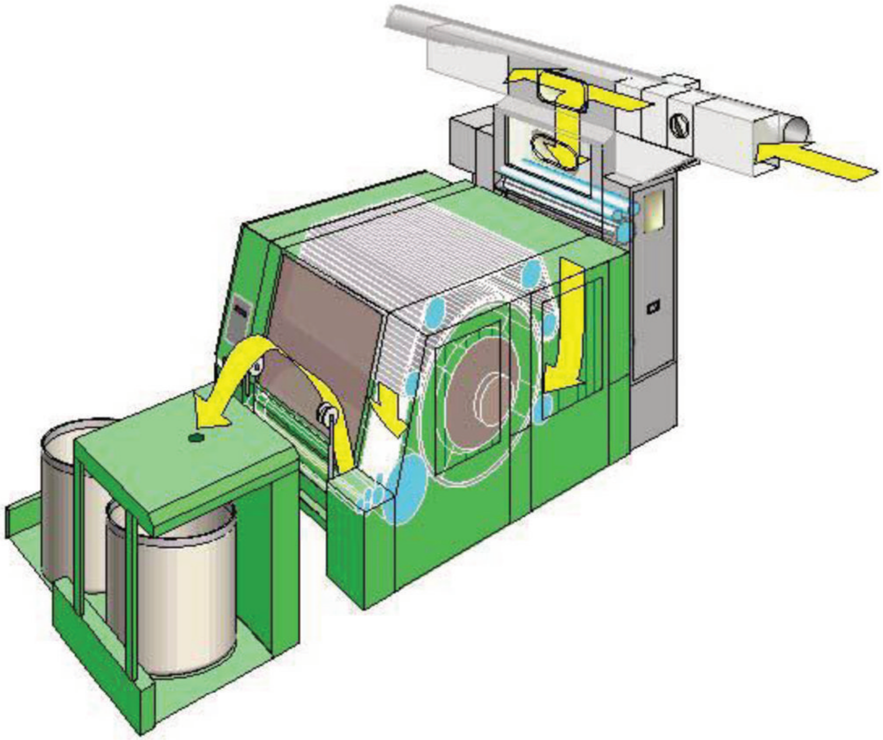
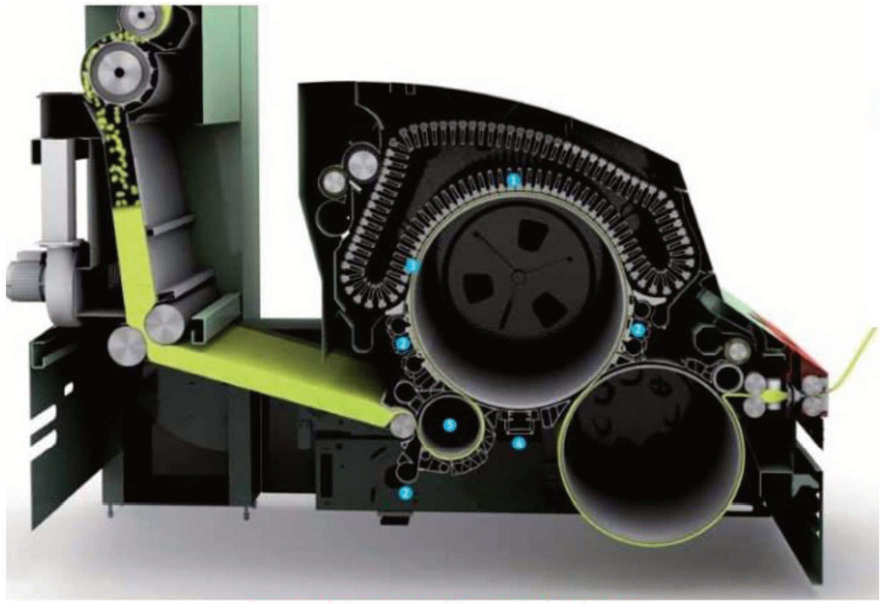
CHAPTER THREE
CARDING





Cross Section of Carding Machine

By: Lami A.

Fundamental of carding

- Two proverbs of the experts - ***The card is the heart of the spinning mill*** and ***well - carded is half- spun*** - demonstrate the immense significance of darting for the final result of the spinning operation . The main tasks of the card are:

✓**Opening to individual fibres** - Whereas the blow room only opens the raw material to flocks, the card must open to the stage of individual fibres. This is essential to enable elimination of impur8ities and performance of the other operations.

✓**Elimination of impurities** - Elimination of foreign matter occurs mainly in the region of the taker - in. Only a small part of the contaminants is carried along with the flat stripping, or falls out at other positions. The degree of cleaning achieved by the modern card is very high, in the range of 80 95%. Thus, the overall degree of cleaning achieved by the blow room and the carking room together is as high as 95 - 99%. Card sliver still contains 0.05 - .03% foreign matter.

✓**Elimination of dust** - In addition to free dust, which can be directly sucked away as in the blow room, the card also removes a large proportion of the micro particles that are bound to the fibres. Significant fibre/ metal or fibre/ fibre friction is needed in order top loosen such particles. Both are available at the card in considerable measure: the card is a good dust-removing machine.

- ✓ **<u>Disentangling of neps</u>** - While the number of neps increases from machine it machine in the blow room, the card reduces the remaining number to a small fraction. It is often falsely assumed that neps are eliminated at the card; in fact, they are mostly opened out. Only a fraction of the neps leave the machine unopened via the flat stripping.

- ❑ An improvement in disentangling of neps is obtained by: closer spacing between the clothing's; sharper clothing; optimal (not too low) speeds of the taker - in; low doffer speeds; lower throughput.

- ✓ **<u>Elimination of short fibres</u>** - Short fibres can only be eliminated if they are pressed into the clothing. Since that is not possible with metallic clothing, only the flats can be considered in this context. The ability to select short as opposed to long fibres is based in the fact that ling fibres have more contact with the clothing of the main cylinder than

- the short fibres. Thus longer fibres are continually caught and carried along by the main cylinder. Short fibres, on the other hand, offer fewer surfaces to the clothing of the main cylinder; they therefore stay caught in the flats clothing, press into it and leave the machine in the flat stripping.

- Elimination of short fibres in the card must, however, be viewed in proportion. It is actually very small, as can be redily demonstrated.

- The card eliminates 1 - 2% flat striping approximately half of the stripping is made up of short fibres. The cared therefore eliminates less than 1% short fibres.

- In the staple diagram this is scarcely noticeable - the inaccuracy of the staple measurement procedure is greater than the change in value.

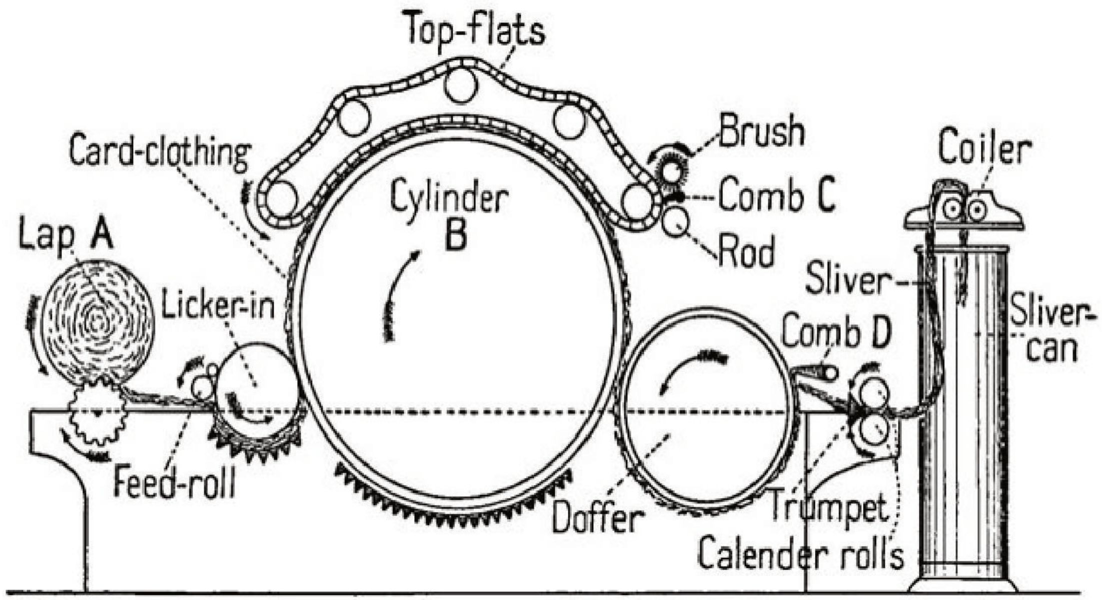
✓**Fibre blending** - The card ids often attributed the effect of parallelizing. This is not completely justified, since the fibres in the web are not parallel, although they do have, for the first time, a degree of longitudinal order.

❑A parallel condition is achieved on the main cylinder, but it disappears during formation of the web between the cylinder and the doffer. Thus, the card can be given the task of creation partial longitudinal orientation of the fibres, but not that of creating parallelization.

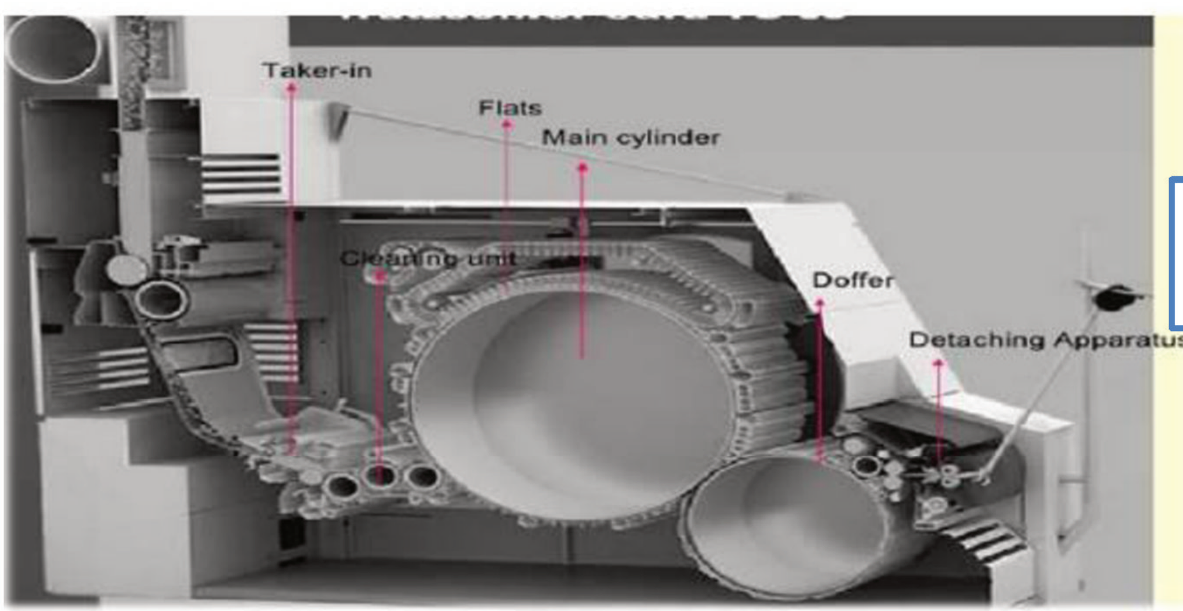
✓**Sliver formation** - In order to be able to deposit the fibre material, to transport it and process it further, an appropriate intermediate product must be formed. In extreme cases, card sliver has a hank of 3ktex (new spinning processes) or 6ktex. Generally the hank lies between 4 and 5.5 ktex in the short - staple-spinning mill.

❑The elimination of short fibres must, however, view in proportion. The main eliminated material is in the flat strips. Assuming flat waste at 1 - 2%, with about half in the form of short fibres, there is such a minor percentage of short - fibre elimination that it could hardly be measured with our current coarse staple - measuring equipment. The operation of oppositely disposed sets of teeth or small wire hooks.

MAJOR COMPONENTS OF CARD

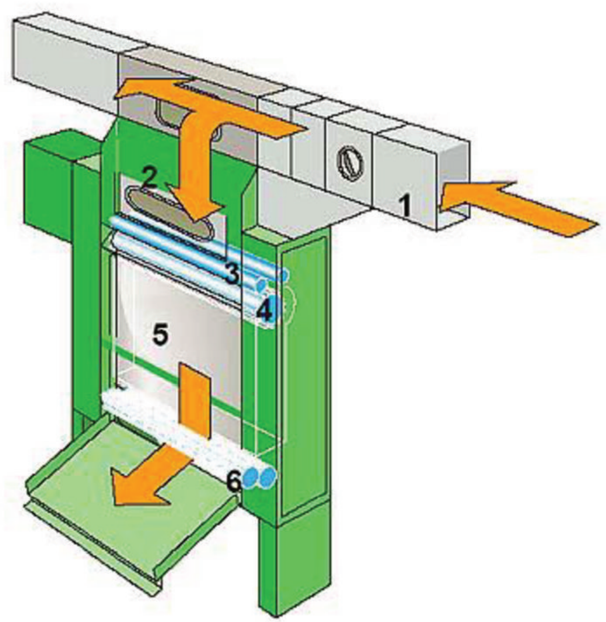


Lap feed carding m/cn



Chute feed carding m/cn

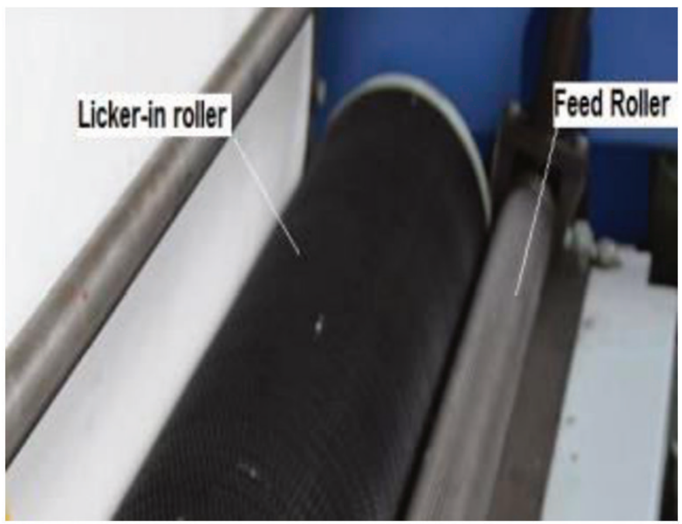
✓ **FEED PLATE:** It is a plain, smooth and polished plate situated between lap roller and licker-in. Feed roller is fitted over it. The adjustment of the feed plate (feed trough) is normally made according to the fibre staple length.



Aero feed system and feed plate

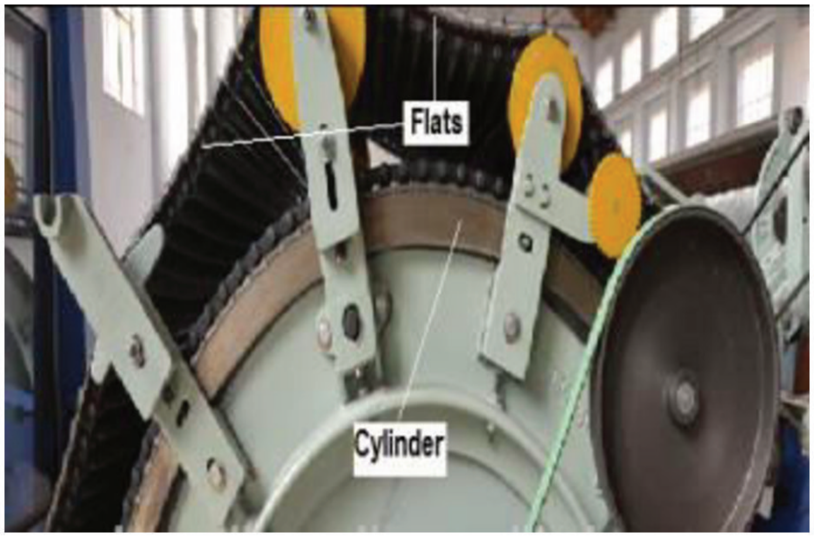
✓ **FEED ROLLER:** It is a steel roller having parallel grooves throughout the length. Assembly of feed roller & feed plate give proper grip to the fibres in between feed roller, feed plate and licker-in.

- ✓ **LICKER-IN** : It is a hollow grooved cylinder covered with saw toothed wire. Its main objective is to further reduce the tufts into small bunches of fibres. During the opening process embedded waste like seed particles, leaf and very small fibres get released and separated. The material on the licker-in is transferred to the cylinder. Generally, the ratio of licker-in surface speed to cylinder surface speed should be about 1:2.



✓In the region of feed roller and Licker- in opens the cotton into very small tufts, extracting the seed bits, sand and other vegetable trash particles from cotton. Licker-in transfers the cotton to the cylinder zone.

✓ **CYLINDER AND FLATS:** The primary carding action takes place between the cylinder and the flats. The fibres carried by the cylinder wire tend to move toward the flats that resist fibre movement. Many of the fibres "float" between the flats and the cylinder wire. the working flats move from the doffer side to the licker-in side. This is in the opposite direction of the cylinder movement.



❑ This is where the "carding action" takes place: In this portion

- ✓ Separates individual fibres,
- ✓ Opens entangled fibres,
- ✓ Separates and retains the neps in the flats,
- ✓ Frees / removes trash particles and vegetable matter from the fibres,
- ✓ Removes dust collected in the flat strips,
- ✓ Orients the fibres in the direction of the cylinder movement.

- The neps per grams that is removed from the carding m/c is expressed as percentage with respect to the nep/gms in cotton while passing through the chute to the carding m/c is known as the nep removal efficiency.

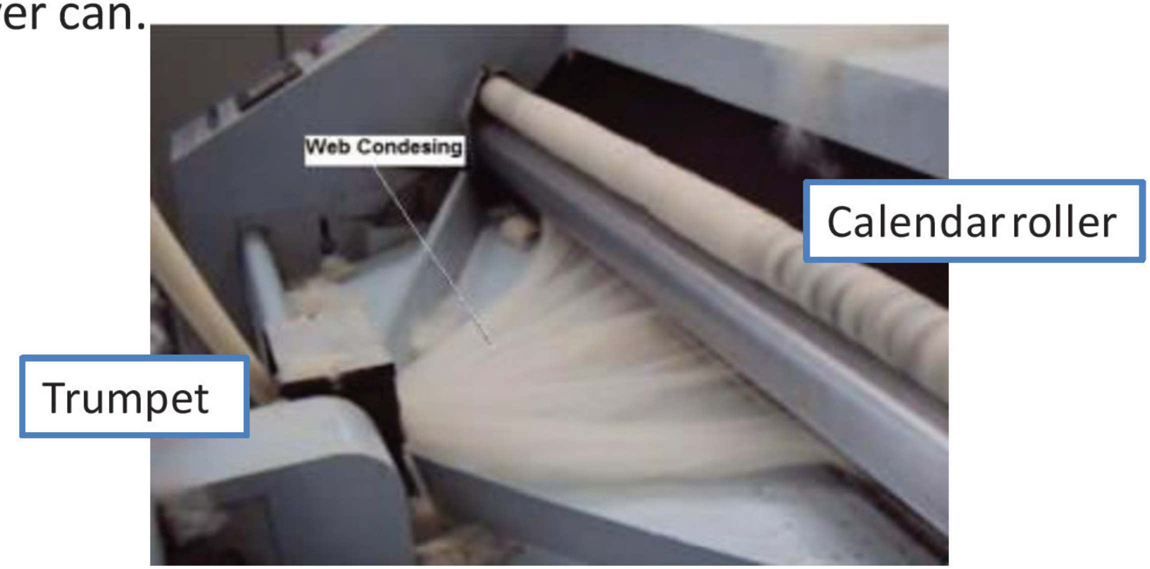
$$N.R.E. = \frac{\text{neps/gm of feed mtl} - \text{neps/gm of delivered mtl}}{\text{neps/gm of feed mtl}} * 100$$

- ✓ **DOFFER**: The fibres are removed from the cylinder by the "doffer". The cylinder and doffer surfaces move in the same direction at the transfer zone.
- The doffer rotates at a considerably slower surface speed than does the cylinder and consequently fibres accumulate on the doffer wire.

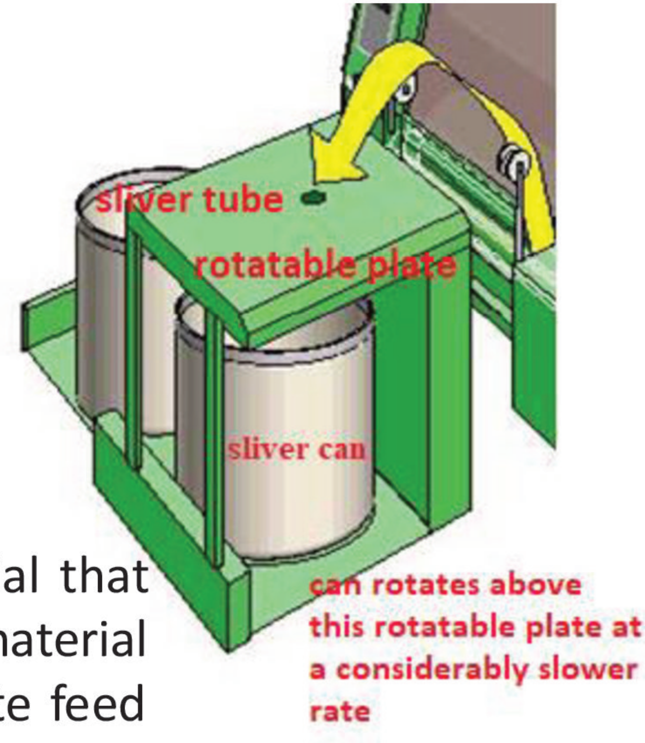
✓Difference in speed of cylinder and doffer enables fibre to be stripped by stripper roller from doffer to form card web.

- Condensation of web & Trumpet: The fibre web is stripped from the doffer using a stripper roller. It is then passed through a pair of squeeze or crush rolls before it is finally accumulated width wise into a fibre strand form (Card Web).The calendar rolls compress the fibre strand to provide better integrity and stable flow of material. The calendar roll crushes the seed/foreign particles of web for their easy separation. Trumpet converts the sheet of fibres (web) to sliver form.

- The fibre strand (the card sliver) proceeds upward over guide pulleys to enter the coiler system. This consists of a trumpet, guide and a second pair of calendar rolls that delivers the carded sliver through a revolving tube into the card sliver can.



- ✓ **Sliver coiler & Carding can:** The rotary movements are required for cycloidal coiling of the sliver. On one hand, the rotatable plate must be rotated above the can, while the can itself must rotate, at a considerably slower rate, below the plate. A sliver tube is provided on the plate as a fixed part to guide the sliver from the calendar rollers into the can.

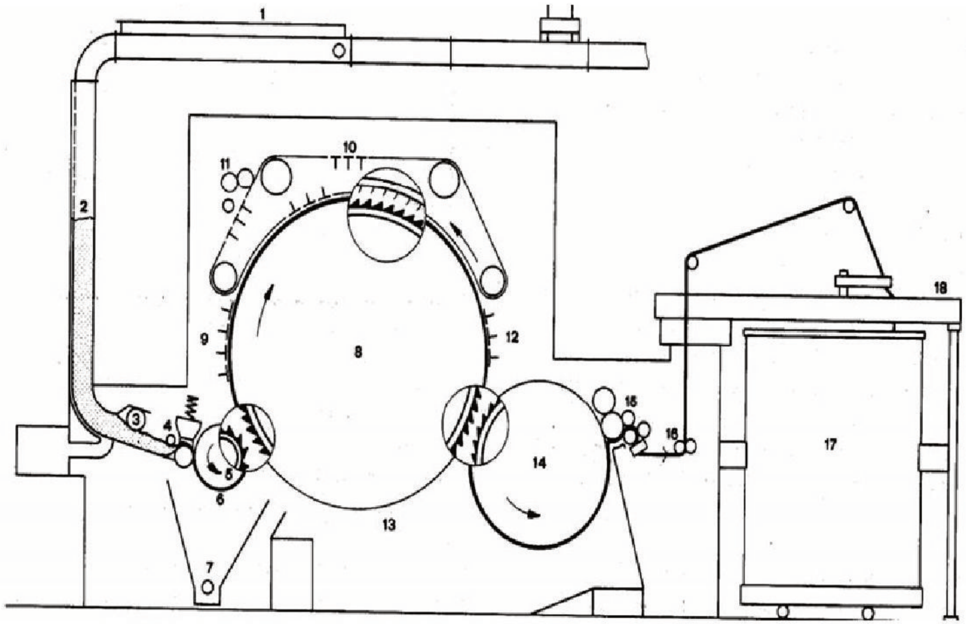


✓**Autolevelling :** In modern spinning plants it is essential that the card sliver weight is controlled. The uniformity of material weight delivered to the card is dependent upon the chute feed system and the condition of the material being processed. Unfortunately irregularities of feed are inherent and have to be corrected at the card. It measure the sliver thickness variations & then continuously to after the draft accordingly so that more draft is applied to thick places & less to thin places with the result that the sliver delivered is less irregular than

✓**Stop signals:** Signal lamps are provided on the machine to indicate the reason for stoppage of machine. Understand each signal lamp and their purpose in the machine.

✓**Display Panel:** It displays various operating machine parameters like speed, production etc. Understand the details in the display panel and work accordingly

WORKING PRINCIPLE OF THE CARD



➢Fibers are partially opened and cleaned into flocks in the blow room. Then raw material is supplied via pipe ducting (1) into the feed chute (2) of the card. An evenly compressed batt of about 500-900 ktex is formed in the chute.

➢A transport roller (3) forwards material from this batt to the feed arrangement (4) composed of a feed plate and feed roller, which pushes the sheet of fibers slowly into the operating range of the taker-in/licker-in (5) while maintaining optimal clamping

➢Flocks intensively opened by the licker-in wire points are passed over the grid equipment (6) and transferred to the main cylinder (8) by a point to back stripping action between licker-in and cylinder wires. In moving past mote knives, grids, carding segments, etc.

✓(6) under the licker-in, the material loses the greater part of its impurities. Suction ducts (7) carry away waste. The flocks, carried along with the main cylinder, penetrate into the flats (10) and open up to individual fibers between these two devices in the actual carding process.

- The flat may rotate either in the same (forward) or in the opposite (backward) direction to that of the cylinder. The flats comprise 80–116 individual carding bars combined into a band moving on an endless path. Some 30–46 of the flats remain in the carding position relative to the main cylinder; the rest are on the return run. During this return, a cleaning unit (11) strips short fibers, neps, and foreign matter from the bars of the flat wire and are removed by flat doffing comb as flat strips.

- Fixed carding bars (9) and (12), provided before and after the main carding zone, are designed to have better carding action. The underside of the main cylinder is enclosed by grids or cover plates (13). After the carding operation has been completed, the main cylinder carries along the fibers that are loose (not 'held' except the loose frictional contact) and lie parallel without hooks on the surface. In this condition, the fibers do not form a transportable intermediate product.

- The doffer (14), another cylinder, is required for this purpose. The doffer combines the fibers into a web because of its substantially lower peripheral speed relative to the main cylinder. The web has cohesion to stand by itself without any support.

- A stripping device draws the web from the doffer either by a doffing comb (old cards) or by doffing roller (modern cards). Crushing rollers (15) are usually found after doffing roller to pulverize any remaining trash before the web is condensed to form a sliver. After calendar rollers (16) have compressed the sliver to some extent, the coiler (18) deposits it in cans (17).

- The licker-in, main cylinder, flats and doffer are provided with a clothing which wears out during fiber processing and must be reground at regular intervals.

ACTIONS OCCURRED IN CARD M,/C

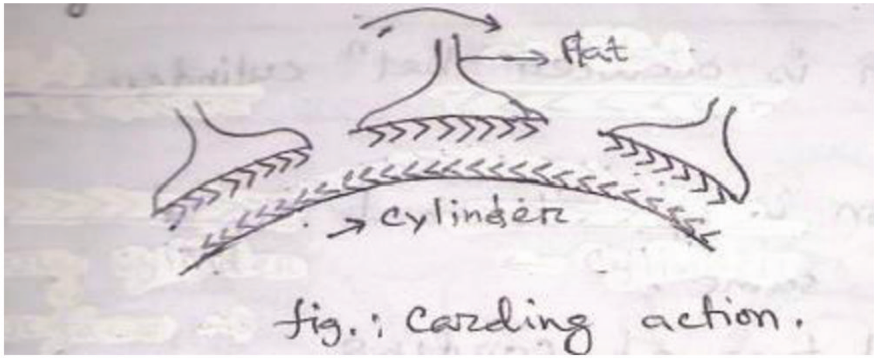
1. Carding action: If two closed surfaces have opposite wire direction & their speed direction or relative motion is also opposite, then the action between two surfaces is known as carding action.

✓ It is occurred between flat & cylinder.

✓Here wire direction is opposite.

✓Speed direction is opposite.

✓ **TAKES PLACE** If the two surfaces move in the same directions at different speed.



❑There always should be point against point direction result of carding action.

Results of carding action -

✓ Maxm individualization of fibres is achieved in this region by opposite spikes.

✓ Neps, short fibres, dirt & dust are removed.

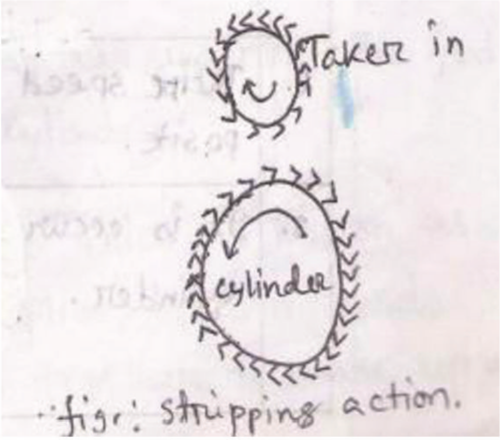
✓ The difference of surface speed between cylinder & flat is more. So, carding action is maxm occurred.

2. **Stripping action:** When two close surfaces have same wire direction & their speed direction or relative motion is also same then the action between two surfaces is called stripping action.

- ✓ It is occurred between T-in & cylinder.
- ✓ Same wire direction.
- ✓ Same speed direction.
- ✓ There always should be against back action.

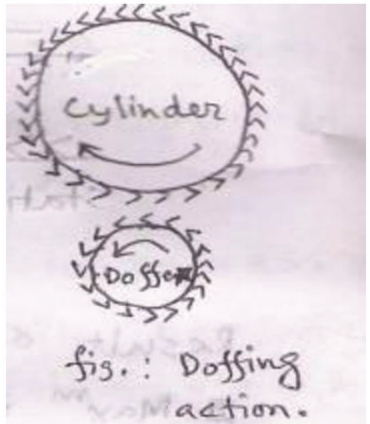
Result of stripping action-

- Trash, neps are transferred from cylinder to Taker in &doffer to stripper by stripping action.



3. Doffing action: When two close surfaces wire points are inclined in opposite direction & their speed direction is same, then the action between two surfaces is called doffing action.

❑Doffing action is occurred bet cylinder & doffer. Wire direction is opposite but speed direction is same. It is special type of carding. Sliver formation – is done by this action.



4.Combing action: This action take place betn feed roller & T-in. nHere, pin direction is same.

TYPES OF CARDING M/C.

- According to construction & working principle, carding m/c may be classified into three types –

a. Roller &cleaner card.
b. Flat card
c. Union card.

Flat card m/c are classified into two types –

1. **Stationary flat card:** In the stationary flat carding m/c, the flat does not rotate & the flat covers one fourth of the cylinder. That is why it was named stationary flat carding m/c.
2. **Revolving flat card:** In the revolving flat carding m/c the flat revolves or rotates along with the cylinder.

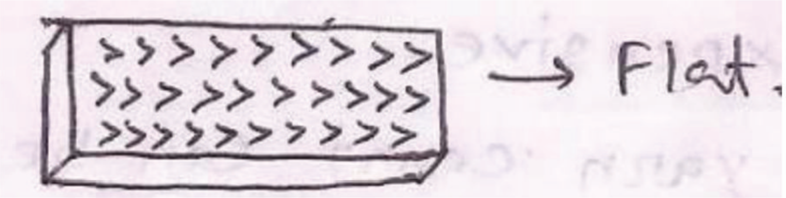
Another type of carding m/c is available which is known as **Duo or tandem cards**. As the name implies, tandem cards consists of two individual cards joined together to make up a unit, in which the doffer of the first card feeds fibres mtl to the taker-in of the second card.

According to their delivery speed (Doffer r.p.m.) carding m/c are classified into three types –

a. Conventional card (4-6).
b. Semi-high speed card (15-25).
c. High-speed card (30+).

CARD WIRE CLOTHING

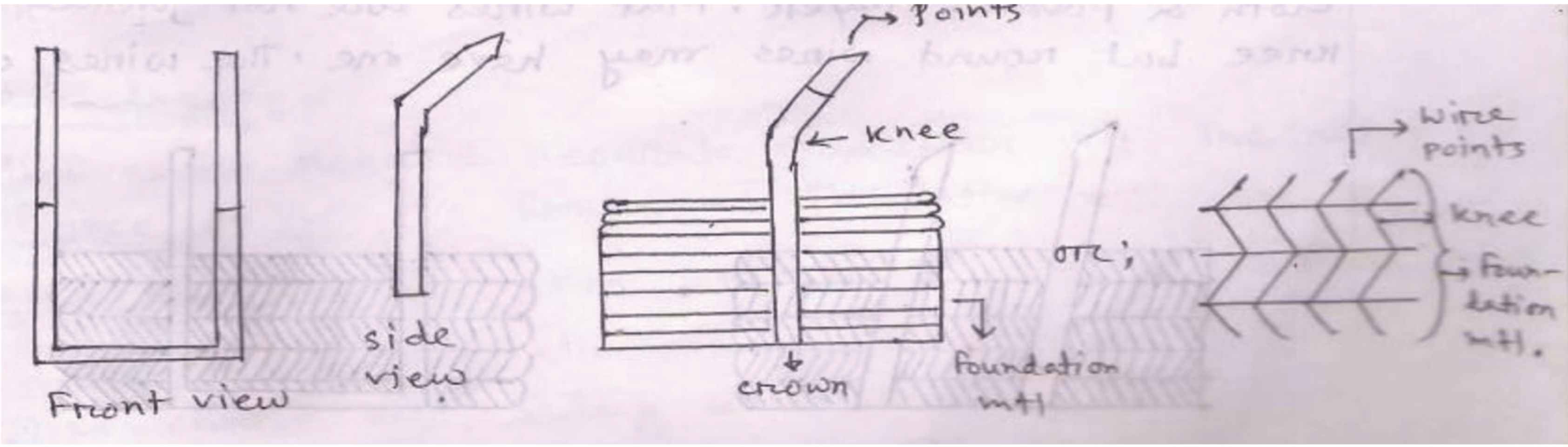
❑In carding m/c, different parts (i.e. T-in, Cylinder, Doffer & flats) are covered with different types of wire which are known as card clothing. To cover the surface of T-in, Cylinder, doffer & flat of carding m/c with the help of a number of unlimited fine, closely spaced & specially bented wire is called card clothing. The wire points are inserted on the m/c surface by means of a base mtl or foundation. Base mtl may be of textile fabric or may be of some other mtl which is very hard & stiff.



❑Types of clothing: Card clothing is divided into three group:-

i) Flexible clothing.
ii) Semi-rigid clothing.
iii) Metallic clothing.

- **FLEXIBLE WIRINGS** have hooks of round or oval wire set into elastic, multiply cloth backing. Each hook is bent to a U-shape & is formed with a knee that flexes under bending load & returns to its original position when the load is removed. Flexible clothing is used in cylinder, flats & doffer. In short staple spgn mills this clothing is now found only in the stripping roller.



Advantages OF FLEXIBLE WIRING:

1. Higher point density, so better carding action.
2. Fibre damage is less due to flexible wire point.
3. Only the damaged part of the clothing is needed to be prepared.
4. Exerts desirable force on cotton causing good carding.
5. Less expensive.
6. Finer yarn count can be prepared.

Disadvantages:

1. Requires textile fabric or rubber as foundation mtl.
2. The wires can be loosened.
3. Production less, due to stripping.
4. Neps regular grinding.
5. Wire & foundation mtl may get damage because of they are both flexible.
6. Fibre becomes lose for grinding action.
7. Any carding angle cannot be chosen.

- ***In semi-rigid clothing*** flat or round wires with sharp points are set in backing which are less elastic than those of the flexible clothing. These backing are multiple-ply structures, with more plies than the backing of flexible clothing, comprising both cloth & plastics layer. Flat wires are not formed with a knee but round wires may have one. The wires cannot bend & are so deeply set in layers of cloth & possible foamed mtl that they are practically immovable.
- The wire do not need sharpening. When subjected to bending loads, they are therefore much less capable of yielding than flexible clothing. They are also found only in the flats. For wood & long staple fibre.

❑**The foundation mtl can be of two types:**

✓**A. Leather:** It is the best & most used foundation mtl.

Advantages:

1. It is not attacked by moisture & oil. 2. It is comparatively of better quality.

Disadvantages:

1. It costs more.
2. Elastic property is not good.

B. Piled fabric:

a. 2 ply foundation: i) Warp - cotton/Linen.
Weft - woolen.
ii) Cotton cloth back.

b. 3 ply foundation:
i) Cotton cloth face. ii) Linen warp & woolen weft cloth.
iii) Cotton cloth back.

c. 4 ply foundation:
i) Vulcanized rubber face. ii) Cotton cloth. iii) Linen warp & woolen weft cloth.
iv) Cotton cloth back.

d. 5 ply foundation:
i) Vulcanized rubber face. ii) Cotton cloth face. iii) Linen warp & woolen weft cloth. iv) Cotton cloth back. v) Cotton cloth (single).

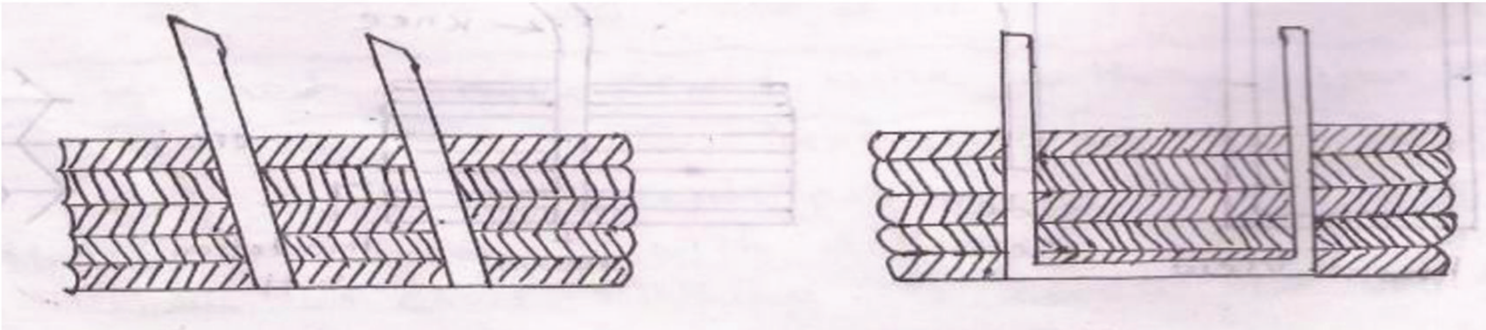


Fig. 2 Semi-rigid clothing.

Advantages:

1. No need of frequent sharping.
2. No need of stripping as well as there is no knee & no dirt & dust is stored.

❑***metallic clothing*** These are continuous, self supporting flat wire structure in which teeth is cut at the smallest spacing by process resembling a punching operation. They do not need any base mtl or foundation. The wire has no knee. Metal surface of m/c acts as metallic foundation. If the teeth are relatively largely used for example as in the T-in.

❑Then the clothing is referred to as saw tooth clothing. Now-a-days the T-in, main Cylinder & doffer are without exception clothed with metallic clothing. The application of metallic card clothing onto spgn carding m/cs has no limits & is used in the prodn of low, medium & high quality yarns.

Advantages:

1. Does not requite separate foundation mtl. The metal surface of the m/c works as foundation mtl.
2. As teeth & foundation mtl are both metallic, there is no possibility of "teeth loose".
3. Can choose any carding angle.
4. Does not require regular grinding.
5. No change of tooth angle due to carding action & so no need of grinding. Again fibre do not embed to teeth & so need of stripping. As a result, save much time.
6. Saved 3% good fibre & increase prodn 18-20% due to no need of stripping & grinding.

Disadvantages:

1. Carding action is not better due to less point density.
2. Fibre damage is mere as the wire points are metallic.
3. Difficult to repair in the mill when a portion of it is worn out.
4. If any part of the wire is damaged, then the total clothing is rewind.
5. Expensive.
6. Not suitable to prepare finer count.
7. Liberates more fly pollutes air.
8. Requires higher starting torque.

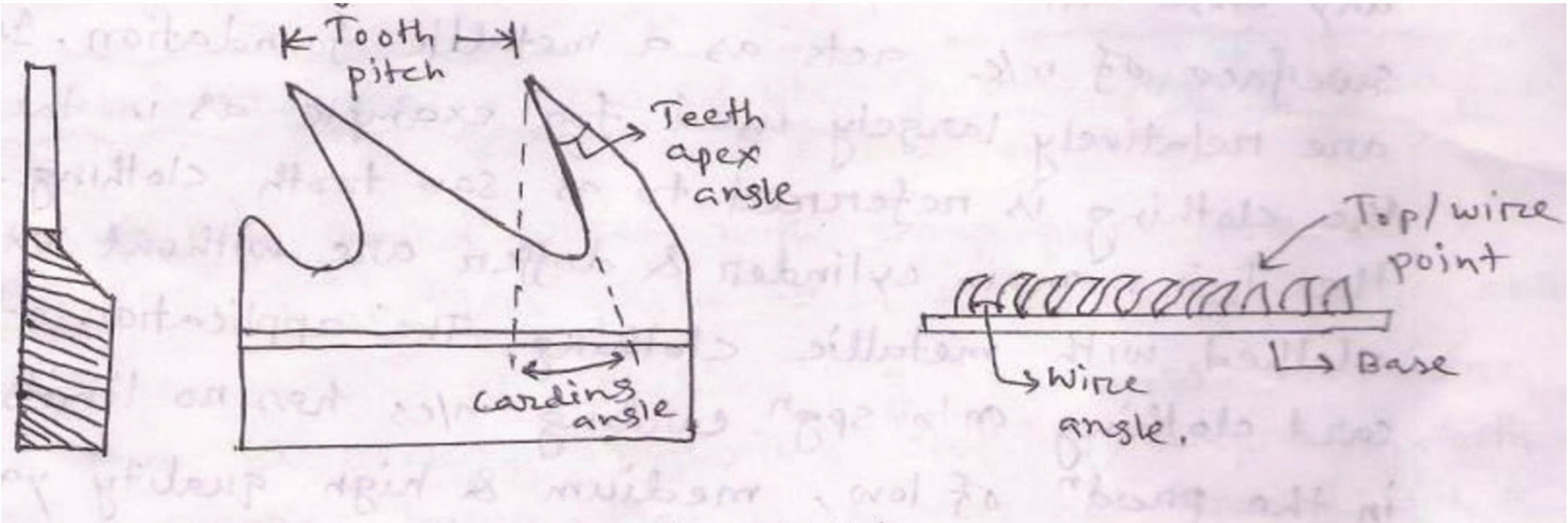


Fig.: Metalic clothing.

- The density of wire on foundation is called wire count or amount of wire per unit volume is called wire count.

Grinding: is the operation by which the good working condition of the wire points of all organs in the carding m/c is maintained i.e. the process of sharpening the wire points of different organs of carding. As card operates, the wire points of different organs i.e. T-in, cylinder, doffer, flats loss their effectiveness in regular fibre processing & become poor carding unit. The points become dull & their fibre hooking property is weakened. So, the purpose of card grinding is to maintain the wire points of different organs in sharp condition. If grinding is not done, due to the action of cotton & dirt with the wire points become round at the top & loose their aggressiveness. Grinding may be considered in two types of wire-

i) Flexible wire. ii) Metallic wire.

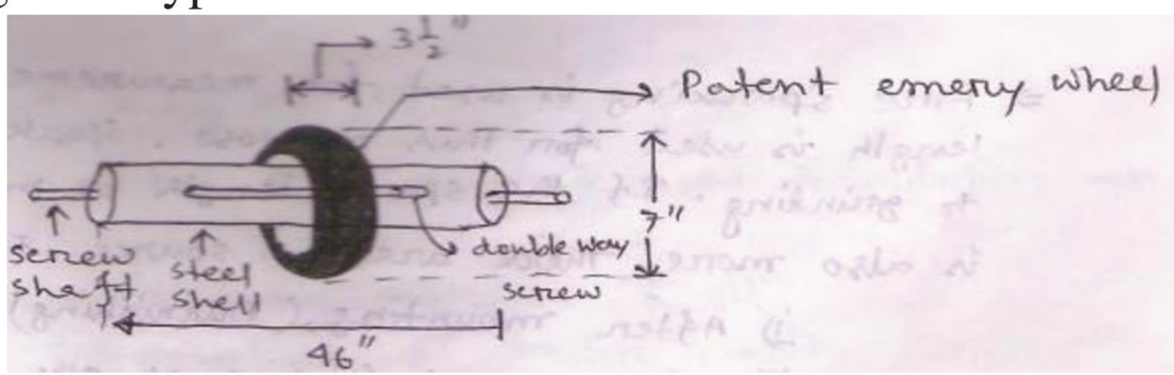
Objects of grinding are:

1. To increase sharpness of the wire points.
2. To keep equal height of wire.
3. To get regular carding action & uniform sliver.

The various types of grinding are :

1. "Traverse wheel (roll) grinding" or "Horse fall grinding": The transverse grinding consists of a narrow roll or emery wheel of 3.5`` wide 7 `` in diameter which performs grinding process by traversing motion, moving from one end to another end across the wire points of different parts of carding m/c.

- This emery wheel is mounted on a hollow steel shell of 46`` or 51`` long suitable for 40`` 45`` wide cards. Within the hollow shell a long central screw shaft is in, which are cut two wide threads, one right hand & one left hand, which join at the two ends. This types of grinding is more commonly used than the long roller type.

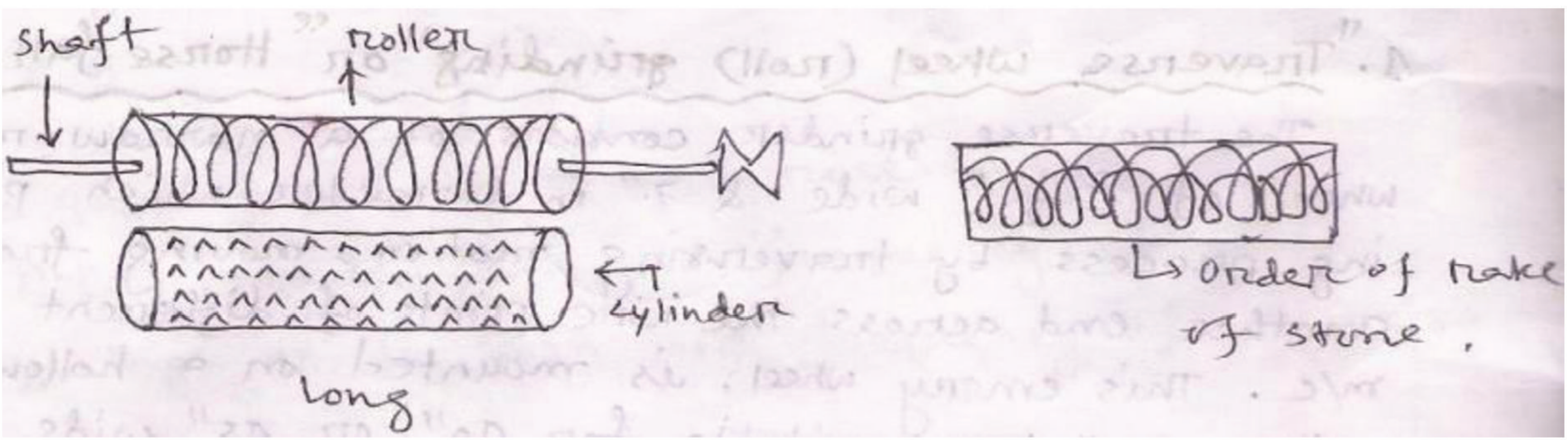


Advantages:

1. Better grinding action.
2. No risk of hooking or fusing of wires.

2. "Long roll grinding" or "dead roll grinding":

❑The long roll grinder is a sheet shell about 7 `` in dia & 4 7`` or 42`` long suitable for 40`` and 45`` wide cards. The roller rotates over the full width of the card & performs grinding process. Roller is covered with emery fillet. The roller is carried on a shaft about 1 1/8 ``in dia which projects about 12 `` at each end. A traverse mechanism makes this rotating grinding roller traverse backward & forward. Owing to its traverse, the roller impacts a certain amount 'side' grinding to the wire.



Advantages:

1. Long grinding roller is used in case of high speed grinding.
2. It is used produce low & medium count yarn.

CARD SETTING

❑In carding m/c, the distance bet subsequent p[art is called card setting. Setting of different parts are of very fine gauge, which are expressed in terms of 1/100" i.e. in Thio. Now-a-days it is also done in mm. Each & every parts are placed or installed in the carding m/c with a precised & accurate setting to achieve the sliver regularity.

❑The settings which are recommended by the m/c maker is termed as ideal setting and Optimum setting are those settings which are merely suitable for achieving the technological target as well as efficiency. It may be quoted that the ideal settings & optimum settings may be of same or different in versatile cases.

❑The factors which are considered for optimum card setting are:

1. Type of feed mtl (cotton, synthetic etc).
2. Staple length of the mtl.
3. Fibre fineness.
4. The amount of trash to be removed.
5. The hank of lap feed.
6. The expected waste percentage.
7. Types of card clothing.
8. Hank of delivered sliver.
9. Production rate.
10. Mechanical condition of m/c.

- The major setting points of carding:

Region	Setting	Effects
Lap guide to feed roller	¾`` - 1 ``	It controls the selvewdges of web. Higher distance make bad selvedge.
Feed roller to T-in	9 -12 Thio	For higher staple, heavy lap, setting will be wider. Excessive impurities in lap, setting will be closer.
T-in to Cylinder	7 Thio	The object of this setting is to transfer the fibres to the cylinder & enable the T-in to present clean teeth to the lap fringe. An unreasonably wide setting would not ensure removal of the cotton from the R-in & in an extreme case, if the T-in became covered with cotton, its action of taking small tufts of mtl from the lap which would be performed inefficiently & neps would be formed.
Flat to Cylinder	10 Thio	Normal & heavy prodn ensure this setting. For light sliver closer setting, tends to produce cleaner web where an exclusive wide setting result in insufficient removal of neps & a poor appearance in web. Sometimes 5 points setting occur. For synthetic fibre, setting will be wider.

Doffer to Cylinder:	5 Thio	The object of this setting is to take all god cotton from cylinder to doffer. A wider setting may be many fibres go round the cylinder unnecessarily more times & weakend by the time they are transferred to doffer & a cloudly web will result. These closer setting will damage each other & leading hook may result.

Formulas for Mathematical problems

$$\text{Draft} = \frac{draft\ constant}{D.C.P} = \frac{delivered\ length}{feed\ length}$$

$$\text{Total Draft} = \frac{wght\ of\ mtl\ feed/yd}{wght\ of\ mtl\ delivered/yd}$$

$$\text{Actual Total} = \frac{Hank\ delivered}{\text{hank feed}}$$

$$\text{Reqd. D. C. P} = \text{Present D. C. P} * \frac{\text{Present hank}}{Reqd.\ \ hank}$$

$$\text{Reqd. D. C. P} = \text{Present D. C. P} * \frac{\text{Reqd wght/yard}}{present\ wght/yrd}$$

$$\text{Reqd. D. C. P} = \text{Present D. C. P} * \frac{\text{Present draft}}{required\ draft}$$

$$\text{production/hr} = \frac{\text{Doffer r.p.m.} * \text{Doffer dia(inch)} * \pi * 60 * \text{efficiency} * \text{waste\%}}{36 * 840 * sliver\ hank}$$

$$\text{Cleaning efficiency of carding} = \frac{\text{Trash in lap} - \text{trash in sliver}}{trash\ in\ lap} * 100$$

Eg1. Calculate the cleaning efficiency of carding from following data:

Trash in lap = 5lbs

Trash in sliver = 3 lbs

$$\text{Cleaning efficiency of carding} = \frac{\text{Trash in lap} - \text{trash in sliver}}{trash\ in\ lap} * 100$$

CE % = 5 – 3/3 * 100
= 66.67%

Eg2. In a carding m/c D.C.P is 14 & draft constant is 1640. Find the draft of the m/c.

$$\text{Draft} = \frac{draft\ constant}{D.C.P} = \frac{delivered\ length}{feed\ length}$$

Draft = 1640/14 = 117.14

Eg3. Find the reqd D.C.P from the following information-

Present D.C.P = 17T   Present Hank = 9   Reqd Hank = 16.

$$\text{Reqd. D. C. P} = \text{Present D. C. P} * \frac{\text{Present hank}}{Reqd.\ \ hank}$$

= 17 * 9 /16
=9.6 T

Eg3. Calculate the production/hr in kg of 10 carding m/cs from the following informations – Doffer r.p.m = 45, doffer dia = 27 inch, hank of sliver = 0.15s Ne, waste extraction = 4% & efficiency = 90%.

production/hr

$$= \frac{\text{Doffer r.p.m.} * \text{Doffer dia(inch)} * \pi * 60 * \text{efficiency} * \text{waste\%}}{36 * 840 * sliver\ hank}$$

45*27*3.14*60*90*(100-4)/ 840*36*100*100*0.15
=43.60lBS = 19.78kG (1kg = 2.204lb)
Production/hr of 10 carding m/c = 19.78*10 = 197.8 kg.

Eg4. Feed roller dia = 2.25 inch, Feed roller r.p.m = 4, Doffer dia = 27 inch, Doffer r.p.m = 30, Lap wt = 14 os/yd, Carding eff. = 90%. Find the prodn/hr in lbs.

hank Lap = 1 yd * 1lb/840yds*14/16lb
=$1.3*10^{-3}$
Draft = surface speed of delivery roller/ surface speed of feed roller
= **π***27*30/ **π***2.25*4
= 90

Draft = deliver hnk/feed hank

Delivery hank =90*1.36*10^{-3} = 0.1224

Production /hr= **π***27*30*60*90/840*36* 0.1224*100

= 37.11 lb

Eg5. The surface speed of the coiler winder rollers calculated & found to be 39.1 m/min. If the linear density of the sliver is 4 kilo Tex (4kg/km). What is the production per hr at 80% efficiency.

Production = **π**DN* Efficiency* linear density of sliver

39.1*80/100*4/1000*60

=7.50kg/hr

Eg6. Doffer r.p.m = 1, Dia = 27 inch, sliver wt = 1grain/yds. Tension draft = 1. Find the production constant at 85% eff.

Production constant= **π**DN* 60*Efficiency* sliver wght/grain* tension drft/36*100*7000

=0.017

Eg7. Calculate the prodn in card from the following details – doffer r.p.m = 9.95, sliver wt 50 grains/yd, prodn const. 0.017, tension draft 1.03, efficiency 85%

Production = production constant*Doffer RPM*T.D* sliver wght grain/yard

0.017*9.95*50

= 8.71lbs/hr