

Charkha: Wheel that Spun the History: An Overview

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Abstract:

The process of making yarn from the fibre is known as spinning. Spinning has gone through a long journey, from basic hand spinning to mechanize spinning. The major revolution in its landmark was the invention of charkha or the Indian version of the spinning wheel. Hand spinning was very prevalent in ancient India. Traces of spinning wheels being used by ancient Indian civilizations can be easily found. During the time of British rule, charkha gained popularity under the influence of Mahatma Gandhi. Charkha played a very vital role in India's fight for freedom. Despite being equipment for spinning yarn from fibre, it had a much broader perspective in Indian history. During the fight for freedom, it was a symbol of nationalism, economic upliftment, revolution, and self-reliance. There are several types of charkhas, and they can be broadly classified into two types, viz., upright-wheeled charkha and horizontal charkha. New technological advancements in charkha spinning are continuously being introduced to enhance its functionality without losing its spiritual importance.

Keywords: Charkha, spinning wheel, Khadi, hand spinning, history of spinning wheel

1. Introduction

The basic process of spinning has been described as a loosely held fibre bundle when gradually pulled out and twisted between the thumb and fingers, forming a thread that used to untwist partially as soon as it was left free. Therefore, a stick was used to immediately wind the yarn onto it to avoid untwisting. The stick became the basic tool for spinning. The real breakthrough came when weight was added to the stick. These weights acted as a flywheel, sustaining the momentum of the twisted stick while at the same time leaving both hands free for drafting of the fibre. The shaft with a weight (whorl) below is known as a spindle (Figure 1) (Hecht,1989:16-21). Spinning on a drop spindle was very tedious and slow work. It was practiced for thousands of years before the spinning wheel was invented (Kronenberg,1981).

The spinning wheel changed the ancient approach of using a spindle for hand spinning. In the spinning wheel, the spindle was assembled parallel to the ground so that it could be spun around using a string surrounding a big hand-operated wheel, making the whole process of spinning easier. (Figure 2).



(Source: <https://images.app.goo.gl/WbvrnZpcDpshd28z5>)

Figure 1: Spindle

The word *charkha* means any hand spinning machine that is capable of spinning fibre into yarn. The spinning wheel finds its place in Indian homes from very ancient times. There has been evidence of *charkha* being used throughout the ages. The excavations of Harappa and Mohenjo-Daro (2600-1900 B.C.) revealed that *charkha* was an important household tool (Division of Ministry of Information and Broadcasting, 1962,3). There are also proofs of *charkha* being used by Vedic Aryans (1500-500 B.C.). There are numerous references in the Rig Veda mentioning the various processes of spinning and weaving. In 1922, Pandit Satavalekar wrote a booklet in Hindi titled '*Ved Me Charkha*', mentioning various spiritual quotes on spinning and weaving from Rigveda, one of them being:

"Having spun the thread and given it a shining color, weave it without knots, and so guard the pathways which the enlightened have chalked out, and thinking well, leading posterity into the divine light, or (according to the author's rendering) bring forth Devine progeny. This truly is the work of poets." Rig Veda X, 53-6 (cited from Gandhi, 1955)

Charkha was popular among the Buddhists as well. There are also references to the wide use of *charkha* and spinning during the Mauryan age (Radhhakrishnan, 1988:02). In Maurya Dynasty (322 -185 B.C.), an organization for spinning and weaving was formed. Kautilya mentioned an important state official, *Sutradhayaksh*, the director of spinning, as being in charge of the spinning department. During the reign of Chandragupt Maurya, a special code of conduct was prescribed to deal with women spinners, as most of the spinners were women. They worked at home in their spare time. The raw material was sent to the home of the spinner. If any woman came to deliver yarn at *Sutrashala*, immediate attention was given to her, and payment was done on the spot. Thus, wages were fixed according to the count of the yarn and the quality of the thread spun. The *charkha* has provided the means of earning a livelihood since ancient times (Division of Ministry of Information and Broadcasting, 1962:3). There is a story in the Jataka of a woman spinner telling her husband, "I know the art of spinning, and by this means shall I bring up the children. Grievest not thou for me." (Radhhakrishnan, 1988:02).

In the Mughal period (1526-1761) hand spinning and hand weaving continued to be an important part of people's lives. The fabrics were known for their fineness and texture. In 16th and 17th centuries, foreign traders visited India to explore the rich textile heritage of India (Division of

Ministry of Information and Broadcasting,1962:4). By the end of the 17th century, the British came to India as a band of traders and promoted companies from England in India. (Devi,1921:3,4). Britishers established the East India Trading Company with the aim of importing Indian goods, including textiles in England. The growing reputation of Indian fabric in England led to the downfall of their indigenous fabric. The British passed a Parliament Act implementing high taxes on Indian fabric and additionally imposed heavy taxes on the customers of Indian fabric in England. It seriously affected the position of the Indian spinners and weavers, and many of them were forced into idleness (Division of Ministry of Information and Broadcasting, 1962:4). During the time of British rule, *charkha* gained popularity under the influence of Mahatma Gandhi. *Charkha* played a very vital role in India's fight for freedom. Despite being equipment for spinning yarn from fibre, it had a much broader perspective in Indian history. During the fight for freedom, it was a symbol of nationalism, economic upliftment, revolution, and self-reliance.

2. Types of *Charkhas*:

Charkha making is a traditional craft in India. According to the Khadi and Village Industries Commission (KVIC), Ahmedabad is one of the major *charkha* manufacturing centres(<https://www.kvic.gov.in/update/KRDP/List%20of%20Charkha%20Manufacturer.pdf>). In ancient times, locally available wood was used for making *charkha*. Different parts of the wood are carved using chisels and a hammer. Before fixing the parts of *charkha*, wood is painted with *hirogi* (brick red color), which is mixed with varnish and applied to the carved parts of the wood, and dried in sunshade. After drying, different parts are fixed together, such as, big wheel, spindle, spindle holder, *charkha* holder, etc., with the help of strings (Figure 3). (<https://www.dsource.in/resource/charaka/making-process>).

Charkha is recognized in the history of technology as one of the earliest machines in India. It was widespread in villages and was India's first and foremost industry. Its mechanical structure, combined with its portability and easy mobility, were some reasons for its wide diffusion among rural folks. (Gonsalves,2012:44). The three main mechanisms of *charkha* are drafting, twisting, and winding. Roving/sliver (sometimes raw fibres bundle as well) is the raw material for the *charkha*, which contains a large number of fibres in its cross-section. The numbers must be reduced to about 100 in the yarn cross-section (<http://www.nacomm03.ammindia.org/Articles/Rat008.pdf>). Over the years, various models of *charkha* have been designed and manufactured in different sizes and specifications. Different types of *charkhas* can be broadly categorized into two categories: **upright-wheeled *charkha*** (Figure 2) and **horizontal *charkha*** (Figure 3) (Parikh, 2011).

3. Upright wheeled *charkha*

In upright wheeled *charkha*, the rotating wheel is placed vertically to the ground. The common examples of upright wheeled *charkhas* are traditional *charkha*, tabletop *charkha*, and bageshwari *charkha*. The oldest form of *charkha* is the traditional *charkha*. The wheel is the principal part of *charkha* spinning mechanism. In traditional *charkha*, the big wheel is attached to the spindle holder with the help of a string. Rotating the big wheel with the index finger and thumb imparts the rotatory motion to the spindle (Figure 2). Due to this motion, the spindle starts

spinning on its own axis. This motion facilitates drawing the thread and twisting it simultaneously. The whole process results in transforming a loose fibre bundle into spun yarn. The spinning mechanism of most of the upright- wheeled *charkhas* is similar to the traditional *charka*.



(Source: <https://images.app.goo.gl/ondXTsspDFGHbFU7>)

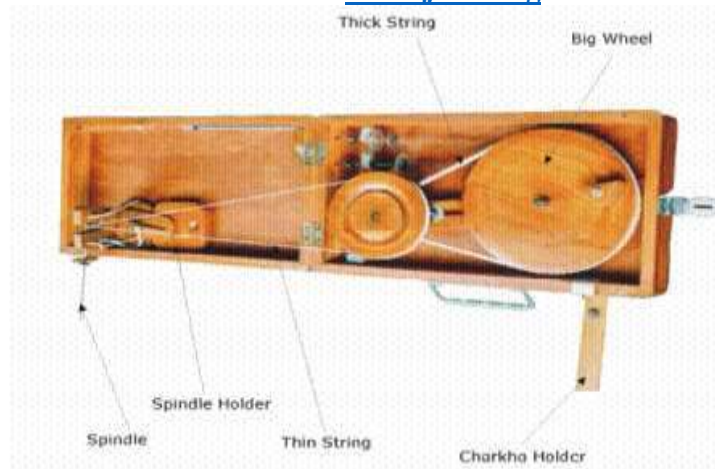
Figure 2: Traditional/Tabletop/ Floor *Charkha*

To increase the productivity of ordinary *charkha* All India Spinners Association (A I S A) has invented a speed wheel that can be attached to the ordinary *charkha*. The speed wheel is an additional wheel interposed between the main wheel and the hub of the spindle, so that, the higher rotatory motion of the big wheel can be transmitted to the spindle.

4. Horizontal *charkha*

In horizontal *charkha*, the rotating wheel is placed horizontally to the ground. The common examples of horizontal *charkhas* are book *charkha*, Kisan *charkha*, and peti *charkha*. Horizontal *charkhas* are usually for private use as it is easier to transport and may be taken along while traveling, to hold everyday schedule of spinning. Its length varies from a book- length to a briefcase (<https://silkroadgallery.co.uk/blogs/news/traditional-spinning-wheel-information>). In horizontal *charkha*, to make it more compact, two wheels are installed. When the big wheel is rotated, the revolutions of the big wheel are transmitted to the small wheel through the thick string built around the small wheel (Figure 3). The small wheel is attached to the spindle holder with a thin string. In the horizontal *charkha*, the rotation of the big wheel and the small wheels set the spindle rotates on its own axis at an accelerated speed. (Sitaramayya,1946:10-12). The working mechanism of all the horizontal *charkha* is almost similar.

The efficiency of *charkha* depends on how it is constructed, and how the rotatory principle is applied. One essential principle relates to the ratio that the revolutions of the two wheels in the machine bear to each other. In a good *charkha*, for every single revolution of the large wheel, the spindle must execute 120 revolutions. This ratio depends on the gear ratio of the big wheel (hand-operated) and the small wheel (attached to the big wheel and spindle). The rotation executed by the spindle imparts twists to the yarn drawn out. Thus, the higher the gear ratio, the greater the twist. It is possible to increase the size of the larger wheel to develop greater gear ratio but beyond a certain stage, this would make the *charkha* unwieldy.



(Source: <https://www.indiamart.com/etrade-entps/charkha.html>)

Figure 3: Parts of the Box/Peti/Yerwada Charkha

Over the years, many technological advancements took place in the *charkha* and its working mechanism. In response to which, many variants of *charkhas* are available in the hand spinning industry. All these variants have their own merits and demerits.

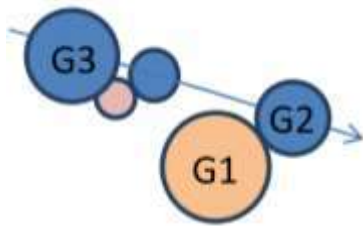
5. Ambar Charkha:

Initially, *charkha* had only one spindle. In 1923, an award was announced for technological upgradation, that would enhance the productivity of *charkha* simultaneously, keeping its primary traits as well as simplicity. Financial support and motivation from the All India Spinner's Association led to the invention of **two-spindle wooden charkha** in 1949. In 1953-1954, with similar efforts, **4 spindle timber charkha-Ambar charkha** was invented (Figure 4). It had three gears, and the gear ratio between them led to different yarn count. Table 1 shows the different gear ratios. It consisted of 3 small units i.e., carding unit, roving unit, and spinning unit. The wooden Ambar *charkha* was 21 inches long, 16 inches wide, and 21 inches high and weighed approximately 12 kgs (https://www.youtube.com/watch?v=fSs0_i3BFho&t=364s). However, in those times, spinning had a distinctive ideology, and consequently, portability mattered. Therefore, the *Khadi* Evaluation Committee rejected the working of Ambar *charkha* because of its high price and inconvenience for personal use and portability. (Parikh, 2011).



(Source: <https://www.craftscouncilofindia.in/event/celebrating-Khadi/amber-Charkha/>)

Figure 4: Ambar *Charkha*



Yarn count	Teeth		
	Gear 1	Gear 2	Gear 3
40	46	22	24
60	42	24	26
80	42	24	28
100	42	24	30

(Source: https://www.mkgandhi.org/swadeshi_khadi/Charkha_Manual.pdf)

Table 1: Gear ratio setting for different yarn counts.

6. New Model *Charkha* (NMC):

In 1968, **New Model *Charkha*** was launched by KVIC with the agreement of the Planning Commission, Government of India (Figure 5). NMC is an improved version of the Ambar *charkha* with metal body and multiple spindles. Gradually, quality requirements for *charkha* in collaboration with BIS (Bureau of Indian Standards) were also developed in 1999 (Parikh, 2011).



(Source: <https://thevoiceoffashion.com/fabric-of-india/crafts-and-textiles/march-of-the-Charkha--3183>)

Figure 5: NMC at Sarvodaya *Khadi* Ashram Chharra, Aligarh.

7. E-*Charkha*:

In 2007, **E-*Charkha***, a two-spindle NMC (New Model *Charkha*), was invented in affiliation with Flexitron, Bangalore. It is supplied with a power-generating unit that may be connected to or disconnected from rechargeable batteries by flipping the on/off button. The battery stores the energy generated by spinning. Two hours of spinning can power an LED lamp or a radio for eight hours. It is easy to use and has zero carbon footprint (<https://theindexproject.org/stories/e-charkha>). It permits a spinner to spin yarn and additionally generate energy. Such E-*Charkha* varies from single, two, to eight spindles. Now, with the invention of E-*Charkha*, it is an energy-

producing device also. Thus, E-*Charkha* (Figure 6) is an innovation with multi-purpose use (Parikh,2011).

8. Solar *Charkha*:

To enhance productivity and encourage the sector, the government started implementing the **Solar *Charkha* Mission** in 2018. These solar- *Charkhas* (Figure 7) have more productivity than the traditional ones and they are less labour intensive (<https://yourstory.com/smbstory/mahatma-gandhi-jayanti-solar-Charkha-mission-textiles/amp>). SCM started up with 50 clusters, each cluster having the capacity to employ up to 2,000 spinners and artisans. The principal part of solar *charkha* technology is solar cells, which convert solar energy into electric energy (http://www.ijmer.com/papers/Vol3_Issue4/AR3419651979.pdf). Solar *charkha* has an electric motor powered by solar energy and a battery bank that is capable of running the machine for 5-6 hours a day (Ravi, 2013:1965-1979).



Source: <https://theindexproject.org/post/e-Charkha>

Figure 6: E- *Charkha*



Source: <https://www.patrika.com/bikaner-news/solar-Charkha-mission-to-be-started-from-bikaner-2290897/>

Figure 7: Solar *Charkha*

9. Significance of *Charkha* in India:

Charkha played a very significant role in Indian history and its revolutionary journey for independence. In Indian society, *charkha* has its own value and importance, Following are the few significant roles played by *charkha* in Indian history:

- **Significance of *Charkha* in the economy:**

Hand spinning and hand weaving made a very vital contribution to the Indian economy in two ways: Firstly, it helped in removing poverty in villages, and secondly, it assisted in limiting the drift of Indian capital to British industries (Parikh, 2011). Hand-spinning gave employment to the poverty-stricken villagers. They became financially independent and were not dependent on British industries for their livelihood. Every agricultural nation needs a supplementary occupation to allow the peasants to make use of their spare time. Such occupation for India has usually been spinning (Parikh, 2011). In earlier times, a spinner could make only half a *tola* weight (1 *tola* = 11.66 grams) of the finest thread in a month by using spindle. Their speed could have been 40-50 yards per hour. With the thread value of Rs. 8 per *tola* weight, the spinner could

earn Rs. 4 a month (Putambekar,1926:34). After the interventions of Khadi and Village Industries Commission (KVIC), the wages of spinners have been increasing continuously. Before 2012, a regular spinner could earn 20- 30 rupees per day; in April 2012, the KVIC increased the wages by 2-3 rupees per hank (https://www.kvic.gov.in/update/circulars/Circular_KC.pdf). In November 2016, the wages were 4 rupees per hank. KVIC increased the wages in 2017 to 7 rupees per hank, enabling the spinner to earn a minimum of 200 rupees per day (the hindubusinessline, dated feb 27,2017).

- **Charkha as a symbol of nationalism:**

Charkha was known as India's national emblem and it was once part of the Indian national flag. Originally white, green, and red colors were chosen, and *charkha* was placed in the Centre. (Figure 8). White, green, and red colors symbolized the weakest, Islamic, and Hindus, respectively. The national flag was made of *Khadi* fabric. Later, the colors were changed to saffron for courage, white for truth and peace, and green for faith and prosperity. No communal significance was attributed to the colors, and the spinning wheel (*charkha*) was replaced by Ashoka *Chakra* (Figure 9) (Gonsalves,2010,75). Although *charkha* has been replaced in our national flag it is still a symbol of nationalism in India. The government has installed the world's largest wooden *charkha* at terminal 3 of Indira Gandhi International airport, symbolizing the *charkha* as a government priority for khadi and village industries (the Economic Times July, 07, 2016).



Source:
<https://images.app.goo.gl/tdXRxJAs3D3yxY5w6>

Figure 8: Charkha in national flag of India



Source:<https://knowindia.gov.in/national-identity-elements/national-flag.php>

Figure 9: Present national flag of India

- **Charkha spinning as a women's activity:**

According to the textual and visual archives, most of the spinners were women. These archives contribute to the normalization of spinning as a women's activity (Brown,2010:89). In 1350, an Indian historian and poet, Abdul Malik Isami, wrote "That woman alone is good who works all the time with the *charkha*,". Spinning is so closely associated with women that the word spinster means a person who spins or an unmarried woman. (<https://jezebel.com/the-centuries-old-symbolism-of-a-woman-at-her-industrio-1845658766>).

Spinning was considered more suitable for rural women because they had constraints of time, mobility, and conventional regulations for going outside the home. *Charkha* helped them by

supplying income without leaving their residence or family (Parikh,2011). Women might have spun as a part of their everyday practice and might have regularly spun and socialized in gatherings. They would weave fabric or rugs from their spun yarn. Therefore, *Charkha* was an important part of a woman's dowry. This *charkha* was probably extraordinarily adorned if the woman was from a wealthy background. (<http://www.Charkhafibrebook.com/history.html>).

According to the KVIC report, there are 399539 women artisans working in different khadi manufacturing units (<https://www.kviconline.gov.in/claims/mdamrj/misreps/officewiseArtisans.jsp>). The government is also promoting female spinners. Recently, government has launched several programs for women entrepreneurs in the spinning sector, such as skill upgradation and *Mahila Coir Yojana* (MCJ) (<https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1562496>).

- ***Charkha* as a tool for moral and spiritual upliftment:**

All the social and spiritual meanings of *Chakra/charkha* came to the public eye when the spinning wheel assumed the symbolic position of nationalism throughout the freedom struggle. The *charkha* was a symbol of cultural as well as moral upliftment in the village. Besides this, it represented the rhythm of life and nature, and *charkha* was viewed as an instrument that could bring back the lost rhythm to life and give a sense of fulfillment (Radhakrishnan,1998:20). The *charkha* provided the thread that knits the whole country into one. Spinning created a "moral bond" between rich urban, educated Indians and the rural, famished masses (Ramagundan,2008:12).

According to Elwin, *charkha* represents the enlargement of human conscience and the invasion of the economic and political spheres by the ideals of religion (1932:6,7). He further described that religion is not only inspired by social service; it is also discipline, concentration, prayer, and yoga. The *charkha* is an aid to meditation. The art of drawing a fine thread of even count develops the habit of concentration; it is a form of body labor that trains and develops the mind (1932:14-16). The sacred touch of the spinner's hand gives life and history to *Khadi*, which can never be achieved by the machine-made yarn. According to Anand, machine-made articles are visually appealing, but the artwork in *Khadi* attracts the heart and soul (2003:25).

- ***Charkha* and Music:**

Charkha is part of Indian literature as well. There are various references mentioning *charkha* in songs, bhajans, and poems. In the bhajan '*charkhe ka bhed*', sung by Sanwermal Saini, the circular motion of *charkha* was compared to the vicious circle of life and reincarnation, described in a poetic manner (<https://www.youtube.com/watch?v=xqvTSEw7EB4>). In the bhajan sung by Kusum Chauhan *tune vyartha janam gawaya*, *charkha* is symbolized human life and how it is important to understand the art of spinning for human beings (<https://www.youtube.com/watch?v=QG1C6LAcS4g>). In the song *charkha* sung by Wadali brothers, the *charkha* is symbolized with the feeling of love and separation (<https://www.youtube.com/watch?v=5OwOoQzLOyc>).

According to Kulkarni, the music of the spinning wheel had magical healing power. The hand-spun yarn had the capacity to mend the broken warp and weft of our lives. Saint Kabir (1440-

1518) (<https://www.varanasi.org.in/kabir-das>) wrote a bhajan on the spinning wheel, - *chadariya Jhini Re Jhini*, mentioning the importance of spinning as a form of art (2012:166-168).

Chadariya, jhini re jhini, (Weaving, finer and finer),

ke Ram nam ras bhini. (Dipped in the essence of Ram's name).

Astah kamal ka, charkha banaya (A lotus flower with eight petals made the spinning wheel)

panch tattva ki puni (loaded with five elements to make the thread)

Nao/das maas bunan ko lage, (It takes 9/10 months to make the covering),
murkh maili kinhi. (But the foolish soiled it straight away).

jab mori chaadar, ban ghaar ayie, (When my covering was made, and came home),

rang-rej ko dinhi. (It was given to the dyer).

Aisa rang, ranga rang re le, (He painted the colours such that),

lal-o-lal kar dinhi. (He made it completely red).

(<https://www.petervis.com/gallery/web/bollywood-translations/chadariya-jhini-re-jhini-english-translation.html>)

The above- mentioned are a few references of *charkha* in Indian art form, there are many more songs and bhajans written on *charkha*. Mahatma Gandhi believed that instead of using fossil fuels, human energy could be used as an energy source for producing goods. Manufacturing goods using human resources provides a sustainable alternative to the economy. The energy required for hand-spun yarn is zero whereas, for mill-spun yarn is 2.73 MJ/Kg. The fabric hand-woven from the charkha spun yarn barely requires any energy and liberates no harmful pollutants. The carbon footprint of hand-spun yarn is very low making it a green fabric, as it is made from natural fibers which are readily degradable. The machinery and chemicals required for hand spinning are very less, therefore, the fabric made from hand-spun yarn is more eco-friendly than mill-spun yarn. The hand-spun and hand-woven industry enhances the rural economy and hence contributes to sustainable rural development.

10. Conclusion:

The spinning wheel or *charkha*, was synonymous with the ideologies of self-reliance, perseverance, and determination. *Charkha* had a vital role in India's freedom movement. In earlier days, spinning was the regular household activity for Indian people, and every house had a *charkha* for their personal use. Gradually, *charkha* lost its charm because of mill- made substitutes. Thereafter, during the freedom fight, the importance of *charkha* was revived under the guidance of Mahatma Gandhi. From then to now, the *charkha* has marked the route of development for the Indian spinning industry. The Indian spinning industry has grown over the years to attain the advanced developmental stage that it has now. India has the second-largest installed capacity of spindles in the world. At the same time, it has been successful in keeping its heritage alive and thriving. Hand spinning on *charkha* is still a source of income in rural India and is gradually gaining popularity amongst Indian youth as a way of practicing meditation and

spirituality. Technological research and development have also been taking place continuously, leading to many varieties of *charkha*, ranging from traditional timber *charkha* to E- *charkha* and solar *charkha*.

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- <https://www.youtube.com/watch?v=xqvTSEw7EB4>
- https://www.youtube.com/watch?v=fSs0_i3BFho&t=364s (5:30-7:10)
- <https://www.youtube.com/watch?v=QG1C6LAcs4g>
- <https://www.youtube.com/watch?v=5OwOoQzLOyc>

Online Resources of Figures/ Tables:

- <https://images.app.goo.gl/WbvrnZpcDpshd28z5>
- <https://images.app.goo.gl/ondXTsspDFGHbFU7>
- <https://images.app.goo.gl/5tgDgH2GBhb8mBYy6>
- <https://theindexproject.org/post/e-Charkha>

- <https://www.patrika.com/bikaner-news/solar-Charkha-mission-to-be-started-from-bikaner-2290897/>
- <https://images.app.goo.gl/tDXRxJAs3D3yxY5w6>
- <https://www.indiamart.com/etrade-entps/Charkha.html>
- https://www.mkgandhi.org/swadeshi_khadi/Charkha_Manual.pdf