AIM:

To study the construction, operation and engineering utilities of "Blake jaw Crusher" .

CRUSHING AND GRINDING MAHINERY:

The terms crushing and grinding is used for same meaning i.e. for size reduction. The term crushing represents the reduction in size of a lumpy solid mass which give coarse product whereas the term grinding represents the reduction in size of the crushed materials which gives fine products than crushing.

Because of the wide variety of devices used, it is extremely difficult to make a rigid classification in which definite limitations of the groups can be established is the decision into coarse crushers, intermediate crushers and fine grinders.

1. Coarse crushers:

a) Jaw crushers

i) Blake

ii) Dodge

2.Intermediates:

a) Rolls

b) Disc crushers

c) Edge runners

d) Disintegrators (cage)

e) Hammer Mills

3. Fine grinders:

a) Centrifugal grinder.

i) Raymond.

b) Burrstones grinders.

c) Roller mills

d) Ball mill & Tube mills

e) Ultrafine grinders.

BLAKE JAW CRUSHER:

CONSTRUCTION:

There are two distinct types of jaw crushers. The Blake and the Dodge. The Blake is by far the commoner, while the Dodge is rarely found. The Blake crusher is made by many concerns, and each maker has own design.

A typical Blake Jaw crusher is shown in the left hand facing page, not necessarily advocated as the best design but is shown merely as one that includes most of the typical features. It consists of an essentially rectangular frame A of either cast iron or steel. In one end of this frame is fastened the stationery jaw B which may be vertical or inclined. It is made of white cast iron, manganese, steel or some other material that will stand abrasion. The faces of the crushing jaws are usually corrugated to concentrate the pressure on relatively small areas. On the sides of the frame are the two journal boxes (not shown in the figure) between which runs a heavy shaft, and this shaft carries at one end the wheel H which serves both as pulley and as a flywheel. Another pair of bearing (not shown) carry a shaft C from which is hung the movable jaw E with its wearing plate D. Most of the length of the shaft between the bearings is developed into an eccentric cam G on which hangs the pitman I. Between the bottom of this pitman and the plate E on the one hand, and between the pitman and the fixed bearing J on the other hand, are two toggle bars is made in two pieces and these two pieces are held together with bolts that are purposely made the weakest parts in the crusher. This policy prevents the failure of the crusher. As the main shaft rotates, the cam G causes the pitmen to oscillate in a vertical direction, and the toggle bars transform this vertical motion of the pitman into a reciprocating motion of the movable jaw. There may or may not be an adjustable bearing, consisting of the two blocks J and K, in order to adjust the distance between the fixed and the movable jaws and thereby regulate the size of the product. The movable jaw is held back against the toggle by link L, the spring M and adjusting wheel N.

OPERATION:

From the constructional point of view, we know that this have a movable jaw. When electric current is supplied, the motor rotates by means of belt, pulley and flywheel. This rotation rotates the shaft between pulley and flywheel. Then is caused by the eccentric cam, the Pitman to oscillate in a vertical direction, and the toggle bars transform this vertical motion of the Pitman into a reciprocating motion of the movable jaw. When the feed is introduced through the input funnel, it react the annular space between the fixed jaw and the movable jaw. Since the movable jaw moves in to - and - fro motion, therefore this lead the feed to go downward. This is occur when the movable jaw go away from the fix jaw. And when it moves towards the fix jaw it presses the feed and crack the solid lumpy feed into smaller individual. The size of the individual particles are maintained by adjusting the blocks J and K which regulates the distance between the jaws. When the distance between the two jaws is more, it applies less pressure on feed thereby breaking the mass into large sizes. On the other hand when the distance is too less, it applies less pressure thereby breaking the mass into fine products.

The maximum travel of the movable jaw is at the bottom because the movable jaw is installed at an inclination thereby reducing the space towards the bottom. On the back stroke the material that has been crushed is permitted to drop freely from the jaws, thereby preventing any cushioning action from the accumulation of fine material from the coarse feed.

Machines in the coarse crusher class are in ordinary employ where the feed is from 1½ to 2 inches in diameter and larger. The largest device of the class have been made will take rocks up to 60 inches in diameter. No type of crusher accepts those listed in this class can be built on sizes that will take this very large pieces of feed.

FAILURE AND ITS PREVENTION:

If accidental pie1es of iron, such as hummer heads, stray bolts, etc., fall into the crusher, they will cause excessive strains unless some provisions is made for relieving the crusher in this emergency. In the particular design shown, one of the toggle bars is made in two pieces are held together with bolts that are purposely made the weakest parts in the crusher. In case material that might otherwise cause destructive strains under enters the jaws, these bolts shear through and allow the movable jaw to drop back far enough to discharge the obstacle. Thus the failure is made to take place at a predetermined point that can be easily and quickly repaired, instead of breaking some vital part o1 the equipment.

ENGINEERING UTILITIES:

Blake jaw 1rushers are generally used in hard rock practice in mining industries. Since jaw crushers are under the group of coarse crushers, they are developed where the 1eed is fewer 1rom 3/2 in. to 2 in. in diameter and larger.

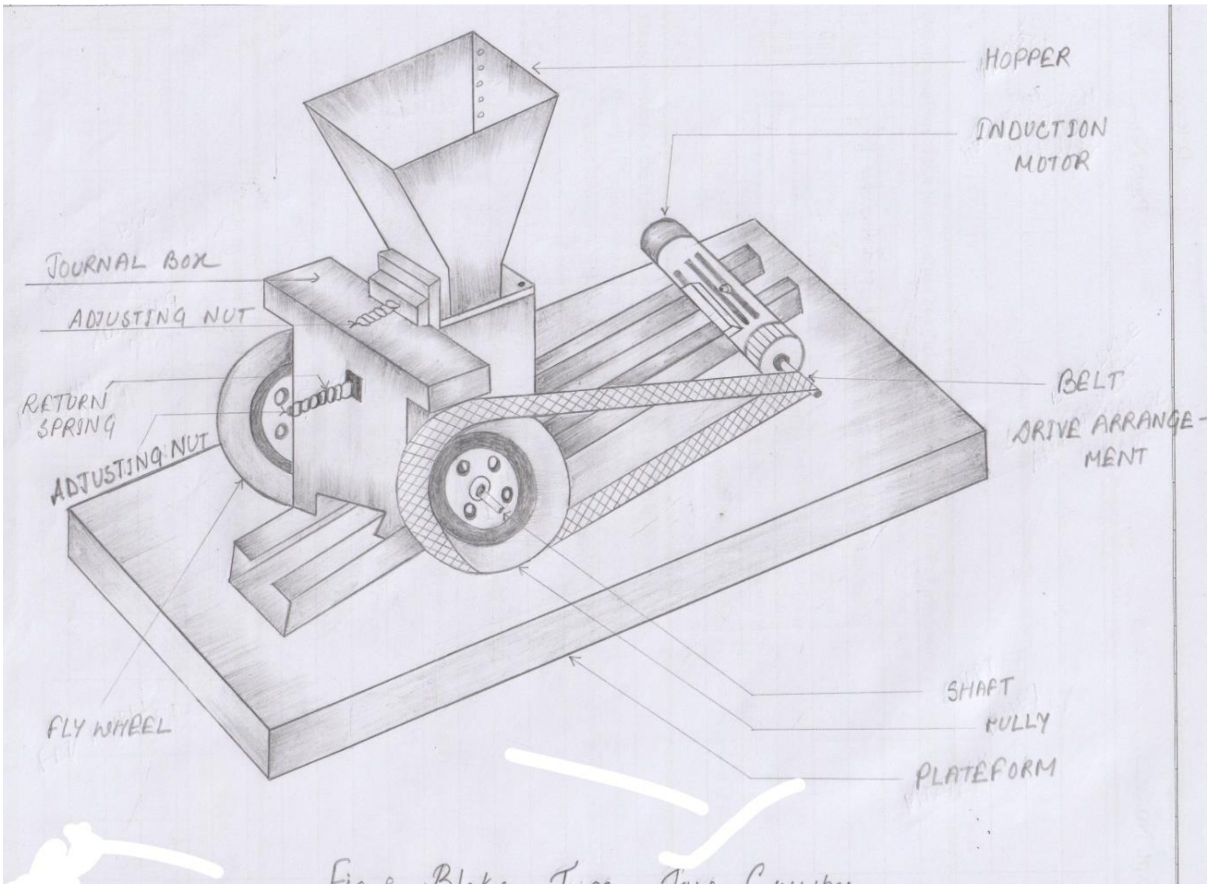

Fig : Blake Type Jaw Crusher