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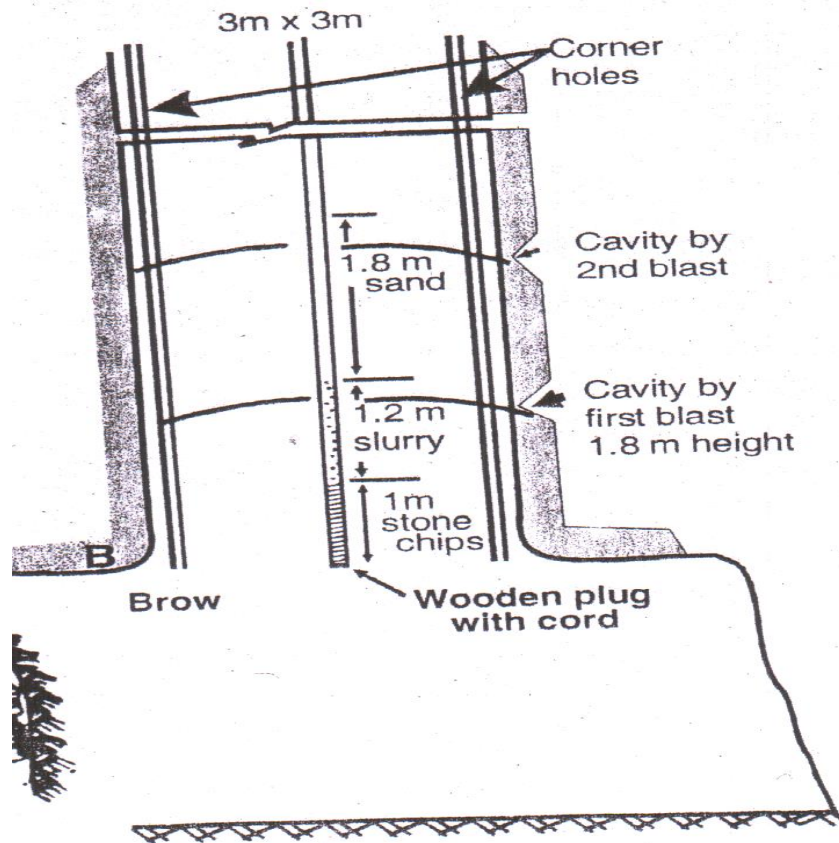
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# ***DROP RAISING***

# *INTRODUCTION*

- This is a method of making a raise connection between two adjacent levels, nearly 60 m apart, by drilling large dia holes (150-165mm), from upper level to lower level and blasting them in stages.
- The raise is usually vertical but may also be steeply inclined.
- In India this method is used at the Copper Mines of Khetri Copper Complex (KCC).



*Drop raising. Total 5 holes,  
each 165 mm dia., 57 m long.*

# *DRILLING*

- The blast holes of 165mm dia, 5 in number (1 in centre, 4 at corners) are drilled from top level to the bottom level, nearly 57 m below.
- In this method of blasting the central hole out of the total five blast holes should be of large dia, 150 mm or 165 mm but the corner holes may be of smaller dia, nearly 100 mm.
- Small dia holes however result in more deviation.
- Moreover it is more convenient to drill all the holes of the same size once the drilling machine is set up at the site. Hence all the holes are of 165 mm dia.

# *CHARGING*

- The charging of explosives into blast holes is done from the upper level.
- A wooden plug in two pieces tied to a nylon rope is lowered into the blast hole to plug the bottom mouth of the blast hole.
- Aggregate, nearly 12mm in size, is stemmed for a length of 1 m followed by charging of slurry explosives (packaged cartridges before they are lowered into the hole).
- All the five holes are charged.

- Explosive charges used in are normally spherical or geometric equivalent, as research in the application of this breakage mechanism to rock indicates that spherical charges or their equivalent produces optimum results
- In blasting practices, spherical charges have been defined as havin a length: diameter(L:D) ratio of 4:1 or less, and upto but not exceeding a L:D equal to 6:1.thus for holes 165mm dia and 990mm in length would constitute a spherical charge
- The explosive charge is nearly 34 kg.
- Above it a length of 1.8 m is packed with sand and the rest of the hole is left unstemmed.

# *BLASTING*

- The concentrated, "spherical" charge is positioned at a specified distance from the horizontal free surface underneath and the detonation creates crater-shaped openings in the rock.
- Several holes are detonated at the same time, and the process is repeated until a horizontal slice is removed.
- The holes are blasted in a sequence with the help of delay detonators at a time from the surface when no worker is allowed to remain underground.



- The roof of the lower level provides a free face for the explosive charged and the result of blasting is that a cavity of nearly 1.8m height is formed.
- With each blasting a vertical height of 1.8 m is formed in the shape of raise.
- The top 4-4.5 m of the blast holes, called the plug, is however is blasted in one step.
- The wooden plug is usually recoverable; the nylon rope burns away during blasting.

# *MUCKING*

- The fragmentation is sufficiently good for loading by L.H.D. units.
- Dressing of the conical cavity is not essential and the fragmented rocks resulting after blasting are removed by the L.H.D.unit working in the lower level.
- As a safety precaution the L.H.D. unit operator has to keep away physically from the point B, shown in the figure.
- He should not go below the raise.

- As the mucking is in progress the upper portions of the blast holes are charged with explosives in the manner as already described and operation of loading, blasting and mucking follow similar pattern.
- The raise so formed has its sides sufficiently strong and stable showing no adverse effects by the heavy blasting.
- Normally it is possible to have two blasts in a period of three shifts with reasonably good supervision, and the raise is completed within a period of about 20 days, with due allowance of minor delays.

# *ADVANTAGES*

- The main advantage of this method of drop raising is that no workers are employed in the lower level except the operator of the L.H.D. unit.
- No side dressing or roof dressing of the raise is required.
- The entire work is safe and fast so that a raise nearly 57 m long is completed within a period of 20 days unless there are undue delays for some reasons.
- In addition, there is a scope to reduce the cost further as a better drill factor, powder factor and productivity can be achieved by this technique.
- Longer raises up to 80 m or so have been driven successfully

# *LIMITATIONS*

- The only limitation is the requirement to use the same drilling equipment in the stoping operations too, in order to justify the investment made.