatmal District as well as Vidharbha is well known for farmers Suicide. As per expert point of view farmers should try to develop some sort of side business, in this dairy production is most suitable and economical business for the farmer. Surrounding area of Yavatmal city there are 550 milkmen out of this near about 462 milk man having bicycle. The use of bicycle is comfortable for human being and gives appropriate power for running our mechanism. So we decide to use bicycle as power source for our mechanism. So the next task is to develop a mechanism which will run on bicycle. Used of bicycle is also good for human health. The trial conducted on the traditional as well as new developed mechanism.

Following table Shows the Total Cycle time of each worker by using traditional Method.

Name of Worker	Avg. Pulse Rate		Avg. OxigenConsumtion		Total time (Min)
	Initial condition	After workingcondition	Initial condition	After working condition	
Sunita	92	159	95	99	14.9
Kaushlya	89	128	96	99	15.7
Shankar	84	127	96	97	15.9
Shanta	85	128	95	98	14.4
Dwarka	104	158	95	98	15.4
Chanda	105	160	98	103	13.7

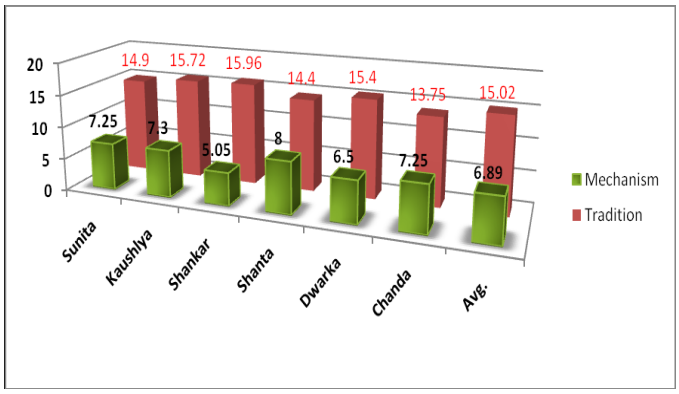
Following table Shows the Total Cycle time of each worker by using Pedal operated Mechanism.

Name of Worker	Avg. Pulse Rate		Avg. OxigenConsumtion		Total time (Min)
	Initial condition	After working condition	Initial condition	After working condition	
Sunita	92	110	95	96	7.25
Kaushlya	87	112	96	96	7.3
Shankar	84	117	95.5	96	5.05
Shanta	85	110	95	95.5	8
Dwarka	102	119	95.25	96.5	6.5
Chanda	103	123	96.5	97.25	7.25

VI. RESULTS & DISCUSSION

The various process of churning and other processes are thoroughly understood by spending reasonable time with milkmen at pimpalgaon Dist. Yavatmal. The propose concept will help to improve the

churning efficiency of milkman where electricity is not available. It will also help to reduce human effort and churning time. It is affordable for rural people. It considerably reduces time, efforts with highest possible economy. From the results it was found that the efficiency as well as quality of butter improves by using newly developed pedal operated mechanism



Avg. cycle time of workers when they done work with traditional method = 15.02 min

Avg. Total Observed Cycle Time of worker when they used our equipment = 6.89 min

The time of operation is successfully reduced from 15 minutes to 6.89 minute

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