Development of Stirring Type Butter Extraction Machine

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Abstract- *The butter extraction is not new .In India it is predicted to be in existence since the era of Hindus God lord Krishna till date. In present scenario many different kinds of butter extraction machine working on different principle and mechanism. The power is transmitted from the driver pulley to the driven pulley by means of friction between the pulleys and belts. This power is used to rotate the shaft in clockwise and anticlockwise direction and vice versa, stirrer shaft is continuously rotated without lagging one end of stirrer shaft is fixed and other is freely rotating (over hanging) during butter extraction.*

Keywords- Inertia force, dynamic equilibrium equations, slip angle.

I. INTRODUCTION

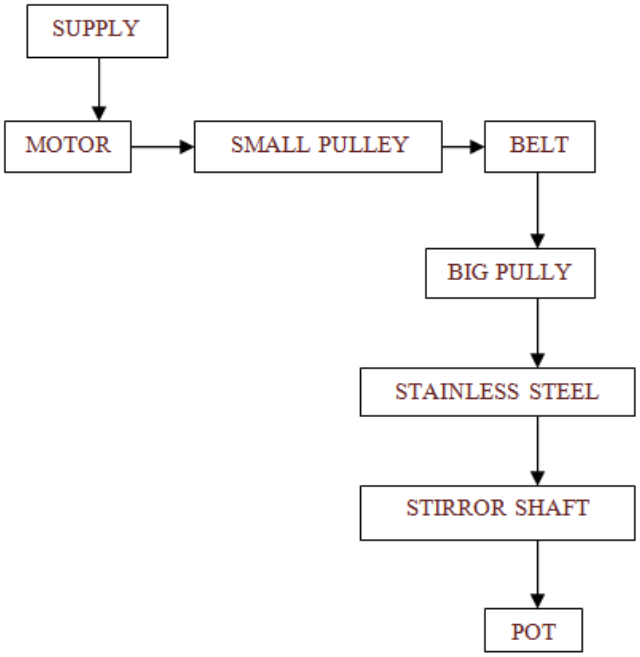
Nowdays many different kinds of butter extraction machine working on different principles and mechanism. Butter is extracted by churning the curd with the help of stirrer.

A butter churn is a device used to convert cream into butter. It is evidence for the use of butter dates back as early as 2000 BC .The most historically promined types of butter churns are the plunge churn which is container , usually made out of wood, where the butter making action is created by moving a vertical motion a shaft that is inserted into the top. This is known as up and down churn another prominent type of churn means the paddle chain. This has been mostly replaced by machine churning wheel into the 19th century was still made from cream that has been allowed to stand and sour naturally. The cream was skimmed from the top of the milk and poured into the wooden tub. Today's commercial butter making is product of the knowledge and hygiene, bacterial acidifying and heat treatment, as well as the rapid technical development that has been fed to the advance machining now used. To compare it this an machine will satisfy the small and medium size industrial because of its prime functionally and design.

II. PROPOSED SYSTEM

The stirrer which to be rotated clockwise and anticlockwise direction and reverse continuously during the process. The speed of stirrer ranges from 75 to 100 rpm. There is no time lag in changing the direction with rotation which impose jerk on shaft. There are various method of butter extraction also come up during the course of time, but then still the clockwise and anticlockwise way of extraction. The method is still existing having own significant as regard the quality and chemical structure of butter is comes the output highest quality.

III. BLOCK DIAGRAM



IV.CONSTRUCTION

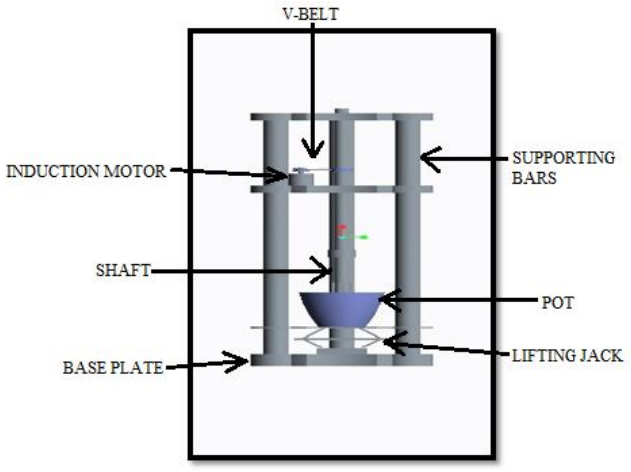


Fig.1 CAD Model

Electric supply is used to drive the induction motor which is drive the shaft with the help of v belt. V belt has negligible slip as compared to flat belt. V belt drive the shaft which is made up of stainless steel and this shaft is connected to wooden shaft which is useful for making of butter. Wooden shaft is act like a stirrer as shown in fig.1. Material is taken in the pot which is useful for making of butter and this pot is placed on lifting jack as per requirement it can be easily lift. All the assembly is stand by using supporting bars it is made up of cast iron as shown in fig.

V. WORKING

It is fully automated machine, it is based on V- belt pulley mechanism and the pulley rotates with the help of motor. The motor rotates clockwise as well as anticlockwise direction as per washing machine with the help of timer switch.A hallow metal shaft is provided which rotates with the help of bigger pulley, inside the hollow shaft a wooden shaft is fixed for churning wooden blades inside the container of milk. Here a jack is provided at bottom to lift the pot for churning process at certain height.as shown in fig.6.

VI. COMPONENTS

MOTOR:

An induction motor or asynchronous motor is an AC electric motor in which the electric current in the rotor needed to produce torque is obtained by electromagnetic induction from the magnetic field of the stator winding. An induction motor can therefore be made without electrical connections to the rotor.Induction Motors are the most commonly used motors in many applications. These are also called as Asynchronous Motors, because an induction motor always runs at a speed lower than synchronous speed. Synchronous speed means the speed of the rotating magnetic field in the stator.

There basically 2 types of induction motor depending upon the type of input supply - (i) Single phase induction motor and (ii) Three phase induction motor.[2] 600 Watts, 800 Rpm, 240V). Atypical AC motor consists of two parts: An outside stationary stator having coils supplied with AC current to produce a rotating magnetic field, and; an inside rotor attached to the output shaft that is given a torque by the rotating field. There are two fundamental types of AC motor depending on the type of rotor used: The synchronous motor, which rotatesexactly at the supply frequency or a submultiple of the supply frequency, and; the induction motor, which turns slightly slower, and typically (though not necessarily always) takes the form of the squirrel cage motor.

For higher-power applications where a polyphase electrical supply is available, the threephase (or polyphase) AC induction motor is used. The phase differences between the three phases of the polyphase electrical supply create a rotating electromagnetic field in the motor. Through electromagnetic induction, the rotating magnetic field induces a current in the conductors in the rotor, which in turn sets up a counterbalancing magnetic field that causes the rotor to turn in the direction the field is rotating.

The rotor must always rotate slower than the rotating magnetic field produced by the polyphase electrical supply; otherwise, no counterbalancing field will be produced in the rotor. Induction motors are the workhorses of industry and motors up to about 500 kW in output are produced in highly standardized frame sizes, making them nearly completely interchangeable between manufacturers (although European and North American standard dimensions are different). Very large synchronous motors are made up to tens of thousands of kilowatts output, for pipeline compressors and wind-tunnel drives Fir bank, T.C.1970, Mechanics of belt drive

Fig.2 Induction Motor

V-BELT:

It has more friction due to groove hence transmit more power. Reduced angle of contact so more power is transmitted.As belt runs in groove so no slip in V-belts Useful at short distances. High speed reduction ratio.

V-belt transmit the power from engine to shaft. There is no slip is present as compared to flat belt.

GROOVED PULLEY:

Belt and pulley system is characterised by two or more pulleys in common to a belt. Belt is the element which is in v shape to drive the pulley. This allows for mechanical power, torque, and speed to be transmitted across axles. If the pulleys are of differing diameters, a mechanical advantage is realised. A pulley is awheel on a shaft that is designed to support movement and change of direction of cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell which does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave.

A pulley may have a grooves between flanges around its circumference to locate the cable or belt. The element is used to drive pulley system can be a rope, cable, belt or chain.Pulleys are also assembled as part of belt and chain drives in order to transmit power from one rotating shaft to another.

Fig.3 Groove Pulley

TIMER SWITCH:

A time switch (also called a timer switch, or simply timer) is a timer that operates an electric switch controlled by the timing mechanism.
The switch may be connected to an electric circuit operating from mains power, including via a relay or contactor; or low voltage, including battery-operated equipment in vehicles. In butter extraction machine timer switch is regulate clockwise and anticlockwise direction for a certain time.

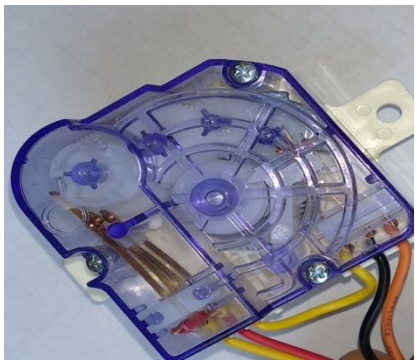


Fig.4Timer Switch

CAPACITOR:

Capacitor is a two terminal electrical conductor and that is separated by an insulator. These terminals store electric energy when they connected to a power source. One terminal stores positive energy and the other terminal stores negative charge. when electrical energy is added to a capacitor is called charging and releasing that energy stored in capacitor from a capacitor is called as discharging.

Fig.5 Capacitor

BEARINGS:

A bearing is a type of rolling-element bearing that uses rotation of shaft freely which is fixed in center of bearing. The purpose of a bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least three races to contain the balls and transmit the loads through the.

Bearings tend to have lower load capacity for their size than other kinds of rolling-element.

Fig.6Bearing

SHAFT:

A shaft is a rotating machine element, usually produces power to a machine which absorbs power. The number of pulleys mounted on it. Transmission shafts are used to transmit power which is obtained from motor.

Another wooden shaft is connected to stainless steel shaft which is rotated by the belt connected to the pulley. Wooden shaft is also called as stirrer shaft. Shaft is main component for churning process.

VI. CONCLUSION

To overcome that manual work and to operate it automatically we decide to provide the transmission mechanism, we selected belt and pulley mechanism for power transmitting.That means the belt drive mechanism replaces the rope and drive the shaft automatically. We considered two types of belt drives flat belt drive and V-belt drive, but the requirement of project is to transmit more power with max friction and with no slip, therefore we select V-belt drive. Here the process is followed by both clockwise and anticlockwise rotations so we select the motor which is used in domestic washing machine with lower power rate which is sufficient to drive the shaft.

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