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Automatic Plastic Rivet Assembling& Packing Machine

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Abstract —*A machine which helps to assemble plastic rivets automatically is known as automatic plastic rivet assembling & packing machine. The purpose of presenting this paper is, to design a machine Such machine to make work easier as the use of plastic rivets are increased tremendously in modern days. Hence its packing and Material Handling time is to be reduced for quick dispatching.*

Keywords-*Rivet, Feeder Automation, Automatic Packing, Quick Dispatching, Material Handling*

I. INTRODUCTION

Automatic rivet assembling& packing machine is a machine which works on a plc controller to assemble plastic rivets. It has of two step feeder one for male part of rivet and another for female part of rivet & there are two tables. First table supports the feeder and the second table has angular plate on which motor is attached at back side and the disc and press is fixed on top of plate. It also consists of control unit in which all electrical circuits and controller is fitted on the controller box there are various switches, display and phase indicators. They are assembled using automatically operated press.

Special motor is attached having a gear box of required torque. The motor drives the circular disc having slots the male part gets inserted in the slot of disc and female part comes directly down of the male part and the pneumatic press presses it and they are get assembled. The disc takes the assembled rivet and the guide way takes the assembled rivet outside and drops it in the box.

II. OBJECTIVE

The main objective of the machine is to reduce the labor effort and increase the rate of assembling the rivets so that the cost will increase and the time also decreased to assemble.

III. CONSTRUCTION

It has two tables. First table supports the feeder and the second table has angular plate on which motor is attached at back side and the disc and press is fixed on top of plate.
It also consists of control unit in which all electrical circuits and controller is fitted on the controller box there are various switches, display and phase indicators.
It has two step feeder one for male part of rivet and another for female part of rivet. They are assembled using automatically operated press. Special motor is attached having a gear box of required torque.

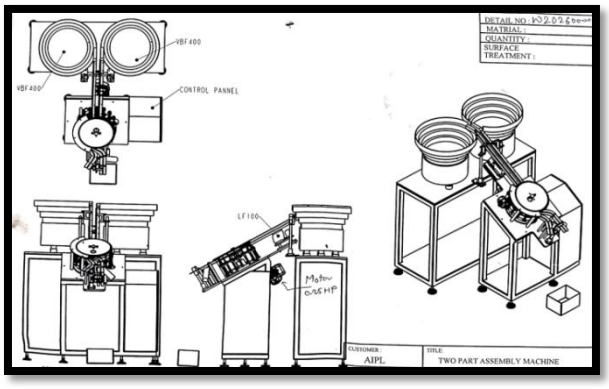

Fig. NO. (1) Schematic Diagram of machine

CONCEPTUAL 3D DRAWING

Fig. NO. (2) Conceptual 3D Diagram of machine

IV. COMPONENTS

a) MOTOR

The motor is main component which is used to rotate the discs which are placed to make assembly of the rivets and it rotates with desired speed set by the operator. The gear box is attached to convert the speed from the motor 1380rpm at any voltage.
Working conditions of motor:

Humidity: The electrical equipment must be able to work with arelative humidity between 30 and 95% (without condensation).
Altitude and temperature: the powers indicated are intended for regular use at altitudes below 1000 mt above sea level and a temperature between +5°C and +40°C for motors having a rated power below 0.6 kW, or between -15°C and 40°C for motors having a rated power equal to or greater than 0.6 kW (IEC 34-1): For higher altitude and/or temperature the power decreases of 10% each 10°C of higher temperature, and of 8% for each 1000 mt of higher altitude.
Voltage - Frequency: The maximum variation of the supply voltage is +/-10%. Within this tolerance rotomotive motors supply the rated power. Within such range, the temperature rise of the motor can fluctuate up to +/-20°C.

Insulation: the stator winding is made of resin coated copper wire and insulation materials in
F class,
That provide high protection against electrical and mechanical stresses. The max temperatures (Tmax) for insulation classes defined by EN60034
1 standard are

Class	Δ T (°C)	T max (°C)
A	60+5 °	105
E	75+5 °	120
B	80+5 °	130
F	105+5 °	155
H	125	180

The temperature rise of the Delphi series is class B or lower, much under the limits of F class motors, thus permitting a longer motor life.

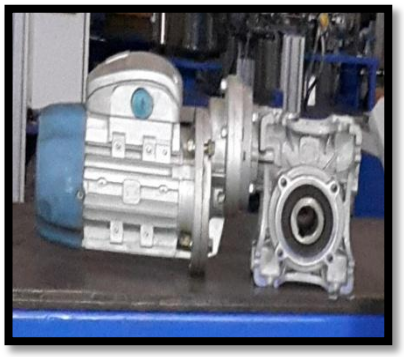

Fig. NO. (3) Actual Image of Motor

b) GEAR BOX

The gear box is attached to convert the speed from the motor 1380rpm at any voltage.

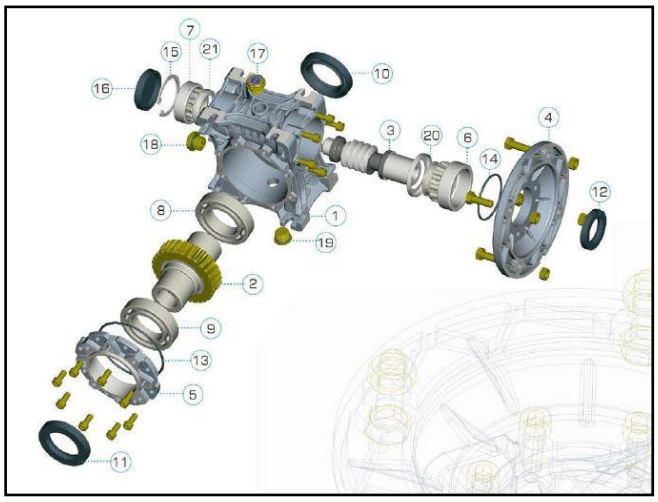

Fig. NO. (4) Dismantle of Gear Box

c) BOWL FEEDERS

There are 3 feeders in which two hold the two parts of rivets that are to be assembled. The third feeder is placed to give linear feed to the parts that move forward to the plates. The vibratory bowl feeder is exclusively intended for bunkering, conveying, isolating and sorting items of different dimension, shape and material as per the required orientations and quantity.The vibratory bowl feeder, together with bowl feeder, is designed for feedingmaterials at a single or multiple tracks. This machine is designed and manufacturedfor parts feeding which is based on the concept of trouble-free operation andlabor saving.

Function:
The vibratory bowl feeder is a manufactured part which transfers the part asresult of electromagnetic oscillations The bowl feeder is installed on the topplate which is connected to the lower by means of the 4 epoxy sheet providedat certain angle, and they are oscillated through a magnet, so that parts on thebowl with the resonating force are moved up through the guide track resulting inlittle-by-little advancement of the component.
The basic construction of the vibratory bowl feeder contains the followingelements.
1. Bowl feeder
2. Feeding direction
3. Epoxy sheets
4. EM Coil

Fig. NO. (5) Image of Bowl Feeder

d) LINEAR FEEDER

Linear Feeders are used to remove parts from upstream machines and/or feed parts to downstream machines. Linear Feeders are also used for sorting parts, with due consideration of various criteria. Linear feeders are fitted in individual feeding units as well as in complex assembly systems. The different types of Linear Feeders vary in size and application.
A Linear Feeder Type HLF-M is generally maintenance free. Under certain conditions, an oxidation layer may however be formed at the contact surfaces of the leaf springs and spacer discs, which may have a negative influence on oscillation for a period of time. Such cases may necessitate dismantling and cleaning the leaf springs, or replacing them.The linear feeder is a device of the family of vibratory bowl feeders. It is, however, equipped with a linear conveyor. Electromagnetic vibrations are converted into mechanical vibrations and are used for conveying material B. When the magnet D, which is fixedly connected with the counter-mass F, is supplied with current, it generates a power that, dependent on the vibration frequency of the mains supply, attracts and releases armature E. Within a period of the 50 Hz of the A.C. network the magnet achieves its maximum power of attraction twice, as this is independent of the direction of the current conduction. The vibration frequency therefore is 100 Hz.

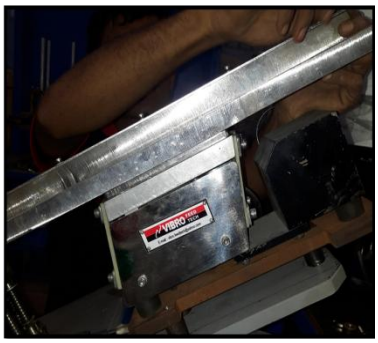

Fig. NO. (6) Actual image of linearFeeder

e) TABLES

The tables are the main components on which the whole machine and the machine components are placed.

Fig. NO. (7) Actual image of Tables

f) CAM ARRANGEMENT

The cam arrangement is done for assembling the rivets followed by the follower.

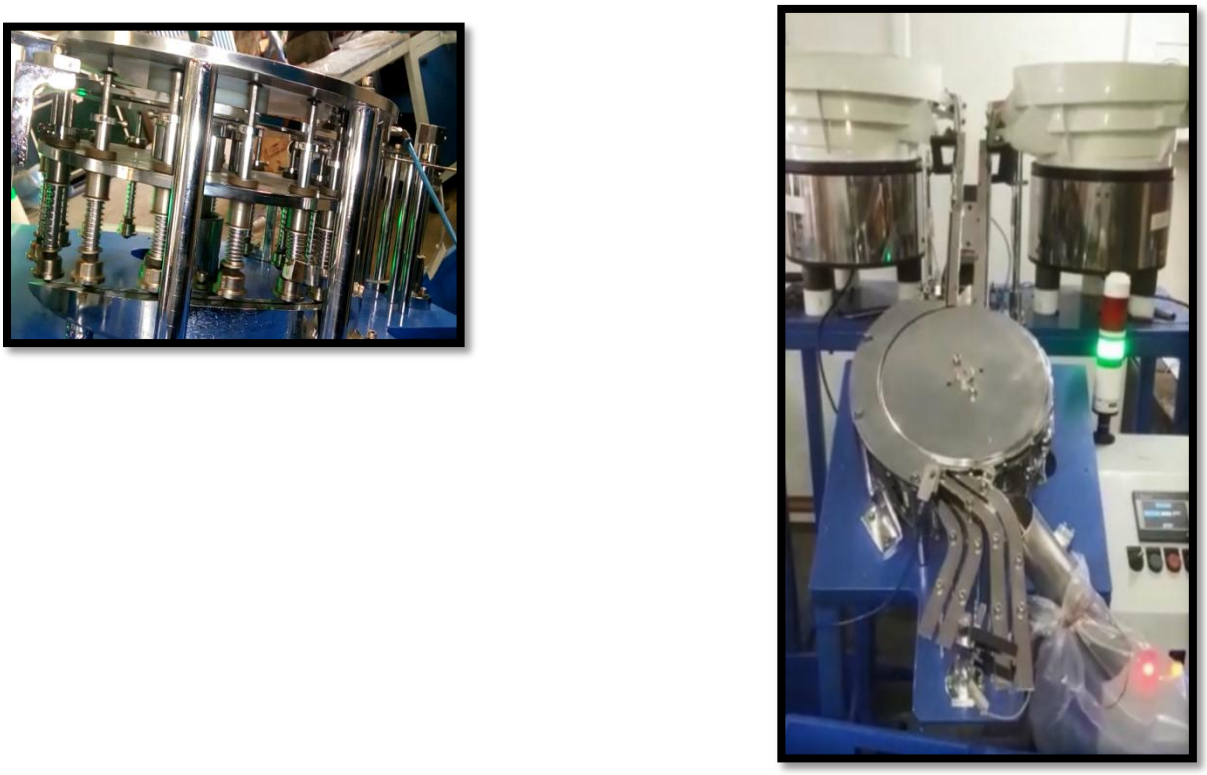

Fig. NO. (8) Actual image of Cam and Follower Arrangement

g) CONTROL UNIT

Fig. NO. (9) Actual image of Control Panel

V. WORKING

1) Automatic rivet assembling & packing machine is a machine which works on a plc controller to assemble plastic rivets. It has two step feeder one for assembling male part of rivet and another for assembling female part of rivet.

2) There are two tables. First table supports the feeders and the second table has angular plate placed on which motor is attached at the back side and the disc and cam arrangement is attached on top of plate.It also consists of control unit

in left side in which all electrical circuits and controllers are fitted on the controller box there are various switches, display and phase indicators. They are assembled using automatically operated press.

3) The motor drives the circular disc having slots the male part gets inserted in the slot of disc and female part comes directly down of the male part and the cam and follower arrangement presses it and they are get assembled. Special motor is attached having a gear box of required torque.

4) The motor drives the circular disc having slots the male & female part gets inserted in the slot of discs and the cam arrangement assembles the rivets. The disc takes the assembled rivet and from there guide ways takes the assembled rivet outside and drops it in the box and the defected or not assembled parts are taken outside by the other way. Fig. NO. (10) Actual image of Machine

VI. ADVANTAGES& DISADVANTAGES

Advantages:

1) Require man power is eliminated.
2) Low running cost.
3) Easy to operate & it also has a counter sensor.
4) Low maintenance cost.
5) It has sensors by which the feeders start periodically.

Disadvantages:

1) Initial cost is high.
2) Pneumatic controller required.
3) Air compressor required.
4) Electrical supply required.

VII. CONCLUSION

It is most important and useful machine which require less time for assembling the rivet and the production rate can be increased.

VIII. FUTURE SCOPE

As the uses of plastic rivets are increasing day by day, the above mentioned concept has lot of scope in all fields as plastic rivets are widely used in mostly all fields.

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