



Fabrication of power hammer for forging and embossing operation

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Abstract — Now a day's competition is increasing in the market with the increase of demand of the products and similarly large number of small scale industries. The present invention relates to the improvement of the power hammer of the type having the impact member adapted to the rapidly reciprocating member by a rotating source of power so as to impart sequential shocks against work to which the appliance is applied with the help of the eccentric mechanism. More particularly this invention relates to the power hammer, used for forging effect, embossing effect, blanking effect, piercing effect, etc. as well as decreasing its cost and making it multi operational.

Keywords — Power hammer, embossing, punching, blanking, forging, molding, blacksmith, multi operational, economic, leaf spring, eccentric mechanism.

I. INTRODUCTION

The forging is the very old technique of manufacturing in which conventionally metal rod is heated and then hammered by black smith, but nowadays with improvement in technology that manual operation is replaced by power hammer which is normally electric motor.

A typical power hammer consists of a frame, an anvil, and a reciprocating ram holding a hammer head or die. The work piece is placed on the lower anvil or die and the head or upper die strikes the work piece. The power hammer is a direct descendant of the trip hammer, differing in that the power hammer stores potential energy in an arrangement of mechanical linkages and springs, in compressed air, or steam, and by the fact that it accelerates the ram on the downward stroke. This gives more power than merely permitting the burden to fall. Earlier designs like trip hammer, steam drop hammers, board or strap hammers, use the power source to raise the ram, but let its fall be propelled solely by gravity.

Embossing denotes to the formation of an imprint of some kind of design, beautification, writing or outline on another surface like paper, cloth, metal and even leather, to form a relief. In consistent printing or a carving, plates are hard-pressed against the surface to leave an imprint. In embossing however, the pressing raises the surfaces in addition to a new height to the body.

Embossing includes the formation of an imprint by insertion of the dies in interaction with the stock under high pressure. Different kinds of paper show dissimilar kinds of embossed effects. The various types of embossing that can be done like blind embossing, tint embossing and glazing to achieve different results. The process of embossing is comparatively inexpensive and has many uses.

Before the construction of power hammer, the models made were only used for a single purpose. I.e. the previous models of the power hammer were just for the special purpose. But here we have made a power hammer which is multi-functional as well as their cost is comparatively very low as compared to the previous available models. The power hammer is a device which uses the electrical power to run the motor and with the help of eccentric mechanism it converts the rotary motion into the linear motion and thus the forging process as well as embossing is carried out.

II. OBJECTIVES

The main objective of this invention is to provide simple and economical mechanism of power hammer. Another objective is to provide a power hammer which is easily adjustable according to the varying stroke of the hammer according to the work piece. To make the power hammer multi-functional. To decrease the cost of the power hammer. To provide a simple and sturdy hammer the manually manipulating portable type which may be manufactured at moderate cost. To provide an improved power hammer having a shoe directly applicable and movable along the work and an impact member connected with the die and adapted.

III. CALCULATIONS

From the references noted below, by using the design book we calculated the for the components of Power hammer such as velocity and power of an electric motor, torque produced and the power required to make the standard size of chisel by the help of power hammer.

We have the torque =2566.37N, for the 1400rpm motor connected with the 8” pulley and the eccentric mechanism connected with 2” pulley, the rotation of the 2” pulley with respect to the 18” pulley connected with the V-belt running at 1400rpm becomes 1600rpm. For load given to the work piece we get force of 23.79N \cong 24N force.

IV. MODELING

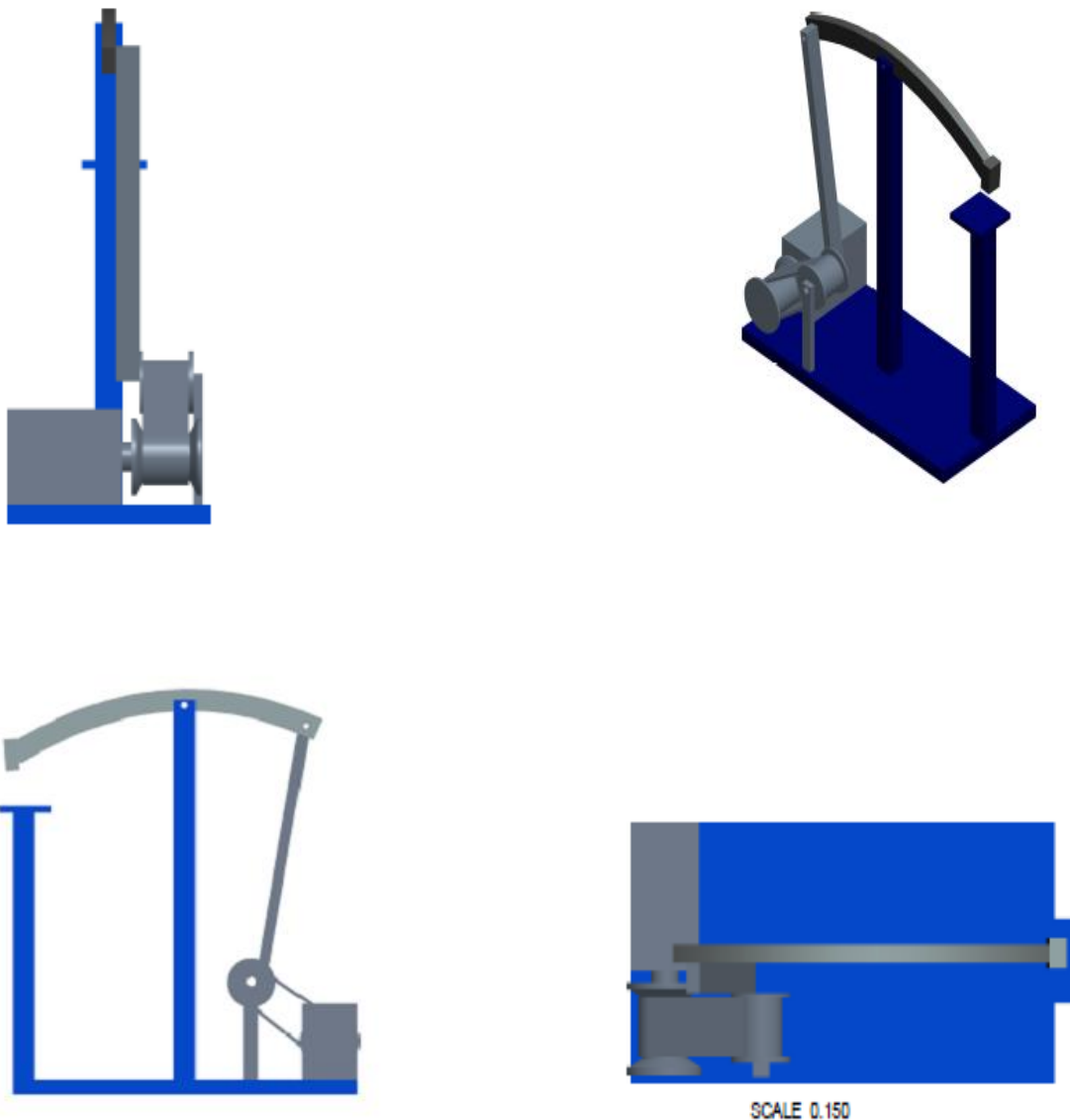


Fig - 1: Modeling of power hammer in CREO and its different views

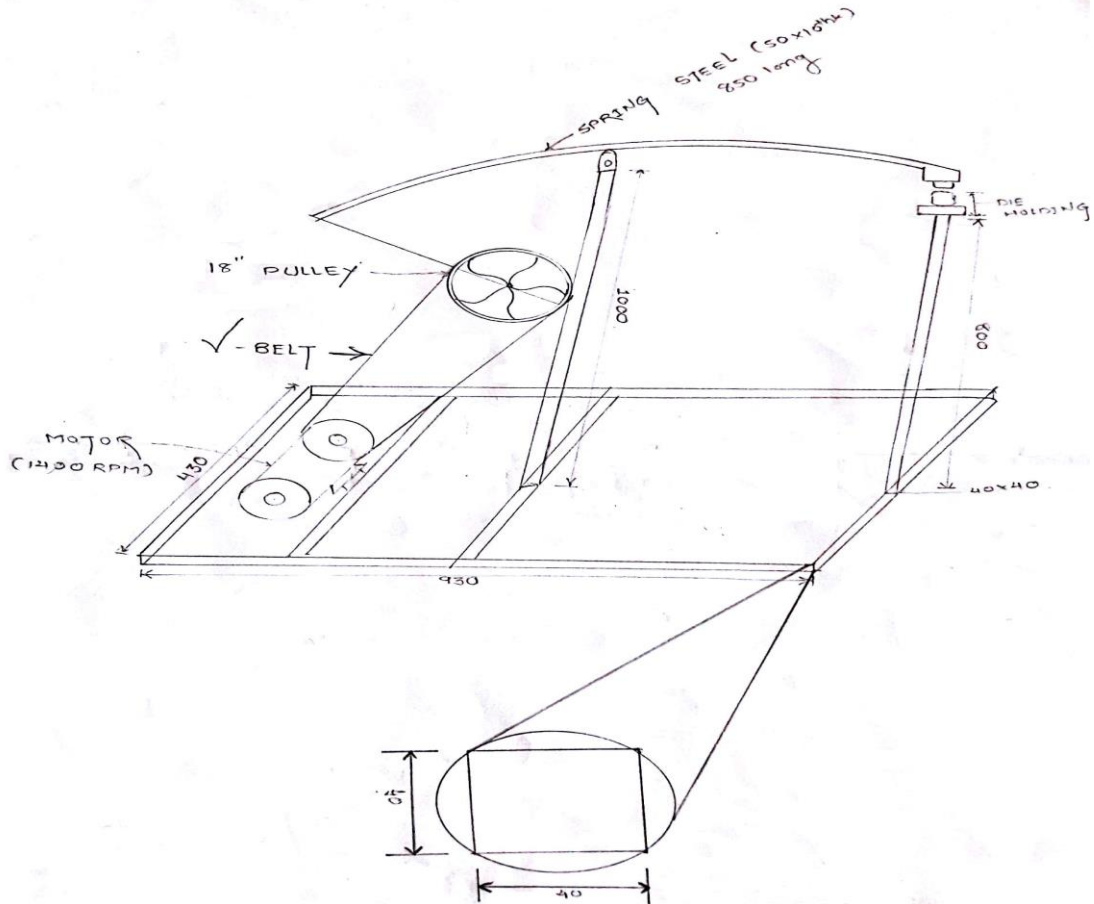


Fig - 2: Dimensions of the working model

| Sr. No. | Name of Components |
|---------|-------------------------------|
| 1. | Motor 1- Φ , 230V, 50 HZ |
| 2. | 18" and 2" pulley |
| 3. | V-Belt |
| 4. | Eccentric mechanism |
| 5. | Bearing |
| 6. | Leaf spring |

Table: 1 Details of components

V. RESULT AND DISCUSSION

After the completion of the setup, we took the setup in the blacksmith workshop where he molds the iron as well as different metals such as steel and the iron. We practiced our model on the chisel made up of mild steel. After heating the chisel in a furnace up till it gets red in color, we started the forging process on the chisel and in 5 strokes in the chisel we got the final dimensions as per our requirement. After that we changed the tool of the power hammer as introduced earlier that the power hammer made by us is multi-functional, we used it for embossing effect and similarly used it for punching and blanking effect.



Fig - 3: Actual working model

VI. CONCLUSION

Here after performing out all the operations by the help of a power hammer in the blacksmith workshop and taking there feedback, we finally concluded that the power hammer fabricated by us was a multi-functional power hammer which can be used for the operations of forging, hammering, embossing, blanking, piercing, just by changing the tool which is provided by us with the leaf spring, as well as the leaf spring used by us in the place of an iron bar helps in absorbing the damping forces originated because of the hammering effect on the work piece. The main objective as well as the main aim of our fabrication was to make the power hammer cheap as well as multi-functional and with respect to that we were successful in decreasing the price of the power hammer and we constructed it in 11,000 INR approx.

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