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FABRICATION OF MULTIPURPOSE DRYER

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ABSTRACT - *Multi-purpose dryer and heater, we introduce through our project is useful for drying grounds and cardamom wherever moisture contents. This is also used as a room heater. Now a day, rain fall occurs at any time. At that time, the dryer is used to remove the moisture contents in the ground. In our project, the Multi-purpose dryer and heater consists of two main parts such as heating element and blower. The blower is used to passing the hot air to the ground, so that the moisture contents in the ground was removed. The size of our project is also portable. So we can move the ground dryer to any place very easily.*

Key Words: **Dryer, Motor, Heater controller system, Gear, Bearing, Blower.**

1. INTRODUCTION

Drying, particularly of crops, is an important human activity and globally the use of dried products is widespread. For preservation, quality improvement and processing purposes, moisture must often be removed from both organic and inorganic materials. Sun drying and mechanical dehydration using fossil fuels are the most common technologies used. Sun drying is a low-cost drying method but the final quality is variable, while mechanical dehydration is an energy intensive process and contributes substantially to energy use and greenhouse gas emissions.

Many products, however, must be dried at relatively low temperatures, i.e., less than 100 ^{0} C to ensure the desired product quality and solar dryers can often be used instead of sun drying or conventional dehydration systems. There are three main types of solar dryer (direct, indirect and mixed modes) but these classifications can be further subdivided depending on the type of heat transfer fluid, the direction and the source of the flow, and the inclusion of thermal storage and a supplementary energy system. In practice, however, some types of solar dryer have proven to be more feasible than others. Several ways can be used to evaluate the technical performance of solar dryers but economic and practical issues will often be more important in determining their acceptability. A solar dryer can be designed using any one of a number of methodologies, but these are less well developed than for other solar technologies. Advances in design methods, absorber and glazing materials, and control systems will bring improvements in the technical performance of solar dryers and these will all contribute to the greater acceptance of a technology that can play an important role in a more sustainable world, particularly the food production system.

2. COMPONENTS AND DESCRIPTION

2.1 FRAME

This is made of mild steel material. The whole parts are mounted on this frame structure with the suitable arrangement. Boring of bearing sizes and open bores done in one setting so as to align the bearings properly while assembling. Provisions are made to cover the bearings with grease.

2.2 DC MOTOR

An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a magnetic force whose direction is given by Fleming's left hand rule.

When a motor is in operation, it develops torque. This torque can produce mechanical rotation. DC motors are also like generators classified into shunt wound or series wound or compound wound motors.

2.3 BATTERY

In isolated systems away from the grid, batteries are used for storage of excess solar energy converted into electrical energy. The only exceptions are isolated sunshine load such as irrigation pumps or drinking water supplies for storage. In fact for small units with output less than one kilowatt.

Batteries seem to be the only technically and economically available storage means. Since both the photo-voltaic system and batteries are high in capital costs. It is necessary that the overall system be optimized with respect to available energy and local demand pattern.

2.3.1 LEAD-ACID WET CELL

Where high values of load current are necessary, the lead-acid cell is the type most commonly used. The electrolyte is a dilute solution of sulfuric acid (H_2SO_4). In the application of battery power to start the engine in an auto mobile, for example, the load current to the starter motor is typically 200 to 400A. One cell has a nominal output of 2.1V, but lead-acid cells are often used in a series combination of three for a 6-V battery and six for a 12-V battery.

The lead acid cell type is a secondary cell or storage cell, which can be recharged. The charge and discharge cycle can be repeated many times to restore the output voltage, as long as the cell is in good physical condition. However, heat with excessive charge and discharge currents shortens the useful life to about 3 to 5 years for an automobile battery. Of the different types of secondary cells, the lead-acid type has the highest output voltage, which allows fewer cells for a specified battery voltage

2.4 BEARING WITH BEARING CAP

The bearings are pressed smoothly to fit into the shafts because if hammered the bearing may develop cracks. Bearing is made up of steel material and bearing cap is mild steel.

2.4.1 CONSRUCTION AND TYPES OF BALL BEARING

A ball bearing usually consists of four parts: an inner ring, an outer ring, the balls and the cage or separator. To increase the contact area and permit larger loads to be carried, the balls run in curvilinear grooves in the rings. The radius of the groove is slightly larger than the radius of the ball, and a very slight amount of radial play must be provided. The bearing is thus permitted to adjust itself to small amounts of angular misalignment between the assembled shaft and mounting. The separator keeps the balls evenly spaced and prevents them from touching each other on the sides where their relative velocities are the greatest. Ball bearings are made in a wide variety of types and sizes. Single-row radial bearings are made in four series, extra light, light, medium, and heavy, for each bore,

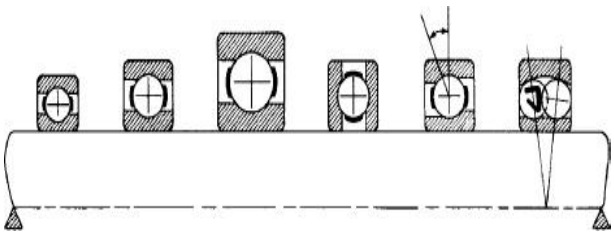


Fig 1: Types of Ball Bearings

The heavy series of bearings is designated by 400. Most, but not all, manufacturers use a numbering system so devised that if the last two digits are multiplied by 5, the result will be the bore in millimeters. The digit in the third place from the right indicates the series number. Thus, bearing 307 signifies a medium-series bearing of 35-mm bore. For additional digits, which may be present in the catalog number of a bearing, refer to manufacturer's details. Some makers list deep groove bearings and bearings with two rows of balls. For bearing designations of Quality Bearings & Components (QBC), see special pages devoted to this purpose. The radial bearing is able to carry a considerable amount of axial thrust.

2.5. EXTERNAL SPUR GEAR

Perhaps the most often used and simplest gear system, external spur gears are cylindrical gears with straight teeth parallel to the axis. They are used to transmit rotary motion between parallel shafts and the shafts rotate in opposite directions.

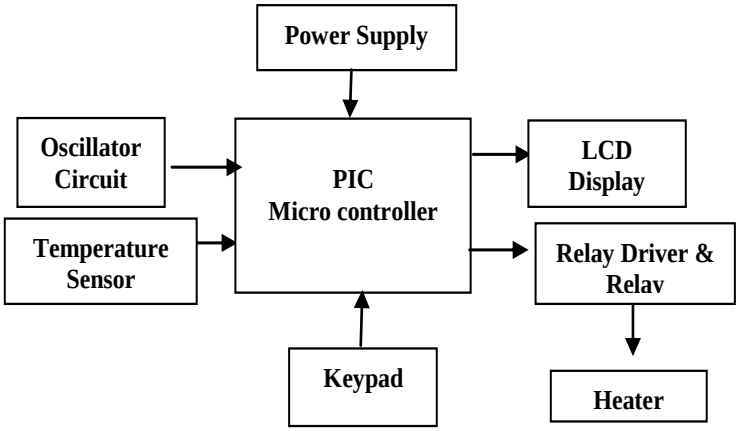
Fig 2: External Spur Gear

They tend to be noisy at high speed as the two gear surfaces come into contact at once. Internal spur gears: The internal spur gear works similarly to the external spur gears except that the pinion is inside the spur gear. They are used to transmit rotary motion between parallel shafts but the shafts rotate in the same direction with this arrangement.

2.6 CAM PLATE

A cam is a rotating or sliding piece in a mechanical linkage used especially in transforming rotary motion into linear motion or vice versa. It is often a part of a rotating wheel (e.g. an eccentric wheel) or shaft (e.g. a cylinder with an irregular shape) that strikes a lever at one or more points on its circular path. The cam can be a simple tooth, as is used to deliver pulses of power to a steam hammer, for example, or an eccentric disc or other shape that produces a smooth reciprocating (back and forth) motion in the *follower*, which is a lever making contact with the cam

3. HEATER CONTROL SYSTEM



4. DESIGN

Fig 3: Isometric view

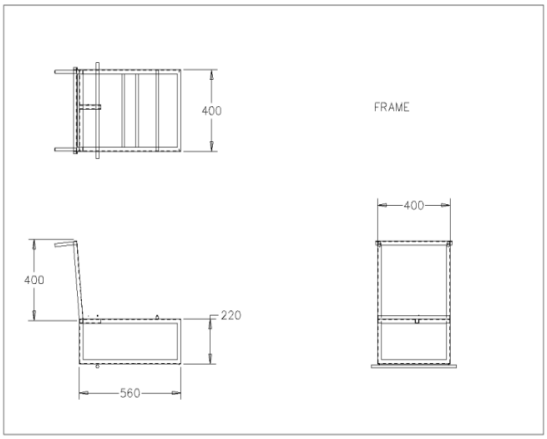


Fig 4: Dimensions of dryer

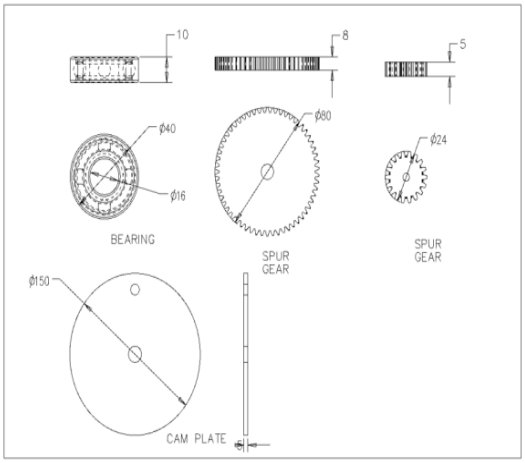


Fig 5: Dimensions of spur gear and cam plate

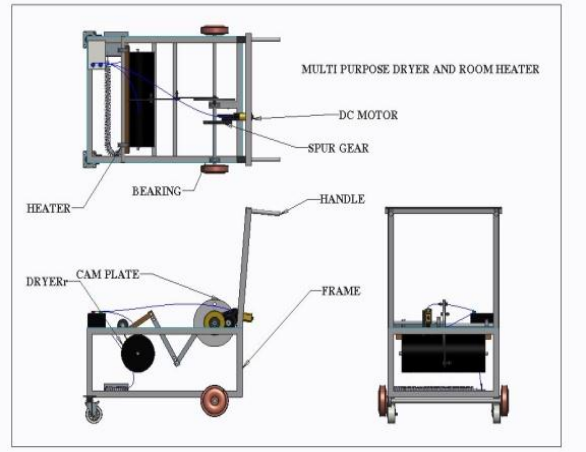
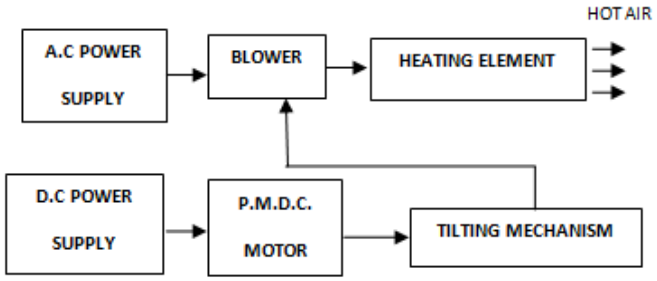


Fig 6: Parts of Multipurpose Dryer

5. WORKING

The DC power supply is applied to the heating element. The heating element gets heated and produces hot flames out from the heating element.



The blower consists of impeller or (fans). The DC motor coupled with the impeller by the way of spur gear. The impeller consists of more number of blades. It is fixed above the heating element, so that hot air forced to the ground. The tilting mechanism is used to tilting the blower blades with cam plate, so that the hot air distributed in all required direction. The Permanent magnet D.C motor is used to tilting the blower blades back and front. The regulated D.C power supply is given to the battery.

6. ADVANTAGES

- No external power supply is required.
- It is reliable.
- Low maintenance.
- It is portable.
- Easy operation by carrying on human back.
- Eco friendly in nature.
- No requirement of skilled labor
- Cost efficient.
- Operating cost is less.

7. DISADVANTAGES

- More effort required to operate the machine
- Overall weight of the model is more.
- Less efficiency compare to electrical device
- Regular lubrication required.

8. CONCLUSION

A strong multidiscipline team with a good engineering base is necessary for the Development and refinement of advanced computer programming, editing techniques, diagnostic Software, algorithms for the dynamic exchange of informational different levels of hierarchy.

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work.

We are proud that we have completed the work with the limited time successfully. The **"FABRICATION OF MULTIPURPOSE DRYER"** is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality.

We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work. Thus we have developed a **"FABRICATION OF MULTIPURPOSE DRYER"**. By using more techniques, they can be modified and developed according to the applications.

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