

Review of Semi-Automatic Dish Washing Machine

Prof. Pankaj H. Jaiswal¹, Vaibhav V. Chitri², Praful C. Panchabhai³,
Mohit H. Solanki⁴, Yogesh S. Date⁵

¹Assistant Professor, J.D. C.O.E.M, Nagpur.

^{2,3,4,5}Student, J.D. C.O.E.M, Nagpur.

Abstract- This review deals with semi-automatic dish washing machine. The schematic diagram of semi-automatic dish washing machine is elaborated. The history of requirements of human effort, time consumption and power consumption is also discussed. Type of construction is also analyzed. Latest literature surveys were carried out to improve the systems. The basic principle of operation is systematically viewed in this paper and its future scope.

Keywords- Washing machine, motor, gears, bearing, plates, water & detergent

I. INTRODUCTION

This paper discusses how to reduce human efforts in dishwasher. The dishwasher has made cleaning and drying dishes much easier and more efficient. This project work has been conceived having studied the difficulty in washing the any type of plates. Our survey in the regard in several home, revealed the facts that mostly some difficulty occurs in washing the dish in Hand. The washing power contains the chemical substances and this is reacting with human hand. Now the project has mainly concentrated on this difficulty, and hence a suitable device has been designed. Such that the dish washing can be done without application of any impact force. By using semi-automatic dishwasher, we can reduce time as well as human efforts significantly. In conventional dish washing process large amount of human power as well as quantity of water is used. So keeping that in mind, to reduce this semi-automatic dish washing machine is developed.

Keywords: - Washing machine, motor, gears, bearing, drain pipe, plats & detergent

1.1 WORKING PRINCIPLE

The working principle of the dishwasher is to provide the mechanical action necessary to distribute and direct the detergent solution and rinse waters over, under and around the dishes to loosen and remove oil. The dishwasher must also remove oil-laden waters from the machine after each phase of the cycle and provide for the

drying of dishes after the cleaning process has been completed.

The motor is coupled with the rotating plate by spur gear mechanism. The shaft rotation depends upon the rotation of motor by spur gear mechanism. The high forced water is sprayed to the rotating plate by water pump. This is a simple type of semi-automation project.

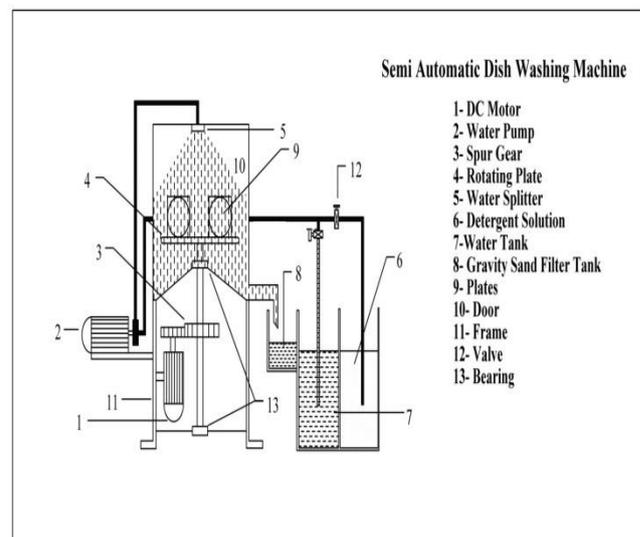


Fig. 1.1 Semi-automatic dish washing machine

II. LITERATURE SURVEY

2.1 J.HOUGHTON- "Table furniture dish cleaning machine" [1] (1850): This paper discuss on invention of semi-automatic dish washing machine. This paper tells about brief idea of semi-automatic dish washing machine construction and their design. He constructed a cylindrical vessel which is of metal or wood. One side of cylinder say one forth, is left open from near the top to bottom. Inside the cylinder there is a vertical shaft, resting on the center in a socket on the bottom, and which passes up through and above the top or cover of the cylinder. Through the top of this shaft there is hole, through which pin passed, by means of it he gave it a rotary motion. Connected to this

shaft is a cylindrical rack or crib, which is supported by shaft. The diameter of crib is so much less than that of cylinder as it allows revolving freely within it.

There is inclination of about 30 degrees downward and outward from the center of the shaft. On the bottom of rack the hoop is placed on the edge about midway between the shaft and outer rim of the rack. Dishes and other articles of table furniture are placed within the rack upon the conical rack in any position in which they can empty themselves, and so that their surfaces will be exposed to the direction of the buckets in the revolution of the rack. Boiling water is poured into a machine from the top of it. The rack or crib containing things is made to revolve by giving rotary motion to the shaft. At the same time the crank is turned where water is taken up by the buckets and thrown into the rack upon the surfaces of its contents, and continued until they are fully washed. After standing few minutes, they became dry and taken out, ready for use without wiping and have good surface.

The design indicates that the construction of the machine is made to wash the dishes. For this he had constructed a cylindrical vessel with a shaft resting upon, the rack within a conical rack, a hoop to hold a table furniture in a combination with a curb. The whole system is supported with a frame and by these mechanical means, cleansing the surface of dishes without uses of hand, the all parts are being arranged, combined and operated substantially as to work as a complete machine.[1]

2.2 J. G. GOCHRAN- "Dish washing machine" [2] (1886): This paper gives brief idea described about improvement of dishwashing machine. It related to improvement in machine washing a dishes in which a continuous stream of either soap-soda or clean water is supply to crate holding the rack or cage hot water is supply to crate is rotate so as to bring the greater portion thereof under water.

In this research paper improvement of designing elevation of machine and it part. The author builds the machine and measures the dishes and inside wire compartment each specially designed to fit either plate's cups or saucer. The wire chamber placed inside a wheel that lay flat inside a copper boiler. A motor turned the wheel while hot soap water squirted up from the bottom of boiler and rained down on the dishes.

The result indicates that model is first reliable hand powered machine use s a water pressure instead of scrubber to clean the dishes inside the machine. [2]

2.3 Odesola & Afolabi- "Design, Fabrication and Performance Evaluation of a Domestic Dish Washing Machine" [3] (2012): This paper discusses about the design, fabrication and performance evaluation of a domestic dish washing machine. The objective of this work is to design and fabricate a dish washing machine that is efficient and easy to operate. Stainless steel and mild steel was used for the construction of the machine considering their availability, cost reduction and corrosion resistance.

The result indicates that the dishes are cleaned by spraying hot water rather than cold water typically, between 55 to 75 °C (130 to 170 °F) to loosen the sticky and oily substances. A mix of water and detergent is used for cleaning purposes, followed by clean water to remove the detergent residue. This work has established the fact that washing machines of different capacities can be manufactured locally in Nigeria without compromising standards. [3]

2.4 Dhale A. D. - "Design and development of semi-automatic dishwasher" [4] (2015): This paper discusses about the design, construction and evaluation of a dish washing machine. The capacity of the machine was 20 plates per minutes (i.e. 1880 plates per hour). The designed dishwashing machine is very efficient and easy to operate.

The result indicates that the detergent used is quite diluted and is biodegradable, with no phosphates, enzymes, or citrus additives. This leads to less requirement of detergent and cleaning is done mostly by use of water. This might leave a greater ecological footprint than other methods of dishwashing. Also series of test were carried out in order to determine the performance and efficiency of the machine. This was done by comparing the rate of washing with the designed dish washer to the hand-washing. [4]

2.5 Pranali Khatake- "Design of Gears in Semi-Automatic Dish Washing Machine" [5] (2016): This paper discuss about design of gears in semi-automatic dish washing machine. Why semi-automatic dish washing machines are more popular in India as compared to fully automatic dish washing machine, Automatic dishwasher uses large amount of water, time and is costly. And because of all these reasons, the usage of automatic dishwasher in our country is very less. Use of semi-automatic dishwasher, they can reduce time as well as efforts of human also.

The result indicate that in India semi-automatic dish washing machines are used than fully automatic dish washing machine as it is cheap, preferably gears are used in these semi-automatic dish washing machine with belt drive for better life and high efficiency. Paper focused on design of gears used in semi-automatic dish washing machine. [5]

2.6 Shaila S. Hedaoo- "Design and fabrication of semi-automatic dish and utensil washing machine" [6] (2016):

This paper discusses the main objective of semi-automatic dishwashing machine is to reduce the cost of fully automatic dish washing machine and giving good cleaning performance. It required less energy and less water consumption. Time of washing dish can be adjusted as per customer requirement. In this system rotary jet technology is used to clean utensils. Any type of utensil will be washed in this system, No electronic circuit will be used multi jet system will be used to clean utensil from all side.

The result indicates that by using galvanized iron material for inner & outer part, the overall weight of the assembly is also reduced. The capacity of machine is to wash 24 pieces of dinner set at a time by using two rotary jets controlled by single pump using parallel connection. [6]

2.7 Shilpa N. Dehedkar- "Design of basic model of semi-automatic dish washer machine" [7] (2016):

This paper gives a brief idea and analysis of the semi-automatic dish washer machine. It also states the mechanisms incorporated in this model for the process of washing the dish.

In this research the dishwasher operates with help of DC motor, universal motor, conveyor belt and microcontroller for time delay. Microcontroller is used to provide delay to universal motor, DC brush motor & DC geared motor. Dish which is placed on the conveyor belt enters the first washing chamber where it is cleaned with soda water and scrubbed with the brushes. This is then passed to next chamber where it is rinsed with the clean water and finally moves out as a complete washed dish.

The result indicates that the model is built with very basic material and can be more standardize by altering motor used. The product designed has minimal operating cost, cost effective, eco-friendly and it can be used with almost zero efforts. [7]

III. FUTURE SCOPE

Scope for future work as suggested in above review is the project is carried out in order to get outside knowledge and involve in practical applications beyond in our day-to-day academic studies under in the module of "Advanced Topics in Mechanical Engineering". Design and fabrication is high efficient in minimum cost.

This machine is very useful to the household women which is wash the dishes by the manually and its dish washing rate is more as compared to the manually washing the dishes. The cost of this machine is very less as compared to the market machine. It also can be used as a commercial machine such as weeding ceremony, hotels, etc.

IV. CONCLUSION

A comprehensive review of the literature on the semi-automatic dish washing machine was successfully carried out on various aspects of energy analysis, time consumption and requirements of efforts.

The designed dishwashing machines are very efficient and easy to operate. In order for this comparison to be competent, the result must be statistically significant. With regards to semi-automatic dish washing machine, it is found that mostly the studies are carried out on the time, energy consumption and requirements of efforts. The literature on degree of cleanliness of dishes is scant and very few studies have been done on it. The above studies are simulation studies. Regarding time, energy consumption and requirements of efforts studies have been carried out by many researchers mostly analytically and experimentally. Thus our research is mainly focused on degree of cleanliness of dishes.

V. REFERENCES

- [1] J.HOUGHTON.Table-furniture cleaning machine. m. 7,865. Patented May 14, 1850.
- [2] J. G. GOOHRAN, Dish washing 'machine. No. 355,139. Patented Dec. 28, 1886.
- [3] Odesola & Afolabi- "Design, Fabrication and Performance Evaluation of a Domestic Dish Washing Machine". An International Journal of Science and Technology Bahir Dar, Ethiopia. AFRREV STECH Vol. 1 (1) Jan.-March, 2012 pp.164-173
- [4] Dhale A. D.-"Design and development of semi-automatic dishwasher". International Journal of Engineering Research and General Science Volume 3, Issue 3, May-June, 2015 pp.108-112
- [5] Pranali Khatake- "Design of Gears in Semi-Automatic Dish Washing Machine". International Journal for Scientific Research & Development Vol. 4, Issue 09, 2016 pp. 836-839
- [6] Shaila S. Hedaoo, Dr. C.C. Handa, V.D.Dhopte- "Design and fabrication of semi- automatic dish and utensil washing machine. International Journal of Engineering Development and Research Volume 4, Issue 3 2016 pp.292-296
- [7] Shilpa N. Dehedkar- "Design of basic model of semi-automatic dish washer machine". National Conference On Innovative Trends in Science and Engineering (NC-ITSE'16) Volume: 4 Issue: 7 2016 pp. 18-21