MINING MACHINERY - (I)

1) ROPE HAULAGE :-
2) MINE LOCOMOTIVE :-
3) REGULATORY PROVISIONS :-

REGULATORY PROVISIONS :- for safe regulation of haulage in mines

D.G.M.S (Directorate General of Mine Safety) 1960
H.Q at DHANBAD
IBM (Indian Bureau of Mines)
Chief Inspector of Mines / Director General of Mines.

a) HAULAGE ROADWAY :- The following set of provisions w.r.t every length of roadway in a mine where materials are transported in tubs by means of gravity or mechanical power shall be in effect

i) Each such roadway shall be adequate dimension and so far as practicable shall be straight and of regular gradient.

~~2) So far as possible should be straight~~

ii) Have tracks properly laid of rails with adequate section.

b)

a) The different pulleys, screen seives & rollers that change the direction of rope shall be securely fixed

2 b) No person shall guide or adjust a moving rope on to drum, pulley, sheave, or roller except with a lever or other proper appliance

3) Wherever haulage is effected by one or more ropes, there shall be provided & maintained

a) At the top of every inclined plane, atleast one stop block or other effective ~~countrymen~~ contrivance to arrest tubs from running out of control.

b) Atleast one runaway switch or other effective contrivance below the first stop block at a distance greater than the length of the set of tubs.

EXCEPTION:- Provided that such distance shall not exceed a set or train of tubs by more than 10m.

Provided further that where the regional inspector by an order inviting so requires, the stop block and the runaway switch shall be interconnected in such a manner that they do not remain ineffective at any point of time.

d) An attachment behind the ascending set of tubs generally known as Backstay or Drag or other suitable contrivance for preventing the tubs running back.

e) Safety hooks, Jazz-rails or other suitable contrivance to prevent runaway in forward direction

d) Tub-re-railers at adequate interval not more than 250m. In case of manual haulage, provision of re-railers is not required rather the haulage rope should be detached from set of engine. Haulage engine should not be stopped before allowing manual haulage of tubs.

The following code of signals shall be strictly used and observed for controlled operation.

25 V dc operation

No. of raps	Interpretation
1	Stop
2	~~how work the~~ lower Haul Slowly
3	Start when rest
4	Rope Raise Haul out Slowly

b) A printed copy of the code of signals shall be posted prominently at the place near to the operator's location and also to all such places where the ~~trends~~ trains are supposed to stop on temporary basis.

c) No person other than a competent person shall transmit the signal. A competent person is employed by mine manager & instructed in writing to do a designated job.

In any underground mine where the length of haulage exceeds more than 600m, there should be an efficient provision for telephonic communication b/n the both ends of the haulage.

In every gasy mine, the communication system should be installed and operated in such a manner that to avoid any chance of close circuiting & must be intrinsically safe.

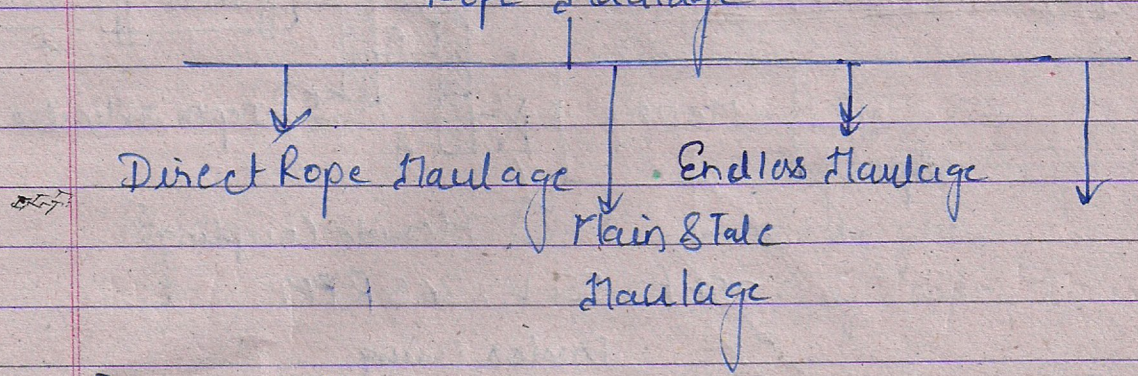
In every haulage route, where a person is allowed to pass or work while the haulage is in motion there shall be a provision of manholes at suitable intervals not more than 10 m. Provided that when the gradient of roadway ~~exceeds~~ less than 1 in 6, spacing of manholes may be upto 20 m.

Every manhole shall not be less than 1.8m in height 1.2m in depth & 0.75m in width. However the max. width of man-hole shall not be more than 1 m

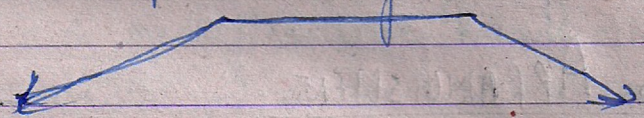
C. Mine Regulation 87, 89

ROPE HAULAGE

Rope Haulage is a system of Haulage in mines where transport is provided through traction of rope attached to gear-motor assembly.



→ Balanced Rope Haulage
→ Unbalanced Rope Haulage



DIRECT ROPE HAULAGE:-

a) Applicability conditions:-

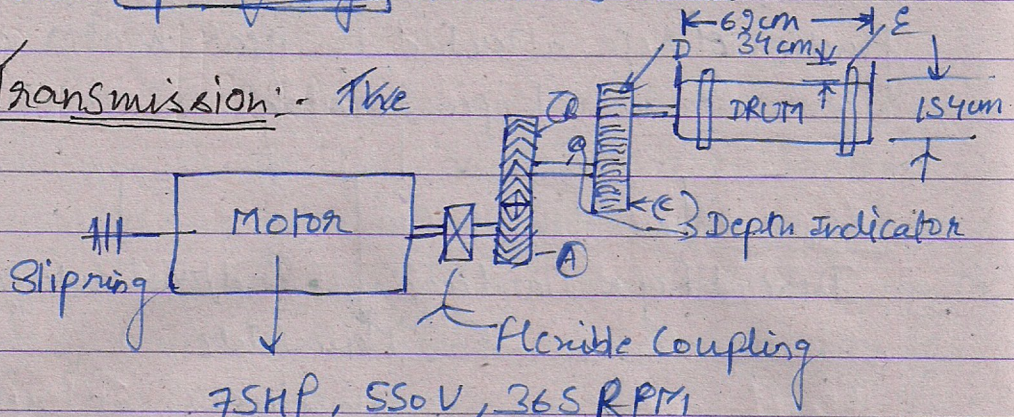
i) Gradient of the Haulage path should be sufficiently steep. (In no case not less than 1 in 10)
ii) where discontinuous transport is in requirement.
iii) The empty tubs can be fedded down under deep-declutched condition and the movement can be controlled by bricks.

b) Limitations:-

i) High peak power demand
ii) Severe Braking duty.
iii) It requires high level of track maintenance because the operating speed of haulage is high.

Motor Requirements:- It requires slip-rings induction motor with water resistance & drum-controller. However in case of small haulage installations a ~~spindle~~ spiral cage motor is used.

Power Transmission:- The

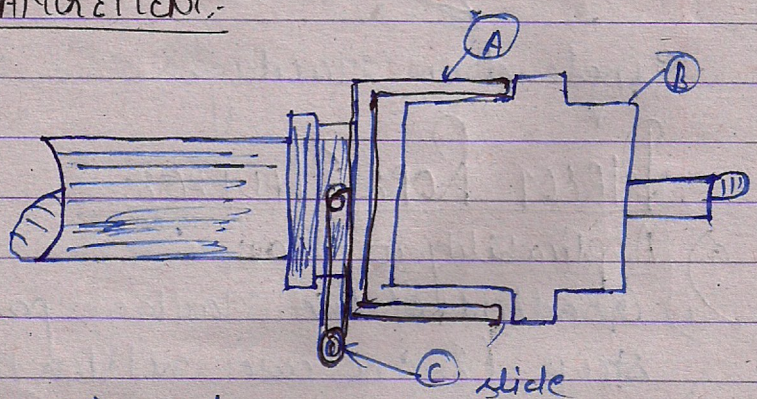


Brake pan is having a ^ of wiring to facilitate better braking effort.

Friction lining

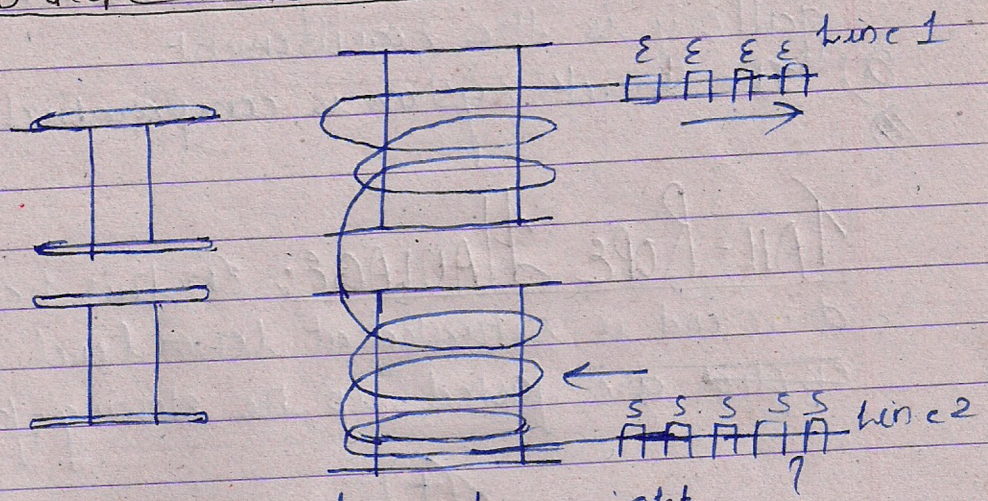
CLUTCHING ARRANGEMENT:-

Dog-clutch.



The driven shaft (A) is free to slight along the axis of rotation as shown and can be moved using lever (C). The driving shaft (B) is coupled with motor. This arrangement of Dog clutch enables simple operation, it is in design and construction so capable of withstanding dynamic loads. However the disadvantage is that it can be clutched only when either both the shafts are under stationary condition or running at the same speed.

BALANCED ROPE DOUBLE DRUM-ROPE HAULAGE:



Payload + Dead load tare weight -
payload = ?

Payload - Coal Deadload - Rope, weight of mine cast

This is a modification of single-drum direct rope haulage. Here, the two drums are provided to work in turns of each other so that when a train of fully loaded tubs is being hauled out-by of the line through one of the haulage line, another set of train having empty tubs gets feeded in-by of the mine. Both the drums are ~~fitted~~ fitted with clutches and are mounted on the same side The advantage of this system is that it uses only payload for energy consumption. The deadload components of the haulage rope and the mine cast get balanced

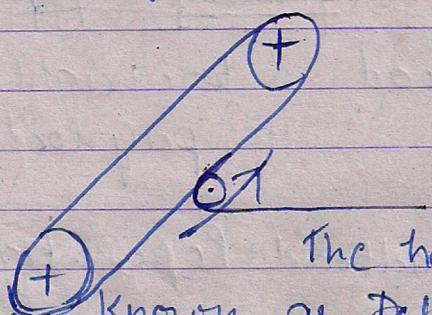
ADVANTAGES:

1) The peak power requirement is substantially reduced
2) The braking is easier.
3) Higher output per trip.
4) It ensures regular delivery of empty and loaded tubs.

DISADVANTAGES:-

1) It requires 2 haulage tracks therefore wider gallery is the requirement.
2) The track system is comparatively complicated.
3)

TAIL-ROPE HAULAGE:- In this haulage the drive end is situated at lower level and the ~~empties~~ are fasted up the slowing-fasting track



The haulage rope passes ~~by~~ via a pulley known as Deflection Pulley located at the top of the ropeway. The load travels by gravity down the gradient and its movement is controlled by the haulage-operator.