

## Safety Mechanism of Power Press

<sup>1</sup>Vishakha V Meshram , <sup>2</sup>Assistant Prof. Pravin M Wanjari

### Abstract:-

*Mechanical power press activated through foot paddle. The mechanical power press is having full revolution clutch, once the clutch is engaged it remains engaged until the crankshaft has completed full cycle. Before completing the downward stroke, if operator is working on power press, he gets injured. And there is one another problem, when the machine is overloaded it break the part in the transmission system. Hence for operator safety and machine safety, it is necessary to develop new safety mechanism for power press. By using the friction clutch brake mechanism engage and disengagement becomes smooth and the braking is done at the will of operator. The friction plate safeguards the transmission against over loading.*

**Keywords**—Mechanical Power Press, friction clutch, safety mechanism.

### INTRODUCTION

Power presses are sheet metal working machine which is used to punch, cut, shear, forms and bend metals. Mechanical power press use full revolution or part revolution clutches. Generally power presses used, mechanical, pneumatic and hydraulic powered. The mechanically powered press is widely used throughout industry. Clutch, flywheel and crankshaft are the main component for power transmission on mechanical power press. Ram is attached to the crankshaft with pitman and crankshaft is connected to the flywheel, which rotates when flywheel is rotated. Crankshaft converts the rotary motion of the flywheel into the downward and upward motion of the ram. The mechanical power press which is consider for research is structurally 'c' frame type, having 75 tonnage capacity and it performs punching, and blanking operations, it is paddle operated. The clutch used for power transmission is full revolution type. When operator press the paddle the clutch is engaged and when release the paddle clutch is disengaged after taking the full revolution of the crankshaft. If operator is working on press and if press machine failure occurs before completing the full revolution, then operator may injure.

The operators hand is crush while performing the operation due to the inability to stop the machine stroke.

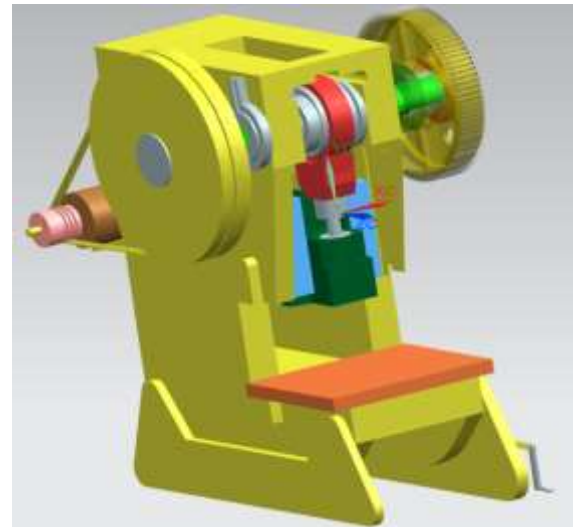


Fig: 1 Mechanical power press

### The Main Parts of Mechanical Power Press

#### (1) Base

It is main supporting member of power press. Which is use for holding the dies and supports different controlling mechanism.

#### (2) Ram

It is the main operating member, which reciprocates to and fro inside suitable guide. It carries the punch at the bottom end.

### (3) Pitman

Pitman is also called as connecting rod. It connects the ram and crankshaft. As per the requirement the stroke length and power transferred can be adjusted.

### (4) Frame

It forms the main body of power press which carries the ram and driving mechanism. C frame type power presses are most widely used.

### (5) Driving mechanism

In different types of presses different type of driving mechanisms are used, like crankshaft and eccentric mechanism in mechanical power press. It is used to drive the ram by transferring power from motor to ram.

### (6) Controlling mechanism

The power transmitted through the transmission system can be disengaged with the help of clutch provided with driving mechanism as per the need.

### (7) Flywheel and clutch

Flywheel stores the energy required for maintaining constant speed of ram when the punch is pressed into the workpiece. Clutch is used for engaging and disengaging the drive shaft with the flywheel. [2]The function of clutch is to transmit the torque from flywheel to the eccentric shaft or crankshaft. [4]

**The main advantages of clutch are,**

- The engagement is smooth.
- Proper disengagement, i.e. complete disconnection of the engine.
- In certain cases, the friction clutch serves as a safety device. It slips when the torque transmitted through it exceeds a safe value. This prevents the breakage of parts in the transmission chain.
- Safeguards the transmission against dynamic loads.[3]

### (8) Brakes

Brakes are used to bring the driving shaft to the rest when it disengaged from flywheel.

### (9) Bolster plate

It is fastened to the bed of the power press which supports and hold the die assembly over it.

### Previous operation of the mechanical power press

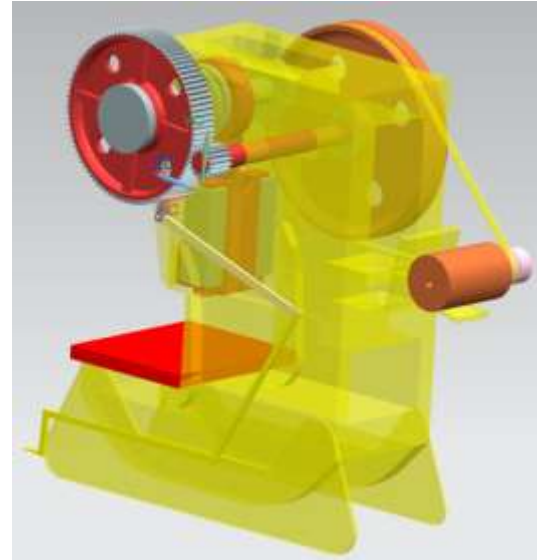


Fig: 2 Mechanism of previous operation of power press

When operator starts the motor, the power is transmitted from motor to the flywheel shaft through the V belt which connect the flywheel to the motor pulley. From flywheel shaft power is transmitted to the pinion, from pinion power is transmitted to the main gear. When operator press the paddle rolling key clutch is engaged with the main shaft and power is transmitted to main shaft and through it power transmits to the slides or ram and operation is perform. When the operator release the paddle clutch is disengaged after taking the full revolution of the crankshaft. Operator cannot stop it before taking the full revolution.

### [ III ] Modified operation of the mechanical power press

As the more injuries occurs due to the full revolution clutch type of operation, there is need to convert the full revolution mechanical power press into the part revolution mechanical power press. Some modifications are done to convert it into part revolution type. Firstly the solid flywheel shaft is made hallow and then the solid shaft is inserted in the hallow shaft. Flywheel is placed on the solid shaft and connected to the motor through V belt and friction clutch and brakes are placed on the hallow shaft. They are connected by the mechanical linkage. Here friction clutch are use for the proper engagement and disengagement of clutch. Rolling key is made permanently engaged.

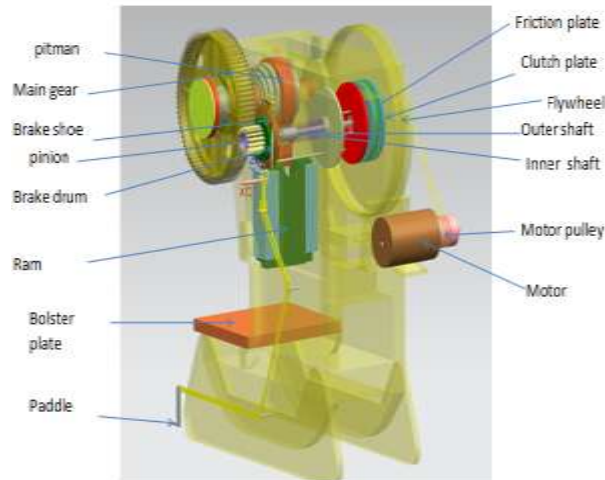


Fig: 3 Modified operation of the mechanical power press

#### [ IV ] Power transmission in modified mechanical power press

When the operator starts the motor power is transmitted from motor to the flywheel shaft through the V belt connection due to which flywheel shaft is rotate, when the operator press the paddle, brakes are open and clutch is engaged with the flywheel shaft, due to this the clutch shaft is rotates and transmits the power to the pinion then pinion transmits the power to the main gear, from main gear power transmits to the main shaft through the rolling key. As the main shaft rotates it transmits power to the slides and operation is performs. When the operator release the paddle clutch is disengaged and brakes are applied without taking the full revolution due to this, the operator working on power press is safe as there is no downward movement of the slide or ram after releasing the paddle. The total braking system is in the hands of operator. He can stop it for safety purpose. If in case the machine is overloaded the friction clutch plate is slips as it exceeds the torque acting on it. Only we have to change the friction plate or repair it. As the friction plate is slips it disengage the clutch and brakes are applied. Which prevents the breakage of parts in the transmission system from overloading.

#### CONCLUSION

By converting the full revolution clutch power press into the part revolution mechanical power press, operator's life becomes safe, as the total control of braking is in the hands of operator. operator can stop it for the safety purpose. And the breakage of the parts occurs due to the overloading in the transmission system is prevented. So machine is safe.

#### REFERENCES

- [1.] Woon Chul SHINa,\*, Seung Ju CHOI a, Keun Oh LEEb, 2012“The prevention of the injuries through the mold design of the press machine in south of Korea.”
- [2.] B. S. Raghuwanshi,1998, “workshop technology” Vol.II (Machine tool)
- [3.] V B Bhandari, “design of machine elements”,2010,Third edition
- [4.] Orville D. Lascoe, “Handbook of fabrication processes”, 1998 Fifth edition