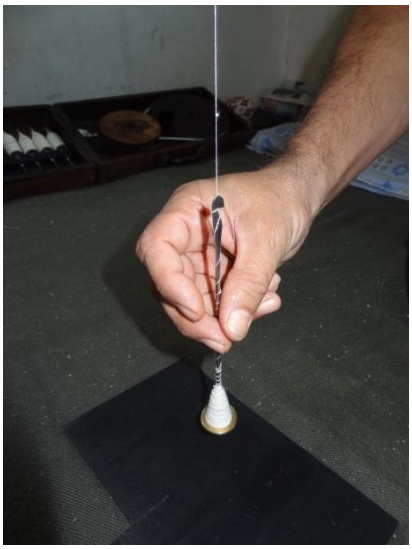
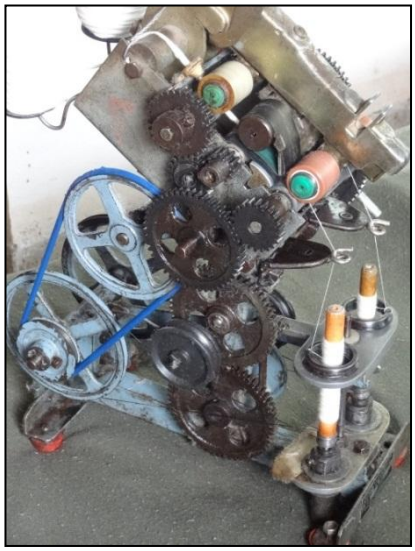
Art of Spinning





2 October 2013

Madhav Sahasrabudhe

The firm belief and commitment to Gandhian thoughts by

Shri. Vasantrao Palshikar, Shri. Sadashivrao (Dada) Bhosale

and

Shri. Shivaji Kaganikar

has always been my inspiration.

Khadi is not merely a cloth. It is a way of life in which all aspects of Nature-friendly life are embedded. It welcomes and celebrates the productive participation by one and all.

Everyday every household generally cooks food for the family members and the guests, as per their needs and choices. Similarly every household can spin cotton for their clothing requirement, and a little more for the weaker and disabled persons in the family and neighborhood.

One or two persons in a family can easily spin for an hour every day. This is good enough for @ 30 to 35 meters of cloth in year.

This is easily possible. Let us see … How ?

Background

Primitive humans protected themselves from Heat , wind and cold using leaves, bark from trees and hides for covering their body.

Today, we protect ourselves from cloth made of various fibers available from plants (flax, jute, cotton), from Animals (Silk, Wool) or Manmade fibers (Nylon, Rayon, polyester etc).

Wool was in use since antiquity, however use of cotton in fabrics is comparatively very recent. Manmade fibers are only a century old.

Before the British rule was established, India had a rich tradition of manufacture of fine cloth with exclusive designs and patterns and was a major supplier of these varieties all over the world. Widespread self-employment was available throughout the Indian continent.

Large scale industrialization in England, resulted in mass produced articles including mill cloth. England needed a market for these articles. Those Days Indian villages were almost self sufficient with the help of local industries, for their day to day needs. Unless these cottage industries were dismantled British Goods could not enter the Indian market. British rulers ruthlessly destroyed the village industries, particularly cotton processing industry. Villagers lost their means of survival as there was no trade available to augment the agricultural income. Most of the people were pushed to acute poverty, unemployment and severe hunger.

Unless every able hand is provided with productive work, common man cannot survive. It was in 1920, that Mahatma Gandhi rightly diagnosed the situation in India. Considering the proportion of the imported cotton fabric from England to total imports to India, it became very clear to him that rejuvenation of the distributed village Cotton processing Industry is the only way out from this pathetic situation. He strived to re-introduce and establish on priority, the spinning, weaving and other related activities in villages to empower the villagers themselves.

Today, particularly the city life, is very much energy intensive. We deploy all forms of energy to replace human or animal muscle power. The limited quantum of external forms of energy are being consumed more and more exponentially. Unless we address this issue by reducing our external energy requirement in day to day life style, the future will be darker. Promoting less energy intensive local industries by using the locally produced products and services is one of the major strategies to be adopted now and here. It is we, city dwellers, need to be the agents of change. We

should stop looking at villages as merely a source of raw material , cheap labour and a market for factory produced goods. Instead we should be the market for the products and services from the village industries. Khadi and Village industries is one such initiative.

Clothing being one of our primary requirements, Khadi takes the center stage. Thus to promote khadi the old designs for the spinning gadgets were modified to accelerate the production of handspun yarn, which resulted in present day's models of Box Charakhaa and Ambar Charakhaa.

Following models of Charakhaa are in use these days

For personal use

(Self sufficiency in clothing requirement)

1. Box Charakhaa (पेटी चरखा)
2. Traveler's Charakhaa (प्रवासी चरखा)
3. Book Charakhaa (पुस्तक चरखा)
4. Ambar Charakhaa (अंबर चरखा) with 2 spindles

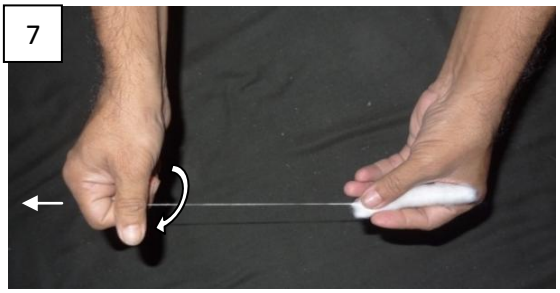
For Employment

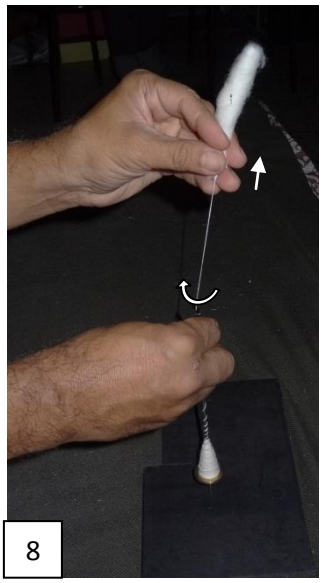
5. Ambar Charakhaa with 4, 6, 8 or 10 spindles (Manual)
6. Ambar Charakhaa with 4, 6, 8 or 10 spindles (Solar Powered)

Major Processes in making a cloth

1. Growing Cotton
2. Harvesting ripped cotton boles
3. Cleaning and opening the cotton boles
4. Ginning (Removing the cotton Seeds)
5. Carding
6. Making Slivers (for Box Charakhaa) or Rovings (for Ambar Charakhaa)
7. Spinning and making Hanks
8. Processing the Yarn (unwinding, washing, boiling to remove traces of Oil, Dyeing, preparing Bobbins)
9. Preparing Weft (lengthwise arrangement)
10. Weaving
11. Washing, bleaching, Starch, pressing,

1.Full grown Cotton variety
2.Long staple Cotton **G arboretum**. One bole weighs @ 7-8 grams
3. fibers in use in past 5000 years**a**.Flax(Egypt and South Europe),**b**.wool (V West Asia and Northern Europe,**c**.Silk (China), **d**.Cotton (India)
4. Ginning by hand
5.Carding using a bamboo Bow
6.Preparing sliver, Pooni (पेळू) for use in box Charakhaa
7.Making Yarn by Hand
8. Spinning using Drop Spindle (टकळी)
9. Students and Teachers participate in spinning and weaving activities at Anand Niketan school in Sevagram, Wardha..





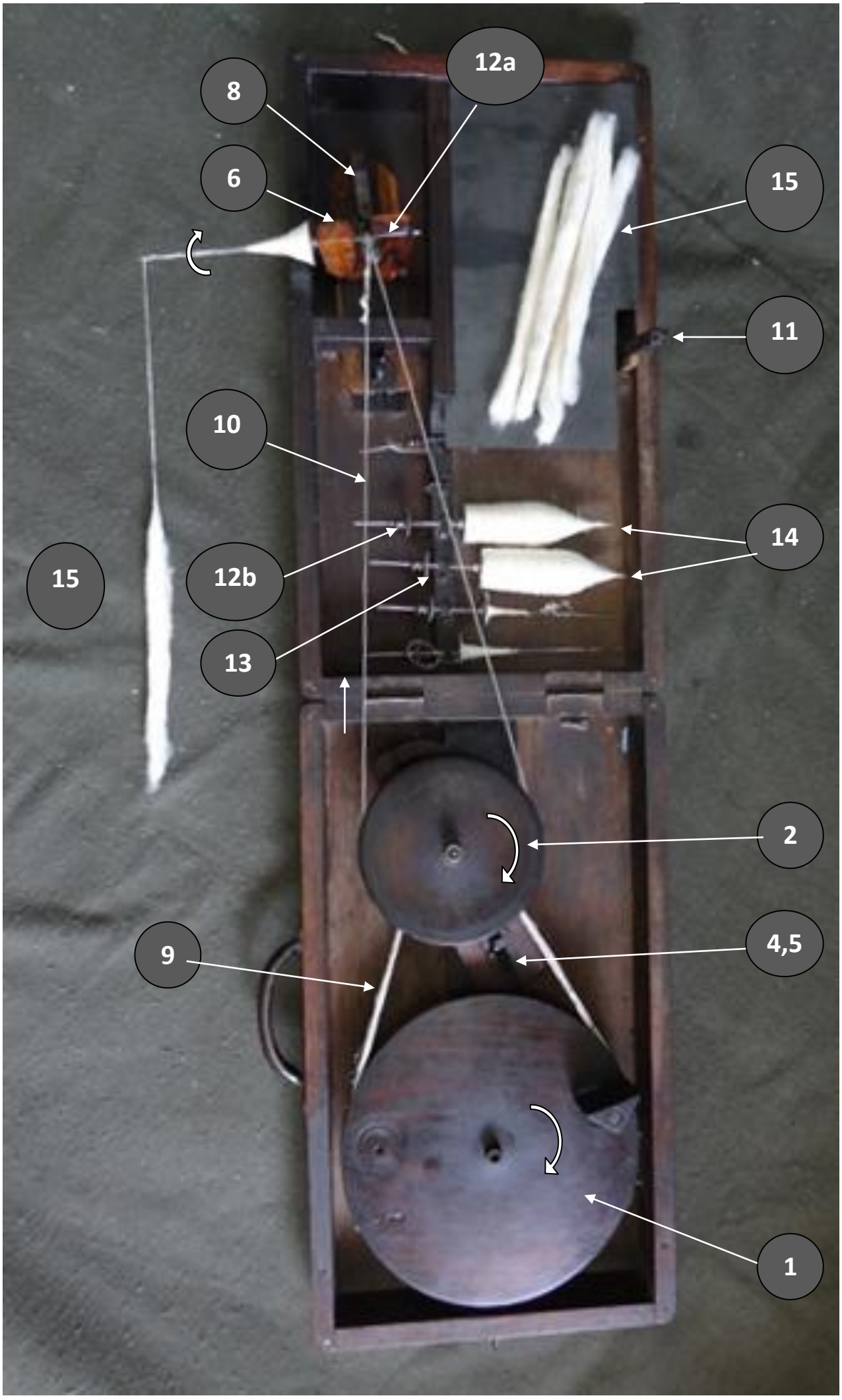

12a
8
6
15
11
10
14
15
12b
13
2
9
4,5
1

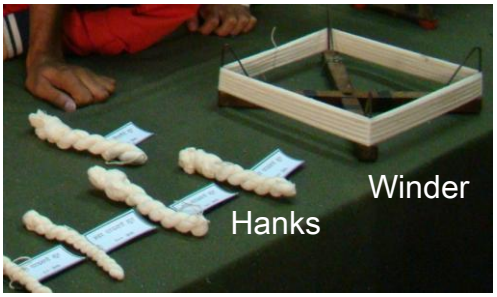
Table showing Major parts of Box Charakhaa

Sr. No.	मराठी	English	Remarks
1	मूळ चक्र	Main Wheel, with handle	8" ,
2	गती चक्र	Accelerator Wheel	5 "
3	फाळका	Winder	14"
4	स्लाईड (स्प्रिंग सह)	Slide, with spring	
5	फ्लाय नट	Fly-nut	
6	मोढीया	Stand	
7	वादी	Bearing String, Strip	Cotton , Plastic
8	मोढीया खुंटी	Stopper	
9	मोठी माळ	Thick Belt	
10	छोटी माळ	Thin Belt	
11	सूतखुंटी हूक सह	Arm, with Hook	
12	त्राक (a), पूली (b) सह	Spindle(a), with Pulley (b)	7"
13	चामड्याची चकती	Leather Washer	
14	योग्य आकारात सूत गुंडाळलेली त्राक	Yarn Properly wound	
15	पेळू	Sliver	
16	गुंडी	Hank	

You must know this.

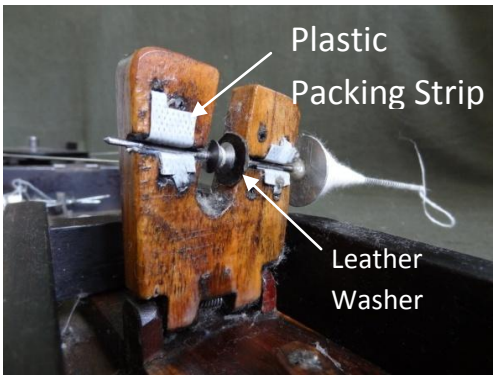
1. Khadi means a cloth woven on Handloom using Hand –Spun Yarn. Handloom means cloth woven on Handloom using Mill-spun yarn. You can easily distinguish between Handloom and Khadi. Khadi cloth is generally much more porous. This gives Khadi a soft and well ventilated feel. The twist of the hand woven yarn is generally less than that of mill yarn. This less twist helps improve its absorption properties.
2. Yarn spun on Charakhaa has a twist in the direction of letter 'S'. If we twist the yarn in the direction of normal tightening of the right handed screw, the yarn gets more twist. (The mill yarn has an opposite twist in the direction of letter 'Z').

3. The quality of yarn depends on the strength, twist and the uniformity of the yarn.
4. All varieties of the yarn with uniform twist and the thickness is useful. Thicker yarn can be woven into towels, curtain cloths, mattings etc.
5. A bundle of 1000 m of yarn is called as hank. The number of hanks in 1 kg of yarn is called as the count of the yarn. Yarn of 30 to 50 counts is commonly spun on Box Charakhaa. This range of yarn is required for most of the day to day requirements of cloths. Sari is made from finer yarn @ 80 to 100 counts. Still finer yarn of count 120 or more is used in making Muslin.



Before starting spinning on Box Charakhaa

1. Thin Belt should be thin and non elastic as far as possible. Knot should be as small as possible. This improves the life of the belt and smooth running of the spindle. Applying Bee-wax to the thin Belt will enhance the life and the grip considerably.
2. The tension on the thick and Thin belts should be proper. The wheel should rotate freely without transferring force to the box and without slipping over the pulley.
3. Oil the axles of both the wooden wheels as well as the bearing pads for the spindle in stand and the leather washer. Mixture of Coconut oil and kerosene is the best. It does not solidify in winter and is sufficiently thin.
4. In place of cotton string used as bearing pads Plastic strap (generally used as box packing strap) can be used at advantage. It lasts for years with reduction in friction and Noise .
5. The Leather washer on the spindle should be placed between the pulley and the wooden portion of the stand, to act as a bearing while the spindle rotates. This prevents friction between pulley and the wood.



6. The angle of the stand should be adjusted to ensure that the pulley on spindle , while rotating in forward direction just touches to the leather washer and while in reverse direction the pulley moves little away from the leather washer.

7. The aluminum disk on the spindle should be fixed using yarn soaked in gum and wound on either sides of the disk. The disk should rotate in a plane perpendicular to the axis of the spindle. Please note do not forget to insert leather washer in-between the disk and the pulley, with hard surface towards the pulley, before fixing the pulley.
8. The spindle should rotate without any vibration. Some inherent noise will be there, however it should be minimal. Proper oiling will substantially reduce the noise . If the noise and vibrations still persist, the spindle should be replaced. Straightening of the spindle is a specialists job
9. Please ensure that the pointed end of the spindle is well above the ground matt, otherwise the yarn may get entangled in the ground sheet frequently.
10. When rotating the main wheel in Clockwise direction when seen from Top the spindle should rotate in anticlockwise direction when seen from the spindle pointed end.
11. Ensure proper tension on either belts.
12. While spinning, the spindle stand should be vertical or slightly tilted away from the spinner.
13. The stopper for the Stand should always be applied. While spinning, the stand should not touch the stopper. The stopper arrests the flying of the rotating spindle in case the thin belt snaps while in operation.
14. Ensure that there is no unwanted rubbing / friction, fouling of any of the parts when the mechanism is rotated in forward and reverse direction.
15. It is better to spread a black or any dark colored plain bed sheet on a floor matt. The light should preferably from behind- right. Fresh air is desirable however Fan scatters the loose cotton fibers all over and snaps the drafted yarn frequently.

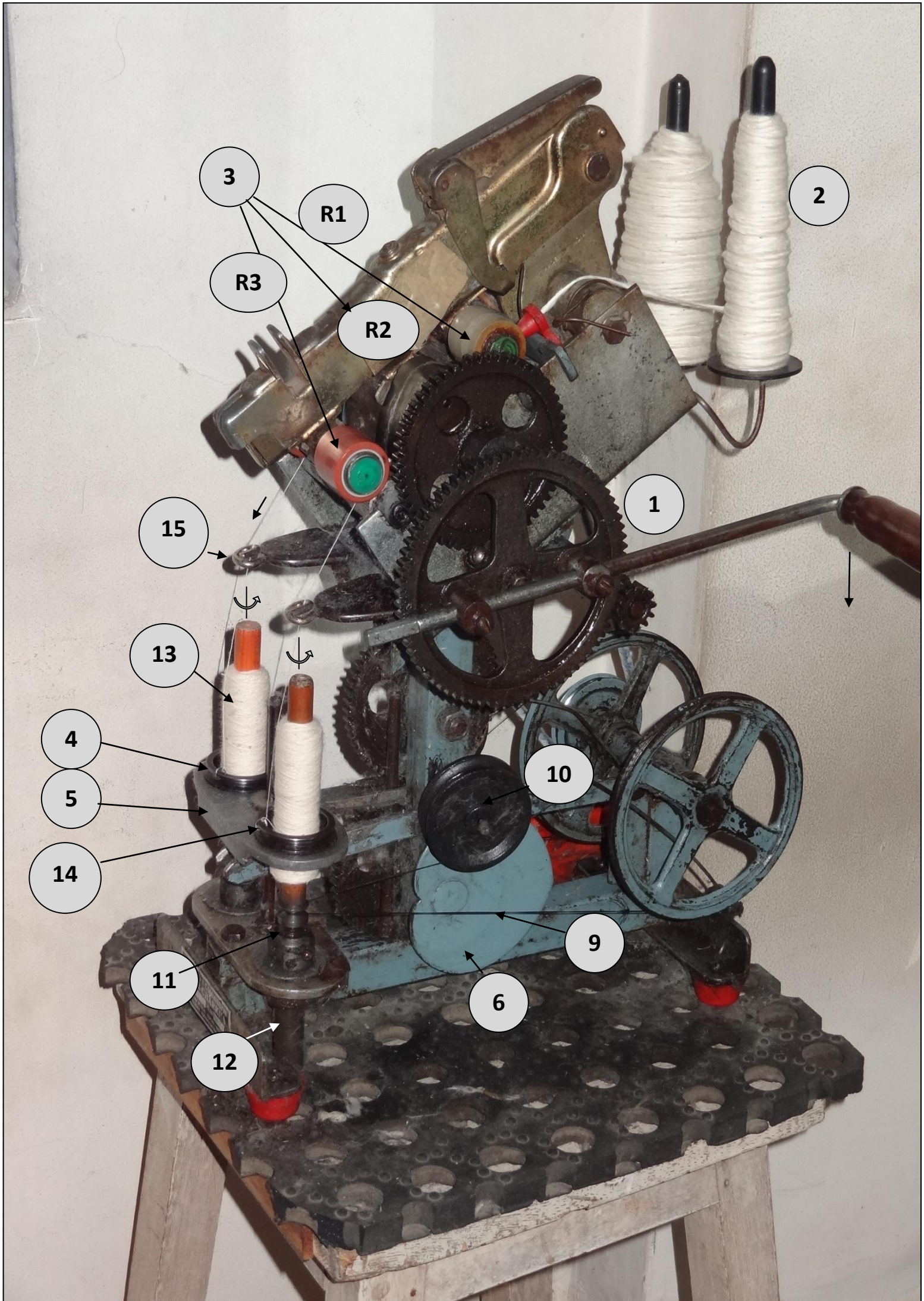
While you spin

1. Practicing the spinning by hand or with Drop Spindle will ensure that you understand the yarn formation process thoroughly. With box Charakhaa , this very process is accelerated.
2. It is important to draft the yarn with continuous, uniformly thick and uniformly twisted yarn. It is equally important to wind the yarn on the spindle.
3. Do not wind the yarn beyond the diameter of the metal disk. Yarn should be wound tightly in the conical shape . Never wind the yarn up to the tip of the spindle. Leave 20 to 25 mm from the spindle tip. Otherwise it may damage the entire stock on the spindle while unwinding and transferring to the winder for making Hank.

4. It is important to draft the yarn without snapping it. The joining the yarn takes maximum of the time.
5. The angle of the spindle with the ground should preferably be @ 35 Degrees. This makes it most convenient as you do not have to lift the hand excessively for winding the yarn on the spindle. This angle can be adjusted by lifting the far side of the box by inserting a roll of a bed sheet below the box longitudinally.
6. While trying to improve on speed in spinning it is important to have a uniform twist and thickness as well as the movements while drafting and winding need to be well synchronized.

Ambar Charakhaa

1. To provide supplementary and remunerative employment to more and more needy people especially women, there was a need to improve design of the Charakhaa which will be more productive. One such Charakhaa was proposed ,designed and further improved by Mr. Ekambaranath from south India. Thus this Charakhaa is called as Ambar Charakhaa. Ambar Charakhaahs use standard parts used in the mills for spinning yarn (ring frame, set of rollers with pressure arm, cam etc). A modular unit with 1, 2 or more spindles is assembled and driven by hand to produce cotton yarn. Spinning with Ambar Charakhaa is a much faster process. There were various other types of charakhaas in use , however owing to simplicity in design and operation along-with speed of production Ambar Charakhaa became popular. (Please refer Fig overleaf)
2. The raw material for the Ambar Charakhaa is called as Roving. These can be manufactured with Ambar Charakhaa, however due to increased demand these are manufactured in private or co-operative spinning mills managed by KVIC (Khadi and Village Industries Commission).
3. When the handle is rotated its movement is transferred to various parts through Gears, belts and Pulleys. The function of major parts is given below.
4. R1 Feed Roller Pair, it decides the rate of feeding the roving
5. R2 Extender Roller Pair; It opens , stretches and aligns the fibers in the roving
6. R3 Throw Roller Pair; It decides the speed of formation of the yarn
7. Yarn Guide Hook; it facilitates the free rotation and linear movement of the yarn
8. Traveler; It facilitates the twisting and winding of the yarn on the bobbin .
9. Ring Frame; It holds and guides the Traveler and helps in winding the Yarn on Bobbin.


3
R1
R3
R2
2
1
15
13
4
5
14
10
9
11
6
12

10. Cam; It facilitates the follower lever to move up and down which in turn wind the yarn on the Bobbin , uniformly.
11. G1, G2 and G3 gears which decide the rate of production of Yarn
12. Generally 1 meter of roving is converted in to 20 meters of yarn. This 1:20 is called as the throw of the Charakhaa. The count of the yarn is decided by the throw, revolutions of the spindle in 1 revolution of the handle and the count of the roving. The required throw can be adjusted by using the appropriate set of gears.

The table below shows the gear arrangement for required count of the yarn.

Count of Yarn		40	60	80	100
Gear 1 (G1)	Teeth	46	42	42	42
Gear 2 (G2)		22	24	24	24
Gear 3 (G3)		24	26	28	30

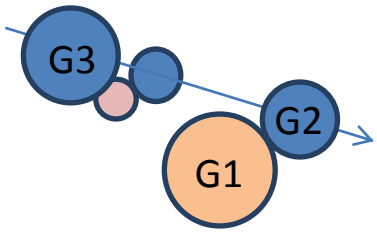
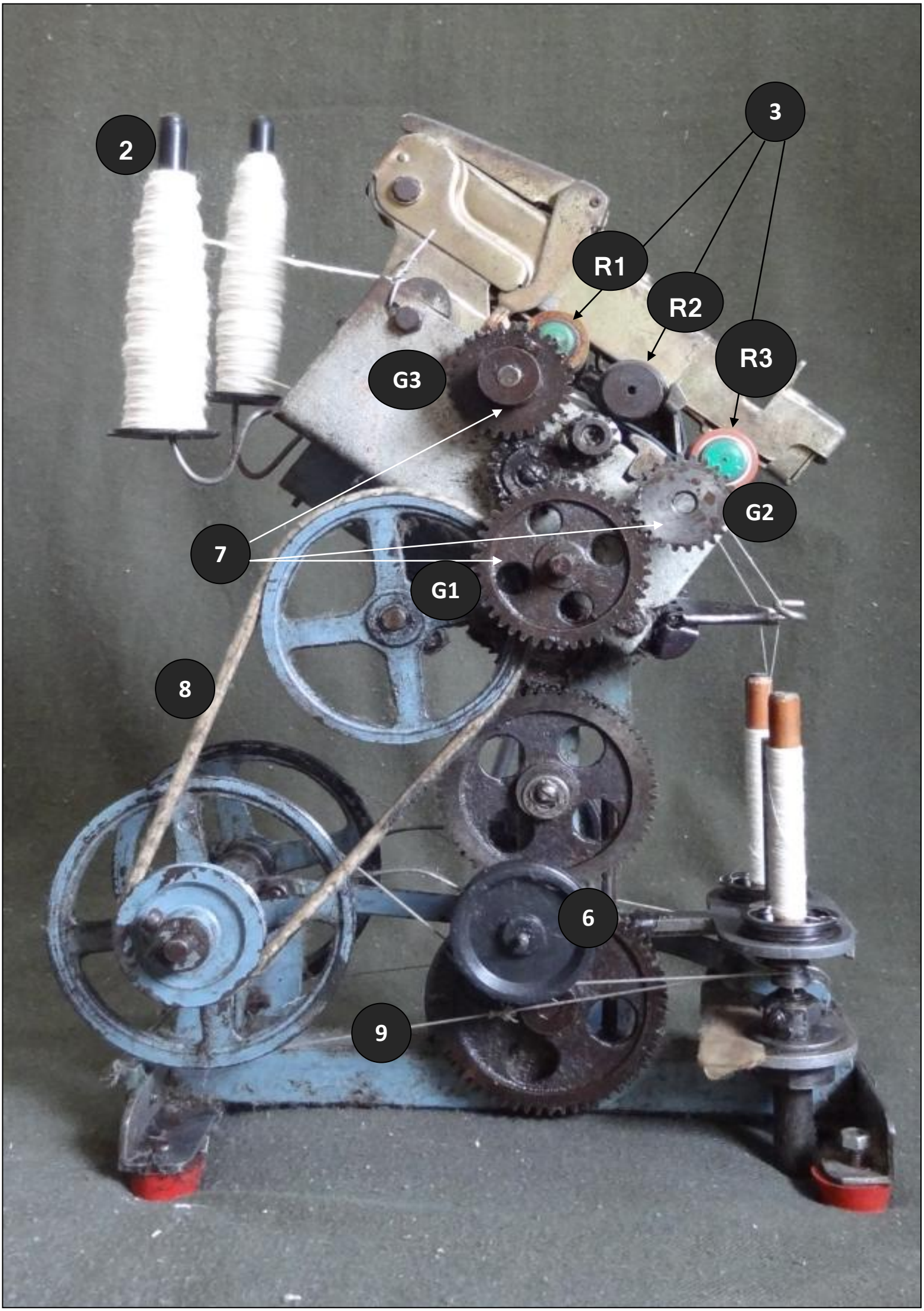


Table showing Major parts of Box Charakhaa

Sr. No.	मराठी	English	तपशील
1	मूळ चक्र	Main Wheel, with handle	
2	पूनी , बॉबीन वर गुंडाळलेली	Roving, wound on Plastic Bobbin	
3	R!,R2,R3 रोलर जोड्या	R1, R2, R3 Roller pairs	
4	रिंग (बांगडी)	Ring	
5	रिंग फ्रेम	Ring Frame	
6	कॅम , कॅम पट्टी	Cam, Cam follower lifter	
7	G1, G2 , G3 गियर्स	G1, G2. G3 Gears set	
8	जाड माळ	Thick Belt	
9	बारीक माळ	Thin Belt	
10	टेन्शन व्हील	Tension Wheel Idler	
11	त्राक	Spindle	
12	बेअरिंग	Spindle Bearing	
13	बॉबिनसह त्राक	Bobbin	
14	नथ	Traveler	
15	सूत कडी	Guide Hook	


2
3
R1
R2
R3
G3
G2
7
G1
8
6
9

Before starting the Ambar Charakhaa

1. Clean the dust, cotton fibers, oil etc from the Charakhaa.
2. Check tension on the thin and thick belt. The belt should not be too tight nor slip over the pulley.
3. Oil all bush bearings, spindles and shafts.
4. Check the movement of all the parts by slowly rotating the handle for any obstruction or excessive friction. The spindle should rotate in Counter clockwise direction when seen from top when the handle is rotated in clockwise direction when seen from right hand side.
5. The spindle along-with the bobbin should rotate freely without vibrating. If it vibrates try repositioning the bobbin.
6. Position yourself so that you can rotate the handle comfortably. Adjust the length of the handle if required. Generally the Charakhaa, if raised to @ 20 – 25 cm above the sitting level, offers a better position.
7. 60 to 70 revolutions of the handle per minute is the optimal speed to operate the Charakhaa. Rotating the handle with uniform speed is extremely important. This ensures continuous operation of Charakhaa. Snapping the yarn, yarn slipping out of the traveller and entangling over the bobbin are caused mainly due to non uniform movement of the handle.
8. Over the period the tension on the belts is reduced due to elongation of the belts. The twist imparted to the yarn gets reduced and the strength of the yarn is also reduced. We need to be very careful about the tension on the belts.
9. The bobbin will get wound to its full capacity in around 1 hour of operation of Charakhaa for 40 count Yarn. Please change the bobbin before it touches the ring, otherwise the movement of the traveller is hampered and lot of yarn is wasted while rewinding it .
10. Please keep spare travellers, bobbins, thick and thin belts for emergency use.
11. While preparing the hanks pass a piece of thread over each bunch of 200 turns of yarn on the winder, without a knot (i.e. in the form of ' ४ '). After making 5 x 200 turns of winder, secure start and end of the yarn in this thread ; twist and ply the ends. Please do not put a knot as it is very difficult to open the knot while opening the hanks for further processing.
12. Record the hanks as and when they are produced. This helps to review your progress. Store the hanks in a dry place.

13. **If you suffer from asthma or are prone to cough , to protect from loose fibers, please cover the nose with mask or a napkin.**
14. You can exchange your yarn for the variety of cloth at Gram Seva Mandal , Gopuri, Wardha, after paying for appropriate labour charges for weaving, Dying, washing and bleaching.

For those who are curious to know more

1. Cotton fifers are @ 8 mm to 30 mm long. The long staple cotton is used for finer cloths. One tree (multi-year variety, with long staple, yields @ 1 – 2 kg of raw cotton. 40% of it can be used for spinning. Cotton seed can be preserved for the next season plantation or can be used as fodder after extracting edible oil from it. These cakes are a very rich organic manure.
2. Cloth can be made of fibers from
   a. Plants : Coconut, Jute, Pineapple, Flax, Cotton
   b. Animals : Silk, Wool
   c. Metals : Gold, silver
   d. Manmade : Nylon, Polyester, Rayon, Terrene etc
3. Terminology used in cotton processing, spinning and weaving. There are various methods of measurements. Here we discuss some metric measurements.

a. Count : Length of yarn in km of 1 kg of yarn. Higher the count finer the cloth.
b. Twist : Measured as number of turns in a meter. Proper twist can be calculated as Twist/ m = squarer root of Count of Yarn x 120.
c. Strength : It is measured as an average of six samples, for maximum weight in grams supported by 12 fibers of 30 Cm length before breaking. For the yarn to have 100% strength , the relation of Count and the minimum weight before **breaking** is indicated below
   Count (grams), 20(3188), 30(2284), 40(2033), 50(1850), 60(1600), 80(1170) 100(937)
d. Non uniformity : is measured in percentage and is measured as a ratio of the max difference in weights of samples of fixed length of yarn in the same hank to average weight of the sample.
e. From I kg of yarn of 40 count we can weave @ 7 to 8 square meter of cloth.

f. There are various patterns of weaving, some of them are
   i. 1 x 1 [1 yarn lengthwise(Warp) x 1 yarn width wise (Weft)] , used for shirt, Kurtaa
   ii. 1 x 2 : for Pajama, Salvaar
   iii. 2 x 2 : Pant, Pajama
   iv. Twisted : One or more strands of yarn twisted in one strand, used in Coating etc

4. Some idea of speed of spinning --- meters / hr / spindle

Instrument	**Average**	**Skilled**	**Record (Max)**
Takli	100	200	300
Box Charakhaa	300	500	615
Ambar Charakhaa	500	500	

Finest yarn can be spun on Takli (>500 count), however mills can not spin cotton finer than 200 count. Yarn of 500 counts was being woven on the handlooms in India, however mills can not weave a yarn more than 150-200 counts.

5. It takes @ 5-6 hrs on Ambar Charakhaa or 15 to 20 hrs on Box Charakhaa to make yarn required for 1 square meter of cloth.
6. A weaver family takes 1 month to process the yarn and weave @ 200–250 meters of cloth.

Describing this process is like explaining the sweetness of the sugar. The real enjoyment is in tasting the sugar. Similarly real enjoyment is in spinning the yarn. With little determination from within and some patience one can very easily produce yarn enough for his / her family. The minor difficulties get resolved with closer observation and little commonsense applied to it. If the activity can be arranged in a group, the progress is exponential, as everybody benefits by observing others and improving on our operations.

So try it ! Wish you all the success ! Happy Spinning !!!

If you still need more information please write to us. We will be happy to support you. You can contact us in case you need support for the training in spinning, repairs of charakhaas etc.

You are most welcome to visit Gram Seva Mandal, Gopuri, Wardha. Here you will find entire cotton processing , spinning and weaving activities. Exclusive varieties of khadi and article manufactured in local village industries are also for sale at the khadi shops in Gopuri .

In addition there is a workshop for manufacture of all varieties of Charakhaas and other cotton processing equipments. There is an oil extraction unit and a Cow farm also.

Contact

Gram Seva Mandal, Gopuri, Wardha: 07152-243812
gramsevamandal@gmail.com

Karuna Phutane, Wardha : 0 9422633771

Shri. Kanakmal Gandhi, Wardha : 07152-284725

Smt. Vasanti Sor, Nasik : 0 8007851381

Madhav Sahasrabudhe, Pune : 020 25469859
madhavsahasrabudhe@gmail.com

Neela Apte, Sawantwadi : 0 9405924227
apte_neela@yahoo.co.in

Ramakant Pathak, Aurangaabad : 0 9422296316
ramakantpathak@gmail.com

For those who are curious to know about the simple art of spinning and for those who have already started spinning …….

this booklet should serve to enhance their confidence and commitment towards this all encompassing art of spinning which is a non-violent and eco-friendly way of life.