Size: Skeins to contain silk to the weight of 2½ to 3 ounces, the lighter for fine sizes, the heavier for coarse sizes, but in no case to exceed three ounces.

Skeins: Always single skeins laced through in two places directly opposite each other.

SILK THROWING.

When the hard or raw silk is received by the manufacturer, it has to undergo more or less processes, in order to get it in proper condition for manufacturing into fabrics. There are several different classes of silk yarns that are made by the different systems of doubling and twisting, the process in either case being known as silk throwing.

The first process to which the silk, as received in the form of skeins, is subjected, is transferring it onto bobbins on a winding machine, after which the silk goes through a cleaning process in order to rid the yarn of any irregularities or imperfections, which would otherwise cause bad yarn during throwing. It consists in passing each thread between two fixed, upright, parallel plates, of a series of plates, placed close together, so as to catch any knots or other imperfections in the thread, and arrest its passage until said imperfections are removed. The silk is then ready to be thrown, *i. e.* made into "singles," "tram," or "organzine," which are the three classes of silk yarn made.

Singles also termed "dumb" singles, is made by simply doubling two or more raw silk threads and winding, without twisting, them together. This silk produces a very soft and lustrous silk fabric which cannot be equalled with twisted yarns.

Tram silk is composed of two or more single threads without individual twist, and which are united into one thread by slightly twisting them together, for the more the twist, the less the lustre, and harder the feel; also a very slight twist enables the yarn to "cover" better when woven into cloth. If two threads are used it is termed two thread tram; if three, three thread tram, etc. Tram silk is made from the poorer qualities of fibre and is used principally for filling yarns.

Organzine consists of several single threads which are first individually twisted in one direction, after which they are doubled and twisted in the opposite direction to the first twist. The twist thus imparted to the yarn adds strength to it, however an excess of twist is a disadvantage, since it reduces the glossiness of the yarn. It is made from the better qualities of cocoons and is used chiefly for warp yarns.

Boiling off. The next process which the silk undergoes is that of boiling and dyeing. The hard silk, as it reaches the dyer, contains the natural gum and color from the worm, and other impurities, some of which have been necessarily added in reeling and throwing it, and which have all to be discharged in order to obtain what is known as "soft" silk; in the case of Souple and Ecru silks, this discharging of the impurities is less fully done. The silk during the process of boiling off will, of course, lose in weight, the amount depending on the character of the silk; China silk losing the most, while European and Japan silks lose the least; and also upon the class of silk, as previously mentioned, required to be produced. The boiling off or ungumming of silk is performed by means of hot soap solutions. Boiling the silk repeatedly in these soap baths deprives the former of its gum and leaves it soft and lustrous, qualities which are so highly prized in silk fabrics.

Soft Silk. In this case the boiling off or ungumming of the silk is made complete, the silk losing by this process from 24% to 30% of its weight.

Souple silk, is silk from which only a part of the gum has been removed, this silk in this instance losing only from 5% to 12% of its weight. This silk is not as soft after the process as in the case of the completely ungummed silk.

Ecru silk, is silk which has had only a small portion of the gum removed, the loss in weight of the silk, due to the removal of the gum, being from 2% to 5% of its weight.

After the silk has been thus scoured of its gum, it is ready for bleaching, in connection with white, or light shades, or dyeing if calling for dark colors.

WASTE OR SPUN SILK.

The product, known as Spun, Waste, Floss, Chappe, or Filosella Silk, is obtained from various sources, amongst which we find: First, the coarse, loose, outer layers surrounding the true cocoon; Second, defective cocoons, *i. e.* such as have been used for breeding purposes and from which the moth has emerged, and which are therefore difficult or impossible to reel, also double cocoons and those from diseased worms; Third, the parchment like skin left behind in reeling the sound cocoons; Fourth, the waste made in reeling the cocoons, as well as such as made in silk throwing mills. This waste silk fibre, after being properly prepared, *i. e.* boiled off, in turn is carded, combed, drawn and spun into a yarn partaking of some of the qualities of raw silk, although it is not as bright as the latter, its lustre varying largely according to the amount of gum retained on the fibres. The more the gum has been boiled out, the greater will be the lustre of the fibres. Again, spun silk is weaker than thrown silk, both in strength and elasticity.

The boiling is usually extended for about two hours, after which the silk is dried and then placed in a damp place to better enable it afterwards to be worked. After being garnetted or carded, *i. e.* torn up into short workable lengths, the silk is dressed—a proceeding somewhat similar to combing. The process results in a lap which is gilled, drawn and then passes to the roving frames, preparatory to spinning and doubling.

Lately a process for waste silk spinning has been patented in this country, the gist of which is to spin the yarn in the gum, and afterwards subject the yarn or fabric, as the case may be, to the boiling off process, the inventor claiming that in this manner the spinning operation can take place with less waste being made, besides producing a smoother thread, owing to the influence of the gum which causes the fibres to adhere more closely to each other, and consequently the singeing of the yarn is unnecessary.

The best kinds of spun silk yarns (mostly two threads united by doubling) are used as filling for various silk fabrics and velvets, also as warps for many half silk goods, and as embroidery and knitting silk; whilst the lower grades are made up into ribbons and cords, and the poorest are used in cheaper knit goods and other fabrics. Floss or chappe silk, with the exception of yarns for zephyrs, are generally doubled and in turn gassed, for which purpose they are passed quickly through a gas jet about a dozen times, and when they lose about 5 per cent of their weight.

The waste made during spinning these spun silk, waste silk, floss or chappe silk yarns is afterwards used either by itself or in connection with better stock in spinning still lower qualities of silk waste yarns. In this instance the yarn is spun after the woolen yarn system. These yarns are then used as filling for dress goods, upholstery fabrics, polishing cloths, coarse grades of knit goods; also for packing material, and as insulating lagging for steam pipes, silk being a bad conductor of heat.

Silk Shoddy is prepared from silk cuttings and remnants by a similar treatment to that employed and explained with wool shoddy, the short staple product being worked up as an adjunct to waste silk in the cheapest grades of yarns, or for other purposes previously explained.

WILD SILKS.

The same are the products of the various species of wild silkworms as found principally in India, China and Japan, although found also more or less in other localities. Like cultivated silk, wild silks consist of two filaments which, however, instead of being structureless are composed of individual fibrils, readily recognized under the microscope by decided, parallel, longitudinal striations. They are also less circular in cross section than cultivated silk. Only very few of the wild silkworms produce cocoons of the same regularity as those of the cultivated silkworms, owing to the worm interrupting the spinning of its cocoon, and what will mix up the filaments composing the cocoon; again small portions of leaves and twigs will get entangled with the cocoon, on which account the majority of wild silks are difficult if not impossible to reel, and for which reason they are chiefly used for the production of yarns corresponding to spun or waste silk of the cultivated variety.

Among the advantages of wild silk are its greater durability, by reason of the larger diameter of the filament, which is about 0.002 of an inch; its cheapness, since the worms thrive in the open without attention and yield two, three, and with some species more crops of large cocoons in the year; absence of loss of weight in dyeing, since wild silk does not require to be scoured.

However, it must be mentioned that wild silk has a darker color, which cannot be removed except by means of a powerful bleaching agent; its lustre, softness, and elasticity being inferior to those of cultivated silk. The most important varieties of wild silks are: Tussah, Eria, Fagara, and Yamamai.

Tussah Silk is the most important variety of wild silk and is the product of the Tussah moth which is widely distributed throughout India and Southern China. The cocoons are of a large size and vary in color from silver gray to brown. They are hard and difficult to reel, unless specially treated, for which reason they are mostly worked up in the same manner as defective cocoons of cultivated silk in connection with spun silk. Tussah silk has a vitreous lustre, and is somewhat stiff compared to cultivated silk, the fibres being more or less irregular and measuring on an average of 0.002 of an inch in cross section. It is used chiefly in the production of plushes, upholstery fabrics, draperies, and similar other fabrics. Fig. 4 shows a magnified view of these fibres.

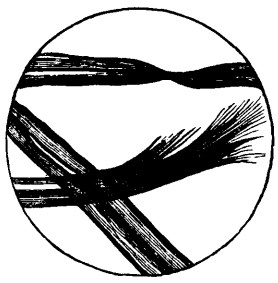


Fig. 4.

Eria Silk, is closely related to Tussah silk, being produced from the recinus moth, a native of India.

Fagara Silk, is the product from the Atlas moth, the largest nocturnal moth known, and a native throughout Eastern Asia. The cocoon is light brown in color, being open at both ends, so that the moth can escape without injuring the cocoon filaments. This silk also resembles Tussah silk.

Yamamai Silk, is obtained from the Japanese oak leaf moth of this name, and compared to the other wild silks most nearly resembles cultivated silk, though it is somewhat coarser than the average cultivated silk, its diameter being about 0.001 inch. This silkworm spins an unusually regular cocoon of a beautiful pale green color, and from which the silk can be readily reeled.

In California, a wild silk-moth is found thriving on the poisonous species of Rhamnus californicus. It produces a silk nearly as good as that of the cultivated silkworm, and owing to the favorable nature of the climate, without the frosts or rains of China and Japan, has great prospects.

WEIGHTED SILK.

The weight taken from the silk during the boiling off process is a considerable item, and to compensate for this loss, the practice of artificially adding weight to some silks received its start, the amount of weighting done having been continually increased above the original weight of the silk, until now from 3 to 4, or more, times its weight is thus added. Different methods are employed for this process, depending on the color of the silk, that is, whether it is white, light, or heavy colored.

For dark colored or black silks, nitrate of iron in combination with tannin matters, like catechu, galls, logwoods, etc., is used for weighting, this being easily and readily effected by alternate treatments with the iron salts and tannin matters; and by the addition of tin salt it is possible to increase the weight of the silk to three or four times its original weight. As iron tends to color silk, it cannot be used for weighting silk when the latter is to be dyed in light colors, for which reason recourse is had to perchloride of tin, which weights silk in a satisfactory manner, and at the same time permits the dyeing of such weighted silks in any color. Tin perchloride comes in the market in two forms, viz., either as a strong and somewhat corrosive liquid, or in the form of white solid lumps of a hygroscopic nature. It also can be made by the dyer himself in the following manner: 1 pound of tin crystals is dissolved in 1 pound of hydrochloric acid. Next add 3 ounces chlorate of potash in small quantities at a time, since there is a considerable amount of chemical action going on, for which reason caution must be exercised in mixing the ingredients. Stoneware jars are the best to use in carrying on the work. Whether bought ready made or prepared, as described, the tin chloride liquor is prepared by making it up to a strength of 50° Tw. The solution should not be made stronger, since tin chloride liquors of over 60° Tw. tend to act upon, and in turn disintegrate the silk fibre. The silk is well immersed in this liquor and left for about two hours, after which it is taken out, the surplus liquor wrung out and allowed to run back into the jars, since the said liquor can be used over and over again, only replenishing the solution with new strong liquor from time to time, in order to keep the same up to its proper required degree of strength. After the silk has been wrung, it is well washed in water, then passed through a prepared bath of 4 ounces of soda per gallon of water. These two operations of immersing the silk in the tin chloride liquor and in turn washing the silk thus treated, are repeated as often as is necessary to produce the required weighting. After being thus weighted, the silk is ready for dyeing. By alternating baths of tannic acid with the tin, it is possible to add considerably to the weighting power of the tin baths. This weighting does not add anything to the color of the silk, so that, as mentioned before, silk thus treated can be dyed in the most delicate colors, as, for example, light shades of blue, yellow, red, green, etc. In order to show

the apearance of loaded silk fibres, Fig. 5 is given, showing magnified views of different amounts of weighting: A shows weighting from one and one-half to twice the weight of the silk, B shows this weighting

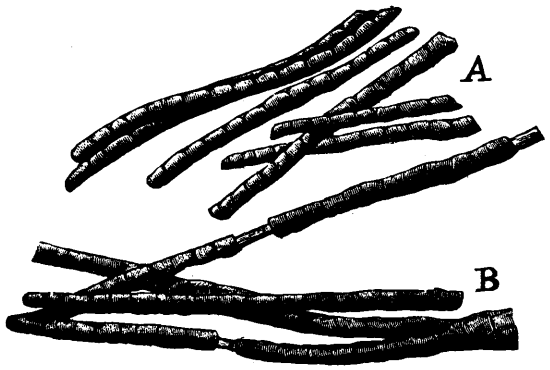


Fig. 5.

increased to from three and one-half to four times the weight of the silk. The weighting of silk is confined to raw, *i. e.* reeled silks, for the prices of waste or spun silks would not make it worth while extending the system in that direction.

ARTIFICIAL SILK,

is made by treating cotton or other cellulose material with a mixture of nitric and sulphuric acid at a low temperature, which converts it into nitro-cellulose, which is then dissolved in a mixture of acetone, acetic acid and amyl alcohol, equal volumes of each of the three components giving the best results. This substance is expressed from capillary orifices, and instantly solidifies on contact with the atmosphere, by reason of the evaporation of the acetone, and forms solid, silky, lustrous threads, which in turn are reeled, doubling two or three ends. Artificial silk in this state is an inflammable and explosive product, due to the presence of the nitro-cellulose, and this has to be remedied to render it safe for use. For this purpose suitable reducing agents, such as hydrosulphurous acid, ammonium sulphydrate, etc., are employed in order to reduce the nitro-cellulose, to totally or partially denitrated cellulose, according to the length of the reaction. The hanks of threads are immersed in the solution for several hours, then washed in pure water and suitably dried. The coloring of the threads is done when preparing the mixture for making the thread.

Artificial silk has not met with that success that was predicted for it, but it has found some uses in the manufacture of braids, etc. Since it thus has become, to some extent, an article of commerce, the following methods for detecting its presence, when employed in combination with natural silk or other fibres in the construction of fabrics, may be used: Natural silk dissolves in an alkaline solution which remains white, while with artificial silk the solution turns yellow. Another method is thus: Artificial silk is not soluble in an alkaline copper solution when glycerine is present, while natural silk dissolves in it at ordinary temperature. This test is so sensitive, that by means of it, the relative quantities of natural and artificial silk in a tissue can be readily ascertained. The solution is prepared by dissolving 10 parts of sulphate of copper in 100 parts of water. To this are added 5 parts of glycerine and potash in sufficient quantity to again re-dissolve the precipitate that has been formed.

MODES OF ASCERTAINING THE CHARACTER OF SILK.

To test the quality of silk, as used in the construction of a fabric, tear the latter both lengthwise and crosswise. If it gives way readily in either direction, it shows that either the dye used has destroyed the strength, or the threads are composed of inferior material. Pure silk, if not weakened in dyeing, is the strongest of fibres. Nearly all the cheaper dyes, particularly the dark and black ones, have metallic salts as a basis, which weaken the fibres. The construction of the fabric, *i. e.*, its texture and weave, is tested by scraping diagonally across the fabric with the thumb nail, and if the fabric in question is durable, the threads will not slip, otherwise the thumb nail will soon make a space of loose threads, indicating too loose a texture. The quality of the warp and filling is determined by ravelling out the fabric, and examining carefully the threads. Sometimes a pure silk warp is used in connection with a heavily loaded filling; at others, the filling which comes on the face of the fabric is of pure silk, while the remainder is inferior silk, etc. Weighting or adulteration of fibre is readily ascertained by burning the thread. If it is pure and properly dyed, it will take fire with difficulty, and the flame will go out as soon as the fire is withdrawn, in turn leaving a nearly jet black mass, the same as wool, but since silk contains no sulphur, no pronounced smell of burnt horn is evolved. Weighted silk takes fire readily, and once burning, will smoulder, leaving a refuse, retaining the shape of the yarn or fabric tested, and is of a light yellowish red color.

TESTS FOR DISTINGUISHING SILK FROM OTHER FIBRES.

Silk can be distinguished from cotton by alkalinizing a solution of fuchsine, by adding drop by drop a liquor of potash or caustic soda. The moment the liquor gets discolored, the threads to be tested are immersed and lifted after half an hour and carefully washed. Under this treatment silk threads or fibres become red, whereas cotton threads or fibres remain colorless.

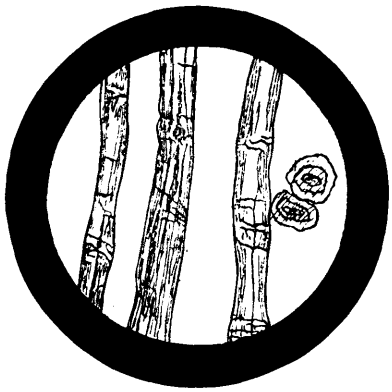
A solution of zinc chloride of 1.7 specific gravity dissolves silk, but has no action on wool, and therefore is a simple procedure for ascertaining if wool fibre is present.

When flax, hemp, cotton, and jute are mixed with wool and silk, the sample may then be boiled in an aqueous solution containing 10 per cent. of hydrate of soda; the wool and silk dissolve, while the vegetable fibres remain unacted upon. The whole is thrown upon a cotton filter, and the undissolved matter is then washed with hot water and afterwards acidulated with 5 per cent. of hydrochloric acid, to which, if the residue is black or dark colored, a few drops of chlorine water are added. Meantime the original alkaline filtrate can be tested for wool with acetate of lead. If a white precipitate is formed, which dissolves on stirring, silk alone is present. A black precipitate indicates wool. The nitro-prusside of sodium gives a violet color if wool is present. If the tissue is deeply colored, it may be cut up and steeped for from fifteen to twenty minutes in a mixture of two measures of concentrated sulphuric and one of fuming nitric acids. Wool, silk, and coloring matters are destroyed, while the cellulose is converted into gun-cotton.

FLAX.

The flax fibre of commerce is obtained from the stem of the flax plant (Linum usitatissimum), which is grown here, Canada, as well as all over central and northern Europe.

The portion of the flax plant as used in the manufacture of linen yarn is the bast tissue, situated between the bark and the hard or woody tissue. The characteristic features of the flax fibres are their length, strength, fineness and color. The fibres of flax vary with the tapering character of the stem, and the natural ends are sharp pointed and generally long drawn out. Good flax should average about 20 ins., and be free from fibres 12 ins. long.



SPECIMENS OF FLAX FIBRES, MAGNIFIED,
Showing also Cross Sections.

Pulling and Rippling of Flax. The farmer who aims at the production of a good fibre, must pull the plant before it has attained its full maturity; namely, when the lower portion of the stalk, to the extent of two-thirds of its height, has become yellow, and while the bolls or seed capsules are just changing from green to brown. At this stage the plants are pulled in handfuls, and these are laid across each other diagonally until a sheaf is complete, when the whole is carefully bound. Stems of a different length should be pulled separately and kept in separate sheaves.

The next process to which the freshly pulled flax is submitted is rippling, which has for its object the separation of bolls from the stems, this process as a rule being carried on in the same field where the flax was grown. The ripple is a kind of a large comb composed of large teeth about eighteen inches long, made of half inch square iron, placed $\frac{3}{16}$ of an inch apart at the bottom and tapering slightly toward the apex, being screwed down to the centre of a nine-foot plank and resting on two stools. This comparatively great length and smallness of the iron teeth allows them to spring lightly, and so yield to the pull of the stalk, instead of presenting a rigid surface, which would act too roughly upon them. The operation of rippling is performed by hand by drawing successive bundles of flax through the upright prongs of the ripple. The bulbs on the stems, being greater in diameter than the distance apart of the rods, are therefore stripped off in the process.

Retting. The adhesion of the hard tissue to the bast fibres of flax necessitates the stems being macerated in slow running, almost sluggish waters, from 10 to 14 days, so as to produce fermentation, which aids to separate the bast fibres from the cortical layer. When it is found that the woody portion separates freely from the fibre on breaking the stem about every six or seven inches along its length, the operation is complete, and the flax is then removed and allowed to drain and dry for a few hours, preparatory to being spread evenly and thinly on a meadow and left there for from 5 to 6 days, in order that by the action of the air and sun, the drying process may be completed, as well as the fibres bleached. This process of "grassing" also renders the wood part short and brittle, and easily crushed and broken. When dried, the flax is ready for lifting, tying in bunches and storing for the scutch-mill. Another method in use for retting flax is what is called dew-retting, and by which process the flax is spread on a meadow without steeping, and simply exposing it to the action of the weather for six or eight weeks. Damp weather is the most suitable for this system of retting, since all fermentation ceases if the flax becomes dry.

As will be readily understood, the methods of retting flax thus explained are slow work, and can be carried on only in sections of the world where labor is cheap, hence since years chemists have tried to solve a quicker process for it. By means of one of the latest processes, the pulled and rippled flax is placed in vats and kept immersed by a strong framework. Steam is admitted until the temperature of the water is raised to about 194° F. Acetous fermentation is developed, which causes the gummy cortex of the stem to be decomposed. About sixty hours' maceration is sufficient for the retting. The flax is afterwards dressed in the open air.

Scutching. This is the next process to which the flax plant after retting is subjected, and can be done by power or hand work, and consists in breaking up the woody part of the stem, and in turn eliminating it from the fibres.

In hand scutching, the flax stems are first broken by placing them across a set of hard wooden slats arranged in a frame and having a similar set pivoted so as to descend between the first set of slats. The outer ends of the pivoted slats are connected by a wooden piece, which is struck with a mallet in order to break the stems as placed between these two sets of slats. During this procedure the flax stems are held by hand by means of two short rods, connected to each other by a short wire, the operator gripping the two rods in one hand with the flax stems firmly held between them. The breaking process must always be begun with the root ends of the stems. After thus breaking the stems, a convenient amount of them is placed, and held with one hand, through a cut out portion in an upright board, the projecting ends of the stems then being struck several times with the blade of a scutching knife, as handled with the other hand, until that portion of the stem is completely separated from its woody part, and when the next portion of stem is treated in a similar manner until the entire length of the stems has thus been dealt with.

In connection with power breaking and scutching, although a variety of machinery is built, their principles of operation are identical to those just explained. We thus find breaking machines built with crushing rollers, between which the stems are passed; whereas in another style of machine we find one set of stationary horizontal iron bars having a similar set of bars working between them, so that when the stems are laid across the stationary set and the other set is lowered onto them, they are broken by this action. The machines for scutching consist principally of a board for holding the broken stems on, and having the ends project over and into the path of blades as carried by arms fast to a revolving piece, said blades taking the place of the scutching knife in the hand process. Since these blades revolve at a high speed (about 1000 strokes per minute), they must be carefully set.

A competent scutcher aims to thoroughly separate the fibre from the woody part with as little waste as possible. No doubt there will always be more or less short fibre removed along with the unworkable matter, the percentage of loss being greater when

the retting process has been slighted. These short fibres, called tow, when removed from the woody droppings, are afterwards manufactured (by means of carding) into an inferior grade of yarns known as tow yarns.

When scutched, a good flax fibre is of a bright silver-gray color, (resembling silk) in its appearance. When dark in color or of a greenish tint, the fibres are either of an inferior quality, or have been imperfectly treated during the previously explained manipulations. After scutching, the flax is ready for the market, *i. e.* the spinning mill.

Chemical Composition of Flax. The flax plant is chemically composed of about:

42.0 per cent Organic Matter,
56.5 per cent Water,
1.5 per cent Ash.

100

To Ascertain whether a Yarn is Cotton or Linen, examine the threads carefully and remember that cotton threads appear of regular form throughout, whereas flax threads are irregular. When quickly torn across, cotton threads curl up, but flax threads remain smooth, this test however requiring more or less practice.

To Detect Cotton in Linen Yarns or Fabrics, treat the sample submitted with a solution of caustic potash (1 : 6). The flax will become more curly than the cotton, and the latter finally turns grayish white, whereas the flax is dyed orange.

Another procedure calls for treating the sample with a stronger solution of caustic potash (1 : 2) and boiling for two minutes, then washing, and drying between blotting paper, and when flax becomes of a deep yellow color as compared to the cotton which assumes a whitish or straw color.

By means of another process, the sample is boiled in water and then steeped in concentrated sulphuric acid for two minutes and when the cotton is dissolved, while the flax remains white and unaltered, and can be separated by washing with a weak solution of caustic potash.

HEMP, JUTE AND RAMIE.

Hemp. The character of this fibre as well as its method of production from the plant is very similar to that of flax, although hemp is inferior in delicacy and fineness. It is very much stronger than flax and equally susceptible of bleaching.

The average height of the hemp plant is from 6 to 18 feet, according to the soil, climate, etc., a mild and humid atmosphere being most favorable to its growth.

America and Russia produce the best hemp, but the former possesses greater flexibility, and can be dressed finer, although the Russian hemp is more equal in length. Manila hemp is also well known, being one of the chief products of the Philippine Islands.

The various operations through which the hemp stalk is passed in obtaining the bast fibres, which is the spinning material, are nearly the same as those used for flax, and may be divided into the same two important classes thus: (1) A chemical treatment and (2) a series of mechanical treatments.

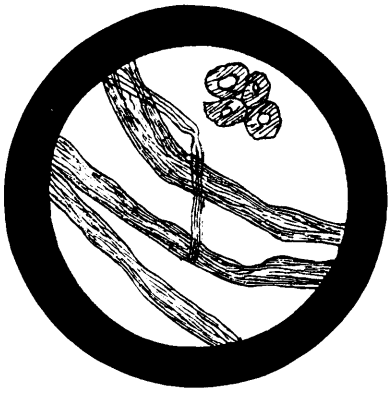
The chemical treatment comprises retting, which is carried on in stagnant or running water, in the same manner as with flax. After the retted stalks have been rinsed clean, and dried, they are subjected successively to breaking, crushing, cutting and hackling, in order to separate the bast fibres and prepare them for the market.

The hemp fibre is whitish, silver or pearly gray, and sometimes greenish or yellowish in color, and as a rule, the paler the color, the better the quality. The length of the fibres varies from 40 to 80 inches, depending on the growth of the plant; it is very strong, and in the best hemps, the same have a silky gloss nearly equal to that of flax. Hemp absorbs moisture up to 30% of its own weight, although the maximum permissible limit is 12%. The male hemp is employed for making best hempen cloth, the coarser kinds being used for weaving canvas (for sails, shoes, etc.), hose-pipe, carpets, etc. The female hemp is preferred for making string, cord, rope, hammocks, fishing nets, etc.

SPECIMENS OF HEMP FIBRES, MAGNIFIED, Showing also Cross Sections.

Hydrochloric acid and caustic soda give a brown color to hemp, and sulphuric acid gradually dissolves it.

Jute. This textile fibre is also obtained from the jute plant in practically the same manner as flax is obtained from its respective plant, that is by separating the bast fibres from the woody portion, by a series of operations explained in connection with flax. Jute is largely cultivated in India and China. Examining the illustration, it will be seen that the fibres consist of bundles of stiff, lustrous, cylindrical fibrils, having irregularly thickened walls and comparatively large central openings.



SPECIMENS OF JUTE FIBRES, MAGNIFIED, Showing also Cross Sections.

The best grades of fibres in the raw state are of a light brown to silver-gray color, while the more inferior grades are brownish or greenish. The fibres are rendered pliable previous to spinning by immersing them in the raw state in a solution of oil.

In medium qualities, the fibres measure from 7 to 10 feet in length, the better kinds attaining a length of as much as 13 to 14 feet.

Jute takes up as much as 24 per cent of moisture, the permissible maximum allowed when buying being 14 per cent. It is fairly lustrous in the better grades, and very strong, although its wearing qualities are deficient. The fibres are as a rule uniform

in the good varieties, and their capacity for absorbing dyestuffs is good. When bleached with bleaching powder, jute can be dyed and printed a number of handsome bright colors.

Under the continued influence of light, air and moisture, the fibre is easily decomposed, turns black and becomes rotten, which is found to occur in jute fabrics exposed to light, and more particularly at the folds, which in a short time exhibit holes. It is also essential that jute should be packed in a dry state, otherwise it is liable to spontaneous combustion.

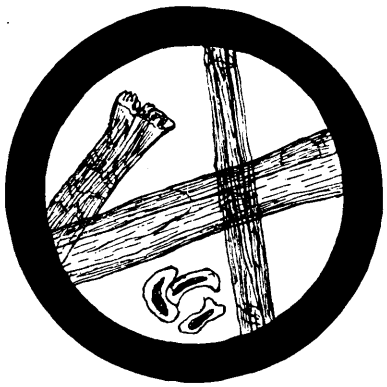
The material is used in connection with the manufacture of carpets, rugs, upholstery fabrics, etc.; also for the manufacture of gunny-bags, burlaps, etc.

When treated with dilute chromic acid, to which a little hydrochloric acid has been added, jute turns blue, while iodine and sulphuric acid produce a dark yellow stain, which may be used to distinguish jute from flax.

To distinguish jute from flax and hemp, the threads are placed in a solution of nitric acid and a little potassium chromate and warmed, then washed, and introduced into warm alkaline water, and washed again; when the water is evaporated from the slide, a drop of glycerine is added, and after a short time the characteristic structure of the jute will be seen, under the microscope, if jute is present.

Ramie. This fibre is synonymous with China grass, since the character of both fibres is practically the same. The method for obtaining the fibre, as practiced in India, China and Japan where it is chiefly grown, is splitting and scraping the plant stems and then steeping them. The ordinary retting process, as used for flax, etc., is not sufficiently effective, since the succulent nature of the stem and the great amount and acridity of the gummy matter causes it to rapidly coagulate and become insoluble on exposure to the air.

The ramie fibre in the raw state has a soft, silky feel, but by pulling the staple, this quality becomes reduced and gives way to more or less harshness in the feel. The fibres are about 4¾ inches in length and are snow white.



SPECIMENS OF RAMIE FIBRES, MAGNIFIED, Showing also Cross Sections.

The ramie fibre is used for making fabrics resembling silk and linen goods, the products being characterized by a peculiar transparent appearance and fineness to the touch, and are known as grass linen and Canton cambric. The fibre is also made into yarns for curtains, table cloths, lace, cord, and is used chiefly in Europe.

Sulphuric acid and iodine stain the pure fibres blue.

THE MICROSCOPE.

When required to determine the nature of the raw material used in the construction of a yarn or fabric, and no chemical test wanted, the naked eye being insufficient, then the compound microscope is employed for solving the question.

Yarns or fibres can be examined under a lens either by bringing them within or beyond focal length; in the first instance obtaining an enlarged picture on the side next the object, whereas in the other case, the enlarged picture is formed in an inverted position on the opposite side of the lens. In order to obtain high magnifying power, these two conditions are combined in the compound microscope, which consists in its main parts of a tube some six or seven inches in length, closed at the upper end by a large glass lens (of greater focal length — placed nearest the eye, hence termed "eye piece") and at the lower end by a smaller glass lens (of smaller focal length—placed nearest the fibres to be examined, hence "object piece"), both pieces being capable of vertical movement, and blackened on the inside to exclude extraneous light. The total magnifying power of a microscope is thus the sum of the powers of the "object" and the "eye piece." The tube carrying the "eye" and the "object" piece, for adjustment in the regular microscope, is raised or lowered by a rack and pinion motion, while in connection with a high class microscope, an extra, *i. e.* fine adjustment is afterwards made by the micrometer screw, as provided to such microscopes. On the stand of the microscope we find fixed an arrangement for supporting the stage (pierced with a small circular aperture for the passage of the reflected light), as well as a small circular concave reflector, which is movable in any direction.

The most important quality of a good microscope is, that its lenses produce a well defined, clear picture, distinctly showing every detail of structure in the object under examination.

The best source of illumination for carrying on investigations by means of the microscope is diffuse daylight, with a sky evenly covered with a white veil of clouds. In connection with artificial light, a glass bulb, filled with a dark blue solution of ammoniacal copper oxide, interposed between the source of light and the condenser, will be found of advantage.

For copying microscopic researches, the "Camera Lucida" is used, projecting the image either by means of glass prisms or reflectors on to an adjacent sheet of paper, placed on a level with the microscope stage, and when the outlines of the object then can be reproduced by pencilling. In order to get pictures free from distortion, the drawing surface should be inclined at an angle of 25°.

For measuring the diameters of fibres under the microscope, the glass micrometer is used, it being a fine scale engraved on glass, and the measurement is performed either on the object itself (objective micrometer) or on the image (ocular micrometer).

Yarns to be examined under the microscope, after proper removal of all dirt (in connection with undyed fibres it is advisable to previously steep or boil them in water, in the case of wool, not scoured, and where the fibres are contaminated by adherent fat, remove the latter by boiling with alcohol or treating them with ether, etc.), coloring matter (which should be removed by boiling in an alkaline or weak acid bath, or by extraction with alcohol, ether, etc.), so that the passage of the light will be unrestricted, are then untwisted by hand, in order to transfer the yarn back into a loose mass of loose fibres; selecting then a proper amount of these fibres for testing. Immersing the fibres thus to be tested in boiling water, or, better still, in glycerine or Canada balsam, will increase their transparency. In connection with vegetable fibres, boiling for a few seconds in nitric acid containing a little potassium chloride is claimed as of advantage. The fibres thus prepared are then separately laid, side by side, on a glass slide, and covered with a small cover glass of from 0.15 to 0.2 mm. in thickness.

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AMERICAN AGENTS:

MR. EVAN A. LEIGH, 232 Summer Street, Boston, Mass.

THE CAMERON & BARKLEY CO., Charleston, S. C., for Cotton Ginning Machinery.

PREPARATORY PROCESSES.

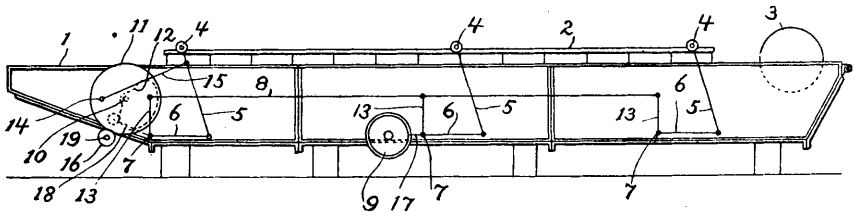
WOOL.

THE HUNTER WOOL WASHER.

The improvement of construction of the new washer over former makes more particularly refers to the means for supporting and operating the rake or harrow by means of which the wool is caused to travel from the feeding end of the bowl of a wool washer to the discharging end of said bowl.

The accompanying illustration is a diagram of this wool washer.

A description of the machine is best given by quoting letters of reference, of which 1 designates the bowl of a wool washer. 2 is the rake working in the said bowl. 3 is the rotary ducker employed at the feeding or receiving end of the bowl; however a basket ducker may be substituted if preferred.



At intervals the rake 2 has connected therewith cross rods 4, the ends of which project laterally beyond the sides of the bowl 1. The said ends are fitted to eyes in the upper ends of side arms 5, each cross rod being thus connected with a pair of the said side arms. The number of cross rods and pairs of side arms employed varies with the length of the bowl and rake, our illustration showing a rather long machine, in which three cross rods and pairs of side arms are employed. In the case of a shorter machine only two cross rods and pairs of side arms would be required. Each side arm 5 is pivoted at its lower end to the horizontal arm 6 of a lever mounted pivotally upon a stud 7 projecting from the exterior of the bowl. Each of the said levers has an upwardly extending arm 13, and the arms 13 of all the levers on each side of the bowl are connected together by a rod or rods 8, so as to compel all of the levers to move in unison.

The weight of the rake is counterbalanced by weights 9, applied to arms 17, with which the levers of one or more pairs of the side arms 5 are provided, the said arms 17 projecting oppositely with respect to the arms 6 of the said levers.

The actuation of the rake is thus: At 10 is a stud projecting from the exterior of the bowl, adjacent to one end of the latter. 11 designates a gear wheel mounted to rotate on the said stud, and 12 is a cam at the side of the gear 11, fixedly connected with the latter and rotating in unison therewith. The acting face of the said cam engages with a roller mounted on a stud carried by the arm 18 of the adjacent lever, arm 18 projecting oppositely with reference to arm 6 of the said lever. A crank pin 14, carried by the gear 11, is connected by a rod 15 with the adjacent side arm 5. The rake supporting and actuating arrangements are also duplicated at the opposite sides of the bowl. For the purpose of causing the gear and cam at one side of the bowl to rotate in unison with the gear and cam at the other side thereof, a cross shaft (driving shaft) 19 is provided, it carrying pinions 16, meshing with the respective gears. The crank pins 14 transmit to the rake or harrow through the rods 15 movement in the direction of the length of the bowl, while the cams 12 act through the lever arrangements described to control the position of the rake vertically as it travels. The cams are shaped so as to co-operate with the cranks in causing the rake to advance horizontally while its tines are immersed in the contents of the bowl, then rise nearly vertically at the extreme of its advancing movement, then return along a substantially horizontal slightly curved course, and then descend in a nearly vertical curved course.

To enable the adjustment of the rake vertically upon the cross rods 4, each cross rod has fitted thereto hangers which are attached to the rake and are formed with vertically elongated eyes through which the cross rods pass. Adjusting screws are applied to the upper portions of the said eyes, their lower ends resting upon the cross rods. By turning the said screws in or out more or less the required adjustment of the rake relative to the cross rods is effected.

The vertical components of the movement of the rake are derived from the cam 12, while the horizontal components of the said movement are derived from the crank 14. The burden of sustaining the rake and imparting vertical movements thereto devolves wholly upon the cam, and the crank is relieved therefrom. The connections are direct and simple, and the possibilities of wear are minimized. (The James Hunter Machine Co., North Adams, Mass.)

SARGENT'S WOOL WASHING MACHINE.

One of the latest improvements to this well known wool washing machine is to prevent sagging of the harrow which carries the rake teeth, at the same time improving the actuating mechanism for said harrow, so as to obviate any jar or shock to the same.

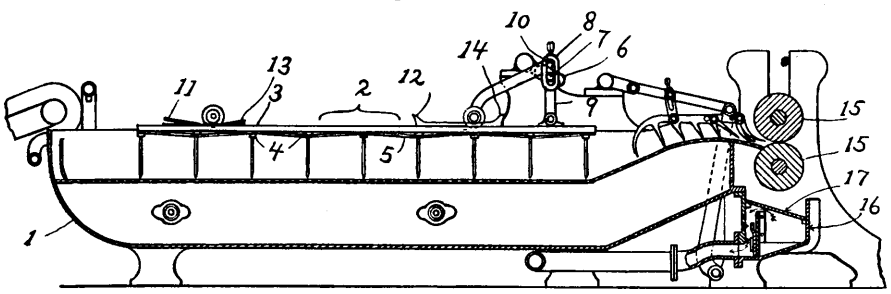
The accompanying illustration is a longitudinal vertical section of one of these wool washing machines, having the improvements above referred to added.

In the bowl 1 of the machine is located a harrow 2 made up of side bars 3, which support a series of rake heads 4. In order to support this harrow 2 and prevent it from sagging, a tie strap 5 is run along beneath each side bar 3, said tie strap extending alternately under and over the successive rake heads 4. To the side bars 3 of the harrow are secured two cross rods, the ends of which project over and beyond the sides of the bowl. With these ends are connected a series of weighted arms, which serve to counterbalance the weight of the harrow, and thus keep it horizontal throughout all its movements.

The harrow is actuated by means of a rotating

crank 6, the pin 7 of said crank working in the slot 8 of stand 9, as fastened to the side frame of the machine. During the lower half of the revolution of this crank, its pin acts simply to advance the harrow, but when the crank pin reaches the upper end of slot 8, the harrow is carried upward, backward and downward. This sudden contact of the crank pin with the upper end of the slot occasions shock and wear, and for which reason the slot is provided with a rubber cushion 10.

In order that the trucks of the harrow strike their track easily when the harrow completes its return



movement, the forward ends of said tracks are upturned as at 11 and 12; again, to assist the crank 6 to more easily raise the harrow, the opposite ends of the tracks are upturned as at 13 and 14.

Beneath the squeeze rollers 15 there is placed a tank 16 to receive the scouring liquor, which also contains such refuse of fibres as fall from said squeeze rolls. A screen 17 is located in said tank, being so placed that it is immersed below the water line of the liquor in the tank, the screen thus being kept more or less from becoming clogged by said refuse of fibres, thus consequently fewer stoppages of the machine, for cleansing the tank from said fibres, being required. (C. G. Sargent's Sons, Graniteville, Mass.)

THE McNAUGHT WOOL WASHERS.

There are two types of this prominent wool washer in the market, one more particularly designed for the scouring of medium and fine wools, the other for coarse and long wools.

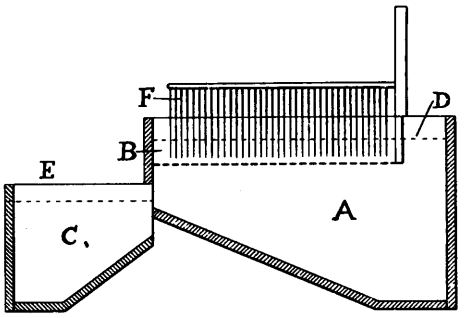
With reference to their wool washer for medium and fine wools, the same has several new features in its make-up, well worthy of an extended investigation by any woolen or worsted manufacturer or wool scouring establishment. The same as in connection with any other wool washer, the wool to be scoured may be passed through one machine two or more times, or what is preferable, the machine being used in sets of two, three or four bowls, the latter combination (4-bowl) being the ideal arrangement and the one which gives the best results in production, economy of use and quality of work produced. In this 4 bowl arrangement, the size of bowls used are, one each of 30, 24, 18 and 12 feet length respectively.

The chief advantage of the machine, as claimed for it, is its principle of operation, which is a radical departure from others theretofore put on the market, and will be readily understood from the accompanying diagram, by means of which it will be seen that the machine itself is divided, or rather composed of two compartments, viz.: the main washing bowl A, in which a washing trough B, having a perforated bottom (see heavy dotted line) is placed, and the settling tank C, in which the scouring liquor is prepared, as well as into which the scouring liquor which falls from the squeeze rolls is delivered and its good portions in turn re-used.

The action of the washer is as follows: The scouring liquor is placed in tank C, from which it is delivered, by a centrifugal pump, in quantities as required, into compartment A. The wool is placed in the washing trough B, the scouring liquor entering said trough B through its perforated bottom previously referred to, and in turn mixes thoroughly with the wool. Dotted line D indicates the height of the scouring liquor in the washing trough B, and dotted line E that of the liquor in tank C. The rakes F drop into the scouring liquor and the wool as in trough B, and at the same time have imparted to them a slow forward motion, which in turn moves the wool gently along, allowing its locks to open out as the liquor soaks into them and the natural refuse matter in the wool to drop out, and this without matting the fibres or swashing them about. The motion given to the rakes is a slow even forward one, one which is calculated to give the best results. The refuse matter, previously referred to, meanwhile drops to the bottom of the trough B, and thence through its perforations to the floor of the bowl A, which is slanting (as shown), and thus allows it to fall into one corner, from which it is then easily removed when the liquor in the bowl A is run off, having from extensive use become devoid of its scouring properties, etc., etc.

The saturated wool is then carried to the squeeze rolls, outside the trough, the liquor squeezed out and the wool passed forward to the washing bowl of the next machine in the series, and the squeezed out liquor returned to the settling tank C, as previously referred to. The composition of the scouring liquor in tank C is then: the mixture of sud and grease floating lightly on the top, dirt falling to the bottom and resting at the lower corner, leaving the middle portions of said composition comparatively clean, and which in turn is then drawn by the centrifugal pump, before mentioned, into the bowl A.

The squeeze-head of this machine is also of a most ingenious construction, in that the wool does not ac-



tually float into the nip of the two squeeze rollers, but it is washed forward by such a flow of water, that the fibres never lie in a sodden mass, as on an apron, and they are partially separated from each other by the water they contain, so that it is easy for sand and other dirt to escape. Once away from the fibre the sand and dirt can never come again to the rollers, for, instead of falling back into the washing trough B, which contains the wool, the stream of sud from the trough B, where the wool is washed, washes the sand through perforated plates into a trough, from which it is pumped to the settling tank C. Here there

is no agitation, and the sand and other heavy impurities quickly settle to the bottom of the tank, which, as shown in the diagram is so shaped that everything falls toward the outlets, and when the cocks are opened, all sediment is readily flushed clear away.

In the case of a series of bowls being used, the first bowl, *i. e.* where the greasy wool enters, will contain the strongest scouring liquor, and which naturally becomes dirty very fast; the second a less strong liquor, the same having less tendency to be polluted; the third a still weaker liquor; the fourth being used as a rinsing bowl in connection with clear water. In this 4-bowl set, it is customary to fill the settling tank of the fourth bowl with clear water, which when squeezed by the rolls is returned to the settling tank of machine No. 3, while in the same manner, that from No. 3 goes to No. 2, and that from No. 2 to No. 1. The scum and froth (*i. e.* all insoluble oily and soapy matter) from settling tank C of the No. 1 machine is allowed to overflow through specially provided drains.

The chief advantages for this wool washing machine are: (1) The scouring liquor is heated in tank C, which precludes the necessity of any steam jets in the washing bowl A. (2) The rakes having a *slow gentle* motion forward, consequently move the wool along without unduly disturbing it and matting it, allowing the locks to open out, the grease to mix with the scouring liquor, and the dirt to drop to the bottom instead of being piled forward at the delivery, as is often the case when the contents are violently forked forward. (3) The bottom of the trough B is full of fine perforations, which, with the absence of violent swashing, has the advantage of letting the dirt drop through easily without the fibres also being driven with it. (4) The floor of the washing bowl A being inclined, allows the dirt to fall to one side, so that when the bowl is to be cleaned, the liquor is simply run off, the attendant meantime stirring up the dirt with a broom, a space being left between the side of the trough B, and the bowl A for that purpose. This obviates the necessity of removing the perforated bottom as has to be done in connection with some of the other wool washing machines. (5) The continuous use of the scouring liquor, allowing only the grease and scum to be run off, makes a saving in materials as used for scouring, and this with a minimum expenditure of heat.

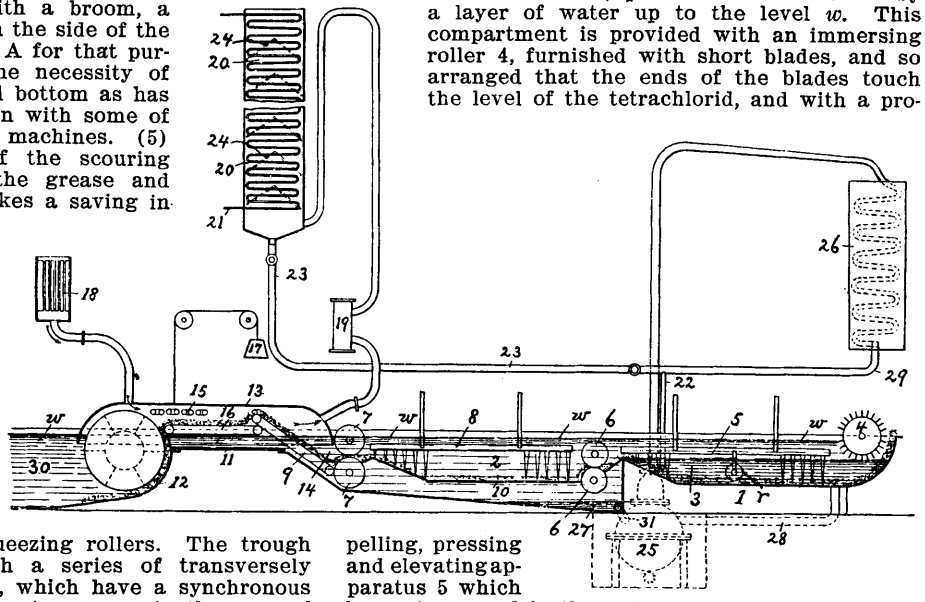
For coarse and long wools, and especially where a large production is required, the machine for doing this work consists of a long trough, in which the scouring liquor is placed. At one end is an endless band or feeding apron, and at the other a pair of squeezing rollers. The trough is fitted internally with a series of transversely situated swinging rakes, which have a synchronous motion and not an alternate one, as in the case of other machines, being supported upon a framework, capable, by means of suitable mechanism, of being moved horizontally forward, raised clear of the trough, moved backward, and again dropped into the trough. The same framework supports a perforated plate which serves to immerse the wool, and a sort of fork scoop to transfer the wool from the trough to the squeezing rollers. The greasy wool is spread more or less evenly upon the traveling feeding apron and is immersed in the liquor by the action of the perforated plate. The fibre is then caused to slowly traverse the trough by the intermittent action of the swinging rakes, and, arriving at the delivery end, passes between the squeezing rollers and is thrown off by the flyer.

A single passage through such a machine is usually not sufficient to thoroughly cleanse the wool, since after being in use for a short time, the liquor becomes very dirty. It is a frequent practice, therefore, the same as with other wool washers, to have two or three machines combined in a set, through each of which the wool passes. The second trough is filled with clean scouring liquor, and the third with water. When the liquor in the first trough becomes saturated with yolk or too dirty for use, it is run out and the trough filled with that from machine No. 2; the latter being supplied with clean liquor. The troughs are fitted with perforated false bottoms, underneath which most of the dirt collects, and from where in turn it is removed. (Stoddard, Haserick, Richards & Co., Boston, Mass., agents for the machine in the United States.)

WOOL SCOURING WITH CARBON TETRACHLORID.

This apparatus for extracting fatty matters from wool by the solvent action of carbon tetrachlorid, is so arranged that the tetrachlorid, being of greater specific gravity than water, acts under water, and is thereby protected from exposure to air and consequently against loss by evaporation.

By reference to the accompanying illustration, which is a diagrammatic longitudinal section of the machine, compartment 1 of a tank contains at 3 carbon tetrachlorid, protected from the air by a layer of water up to the level *w*. This compartment is provided with an immersing roller 4, furnished with short blades, and so arranged that the ends of the blades touch the level of the tetrachlorid, and with a propelling, pressing and elevating apparatus 5 which keeps immersed in the water and serves to advance the wool along the tank. A roller *r*, suspended from 5 has a squeezing effect on the wool below it, pressing out from it tetrachlorid highly charged with fat. Another compartment 2 of the tank contains water at the same level *w* as in the first compartment, and it has two pairs of pressing rollers 6 and 7, a propelling and elevating apparatus 8, and a perforated plate 10, on which the material travels, also an endless apron 9.



In continuation of the compartment 2 is a gutter 11, filled with water up to the level *w*, and leading to a washing tank 12, also filled with water to *w*. This gutter 11 is covered by a cover 13, making hydraulic seal by dipping at the same time into the tank 12 and at 14 into the compartment 2. Under this cover are placed steam-pipe coils 15, for maintaining a constant temperature in this section of the machine, an endless apron 16 being also placed under said cover 13. In order to give easy access under this cover 13 in case of accident, it can be raised by a set of pulleys with counterweight 17 after moving the pipe joints. The cover 13 is connected by pipes, on the one hand, to an apparatus 18 for heating air, and, on the other hand, to an exhausting and compressing air pump 19, which is connected to a condensing apparatus. This latter consists of a chamber or column 20 filled with water, kept cold by a serpentine pipe 21, in which cold water circulates. This chamber communicates with compartment 1 of the tank by pipes 23, 22. In the column 20 are baffles 24 of perforated plates, having for their object to subdivide the air as much as possible, so as to separate the air and the carbon tetrachlorid.

The first compartment, 1, of the tank is connected by a pipe 28 to a distilling apparatus 25, which is connected to a condenser 26, communicating with the bath of tetrachlorid of this compartment by the pipe 29, 22.

The apparatus operates as follows: Previous to the entrance of the wool into this machine, a common single bowl wool scouring machine is used for removing the salts soluble in water and the earthy matters from the wool, which then in turn is, by means of the feeding roller 4, introduced, dry or wet, directly into the bath of the carbon tetrachlorid (cold or slightly heated) in the compartment 1 of the new apparatus. The wool thus immersed in the tetrachlorid is subjected to the action of the propelling, pressing and elevating apparatus 5, which, without taking it out of the water (thus preventing evaporation), pushes it towards the squeezing rollers 6, which squeeze out part of the tetrachlorid containing fat extracted from the wool. The wool then enters the bath of water, pure or slightly soapy (cold or hot), of the compartment 2, in which, by the propelling, pressing and elevating apparatus 8, it is pushed onto the perforated plate 10 and toward the pressing rollers 7, which squeeze out most of the remaining tetrachlorid. The wool is then led by the endless aprons 9 and 16 to the feeder of an ordinary washing tank 30. During its passage on the aprons 9, 16, under the hermetically-closed cover 13, the wool impregnated with tetrachlorid is subjected to a draft of hot air moving in a direction opposite to that of the material. This air, already heated, is kept at a suitable constant temperature by the serpentine steam pipe 15, and its circulation is insured by the pump 19. In its passage under the cover 13, the wool rapidly gives up all its tetrachlorid and retains the water with which it is impregnated. The air charged with tetrachlorid passes through the cold water in the column 20 and deposits its tetrachlorid, which being denser than water is condensed and precipitated to the bottom of the chamber 20, whence the pipes 23, 22, lead it back to the compartment 1. The tetrachlorid, which in the compartment 2 in presence of water is already separated from the wool, passes through the perforated plate 10 and deposits at 27, where also collects the tetrachlorid squeezed out by the pressing rollers 6, and thence it is conducted to the distilling apparatus through pipe 31.

The carbon tetrachlorid charged with fat is led to the distilling apparatus 25, where it is separated from the fat. Its vapor is led to the condenser 26, and the condensed liquid is led back by the pipes 29, 22, to the compartment 1. (George Peltzer, Verviers, Belgium.)

THE HURRICANE AUTOMATIC STOCK DRYER.

The older systems of drying wool, etc., might be divided into two classes, in the first of which the material was dried at a very low temperature, which necessarily implied a considerable length of time for the operation. The second method implied a considerably higher temperature, than the first system, thus resulting in much more rapid drying, but which was frequently objectionable on account of the feeling of harshness which the higher temperature and lack of circulation of air imparts to the material under operation.

The "Hurricane" Automatic Dryers are so designed as to overcome the objections just named and at the same time include whatever tends to make this class of machinery most efficient. These dryers are divided into a series of compartments, two or more as the case may be, and in each successive compartment the temperature is gradually reduced below that of the one immediately preceding it. In this way the wet material is subjected to the greatest heat just as it enters the machine and, when it finally reaches the delivery end of the dryer, it is thoroughly dry and cool and in a first class condition for further handling in the mill.

The best and most economical drying results are obtained by recirculating large volumes of air alternately through the wet materials and then over steam coils, a sufficient quantity of damp air being at the same time discharged from the machine through an exhaust pipe. This exhaust pipe is located near the feed end of the machine, so as to remove the steam and damp air as near as possible to the point where the greatest volume of dampness is created and prevent the damp air from working along further into the dryer portions of the machine.

The machine is adapted for drying wool, cotton, hair, etc. When drying wool, a very convenient arrangement is to have the scouring machines located immediately ahead of the self-feed and the dryer. In this way, after the stock has been thoroughly scoured and the water afterwards extracted as much as possible by means of a hydro-extractor or squeeze rolls, a conveying apron carries the material forward and delivers the stock into the hopper of the self-feed.

A cross section of this automatic dryer, with a self-feed attached, is given in Fig. 1, showing also the passage of the stock through the machine, the latter having two compartments in this instance. The self-feed is of the usual construction and consists principally of a hopper 1, one end of which is formed by a slatted apron 2, from the slats of which, spikes project for carrying the stock forward and upward on the apron. A comb 3 is located in the hopper, near the top, to comb back into the hopper any surplus stock from the spiked apron, and thus insure a practically even feed of the material to the dryer. The spiked apron is endless, and passes over four suitable rollers, it being positively driven by the top roller 4. Situated on the delivery side of the self-feed is a beater 5 for brushing off the stock from the spikes of the apron and delivering it to the wire cloth apron 6 of the dryer proper.

The style and arrangement of the self-feed vary somewhat according to the class of material which is to be handled, as it will readily be understood that different classes of stock, such as wool, cotton, hair, etc., require different adjustments of the feed in order to get the best results from the dryer. For example, when the stock under operation has a short staple, as with cotton and hair, a flat blade paddle is used, and when a long stapled stock like wool is under operation, a comb is used, as previously explained.

The Automatic Dryer consists of a series of compartments 7 and 8, through which the wire cloth apron 6 is caused to travel, and heating compartments 9 and 10 are arranged along the side of the compartments 7 and 8, the former being fitted up with the required amount of steam pipes 11 and 12. Situated in the partitions between the steam and conveying compartments are fans 13 and 14, two for each compartment shown. These fans circulate the air alternately through the steam compartments and conveying compartments, thus resulting in great steam economy. The action of the fans is to give the air a circular and, at the same time, an advancing movement, similar to a point traveling on the outside of a screw thread. The air starts in its circulation at the delivery end of the dryer where it enters the machine and gradually passes through towards the feed end, being successively blown over the steam coils and through the wet stock until it finally approaches the feed end. Naturally, as the air advances toward the feed end of the machine, it becomes more and more saturated with water and by the time it reaches the first compartment 7, can no longer be used successfully for drying purposes and consequently should be gotten rid of, which is accomplished in this dryer by having an exhaust pipe located at 15, a small exhaust fan in some cases being provided to aid in the escape of the saturated air.

The elimination of this saturated air is a very important advantage, since a dry air at a comparatively low temperature will act as a better drying agent than a damp air at a high temperature and hence better results are obtained by getting rid of the saturated air at the proper time. When using three or more compartments in the dryer, the last compartment frequently contains no piping.

The fans are reversible in their rotation by simply crossing the driving belt and in this manner may be made to either draw the air down through, the stock on the apron or blow it up through the stock, depending on the direction of rotation of the fans. When drying wool, it is better to have the first fan 13 blow the air up through the stock, so as to loosen it up and allow the air to act upon it more readily, but by the time the wool is in the last compartment, it is in such a fluffy condition that the air must be drawn down through it, in order to keep it on the apron.

It was mentioned that the first compartment maintained a higher temperature than the second, and it will be seen that this can be safely done because the stock in the first compartment contains more moisture and consequently can stand a higher temperature without injury to the fibre than afterwards when not so wet. The stock is in this manner dried and delivered in a comparatively cool state and this with the greatest economy in the use of steam.

The temperatures of the different compartments are ascertained by means of thermometers, hung in front of small glass windows, in each compartment. The amount of steam in the coils can be easily regulated by valves to get the required temperature for each compartment.

In operating the dryer, the speed of the wire cloth apron should be regulated to suit the character of the stock, for it will be readily appreciated that stock which has been put through a hydro-extractor or squeeze rolls will contain much less water and will consequently dry much more rapidly than stock which has been merely allowed to drain before entering the dryer. This change in the speed of the apron, however, does not affect the speed of the fan or other working parts of the machine. For ordinary wool drying, from 7 to 10 minutes is about the proper time for the stock to travel through the dryer, whereas when the affair refers to future worsted spinning from 3 to 5 minutes will be all that is required, since in this instance it is advisable that the wool leaves the machine not perfectly dry. The apron used in this machine is composed of wire cloth which has been galvanized after weaving, so as to prevent any contraction in the width of the apron when the latter is under tension. The outside selvages are also reenforced by several wires so as to further strengthen the wearing edges of the apron. These selvages of the apron run in guides prepared for them on either side so that the stock on the apron will not fall over the edges of the apron. The apron is endless and passes over large drums 16 and 17, one at each end, and over iron tube rollers 18, located at different points along its travel, to keep said apron level. Sharp curves are avoided in its travel, to prevent excessive bending of the apron and consequent wear and final breakage.

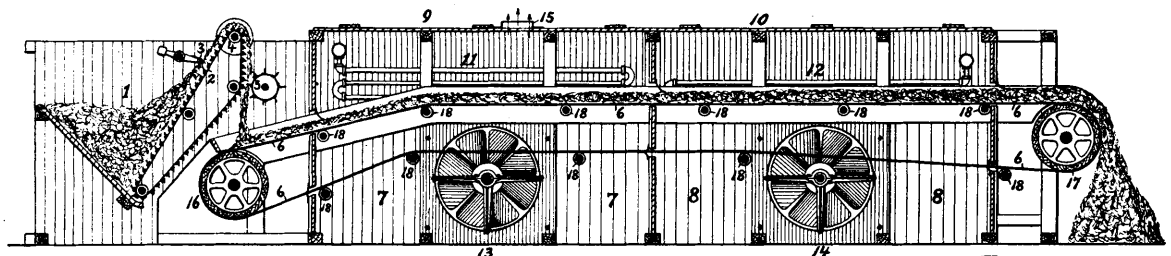


Fig. 1

When these machines are intended for carbonizing wool, noils or rags, it is important to bear in mind that as the carbonizing acid is very corrosive, the machinery should be built so as to resist the corrosive action, and in this connection, brass or bronze spikes are used on the spiked apron instead of steel. It might be well to emphasize one of the fundamental principles of carbonizing,—that if the best results are to be obtained, they will be accomplished by using a high, dry baking heat. In an automatic machine of this character, therefore, by dividing the machine up into compartments, the damp air can be readily confined to the end of the machine where the material enters wet. The special exhaust fan (not shown in the illustration) as placed in this instance at 15, therefore, fulfills its mission of removing the dampness from the first compartments and maintaining the dry heat necessary for carbonizing in the remaining compartments of the machine. In order to facilitate the process of carbonizing, the compartments should be air tight. When the material finally enters the carbonizing compartments, it is thoroughly dry and consequently it is possible to maintain a high temperature free from moisture, thus securing the best results. By this time the carbonizing acid has become concentrated and has destroyed all vegetable fibres that have been mixed in with the wool. The dryer shown in the illustration Fig. 1, if used for carbonizing, should have more steam pipes put in the second compartment than shown, so as to be able to produce the heat required for that purpose.

The fans used in connection with these dryers are designed to produce the best circulation of air at a minimum expenditure of power. Ring Oiling Bearings, as shown in Fig. 2, are provided for the fans, thus securing a positive lubrication at all times to the horizontal fan shafts. As seen in the cross section portion of the illustration, spring rings of tem-

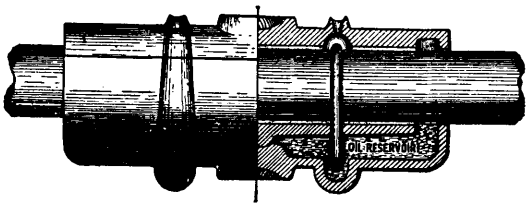


Fig. 2.

pered steel, of considerably larger diameter than the shaft, revolve constantly in a reservoir of oil. A constant oil supply is thus obtained, and there are also means provided for guiding the oil back into the reservoir and preventing waste. These dryers are also designed with the special object in view of making all the parts accessible and easy to keep clean. From the construction adopted, it is also possible to lengthen out the machines at any time, thus increasing their capacity whenever desired.

After the stock has been dried, and it is delivered from the apron of the dryer, it is frequently found economical to collect it in a hopper, and by using a blower, carry it through galvanized sheet iron pipes to bins or machinery located in another part of the mill. This pipe system can be arranged with proper gates, so that the wool can be delivered at any one of a number of different points, as desired. (Philadelphia Drying Machinery Co., Phila., Pa.)

SARGENT'S CONTINUOUS WOOL DRYER.

The object aimed at in this dryer is to divide the air that is forced into the drying chamber into two currents, one passing directly through the wool, while the other is made to re-enter the drying chamber (after being condensed), in turn acting onto the opposite side of the wool, thereby obviating any tendency of the fibres to mat.

The accompanying illustration, Fig. 1, is a vertical cross sectional view of this dryer, clearly showing the process of drying the wool. The machine itself is formed into two compartments, extending the entire length of the machine, being separated by a partition 1. The hot air is forced by two fans (situated, one towards each end of the air chamber 2; one of these fans 3 only can be shown in Fig. 1) from said air chamber 2 into the drying compartment 4, in which the wool is carried through the entire length of the machine on a traveling apron 5.

At each end of the drying compartment 4 is an opening 6, through each of which the hot air is fanned, part of it passing directly through the wool, the remainder passing through respective openings 7 into the passageway 8, where it is moistened, passing in turn through the lower opening 9 into the lower compartment of the drying chamber 4. This feature of passing this moistened air current beneath the traveling apron reduces the downward pressure as exerted by the other current onto the wool under drying, at the same time assisting to also partially dry the wool from beneath.

For regulating the proportion of air which is made to pass through each passageway 8, an automatic damper 10 is provided, and which by adjustment of a weight 11 is made to swing outward more or less, in turn regulating the amount of heated air to enter the moistening chamber 8. The means for moistening or condensing the air current thus referred to consist of a coil of heated pipes 12, and a condensing screen 13, occupying an inclined position in order to enable the drops of water condensing thereon to run off more readily through a drip pipe 14. One of these condensers is provided for each passageway 8, one of said passageways being situated at each end of the machine. In order to loosen the wool while being transported through the drying chamber, one or more revolving tedders or beaters 15 are provided, and which serve to stir up the wool as it travels through the drying chamber.

By reference to Fig. 2, which is a vertical section of a part of a dryer, we find that in connection with the heated air for drying the wool, a pair of perfo-

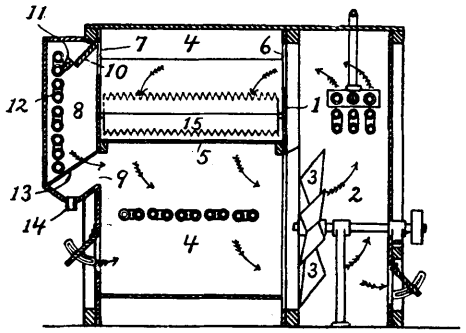


Fig. 1

rated metal plates 16 and 17 may be used in the drying chamber, one of said plates being placed above, and one below the traveling apron 5. These plates, in operation, soon become thoroughly heated by the hot air passing through them, and thereafter radiate a large quantity of heat directly and continuously upon the wool, thereby greatly facilitating the drying process. However, in this construction the tedders

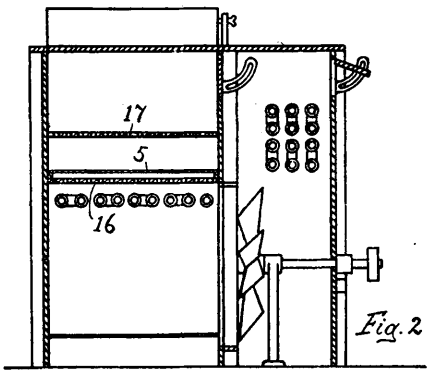
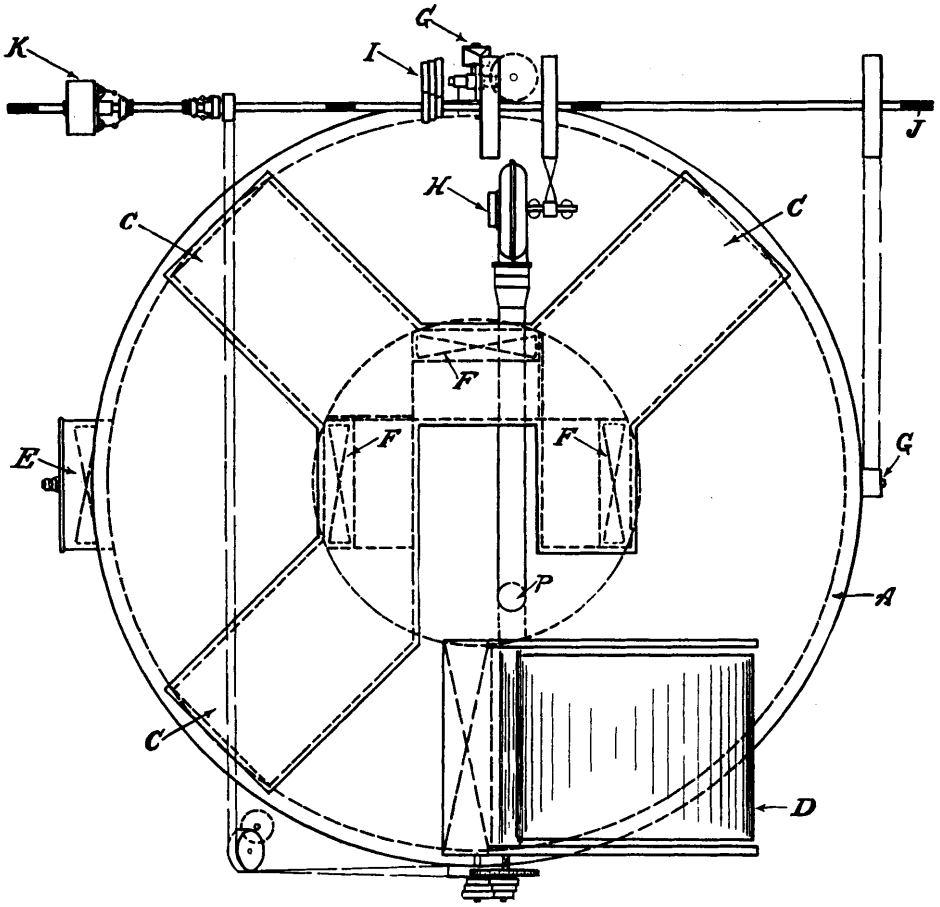


Fig. 2

or beaters 15, previously referred to, cannot be used. The perforation of these plates 16 and 17 permit free passage of the heated air through the wool under drying. (C. G. Sargent's Sons, Graniteville, Mass.)

THE "STONE" WOOL DRYER.

This dryer is constructed on a different line than any other dryer, and has many new features, as will be readily seen from the accompanying illustrations, showing plan and elevation of the machine. Letters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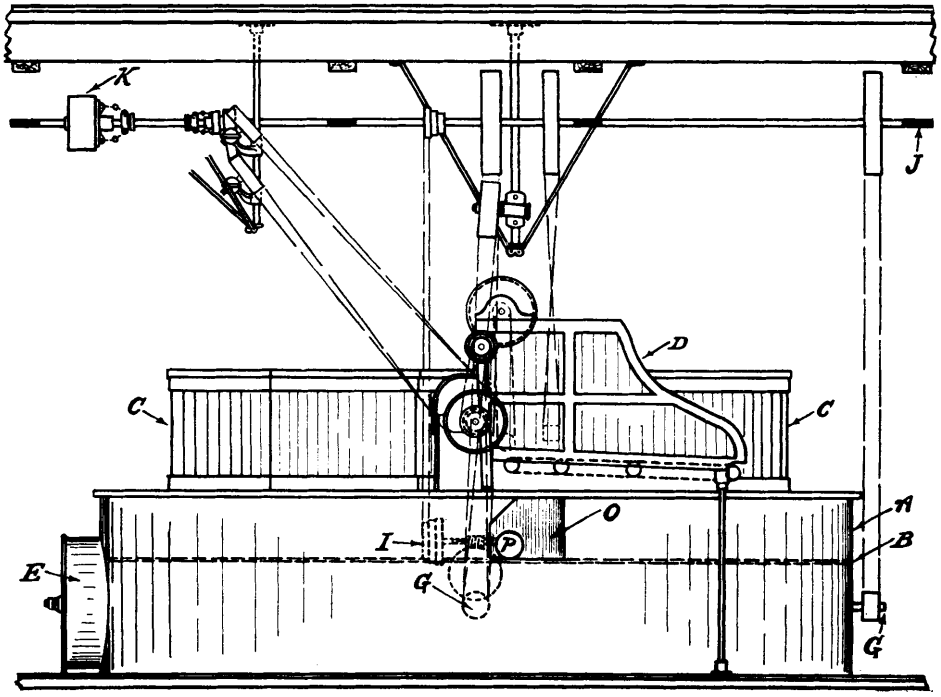
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of reference accompanying the illustrations indicate thus: A shows sheet steel cylinder, lagged with pine wood, forming outer casing of dryer, being provided with angle iron runs for supporting the perforated steel table B, which is rotated by pinion gear engaging rack under side of drying table. C are hot air chambers or boxes, containing steam coils. D is a self feed for introducing the stock to the machine. E is an exhaust fan for removing moisture, and F are three fans for circulating hot air. G are two fan pulleys for driving the three fans previously referred to. H is a blower for blowing stock from table, at O, after being dried. I is a cone pulley for driving the table, J a countershaft, and K a receiving friction pulley from main line. P indicates the blower pipe.

The operation of the machine is as follows: The stock is put into the self feed D, and by it is fed upon the perforated iron drying table B, which revolves slowly from right to left. The stock is subjected first to the action of the current of air from exhaust fan E, which at once removes the excess of moisture through opening at the side of cylinder A. The stock under operation then passes on and is subjected successively to action of currents of hot air from the three fans F, and then passing on goes in front of the blower pipe P, where it is ejected from the machine onto the floor, or into a proper receptacle.

This dryer may also be used for carbonizing purposes, by reducing speed of the drying table and simultaneously increasing the temperature of the air, *i. e.* subjecting the stock to a greater heat and this for a longer time. The machine is built in sizes for drying from 1000 to 15,000 pounds of wool in ten hours. (The James Hunter Machine Co., North Adams, Mass.)

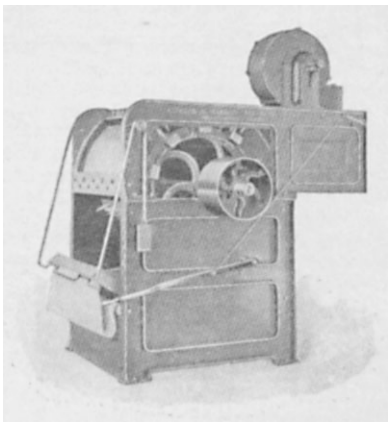
THE CURTIS & MARBLE SHAKE WILLOW.

The object of this machine is to open, dust, and thus clean wool, cotton, waste or shoddy, from loose dyestuffs, dirt, etc., previous to mixing and picking; as well as for preparing dirty and burry wool for the burr picker, and thus increase the efficiency of the latter.

The accompanying illustration is a perspective view of the willow. The same has in its interior, conveniently placed, four stationary bars containing double rows of strong steel pointed teeth. One of these four bars is clearly seen (its back view) in the illustration, the same forming the upper partition of the opening for feeding the machine. The cylinder, which is 3½ ft. in diameter, is covered with ten lags, also containing double rows of teeth, which, as the cylinder revolves, work between the teeth in the stationary bars. Around the circumference of the cylinder extends a heavy wire screen.

To receive the wool or other material to be cleaned, the front apron part of the machine is lowered, as shown in the illustration, and after a sufficient amount of the stock to permit proper handling by the machine, has been deposited upon this, the curved screen with its outside apron is then drawn up and held in its place (the machine thus being closed), by balancing weights on either side of the machine.

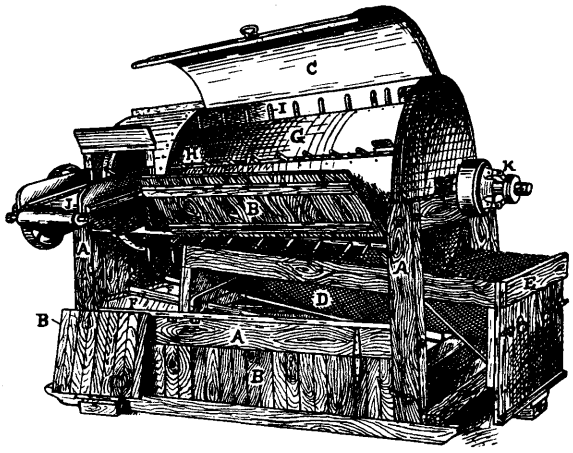
The machine is then set in motion, the cylinder revolving downwards in front. When the stock has been sufficiently opened and cleaned, a door at the back side of the machine is then opened by means of a lever, and the stock blown out of the machine. A powerful exhaust fan, situated on top of the machine, carries off the dust and fine dirt from the stock, by means of suitable pipe connections to wherever directed, leaving the heavy and coarser dirt to fall through the wire screen under the cylinder, from where in turn the same is from time to time, removed by the operator. After one lot of stock has been cleaned and blown out at the rear, another lot is fed in without stopping the machine, and the process, as explained before, is repeated. The machine is built in various sizes, with capacities of from 2000 to 8000 lbs. stock cleaned per day. (Curtis & Marble Machine Co., Worcester, Mass.)



THE HUNTER CONE DUSTER.

The accompanying illustration shows in its perspective view a cone duster brought out recently by the James Hunter Machine Co. The main object in the construction of this machine, has been to produce a duster which will thoroughly clean the stock without injury to it, and one which at the same time is very accessible for cleaning. The machine as designed will remove an excessive amount of dirt and foreign matter from the stock without rolling or pilling it or injuring the fibre in any way.

In its general plan of construction, the new machine follows closely the lines of the well known cone dusters, but differs from them in certain details



as follows: The main frame A of the machine is a skeleton held together by means of girts, and provided with doors B and covers C, so that by opening these doors and raising the covers, as shown in the illustration, the machine is accessible at every point for cleaning.

The screen D is made of perforated sheet steel, secured to a framing E, and can be slid into and out of the duster, as required, from the right hand end,

as shown in the illustration, and where said screen is shown partially pulled out. F are two angle irons, provided as a track for sliding the screen into place and holding it when in. This makes a more satisfactory construction of a screen than the ordinary type which is parted longitudinally through the centre and withdrawn from the machine on either side. The cylinder G is fitted to an excessively large shaft, being formed of cast iron spiders, provided with hard wood rails H into which the pins I are fitted, this in turn being covered with sheet steel, so that the surface of the cone or reel is smooth and true.

An exhaust blower (not shown in the illustration) of exceptionally large capacity is situated at the left hand side, outside of the machine, and which blower removes any dust and foreign matter which falls through the screen, the same being carried off by suction through the blower, and from there delivered by suitable pipe connections, to wherever required, the dust room or outside the building.

J is the feed end of the machine, the outlet being in rear at the right hand side of the machine (not shown). The machine is driven by means of a friction pulley K in place of tight and loose pulleys commonly used. The machine is of a strong heavy construction, in order to stand up to the work indefinitely. (James Hunter Machine Co., North Adams, Mass.)

THE BRANDY WOOL DUSTER.

Of the accompanying drawings, Fig. 1 represents a longitudinal vertical section of this wool duster, and Fig. 2 a perspective view showing one end of the rotary perforated cylinder.

a represents the end pieces of the frame, provided with bearings *a'*, supporting the rotary shaft *b* which supports and rotates cylinder *c*, made of perforated sheet metal or wire-cloth. This cylinder is supported on the shaft *b* by means of a series of spiders c^1, c^2, c^3, which have hubs affixed to the shaft and peripheral portions affixed to the cylinder *c*. The cylinder *c* is provided with a series of rows of radiating spikes c^4.

On the frame *a* is mounted a fixed top cover a^2, the same being continued below the cylinder by two segmental plates provided with numerous small apertures a^3, which permit the escape of the foreign matter separated from the wool, into removable receptacles a^4 below the cylinder.

The supporting-frame is provided with rigid longitudinal side beams extending between the end pieces *a* of the supporting-frame, and which beams are provided with rows of spikes which project into the space between the casing a^2 and the cylinder *c*, and are arranged so that the spikes c^4 on the cylinder pass between the spikes on said beams.

The body portion of the casing a^2 is concentric with the cylinder *c*, so that an annular space or cleaning-chamber is formed between the casing and cylinder, the spikes c^4 on the cylinder projecting outwardly nearly to the casing a^2, while the fixed spikes on the beams (not shown) project inwardly nearly to the periphery of the cylinder, so that any wool introduced into the said annular space and carried around by the rotation of the cylinder will have its fibres loosened and separated by the conjoint action of these two sets of spikes.

e represents a fan blower which is connected by conduit *e'* with the casing, said conduit delivering the blast of air from the blower *e* at one end of the casing at such point that the blast passes through openings c^6, Fig. 2, in one end of the cylinder into the interior of the latter, said opening c^6 being formed by the arms and perimeter of the spider c^3. The opposite end of the cylinder is closed against any appreciable escape of air.

The jets of air thus entering the cylinder, act forcibly upon the fibres of wool, which are being operated upon by the spikes, thus effectually separate therefrom the dirt and foreign matter loosened or detached by the action of the spikes.

The matter detached from the wool by the action of the spikes passes through the perforations a^3, the heavier portions of such foreign matter lodging in the receptacles a^4, and from where they are occasionally removed, while the lighter portions are drawn away through conduits *f'*, by means of an external exhaust-fan *f*.

To equalize the air pressure within the cylinder, and give a practically equal force to all the jets issuing therefrom, fan-blades *g* are provided, and which are attached to the shaft *b* within the cylinder, said blades being obliquely arranged so that both by their position and by the rotary motion they receive from the shaft, each blade deflects a portion of the air entering one end of the cylinder through the conduit *e'* outwardly toward the periphery of the cylinder.

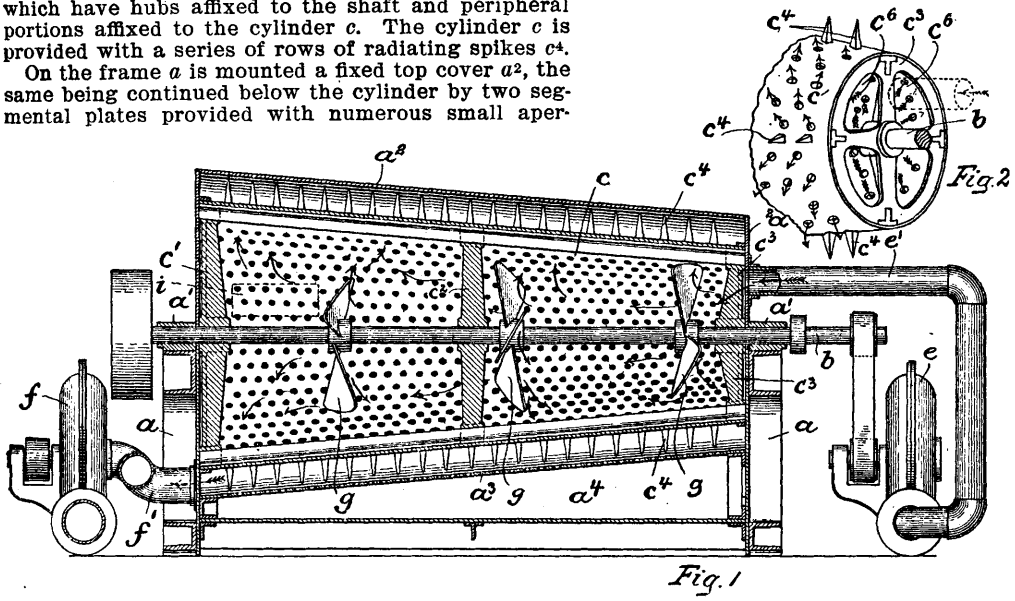


Fig. 1

Fig. 2

The wool to be cleaned is supplied to the annular space between the casing and the cylinder by means of an endless feed-apron which delivers the material to a pair of crushing-rolls, which in turn deliver it through an opening in the casing to the annular space between the casing and the cylinder, the point of delivery being at or near the smaller end of the cylinder. The wool fibres, while being loosened and separated by the spikes in the annular

space, are gradually carried along from the smaller to the larger end of the cylinder, and when they reach the outlet *i* are forced through the latter by the air pressure. (Samuel Smith Machine Co., Lawrence, Mass.)

SARGENT'S COMBINATION WOOL CLEANING AND BURRING PICKER.

The object of this machine is to thoroughly open the wool and also remove part of the burrs from it in its passage from the feed to the discharge end of the machine, the remaining burrs being removed by a separate burring device on its passage out of the machine.

Fig. 1 is a plan view of this combined cleaning and burring picker, Fig. 2 being a vertical section taken on line *x-x*, Fig. 1, and Fig. 3 a vertical section taken on line *y-y*, Fig. 1.

The construction and operation of the machine is thus: The wool is fed to the machine at one end (see Fig. 1) by the feed apron 1 and its toothed feed roller 2, when it is engaged by a beater 3 and in turn

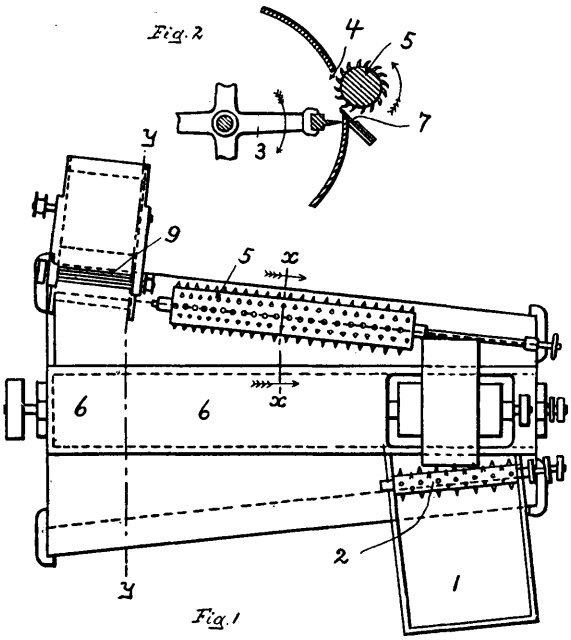


Fig. 1

travels spirally around with the beater towards the discharge end.

In order to prevent the wool from matting during this operation and at the same time remove part of the burrs, an opening 4 (see Fig. 2) is made in the casing of the beater chamber, and in said opening is set a toothed roller 5, which engages the wool carried around by the beater and acts to open it by means of holding the tufts of wool against the beater blades.

A continuous draft of air is set up through the opening 4 by an exhaust fan (not shown) connecting with the chamber 6, and the wool is thus doffed or stripped from the roller 5, and when it again falls on the beater. In order to vary the force of the draft, plate 7 is provided (see Fig. 2), which can be so adjusted that the force of the draft will cause the fibres as presented at the opening 4 to be carried back into contact with the beater, while the burrs or other heavy impurities, detached by the roller 5, pass out of the machine at said opening 4.

The wool as it is thus gradually worked to the discharge end of the machine is more and more opened up and cleaned, the dust being discharged through the passage 6 which connects with the exhaust fan previously referred to.

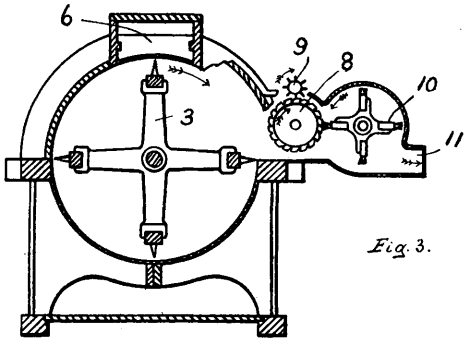


Fig. 3.

At the discharge end of the machine is located a burring cylinder 8 (see Fig. 3), to which the wool is delivered from the beater chamber, any remaining burrs being knocked out of the wool by the rotating toothed guard 9. The cleaned wool is doffed from the burring cylinder 8 by a rotating brush 10 and discharged through the spout 11. (C. G. Sargent's Sons, Graniteville, Mass.)

THE CURTIS & MARBLE BURR PICKER.

The object of this machine is to remove from the wool previous to picking and carding, with the least possible injury to the staple, burrs, shives or other vegetable impurities, then adhering more or less, tenaciously to it.

Fig. 1 is a perspective view of this burr picker, showing countershaft, hangers and pulleys, and man-

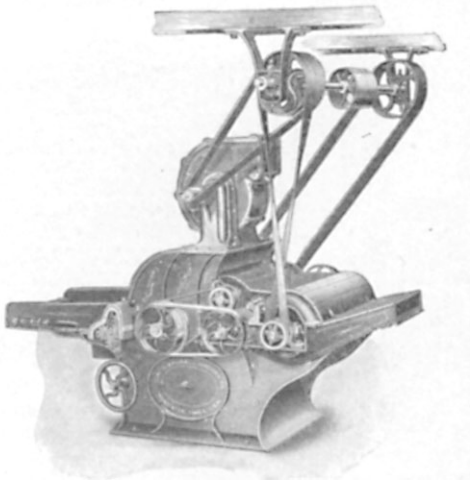


Fig. 1.

ner of belting. Fig. 2 is a sectional view, given more particularly to show the construction of the machine, which consists of the following essential parts: The feed apron A and feed rolls B in front of the machine,

and of which the bottom feed roll is stripped by the picker cylinder C, and the top roll driven faster than the bottom one, to prevent its winding or filling up. Feed apron and feed rolls have an independent stop motion, and can be quickly stopped and started by means of a lever, while the other parts of the machine are in motion. The picker cylinder C has sixteen bars filled with pointed steel teeth, so arranged in the bars as to cover at each revolution of the cylinder every sixteenth of an inch of the entire width of the machine. Above the picker cylinder is a perforated brass screen D, fastened to an iron frame, and held in place by buttons, so that it is easily and quickly removed for cleaning, or giving access to the picker cylinder. This screen is of ample size for the removal, through its perforations, of all the dust and fine dirt from the wool, by means of a powerful exhaust fan E, discharging through suitable pipe connection to wherever directed.

Back of the picker cylinder are the two burr cylinders, F and G, composed of an inner cylinder which is ground perfectly true, and then packed with alternating steel toothed rings and brazed packing rings. They are made with different numbers of rings to the inch, according to the grade and quality of the stock and the kind of refuse matter to be removed. The second, or cotter burr cylinder G, revolves slowly backward like a worker on a card, so that cotted or tangled locks, too small to be opened at the feed rolls, may be harmlessly combed apart by the varying speeds of the two burr cylinders. These burr cylinders are so situated that they are easily accessible; by simply lifting a hinged cover, the operator has ready access to the burr cylinders, guards and brush, and any of them can be removed at will. The burr cylinders are provided with two burr guards or beaters H and I, the upper one of which, I, counteracts the action of the lower one H, so as to prevent the refuse matter from being carried over onto the brush cover by the larger guard H. Back of the burr cylinders is the stripping brush cylinder J, which strips the wool from both burr cylinders F and G, and delivers it through outlet K, into the room partitioned off for this purpose.

Below the picker cylinder is a grate rack L, having sufficiently fine apertures between its bars that loss of wool is avoided, while it allows the heavy dirt, shives, etc., to drop beneath. An adjustable sliding rack is attached so that the spaces between the grate bars may be partly or entirely closed, as required, when burr picking different grades of stock. The grate rack is hinged at the back side so that the front may be lowered, and all material cleaned from the picker cylinder and grating between different batches of wool, thus saving any intermixture of colors or qualities of wool that should be kept separate. An automatic oiler may be attached to the picker outlet K when so desired.

The operation of the machine is as follows: The wool is fed upon the endless apron A and delivered to the feed rolls B, the curved teeth of which firmly hold the stock so that it may be thoroughly opened, and the dirt and burrs loosened by the action of the teeth of the picker cylinder. The picker cylinder C carries the stock around under the screen D to the burr cylinder F. The strong current of air to the exhaust fan E, draws the fine dust and dirt through the holes in the screen D, and discharges it wherever desired. The first burr cylinder F, is of large size, and takes the stock from the picker cylinder C, drawing the wool fibres into the spaces between its toothed rings, while the burrs and other refuse matter remain upon its surface, and, when coming in contact with the guards H and I are thrown back. The wool fibres, together with the cotted locks held upon the teeth of the burr cylinder F, are carried under the guards H and I to the point of contact with the second burr cylinder G, where the cotted and felted locks are loosened and combed apart. The brush J strips the wool from both burr cylinders, and delivers it through outlet K into a room provided for it. The burrs and other refuse matter, which are thrown back by the guards, are carried down to the grate rack L by the current of the picker cylinder, the heavier impurities passing through the narrow spaces in the grate rack, while the fibres of wool on the burrs, uplifted by the current of air to the exhaust fan, are caught by the teeth of the cylinder and carried around to mingle with the body of wool at the feed rolls. The large burrs, swept along over the grate rack, and stripped of their wool, find an outlet under the feed rolls, and are deposited in the burr box outside the machine proper, while the inrushing current of air prevents the wool fibres escaping with the burrs. In this way the burrs are stripped cleaner of their wool than on any other style of burr picker, causing in turn less waste of stock.

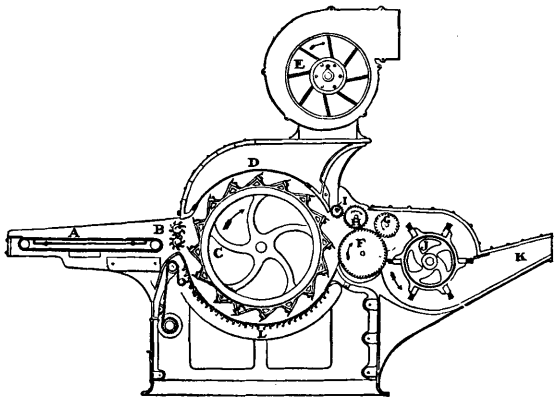


Fig. 2.

The stock, entering the feed rolls as a mass, is thus separated into several distinct parts: (1) The wool, thoroughly cleaned and opened, is delivered into the wool room. (2) The fine dust and dirt, drawn out by the exhaust fan, is discharged outside the building. (3) The small burrs, heavier dirt, kemp, straws, etc., are deposited below the grate rack. (4) The large burrs, free from other refuse, are carried around to the burr box under the feed rolls, whence they are readily removed as occasion requires. (5) All the wool fibres, therefore, except the few which are too tightly wound around the burrs to permit their separation, pass into the wool room, so that there is no loss of fibre of any consequence; the wool being delivered from the machine in a loose, opened condition, and in excellent shape for, future picking and carding. The machines are built in different sizes, varying in capacity of work done of from 1200 to 7000 lbs. per day. (Curtis & Marble Machine Co., Worcester, Mass.)

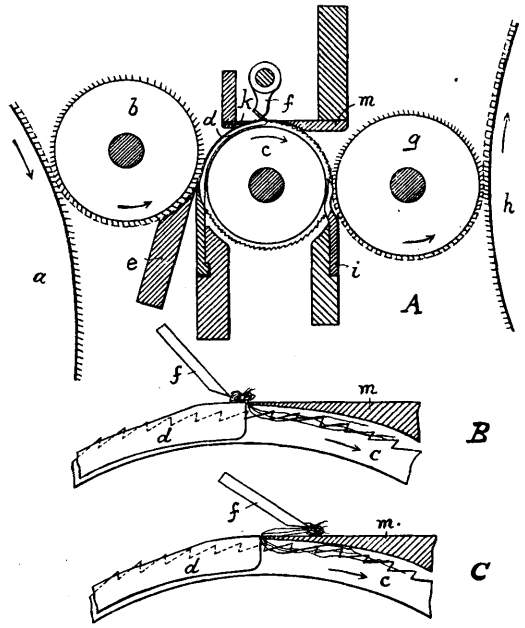
DEVICE FOR REMOVING BURRS FROM WOOL.

Fig. A is a vertical sectional view of this device, showing the construction and operation of the same in connection with a carding engine. Figs. B and C are detail sections (enlarged compared to Fig. A) showing the operation of the clearer.

The wool, as removed from a preliminary opening cylinder *a*, by a brush transfer roller *b*, is in turn

passed to the drum *c* of the burr removing device, which is formed of a series of toothed rings, between which are placed spring bars *d*, their ends projecting beyond the teeth of drum *c*, so that any burrs in the wool will thus be raised off said teeth, while the wool fibres will be held by the teeth and drawn over the ends of bars *d*. To increase the hold of the drum *c* on the fibres a bar *e* engages the wool before it is transferred to drum *c*, and a brush *k* presses on the top of said drum, pushing the fibres more closely yet into the teeth of drum *c*.

A barrier *m* is arranged above the drum *c*, the space between the ends of the bars *d* and said barrier being sufficient for the wool to pass, while the burrs



will be retained by said barrier (see Fig. B) and in turn released by a vibrating clearer *f*, which pushes the burrs alternately in opposite directions, thus gradually removing said burrs as seen in Fig. C from the wool. From the drum *c* the wool passes to a roller *g*, a comb *i* acting to lift the wool from drum *c* so that it can be readily removed by roller *g*, and transferred onto the main cylinder *h* of the carding engine proper. (Leopold Offermann, Leipsic, Ger.)

THE BRAMWELL PICKER FEED.

The tendency in woolen mills in recent years has been more and more to put greater thoroughness into the process of preparing the stock before it reaches the card room. It has been found that if the stock is thoroughly opened, cleaned and mixed before it is put on the card, the result is (1) that the cards are relieved of a good deal of work that was formerly done by them and (2) are enabled to handle a larger quantity of stock and with much finer results. The up to date manufacturer is coming more and more to recognize the wisdom of having his picker room brought up to the highest possible state of efficiency.

One of the improvements which is being widely adopted is the use of the Bramwell self feeds to replace hand feeding of burring machines, willows, lumpers, mixing pickers, fearnaughts and other machines of this character. The Bramwell Picker Feeder is built in various sizes and styles to meet the special conditions in every case and to handle every variety of stock and not only saves labor but greatly assists in the process of opening and preparing the stock, and further by securing even feeding enables the machine fed to do much more satisfactory work both in quantity and quality.

The main features of the machine are (1) a box or hopper to receive the stock, (2) the spike apron carrying the stock to the required height, (3) the reciprocating comb which knocks the surplus stock off the spike apron, prevents unevenness and helps in opening the stock, and (4) the beater or stripping cylinder which strips the stock off the spike apron. There is also a slat apron in the bottom of the box which is always moving the stock toward the spike apron, and a rack which assists in the same process. All the above features are varied to suit the particular sort of stock and the quantity to be handled and the sort of machine to be fed.

Modifications of this machine are being installed quite generally to feed automatically such machines as dryers and washers, the size and style of machine and the kind of spike apron and other features being adapted in each case to suit the conditions of the particular place as to quality and quantity of stock. (Geo. S. Harwood & Son, Boston, Mass.)

THE CURTIS & MARBLE FEARNAUGHT.

This machine is designed for opening, mixing and preparing stock of all kinds, whether wool, cotton, shoddy or hair, for the carding engines, in place of the common wool pickers heretofore used. The action of the Fearnaught upon the stock is similar in principle to that of a coarse clothed wool card, the machine being supplied with feed rolls, main cylinder, workers, strippers and a fan doffer, and in turn opens the stock by a kind of preparatory carding process. The feed rolls, main cylinder and workers are filled with cock spur teeth, and are firmly driven into place, permitting the very hardest work to be done by the machine without affecting its teeth. Underneath the cylinder is a grating, through which dirt may fall, and over the top of the machine are placed iron covers to prevent the stock from flying out.

Fig. 1 is a perspective view, and Fig. 2 a section of the machine, the operation of which will be readily

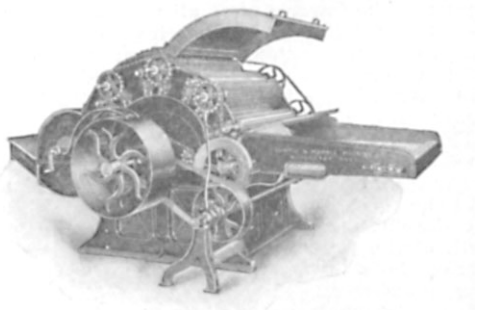


Fig. 1.

understood by quoting letters of reference given in connection with the sectional view. The stock is fed either by hand or a self feeder upon the endless apron A, and delivered by it to the feed rolls B, which hold it with their curved teeth, so that it may be thoroughly opened by the teeth of the main cylinder E, in taking it from them. This main cylinder

is thickly filled throughout its entire surface with cock spur teeth, which follow each other in quick succession as the cylinder revolves, so that a constant opening and combing process on the stock is obtained at the feed rolls. The stock is then carried up by the teeth of the main cylinder and acted upon successively by the various workers D, and strippers C, whose action is similar to that of the workers and strippers on a wool card, although as these rolls on the Fearnaught are filled with teeth instead of being covered with card clothing, the opening or carding process is coarser than on a card, which however has to be the case, since the object of the Fearnaught is to prepare the stock for the cards. At the rear of the machine, the doffer F, which runs at a greater surface speed than the main cylinder,

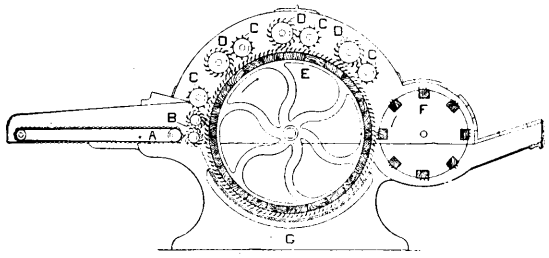


Fig. 2.

strips the stock from the teeth of the main cylinder and delivers it out of the machine. A large amount of dirt and other refuse matter falls out from the stock while it is being thoroughly opened, and this refuse matter drops through the open spaces of the grate rack G, underneath the main cylinder, and is easily removed from the bottom of the machine through panelled openings in the frames.

The boxes which hold the upper feed rolls are held down by heavy springs, so that in case there is any unusual strain or pressure in feeding, the springs allow the top feed roll to raise enough to relieve it. There is also a stop motion, operated by a friction clutch, for the feed rolls and feed apron, so that these parts may be stopped and started while the other parts are in motion—a very desirable and convenient feature. In passing through the Fearnaught, the stock is thus acted upon several times by the various rolls, viz.: the feed rolls, main cylinder, workers, strippers, and doffer, and this by a steady, combing like, process, and when consequently a much more thorough opening and mixing of the stock is secured than in any of the ordinary wool pickers where the stock is acted upon only once, at the feed rolls, and this by a harsh, tearing like process, and then at once thrown out through the outlet of the machine. The stock is thus prepared in fewer runs than by the common pickers, and less labor is required in the picker room. Danger from fire, inherent in pickers with rapidly revolving cylinders, is also largely done away with. The capacity of the Fearnaught is from 800 to 2000 pounds of stock per hour, according to size.

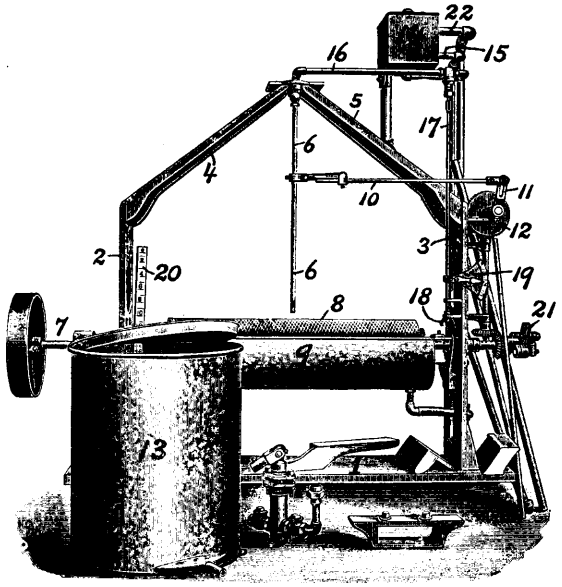
The stock may be delivered from the Fearnaught into a gauze room in the usual manner, or a pipe and exhaust fan may be connected to the outlet of the machine, so as to deliver the stock over the top of the machine to wherever required, thus doing away with the gauze room, giving in turn more room in the picker room, besides saving a large amount of labor otherwise required in sheeting up and handling the stock.

The work of cleaning the Fearnaught between lots is practically no more than on any of the ordinary pickers; by allowing the machine to run a few minutes after you stop feeding in, in most cases it will clean itself sufficiently; where special care is necessary the covers of the machine are readily raised and the cylinders brushed clean in a few moments. (Curtis & Marble Machine Co., Worcester, Mass.)

THE SPENCER AUTOMATIC STOCK OILING MACHINE.

The adoption of the Bramwell self feeder on mixing pickers and fearnaughts, thus securing even and continuous feeding, has made possible the adoption of another improvement in the picker room which is being rapidly adopted in all up-to-date woolen mills. Until recently the regular method of oiling the stock was by spreading it on the floor and then sprinkling the oil over it by hand with a watering can. This method was crude, wasteful and gave unsatisfactory results, some parts of the stock receiving no oil, some too much, again oil was wasted by falling on the floor, the walls of the picker room and considered all around, the whole process was wasteful of labor and oil. Since evenness in feeding has been secured by the use of the Bramwell picker feed, economical and perfect oiling of the stock is done best by attaching to the picker or fearnaught the Spencer automatic oiler.

The machine, which is bolted to the sides of the picker feed apron, is simple and effective, consisting principally of a revolving brush on which the oil or emulsion is dropped by a vibrating pipe which leads from a small tank at the top of the machine. The brush strikes against a metal blade and thus converts the oil or emulsion into a spray which is thrown



evenly on the wool as it passes over the picker feed apron from the feeder to the picker. It thus penetrates the stock thoroughly and reaches the individual fibres effectively and with a perfect uniformity.

The construction and operation of the oiler is best given by means of the accompanying illustration, which is a front view of this automatic oiler, as detached from its working position on a picker, the lower oil tank from which the oil is pumped to the small tank above, being also shown in the illustra-

tion but not connected to the oiler. In attaching the oiler to a picker, the base 1 of the former is bolted to the feed table of the picker and is as near to the feed rolls as practicable. This base carries upright pieces 2 and 3, to which are connected the arms 4 and 5 at the top ends, said arms being placed to converge and meet each other at the centre between the pieces 2 and 3, and thus form a support for the swing pipe 6 and the small tank 14. Fitted in bearings in the pieces 2 and 3, at a sufficient distance above the base 1, is a shaft 7, carrying the oiling brush 8, which is supplied with oil across its entire length by means of the swing pipe 6, and which oil is converted into a fine spray by having a spraying knife set to said brush so as to cause vibration of the bristles and thus throw the oil off and onto the wool in a finely divided state. The drain pan 9 is placed under the brush, as shown, having a pipe connected to return the oil back into use. The swing pipe 6 receives its vibration back and forth across the length of the brush by means of a rod 10 connected to it at one end and having its other end pivotally secured to a revolving arm 11, as secured to the same shaft as carrying the gear 12, said gear being positively driven from the brush shaft 7 through the gearing shown.

The oil or emulsion is pumped from the tank 13 when connected up properly by means of a pump (shown disconnected in the illustration) to the top or overhead reservoir 14 through the pipe 15, the pipe 16 in turn delivering it to the swing pipe 6. The regulating device for the flow of oil through the pipe 16 consists of a rod 17 having its top end connected to a valve in said pipe 16 and having its lower end screw threaded to receive a thumb nut 18 by which the flow of oil may be regulated. Secured also on this rod 17 is one end of the dial needle of the dial 19 so that any movement of said rod 17 will be shown on the dial and by this means the amount of oil passing through the pipe 16 ascertained. By this means the proper amount of oil required for different classes of wool, as found by experience, may be easily and accurately regulated.

A gauge 20 on the outside of the lower oil tank 13 will show at a glance the quantity of oil in the tank. The pump is connected to the shaft 7 at 21 and thus works when the machine is in operation and remains inoperative when the machine is stopped, and is driven from the Bramwell feeder so that the oiler and feeder are operated as a unit, in this manner saving a useless expense of power. An overflow pipe 22 is provided for the overhead tank so as to prevent any possibility of an accident due to a surplus of oil being forced into the overhead reservoir.

Referring to the operation of the automatic oiler, the pump for transferring the oil or emulsion from the tank to the overhead reservoir can be adjusted to pump from one to one hundred gallons per hour, as required; a half-inch to an inch stroke being generally sufficient to supply the demand. Ordinarily eighteen inches of space is required from centre of feed rolls to front of feed bonnet for the oiler. In order to keep the quantity of oil to each hundred pounds of stock uniform, keep the hopper of the self feed as uniformly full of stock as possible. Do not let it run down at any time and keep the oil tank and screen as clean as possible from all kinds of foreign matter. It will be advisable not to raise the oiler more than absolutely necessary in order to allow sufficient room for the stock to pass clear under the drip pan at all times. Where emulsion is used some mills have dispensed with the drip pan altogether as it is not considered necessary, but the value of this can be decided by practical experience in each case.

In connection with using this automatic oiler be sure to have the cylinder of the picker well balanced so as to avoid excessive vibration when running full speed, since such excessive vibration of the picker cylinder would destroy the pipe unions and cause leakage and waste of oil. Also be careful to have the brush and knife blade as level as possible, each with the other, so that the oil will not run off to the side of the knife blade, which should be set at an angle of forty-five degrees into the brush to throw a fine spray of oil. The speed of the brush should not be less than sixty revolutions per minute nor more than ninety; however, this item depends a great deal upon the character of the stock under operation or character and quality of the spray desired.

A good plan to regulate the quantity of oil per hundred pounds of stock is to place only the amount of oil in the tank required for the batch you desire to run through and set the supply valve so that when one-fourth of the batch is run through the tank gauge will show that one-fourth of the oil is gone, and when one-half of the batch is through one-half of the oil will be used; and so on in like proportions until you ascertain by experience just where to set the pin in the dial valve with arrow on dial to bring the oil and stock out even at all times. The float and gauge on the tank will always correctly register the amount of oil in the tank. (Geo. S. Harwood & Son, Boston, Mass.)

COTTON.

THE WORLD'S COTTON SPINDLES AND CONSUMPTION.

The progress of the cotton spinning industry in the various countries of the world since 1900 is illustrated in the table below.

Number of Spindles Operated in Various Countries, 1900 and 1903.

Countries.	Number of spindles.		Number of mills.
	1900.	1903.	1903.
Germany	8,100,000	8,434,601	390
Russia and Poland	7,000,000	6,940,869	304
France	5,500,000	6,150,000	420
Austria	3,200,000	3,250,000	125
Spain	2,650,000	2,614,500	257
Italy	2,100,000	2,435,000	500
Switzerland	1,700,000	1,558,000	72
Belgium	900,000	936,138	36
Sweden and Norway	450,000	459,932	44
Holland	290,000	300,000	12
Portugal	230,000	160,000	15
Greece	80,000	97,000	.....
Roumania	.....	40,000	1
Smyrna	.....	25,000	.....
Total European Continent	32,200,000	33,401,040	2,176
Great Britain	45,600,000	49,727,107	2,077
United States	19,008,000	22,300,292	1,197
East India	4,946,000	5,006,965	192
Japan	1,250,000	1,332,600	64
Canada	670,000	773,538	22
China	565,000	600,000	15
Mexico	491,000	500,000	153
Brazil	.....	300,000	100
Total	104,730,000	113,941,542	5,996

It will be seen that with the exception of Spain, Switzerland, Portugal, and Russia, every country has increased its number of spindles.

The World's Consumption of Cotton, 1890-91 to 1902-3.

[*Bales of 500 pounds.*]

Date.	Great Britain.	Continent of Europe.	United States.	East Indies.	Japan.	Canada and Mexico.	Total.
Year ended Sept. 30:							
1890-91	3,384,000	3,631,000	2,367,000	924,000	100,000	107,000	10,513,000
1891-92	3,181,000	3,619,000	2,576,000	914,000	203,000	110,000	10,603,000
1892-93	2,866,000	3,661,000	2,551,000	918,000	191,000	110,000	10,297,000
1893-94	3,233,000	3,827,000	2,264,000	959,000	284,000	110,000	10,677,000
1894-95	3,250,000	4,030,000	2,743,000	1,052,000	360,000	130,000	11,565,000
1895-96	3,276,000	4,160,000	2,572,000	1,105,000	412,000	120,000	11,645,000
1896-97	3,224,000	4,368,000	2,738,000	1,019,000	495,000	120,000	11,964,000
1897-98	3,432,000	4,628,000	2,962,000	1,161,000	645,000	140,000	12,968,000
1898-99	3,519,000	4,784,000	3,553,000	1,314,000	747,000	140,000	14,057,000
1899-1900	3,334,000	4,576,000	3,856,000	1,139,000	706,000	130,000	13,741,000
1900-1901	3,269,000	4,576,000	3,727,000	1,059,000	536,000	130,000	13,297,000
1901-2	3,253,000	4,784,000	4,037,000	1,383,000	743,000	149,000	14,349,000
1902-3	3,185,000	5,148,000	4,015,000	1,350,000	439,000	202,000	14,339,000

How greatly the world has increased its use of cotton in recent years may be judged from the above figures, and yet they do not include the consumption of all countries, but represent only the cotton brought into commercial channels. Large quantities of cotton are grown in India, Brazil, and China, and smaller quantities in other countries which are consumed by hand or domestic establishments, and of which no account is taken commercially. For instance, in addition to the consumption of the mills in East India, as shown in the above table, it is estimated that from 400,000 to 415,000 bales are worked up by native appliances or by hand, "chiefly for wadding and quilting, in connection with clothing, upholstery, etc." In Brazil cotton manufacturing by modern machinery has increased so greatly that from 200,000 to 250,000 bales are taken by her mills. No allowance for this is made in the above table. As to the production and consumption of cotton in China, little or nothing is known, but considering its enormous population and the almost universal use of cotton clothing the amount must be very large.

So far as the consumption of the cotton of commerce is concerned, it has gradually increased on the Continent of Europe, in the United States, the East Indies, Japan, Canada and Mexico, since 1890-91, Great Britain alone showing a decrease. It appears almost anomalous that Great Britain should have more than twice as many spindles as the United States and yet consume much less cotton and can only be explained by the fact, that the average count of yarn produced in Great Britain is much finer than in the United States.

American Cotton Consumed by Foreign Countries.—The amount of cotton taken by each foreign country in 1901, 1902, and 1903, with its value, is given in the table below. As the exports contain small bales of sea-island cotton, as well as light-weight round bales, all bales are reduced to the uniform weight of 500 pounds.

Exports of cotton from United States to foreign countries, expressed in bales of 500 pounds.

Countries.	Year ended June 30, 1901.		Year ended June 30, 1902.		Year ended June 30, 1903.	
	Bales.	Value.	Bales.	Value.	Bales.	Value.
		Dollars.		*Dollars.*		*Dollars.*
Austria-Hungary	37,042	1,685,220	39,757	1,642,382	39,912	1,774,158
Belgium	151,063	7,302,960	132,232	5,469,847	157,351	6,968,912
Denmark	26,395	1,177,048	39,129	1,685,190	34,062	1,500,048
France	729,332	34,954,658	775,773	31,771,969	806,673	35,564,079
Germany	1,601,462	76,234,319	1,705,815	70,416,199	1,915,094	84,824,284
Greece	100	4,700	1,645	72,602	1,201	55,830
Italy	361,627	16,825,300	445,437	18,472,796	444,950	19,792,253
Malta, Gozo, etc	.....	.....	.....	.....	96	4,080
Netherlands	51,919	2,422,092	22,418	936,531	42,542	1,846,237
Portugal	13,102	631,997	9,360	407,224	15,773	668,832
Russia, Baltic	51,928	2,498,823	73,446	3,218,897	181,938	8,170,060
Spain	239,104	11,204,979	270,602	11,408,504	266,336	12,139,900
Sweden and Norway	12,416	599,771	11,545	491,949	31,112	1,392,600
United Kingdom	3,022,112	147,158,409	3,132,324	128,323,241	2,799,095	124,789,602
Dominion of Canada	102,309	5,104,197	129,016	5,669,956	127,640	5,932,429
Mexico	34,104	1,750,674	27,500	1,273,741	66,507	3,183,430
West Indies, French	5	238	10	434	.....	.....
Chinese Empire	.....	.....	6,110	290,669	2,613	122,780
East Indies, British	350	16,100	153	6,493	254	11,400
Japan	73,722	4,086,317	178,505	9,058,290	152,827	7,434,718
All other countries	358	15,641	780	34,905	110	4,797
Total	6,508,450	313,673,443	7,001,557	290,651,819	7,086,086	316,180,429

THE McPHERSON ROTARY ROLLER GIN.

There are two distinct types of Cotton Gins in use, viz.: the Roller and the Saw Gin. The claim for the latter is production, accomplished however only by deteriorating the quality of the staple, by more or less breaking the individual fibres, as caused by its rough action on the seed cotton under operation; hence if we can bring the output of the roller gin up in quantity, as is the case in connection with the McPherson Gin, this machine cannot help but prove of the greatest of interest to Cotton Growers, Merchants and Manufacturers. It is the object of this Cotton Gin to prepare, at the southern ginneries, a staple as perfect as it is possible to make it, and this, in connection with a large output at no extra cost of preparation.

The McPherson gin follows the approved English practice (the Macarthy Gin) and combination of a ginning roll against a polished steel bed plate, the bed plate being fixed, the rolls being adjustable thereto, either by springs, set screws, or turnbuckles,

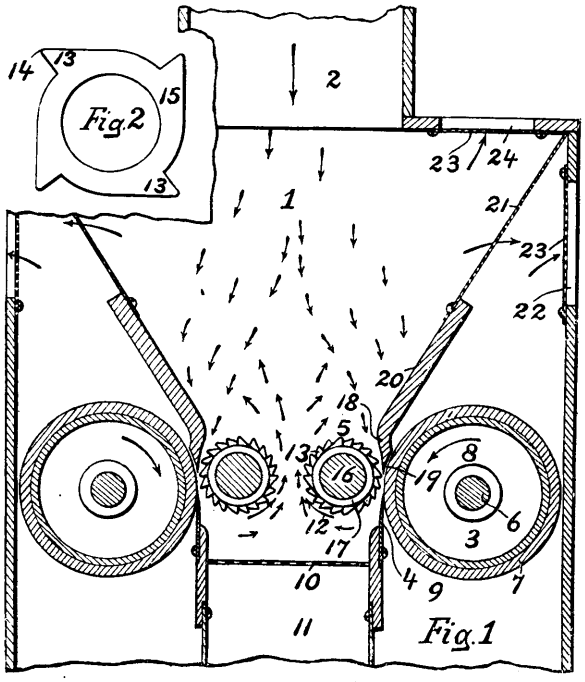


Fig. 2

Fig. 1

to supply the necessary friction to draw the cotton lint between the roll and the polished plate. But here the parallel ceases, for instead of employing the reciprocating movement of a beater blade as is the case with the Macarthy gin, a rotary comb is used for combing the seeds out of the lint, this comb, with its rows of blunt teeth, revolving so smoothly that there is no vibration, and much more rapidly than is possible with a reciprocating beater. The rapidity of the comb rolls allows a corresponding increase in the revolutions of the ginning rolls, and the result is an immense increase in production over former makes of roller gins, and one close up to that of the saw gin, while at the same time, the quality of its work is greatly superior.

A description of the construction and operation of this gin is best given by means of the accompanying illustrations, of which Fig. 1 is a vertical central section of the working portions of the gin, and Fig. 2 a face view of one of the disks (shown enlarged compared to Fig. 1), forming part of the rotary combs.

The hopper 1 of the gin has an opening in its upper wall through which the seed-cotton from the shute or conduit 2 is automatically delivered. Located within the hopper 1 is the ginning mechanism, which is in duplicate (two rotary roller gins combined in one machine—only one of these two gins being supplied with numerals of references), consisting of the ginning rolls 3, the bed plates 4, and the rotary combs 5. The ginning rolls 3 are mounted upon the shafts 6 and are provided with a felt or other soft, non-metallic covering 7, which has a soft brush like effect upon the fibres, leaving them smooth and straight, uncut and unbroken and free from nepiness. These ginning rolls 3 are rotated in opposite directions, as indicated by the arrows 8, and thus draw the lint from the seed-cotton down into the lint chambers 9. The rotary combs or clearing members 5 coöperate with the ginning rolls 3 and serve to dislodge and separate the seed from the cotton.

Located in a substantially horizontal position below the rotary combs 5 is a screen 10, the said screen being of such mesh as to enable the cotton-seed from which the lint has been completely removed to pass therethrough into the chamber 11, but to catch and retain such seed which has passed through the ginning mechanism without having all of the lint completely removed therefrom.

The combs 5 are rotated in opposite directions, (see arrows 12) and this at a high rate of speed, creating in turn an upward draft of air from the screen 10 through the space between said combs and up into the hopper 1, and which draft serves to elevate any cotton-seed with lint adhering thereto from the screen 10, as previously referred to, and cause the same to reënter the hopper 1 to be again acted upon by the ginning mechanism. Said draft also serves to divide the mass of seed-cotton in the hopper, and to deflect the same laterally in opposite directions, so as to cause it to pass into the spaces between the rolls 3 and the combs 5, and which is an important feature of the invention.

The teeth 13, of each rotary comb 5, have blunted or rounded ends 14, as clearly shown in Fig. 2, and are formed upon disks 15, a series of them being secured to each shaft 16 of the gin. Said disks 15 are arranged in parallel relation to each other, and are separated from each other by spacing blocks or washers 17. These disks 15 are so arranged on each shaft 16, that the teeth of each disk are located in advance of the teeth on the next adjacent disk.

For the purpose of guiding the seed-cotton to and between the rotary combs and coöperating ginning rolls, and to assist in preventing the seeds from being crushed by the teeth of the rotary combs, the stationary deflectors 18 are provided, the same extending from side to side of the hopper 1, and having their lower ends formed with tapering edges 19, extending downwardly to a point as close as practicable to the periphery of the ginning roll, and the outer edges of the teeth 13 on the rotary combs. These deflectors serve to automatically guide or deflect the seeds contained in the seed-cotton laterally, relative to the teeth on the rotary combs, so as to enable said teeth to force the seeds away from the lint and conduct them into the seed chamber 11 without being crushed. Secured to, or formed integral with the deflectors 18, and extending across the ginning chamber, are the inclined deflector-plates 20.

The seed-cotton is ordinarily delivered into the hopper 1 by air pressure, and for the purpose of facilitating the feed of the seed-cotton and the delivery of the same to the ginning mechanism, the hopper is provided with means to allow a portion of this compressed air to escape therefrom, while at the

same time preventing the seed-cotton from escaping. To effect this ventilation, the upper ends of the deflector-plates 20 have secured to them screens 21, which extend up to the top of the hopper, and are provided with openings 22 in the side walls of the casing of the device, and which openings are covered by the screens 23, which however can be dispensed with; again screens 21 and 23 as well as opening 22 may be dispensed with, using in place of it screens 23 in connection with openings 24, in the top or upper wall of the hopper.

It has been stated that one of the prime objects of the new gin is to quickly and effectively gin any quality or variety of seed-cotton, and this without crushing the seed. In effecting this result the rotary combs 5, and particularly its rounded or blunt ends 14 of the teeth 13 thereon, play a very important part, since when said combs 5 rotate, their teeth 13 strike against the seed and thus dislodge or disconnect the same from the lint, allowing the same to drop down into the seed-chamber 11. The rounded or blunt ends 14 of the teeth 13, enable said teeth to pass freely over the seed without crushing the same and without cutting or tearing the lint, which in turn is blown away by a current of air to the condenser and to any form of baling press. The seeds drop to the floor or to any receptacle.

Some of the other advantages of the machine, besides its quality and quantity of work, are the small amount of power needed to run it; its absolute immunity from fire—for instead of saws to strike fire, its felt rolls immediately smother out a fire—; its simplicity and consequent easy understanding by unskilled help; its absolute freedom from danger to the operator, as there are no saws nor gears nor other dangerous devices to injure him; its smooth, quiet running and lack of vibration, which saves wear on the machine as well as the building; its ability to gin damp cotton as easily and as well as dry cotton, something the saw gin will not do. (American Cotton Improvement Co., Boston, Mass.)

HOWARD & BULLOUGH'S HOPPER BALE OPENER.

The object of this new machine is to thoroughly open cotton without damage to the staple preparatory to making mixings or being fed to the Openers which follow. This type of machine has found great favor in England and on the Continent and the mills

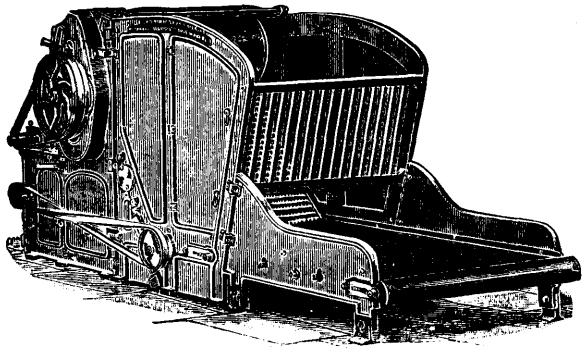


Fig. 1.

in this Country are just beginning to realize its possibilities in the line of labor saving, and large production. No manager who has under his charge a cotton mill of large output can afford to be without such a machine if he desires to keep down the cost of manufacture. Its productive capacity is very great, since a bale of cotton can be put through in six to ten minutes, or 150,000 to 200,000 pounds per week.

The machine is made with different kinds of feed and delivery arrangements. Generally a short feeding lattice is supplied, as shown in Fig. 1 which is a perspective view of the machine; again sometimes a much longer lattice is used, from either side of which cotton can be taken from as many different bales as

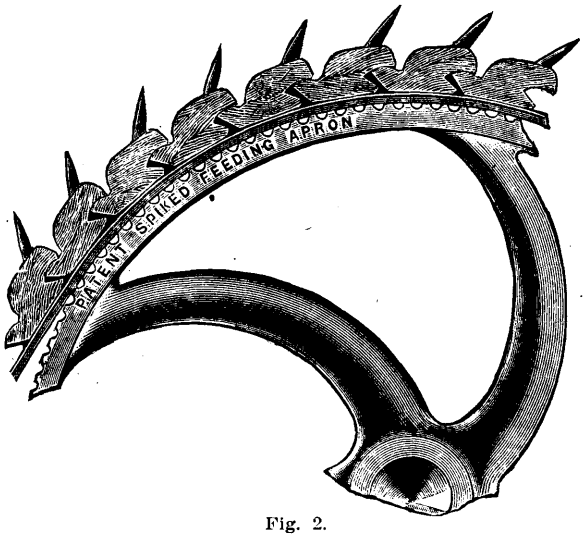


Fig. 2.

desired, thus ensuring even and thorough mixing. Waste can be evenly mixed with the cotton in any desired proportion. Owing to the thorough mixing the variously shaded colors of different cottons are no longer traceable in either yarn or cloth.

The ordinary delivery is intended to drop the cotton on to the floor or into a mouthpiece of a conveying system. Other arrangements are made, by which the cotton is carried upwards from the machine either by pipes or traveling lattices and delivered at any desired point. The machine is heavy and strongly built, and is provided with an extra large Hopper. The Spiked Elevating Lattice in Hopper, and of which a portion is shown in Fig. 2, is made on the new improved patented system without any canvas backing. The slats are made of heavy selected wood, intersecting, and very strong. The spikes are of suitable length and strength, ensuring great durability. The object of the patented intersecting form is to prevent the accumulation of cotton under the slats.

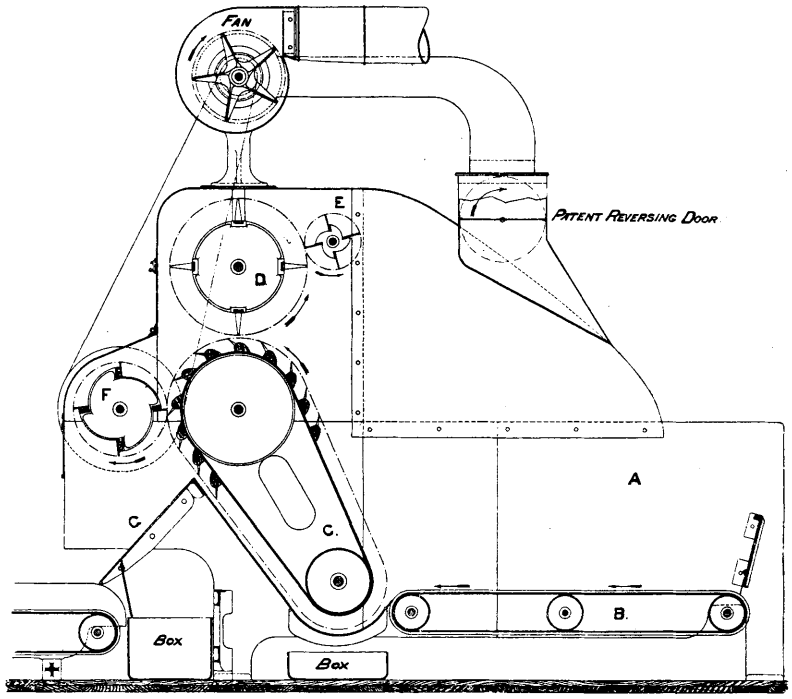
The amount of opening can be regulated by the setting of the Patent Stripping Cylinder, the Adjusting Arrangement of which is conveniently placed on the outside of the machine. The floor space of the machine with short feeding lattice, as shown in the illustration Fig. 1, is 13 ft. 2 in. x 6 ft. 10 in. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

PLATT'S HOPPER BALE BREAKER.

The first operation in cotton spinning is to open the heavy compressed cotton bales and feed the cotton in large pieces to the hopper bale breaker, in order that it may be opened and loosened as much as possible before being either made into a mixing or passed direct to the blowing machinery where mixings are dispensed with, as is now the case in many

mills. Mixings should, however, be used for long stapled cotton such as Sea Islands, Egyptian, etc., for spinning fine counts of yarn, whereas the direct arrangement (without mixings) is used for all classes of cotton with the exception of Sea Islands and fine Egyptian.

The accompanying illustration is a view in section of this bale breaker. The cotton taken from the



bales is put in the hopper A, the horizontal lattice B carrying it forward and pressing it against the spikes of the inclined elevating lattice C, where it is subjected to a sort of combing action, and is then carried upward to the spiked roller D, which further combs the cotton, and throws back into the hopper any large or unopened pieces, thus securing more perfect opening and mixing of the cotton before it leaves the hopper.

The spiked roller is stripped and kept clean by the stripping roller E, the surplus cotton falling back into the hopper. The cotton after passing the spiked roller is stripped from the inclined lattice by the beater F, and falls on the grid G in the delivery sheet, and is conveyed either to the mixing or to the filling lattice of the hopper feeding machine, which not only dispenses with carrying the cotton long distances, but keeps the hopper regularly charged, the lattice being governed by an automatic arrangement fixed to the end of the hopper. (Platt Bros. & Co., Ltd., Oldham, Eng.)

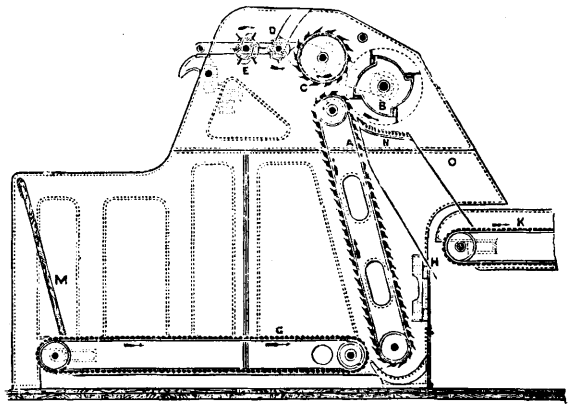
PLATT'S HOPPER FEEDER.

This machine has come during the past years into general use as an auxiliary machine to pickers. There is no doubt as to the usefulness of the hopper feeder, for, when properly applied, it certainly prepares the material in the best form possible (more or less already opened) for the picker, feeding it at the same time evenly and regularly to it, in order that the same may pass the cotton on in like manner to the scutchers, permitting an even lap to be formed. At the same time the action of the picker is more effective and greater cleaning power obtained. Both items, the even feed and greater cleanliness will be the reason for a stronger yarn and better production. Since heavy objects, nails, etc., cannot pass the feeder, the risk of fires in the picker room is lessened.

Another item in favor of the hopper feed is economy in wages, as one operative can tend easily to three machines. The accompanying illustration shows this hopper feeder in its section.

In the arrangement shown, the cotton as taken either from the mixings, the hopper bale breaker, or as the case may be from the bale, is deposited in the hopper of the machine as formed by back wall M and aprons G and A.

After the cotton is deposited in the hopper it is carried forward by the lattice G against the face of the inclined lattice A, traveling in the direction indicated by the arrows, and thence up to the combing cylinder C (running in the opposite direction), which gives the important combing action, characteristic to this machine, and allows only small pieces of cotton to pass forward. The cylinder C takes off the surplus of the feed and carries round a charge of small pieces, the large pieces having in the meantime been removed by the action of the strippers D and E, and returned into the hopper (well away from the lifting lattice A), thus the lifting lattice A, and the combing cylinder C, take forward only small pieces of well combed cotton, which is stripped by the cylinder B, and



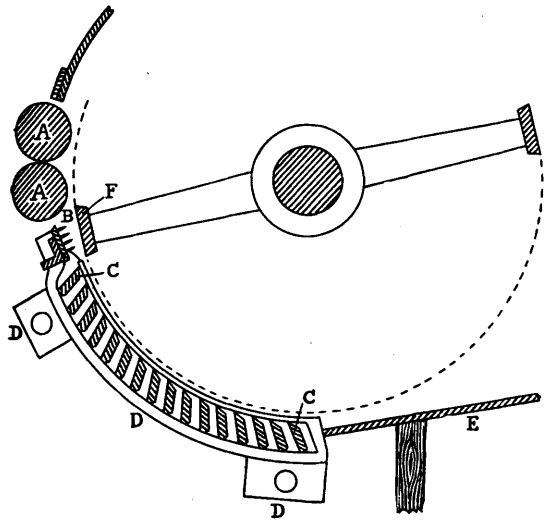
passed down the shute O on to the lattice feeder K, all loose refuse passing through the bars at N and out at H.

Ample space is provided between the lattice G and the lifting lattice A, thereby allowing any hard substance which the spikes will not take up to pass out through the bottom grid. (Platt Bros. & Co., Ltd., Oldham, Eng.)

THE SCHAELLIBAUM PATENT GRID FOR COTTON OPENERS AND SCUTCHERS.

The object of this attachment is to increase the cleaning action of cotton picking machinery and thus furnish a superior lap to the carding engine, and at the same time save cotton from picker waste and sweepings.

The accompanying illustration is a sectional view of this grid, showing also those portions of an opener or scutcher with which the same comes more



closely in contact, viz.: A the feed rolls, B a special comb to work in connection with the new grid, and of which its first and last bar are indicated by C. The bracket for holding the comb and the grid bars in place is indicated by D, the bottom plate of the machine by E, and the beater blades by F.

From this illustration it will be seen that the distinctive features of this grid, as compared with other grids, consist of a comb, and a greater number of bars of a special design.

The comb consists of a steel plate in which are inserted four rows of steel pins set at a certain angle pointing upward against the cotton, when the latter enters the machine, *i. e.* is fed to the machine by means of the feed rolls A. These pins vary in size and distance apart from coarse, for use on openers, to medium and fine for scutchers, to insure a most thorough separating and cleaning of the cotton under the operation. The action of this comb on the cotton fibres is mild and gentle, and does not injure the staple in the least, yet it thoroughly loosens up the bunches of raw cotton and by this more thorough opening and loosening up of the fibres it allows more dirt to go out through the Grid Bars and thus away from the cotton than common grids will permit.

The bars C of the grid, of which from 15 to 18 are used on Scutchers, and on some styles of Openers a larger number, are made of rolled steel and unbreakable. Under extreme strain they will give, and then return to place instantly, thus eliminating all danger of their breaking and the fragments damaging the machine. This Grid can be easily applied to any style of opener or Scutcher except openers of the Crighton Type, and is as equally adapted to one grade of cotton as to another.

For colored goods, the cotton is now usually dyed in the raw, and for such dyed cotton the advantages of the new grid are fully double as great as for white cotton. (The Rob. Schaellibaum Co., Providence, R. I.)

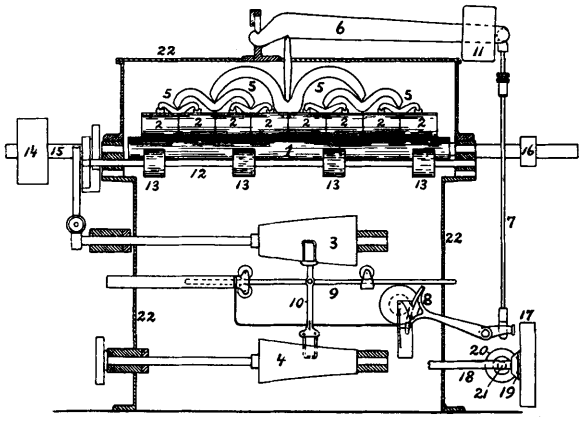
HOWARD & BULLOUGH'S IMPROVED EVENER FOR INTERMEDIATE AND FINISHER SCUTCHERS.

This Evener, as shown in the accompanying illustration, is an improvement brought out after considerable experimenting and many tests. The feed roll 1 and evener plates 2 are arranged on the same principle as the well known "Lord" System, which gives great cleaning capacity, owing to the bite of the roll and plates being close to the beater. The plates are on top of a 3″ steel feed roll which gives a very rigid support and makes sure that all the variation in the thickness of the laps will affect the position of the evener belt on the cones 3 and 4. These cones are conveniently placed under the feeding apron or lattice of the machine. The lower cone 4 works in an adjustable cradle, allowing the belt to be made endless and kept at an even tension at all times in any position on the cones.

The mechanism is what might be called a direct connected evener, as any motion of the evener plates is communicated directly to the cone belt through the yoke arrangement 5, large lever 6, vertical rod 7, toothed segment 8, and rack 9, secured to the cone belt guide 10.

Any change in the thickness of the sheet of cotton passing between the feed roll and the evener plates is thus communicated to the belt. The lever 6 has a large weight 11 resting on it near its outer end, which assists the movement of said lever 6, when the latter is operated. The arrangement is very sensitive and the cone belt at once takes its proper position when a variation in the weight of the cotton sheet occurs.

Other numerals of reference, not directly connected with the evener mechanism of the machine are thus: 12 is the apron shaft on which are fastened the apron driving blocks 13. The machine is driven from a countershaft by means of driving pulley 14 fast to shaft 15, the latter carrying on its other end



a pulley 16, which in turn drives pulley 17 fast to cross shaft 18, the latter carrying also a bevel gear 19 which through another bevel gear 20 drives the side shaft 21 driving the calender rolls in front of the machine. 22 indicates in section, the side and top framing of the machine.

The evener is so simple that it can be understood by the most ordinary picker hand, there are practically no parts to get out of order, and the breakages are reduced to a minimum. The results from this evener are very satisfactory and the evenness in the weight of whole laps and individual yards of laps is

appreciated by the many mills which already have the improved arrangement in operation. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

PLATT'S IMPROVEMENTS TO PICKERS AND SCUTCHERS.

Fig. 1 shows an improvement in the cleaning arrangement, having for its object to extract a greater amount of foreign matter from the cotton, than was formerly possible to do. The illustration shows an

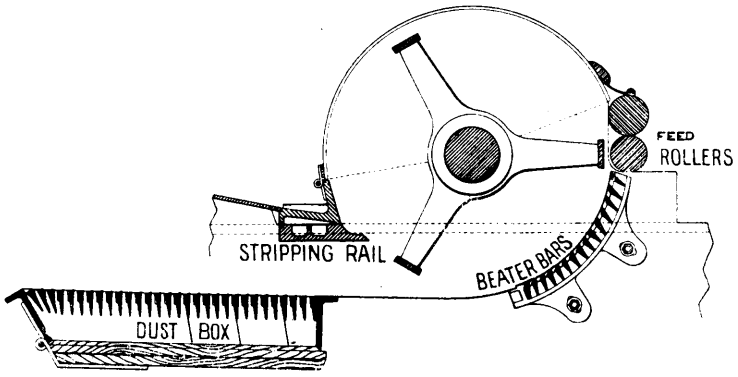
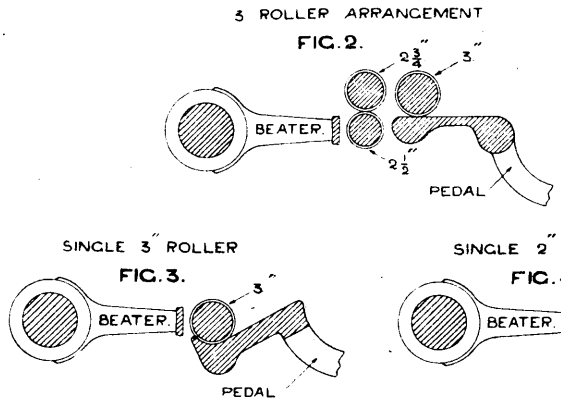


Fig. 1.

arrangement of improved bars under the beater, and a long dust box in connection with loose bars between beater and cages, also showing the improved stripping rail.

It is important that the beater bars, *i. e.* the bars under the beater, and against which the cotton is more or less thrown with force by the action of the beater, should be so shaped and adjusted as to allow a maximum amount of leaf and dust to be thrown out, and this with a minimum of cotton. There are fifteen bars, which are numbered respectively by the builders, and must be placed consecutively in the machine, starting with No. 1 at the bottom and ending with No. 15 nearest the feed rolls.



These bars can be adjusted to suit different varieties of cotton, by means of screws on the end of each bar, and, as will be seen from the illustration, the openings should be narrowest at the bottom, gradually widening as they near the feed rollers, the long face of each bar being uppermost.

The illustration also shows an effective and simple method for adjusting beater and stripping rail, permitting them to be set just so close as to allow the beater to pass the rail, and which is done by making the stripping rail in two sections. The lower section is fixed to the beater pedestal, which allows the stripping rail to be kept at the required distance from the beater by means of screws which can be readily adjusted to meet the wearing of the beater blades. When the stripping rail is to be correctly set to the beater, the two can be moved simultaneously and set to or from the feed rollers at such distances as may be desired.

Fig. 2 shows the three roll feeding arrangement as used in connection with long staple cotton, viz.: using a 3″ pedal roller to feed in connection with the nose of the pedal to a pair of feed rollers (2¾″ upper and 2½″ lower roller) which in turn feed to the beater.

The single roll feeding arrangements shown in Figs. 3 and 4 refer more to be used in connection with short staple cotton, the nose of the pedal of the feed regulator being used in this instance for feeding the cotton, either with a 3″ or 2″ single pedal roller direct to the beater, the nose of the pedal being shaped differently for either size of pedal roller, *i. e.* feed roller in this instance. (Platt Brothers & Co., Ltd., Oldham, Eng.)

SILK.

EVERTZ'S HOT AIR SILK REELING MACHINE.

The purpose of the machine is to reel silk from wet cocoons direct to the spool, through which course the strand is packed and rounded, and the silk thread comes off from the spool dry and free. The machine will be explained with reference to "foot power" driving, but may also be arranged to be driven by "belt power."

Fig. 1 is an elevation of a side view of the machine; Fig. 2 a front view of it, and Fig. 3 a perspective view of the strand in its course from the cocoons *a* to the cleaning arrangement *b*, around reel *c* and guide *d* onto spool *e*.

1 indicates a stand, upon which is placed the drying chamber 2, which holds the reels. The front of said chamber 3 is removable, being fastened to the chamber by means of latches 4 (one on each side), the chamber itself being subdivided in four (or more) sections, according to size of machine, *i. e.* number of reels used. Small holes are placed in this front side of the chamber and also in the top part, respectively, for the purpose of enter and exit of the silk thread in its travel onto and from its reel 5, a series of which (four or more) are arranged free to turn on an axis. To avoid complication in the illustration only one of such reels is shown.

Above chamber 2 is placed a frame for supporting a series of three pulleys (only two, 7 and 8, being visible in the illustration, Fig. 1, the third pulley

being placed on the other end of the machine), and also spool spindles 9 and its spools 10. Each spindle carries a pulley 11, resting on an endless cord 6, which connects those pulleys previously referred to and the driving pulley 14. A side pulley 12, over which this same cord passes entirely around, is supported on a short shaft or pin. Pulley 14 is a double

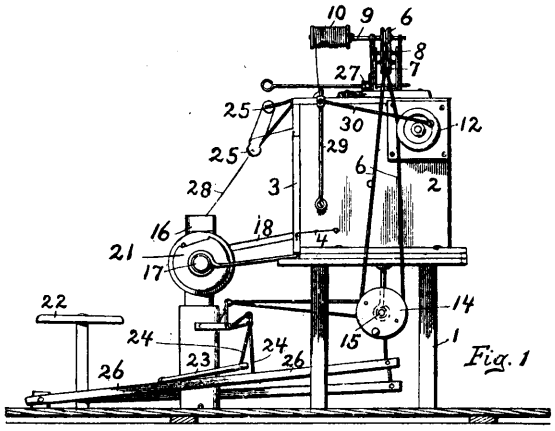


Fig. 1

pulley secured to a crank shaft 15, which is operated by the treadles.

A basin for water and for the silk cocoons is indicated at 16, being located directly over the hot chamber 17, which is provided with tubes 18 (the same number as reels used in the machine—only one tube being shown) for delivering hot air into the respect-

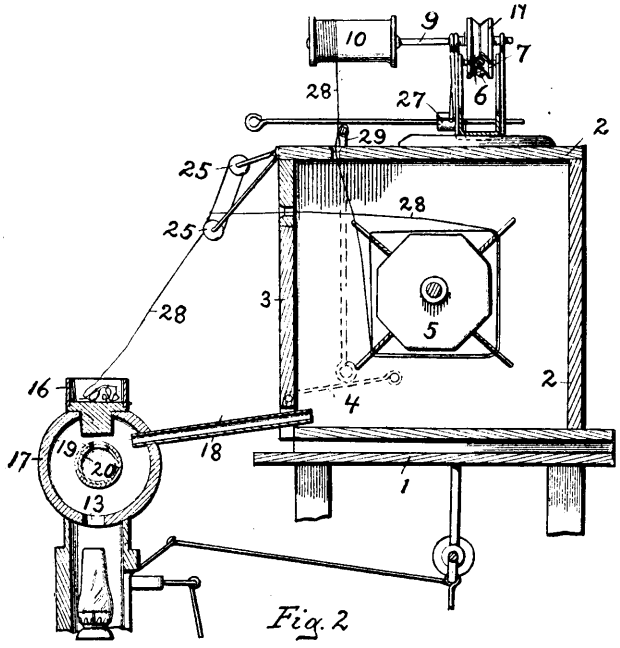


Fig. 2

ive sections of the drying chamber 2. Chamber 17 has an opening at 13, being directly over the heating apparatus, in this instance a lamp, the heat of which passes up through opening 13 and heats the water in the basin 16. This opening 13 and the lamp (a stove, or a charcoal furnace can be made to take the place of the lamp) are used only when the machine is operated by foot power. A tube 19 is for shutting off hot air when desired, and it extends into the tube 17 and has a tube 20 within it. This tube 20 is for receiving hot air when the lamp is not employed for such purpose, a valve or opening coinciding in these tubes 19 and 20. The turning a little on this exterior tube serves to open or close at will both of these valve openings. At the end of tube 19 is provided a notched disk 21, by which it may be properly turned for closing or opening, a pin limiting this movement.

22 is a stool or seat for the operator. Small treadles 23, with brace rods 24, are for the purpose of pushing the cranks of the crank shaft 15. Upon pushing fully down a long treadle and then pressing its small treadle down, the crank moves over the dead centre, in turn insuring practically a uniform movement in effecting the compactness and rounding of the twisted strands at the points between the pulleys 25. The long treadles 26 are provided with connecting rods attached to a crank shaft 15.

A key or cam 27 serves for lowering into action or for raising out of action by turning it partly around the spool spindle 9 and its spool 10. When raised, its pulley 11 no longer rests on the cord 6, and ceases to be driven by the friction of the cord.

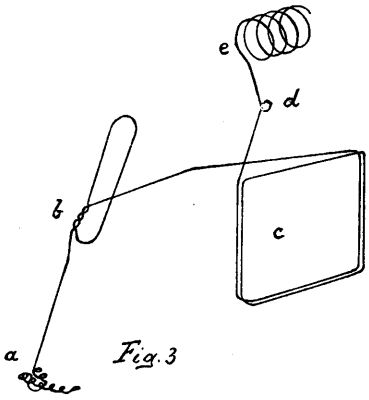


Fig. 3

The procedure of reeling in connection with the new machine is thus: A strand (marked 28) of several — say four or five — filaments, cocoons respectively, is passed from the water basin 16 first over the two guide pulleys 25, supported one above the other at proper distance from each other above the basin, the filaments passing once over around these pulleys, as shown. Then this strand is twisted some thirty or forty times upon itself midway between these guide pulleys. In the illustrations, to avoid confusion, only a few of these twists are shown. The twisting of the silk between the pulleys 25 is of the greatest importance, and when properly done, compactness and roundness of the thread is effected. After leaving the pulleys 25, the thread, having passed through its respective hole in the front wall 3, passes one or two times around its respective reel 5; thence up and through its respective hole in the top of the chamber, and thence once around a transverse bar 29 (which in its traverse or swing is operated by its link 30, reciprocated by pulley 12) and in turn is wound on its respective spool 10.

As a foot power machine, it can be run with one, two, three or even more strands, as any person can conveniently handle. As a belt power machine, there may be more—say ten—sets of devices running. When foot power is used, *i. e.*, heating as thus explained, the tube 20 must be closed at its ends by means of corks. In connection with belt power driving, any heating apparatus can be connected with the tube 20, the treadles and its connections being in this instance omitted and suitable connections for belt power driving substituted. (John P. Evertz, San Diego, Cal.)

SERRELL'S SILK REEL.

This reel is shown in Fig. 1 in its side view, partly in section. Fig. 2 is a plan view of a portion of the table, the water basin, a pair of cocoon holders, feeding drums, and filament attaching devices, with pulleys and belts for rotating the drums and filament attaching devices. Fig. 3 is a sectional elevation of the parts shown in Fig. 2. Fig. 4 is a diagram illustration of the electric devices and connections of the apparatus. Fig. 5 is a sectional plan, showing the ratchet wheel upon the shaft of the cocoon holder, and the devices at one end of the chain for turning said wheel and shaft.

In practice, two threads are wound upon the same reel, hence two cocoon holders and two sets of apparatus, in conjunction with each basin and with one reel, are used; but as these are similar only one is described. In most of the reeling establishments there are several basins, side by side, each being provided with two sets of devices, as previously alluded to, and the reels for each set of devices are situated in a frame common to all, with but one driving shaft to rotate all the reels. Letters of reference in all four illustrations are selected to correspond.

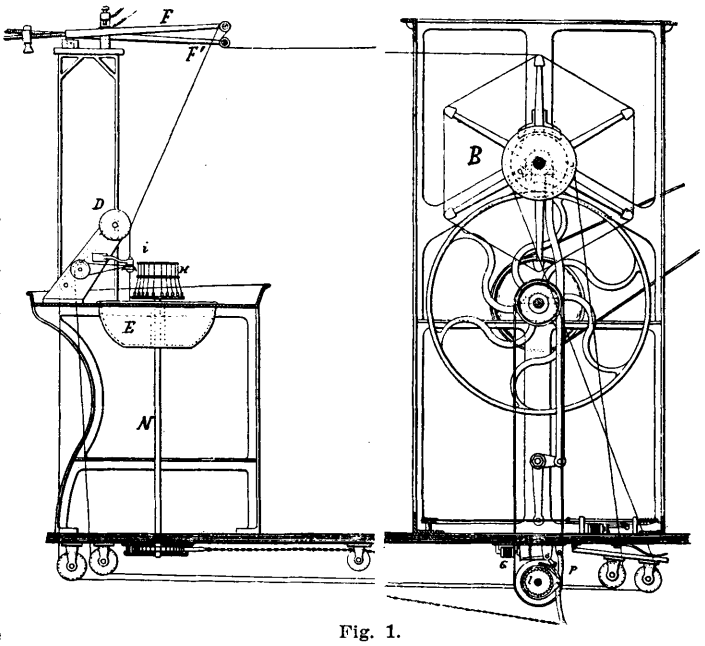


Fig. 1.

The operation of the machine is as follows: The operator places a cocoon in each compartment of the cocoon holder or magazine H, and leads the filaments of each of the cocoons up over the upper plate, attaching them in any convenient manner, as shown in Fig. 3. The filaments of several other cocoons are then passed through the attaching devices, or cylinder *i*, to form the beginning of a thread. The thread thus formed is passed one or more times around the feeding drum D, so as to secure sufficient adhesion to prevent slipping, and the thread, after making the crossings, is carried over the small pulley at the end of the lever F, and under the pulley at the end of the lever F′, and thence to the reel B. The counter weight of the lever F is adjusted by trial to the position required for the count of thread which it is desired to reel, and the reel is allowed to revolve. The thread is delivered from the drum D, at a speed about five per cent. less than that at which it is wound in by the reel B, which will result that in the process of winding, the thread is uniformly stretched this percentage or a fixed proportion in relation to its length, being the proportional difference in winding speed between the drum D and the reel B. The passing thread thus stretched acts upon the lever F with a force which varies according to the strength of the thread to resist the elongation. Now the force which is required to stretch a silk thread a given proportion in relation to its length, is practically in direct proportion to its diameter, and from this it follows that the forces tending to depress the lever F, being in proportion to the resistance to elongation, are proportional to the size of the thread which is passing at any given moment. The lever F, having been adjusted for the desired count of thread, is held down at the end nearest the reel as long as the passing thread is sufficiently strong, and therefore of the required count; but as soon as the thread becomes too weak, the resistance diminishes and the lever F rises and touches the contact point c^1. An electric circuit is thus closed, and the magnet G attracts its armature, releasing the latch lever S. The spring now causes the pawl *p* to engage with a tooth of the ratchet wheel *l*, and the cam case *o* begins to make a revolution. This allows the spring T to contact, causing the ratchet wheel X to advance one tooth through the action of the pawl t^2. The shaft N revolves with the ratchet wheel X sufficiently to advance the magazine H, by one compartment, because the magazine contains the same number of compartments as there are teeth in the ratchet wheel X. In thus partly revolving the cocoon holder H, brings a cocoon filament within reach of one of the hooks upon the rapidly revolving cylinder *i*. The filament so brought within reach is seized by the hook, and the revolution of the latter causes the newly caught filament to be wrapped around those which are already paying out at a point between the lower end of the cylinder *i*, and the water in the basin E. The filament so wound around the running thread adheres, because of the glutinous matter with which heated and wet cocoon filaments are naturally coated, and becomes attached to and a part of the thread being reeled. The thread being thus strengthened, is usually of sufficient size, and in consequence strong enough to draw down the end of the lever F, and break the electric circuit before the cam case *o* has completed its revolution with the shaft J. When this is the case, the lever F no longer touches the contact point c^1, and the magnet G, not being excited, the hook of the armature retains the latch lever S, and the pawl *p* being withdrawn from the teeth of the ratchet wheel *l*, the filament supplying mechanism comes to rest until the thread becoming again weakened, the operation is repeated and another cocoon filament added. Should however the first cocoon not be sufficient, or should the cylinder *i* fail in seizing and attaching it, then the lever F is not drawn down, the contact remains closed at the point c^1, and the cam case *o* continues to revolve, thus progressively advancing the magazine, and causing to be added as many cocoon filaments as may be necessary to bring the thread up to the desired strength and size. The lever F′ is used in combination with the magnet G′, the armature *r*′, the lever *x*, the spring U, the slide rod V, to stop the reel when the

thread breaks, and the operation of the device is as follows: As long as the thread is unbroken, the

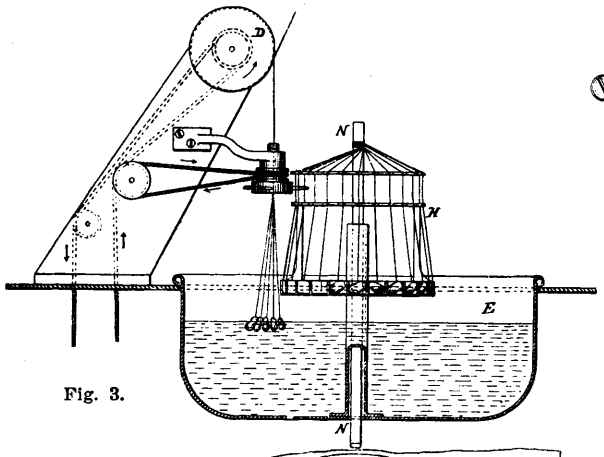


Fig. 3.

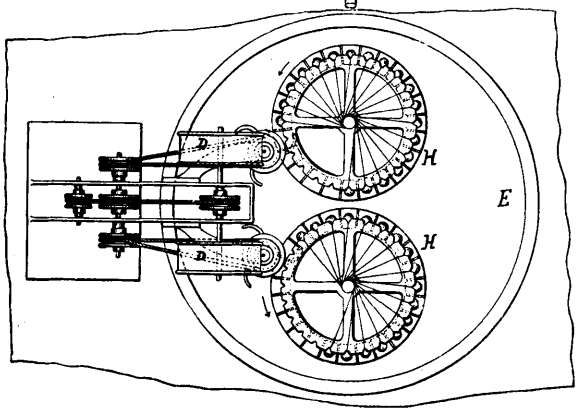


Fig. 2.

lever F′ is held up and does not touch the contact point c^2, but as soon as the thread breaks, the lever F′ falls and makes contact at the point c^2. The elec-

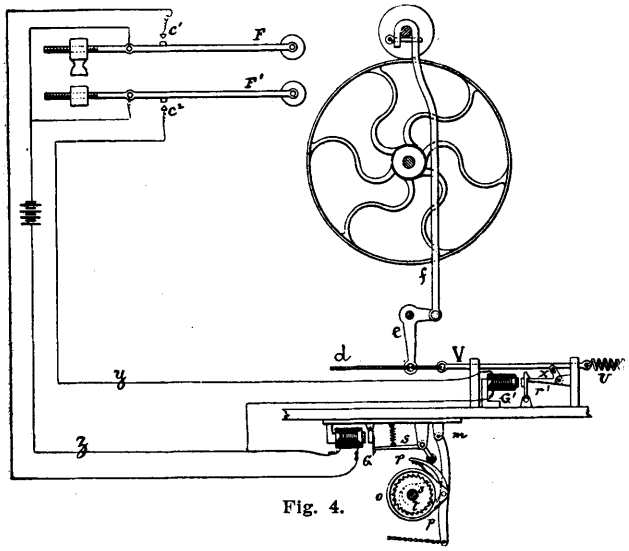


Fig. 4.

tric circuit is completed through the magnet G′, and the wires *y*, *z*. The magnet G′ is thus excited, and the armature *r′* is attracted, thus releasing the lever *x*, allowing the spring U to lift the friction wheel of the reel off from the main friction wheel by means of the rod V, lever *e*, and rod *f*. This causes the reel B to stop. To put the reel in motion, the cord *d*

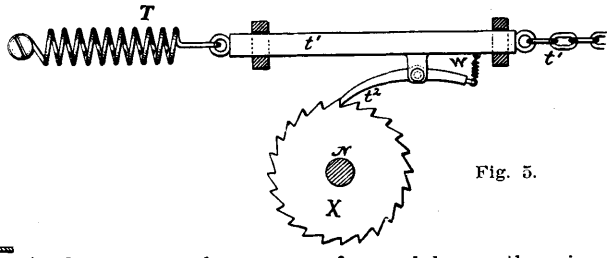


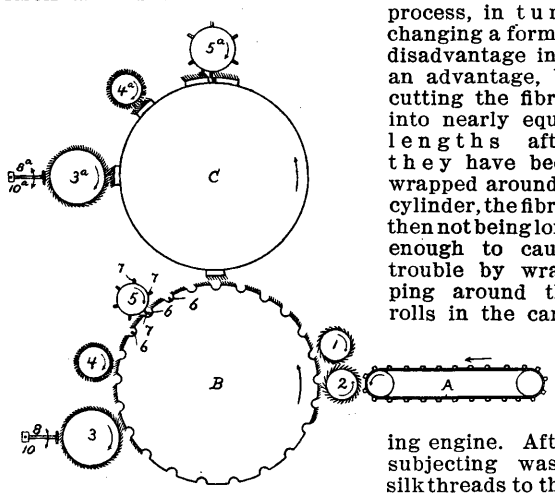
Fig. 5.

is drawn upon by means of a pedal, or otherwise, which again latches the armature *r′*, and moves the lever *e*, and this extends the spring U, and allows the friction wheel of the reel to bear upon the main friction wheel which is constantly in motion.

PREPARING WASTE SILK THREADS FOR RE-MANUFACTURE IN SILK YARNS.

The improvement has reference to a machine which prepares silk waste by straightening and cutting it in convenient lengths, so that the material in turn can be handy carded on a common carding engine.

In carding silk waste direct, one great trouble is that the silk wraps more or less around the rolls on account of its great length and cannot be removed without trouble and loss of time. The same trouble is found in combing it after the carding process has taken place. This principle of the material winding itself around the rolls is made use of in the new process, in turn changing a former disadvantage into an advantage, by cutting the fibres into nearly equal lengths after they have been wrapped around a cylinder, the fibres then not being long enough to cause trouble by wrapping around the rolls in the card-



ing engine. After subjecting waste silk threads to this process, they can be spun on what is termed either the worsted or woolen plan.

The accompanying illustration is a vertical section, partly in side elevation, of the system of cylinders, rolls, and cutters as used in the machine for thus preparing silk waste.

In the same A indicates an endless apron which feeds the silk waste into the feed rolls 1 and 2, provided with teeth, and which in turn feed the waste gradually into the teeth of the large cylinder B, which revolves as indicated by the arrow, and has sections of card clothing and cutter knives arranged over its circumference at distances equal to length desired to have the waste silk cut. 5 is the rotary cutting wheel, which carries knives 7 on its circum-

ference, the cutting edges of which mesh with knives 6 of cylinder B.

4 is a "fancy" placed there for the purpose of bringing the silk onto the surface of the teeth of cylinder B, so that the same, in turn, can be readily taken off by the doffer cylinder 3, which pulls the silk waste from off the large cylinder B, due to the fact that the latter has a greater surface velocity than the doffer, and carries it around to the doffing comb 8, which oscillates on pivot 10 and scrapes off the silk waste which now has been straightened out.

C is another large cylinder, like and for the same purpose as B, whose surface is very close to cylinder B. 3a, 4a and 5a, respectively, are rollers corresponding in construction and operation to rollers 3, 4, and 5 previously referred to in connection with the large cylider B. 8a is a doffing comb which oscillates on pivot 10a and is placed there for the same purpose as comb 8 in connection with doffer cylinder 3.

The same process takes place in this upper set of rollers as in the lower set of rollers, previously explained, and the purpose is to remove the surplus waste and straighten out all knots and kinks from same, a feature done by the action of the teeth of cylinder C upon the teeth of cylinder B, since their teeth point in opposite directions at point of contact.

The silk as thus combed off doffer cylinders 3 and 3a is now straightened out, cut in proper lengths, and ready for re-manufacture of yarn, either by the regular worsted or woolen yarn process. (F. W. Midgley, Phila., Pa.)

CARDING, DRAWING, SPINNING AND TWISTING.

WOOL.

THE BRAMWELL CARD FEED.

This feed, as now universally used for feeding the wool to first breaker cards, consists principally of a hopper in which the wool to be fed is placed by the operator, said hopper having a grating at the bottom for the removal of dirt, etc., dropping from the stock. An elevating spiked apron is provided at the front end of the hopper to which the stock adheres, and is thus taken up out of the hopper. Situated near the top of the hopper and sufficiently close to the apron is a reciprocating comb, having a slow but long sweep in front of the apron, the object of said comb being to carry off the surplus wool adhering to the spikes on the apron, and brush it back into the hopper, thus leaving the proper amount of wool evenly distributed over the apron so as to produce an even feed. The stock remaining on the apron is carried over the top roller and there meets another, but shorter, apron running at a higher speed, being also provided with flexible leather strips, which brush the wool off from the teeth of the apron, and convey it into the trough of the machine, which is used as a scale to weigh the stock and deliver the correct amount at intervals to the apron of the feed. The scale or trough is formed of two covered wings, held together by suitable weights, and the mechanism, suspended on steel knife edges, being balanced with movable weights, which can be fixed to allow any weight of wool desired to be collected in the scale, before the same is emptied onto the endless feed apron of the feeder. When the scale has received the required amount of stock, a small trigger is automatically liberated, which action causes a projection to catch on one of the teeth of a revolving disc connected with an automatic clutch, and this in turn disengages the driving mechanism of the spiked apron of the hopper, thus instantly stopping further delivery of stock to the scale, which now remains at rest, that is, closed.

At the proper time, that is, when the feed apron has traveled sufficiently far to enable the next lot to fall properly on said apron, the wings of the scales are automatically opened apart and the wool is deposited onto the feed apron. The scale is now closed again for receiving the stock, and the spiked apron is started, thus delivering stock again to said scale.

The success of the Bramwell Card Feed and the practical universal use of the machine is largely owing to the fact that the builders have spared no trouble or expense in the development of the machine for a wide range of uses.

To illustrate: The Worsted Bramwell Feed built to feed modern worsted cards is the standard machine of its kind in the world. It has a specially designed stripping device to throw stock into the scales from the spike apron, and this device is the result of careful test and many years of experiment. It does not roll, wind or injure the staple of the stock. The builders of the Bramwell Feed have also perfected machines to feed the finest rabbit's fur to fur blowers for hat cards, also a special feed for cotton batt machinery, a special feed for jute cards, also a recently perfected feeder for flax tow and asbestos stock. (Geo. S. Harwood & Son, Boston, Mass.)

THE MODERN APPERLY FEED, WITH KEMP POSITIVE GEARED TRAVELER.

The object of this device is to make the delivery of the sliver from the second breaker of a woolen card, and the feeding of said sliver to the finisher card, a continuous operation, to be performed automatically; said sliver having to be fed in such a manner as to produce an even and uniform feed across the whole working width of the card. In some instances this feed is also used between first and second breaker cards, besides being used between second breaker and finishers, the feeding in this instance being a continuous operation between first breaker and finisher. To accomplish the even and uniform feeding previously referred to, the delivered sliver has to be laid diagonally back and forth across the width of the feed on the feed table, thus making a continuous layer of sliver which then corresponds to a regular lap.

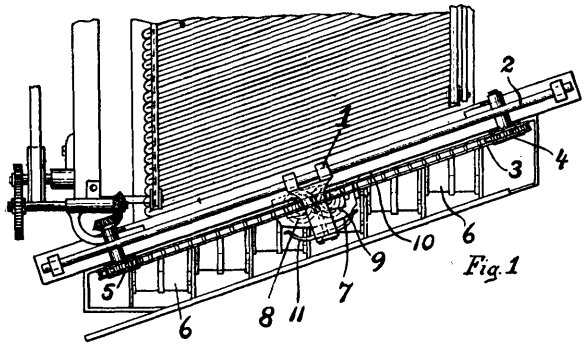


Fig. 1

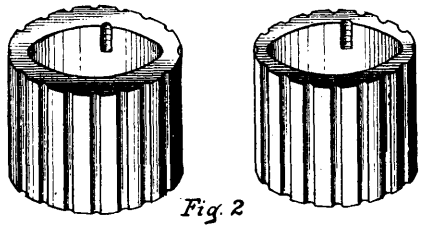


Fig. 2

The machine consists principally of a delivering mechanism for the preceding card, and a mechanism for laying the continuously delivered sliver diagonally on the feed table of the succeeding card. The delivering mechanism consists of a trumpet and pair of calender or delivery rolls, situated at the side of the front end of the card, and by which the film of carded wool is condensed and passed from the card. It is then guided upwardly to an overhead guide pulley, then to a similar one, suitably located, so that the sliver in passing from it is in a convenient position to be fed through the laying mechanism. As will be readily understood, this laying mechanism or traveler, constitutes the principal part of the feeder, and its construction and operation are best shown by means of the accompanying illustrations, of which Fig. 1 is a top view of the laying mechanism, show-

ing also the disposition of the sliver on the feed table of the card, and Fig. 2 is a perspective view of two feed rolls of different external diameter.

It will be seen that the mechanism is placed diagonally to the feed table, and consequently the travel of the carrier back and forth across the table will be at the same angle. The carrier has a pair of feed rolls provided on it, which are driven by the movement of said carrier back and forth, the sliver in this manner being positively laid on the table, rather than simply guided, which requires a gripping device for the sliver on the table to hold the sliver in place.

Referring to the illustrations for the details of the mechanism, 1 indicates the carrier or traveler, which travels back and forth on the guide rod 2, said carrier being actuated through the chain 3, which passes around the sprockets 4 and 5, the latter being positively driven through the gearing shown. The feed table consists of a number of endless aprons 6, which travel slowly towards the licker in of the card, taking the diagonally placed sliver along with them to be fed to the card.

The carrier or traveler is the principal part of the mechanism and consists essentially of a rocking plate 7, carrying a pair of gears 8 and 9, which are in mesh with each other and one of which is always in contact with a stationary rack 10 of the mechanism. On the same studs with the respective gears 8 and 9 are the feed rolls of the carrier, between which the sliver passes to the feed table. From the fact, that one of the gears is in contact with the rack and the two gears are in mesh with each other, when the carrier is moved by the traveling chain 3, the gears will receive a rotation and consequently the feed rolls will also receive a similar rotation. In order that these feed rolls will always revolve in the same direction, whether the carrier is moving in one direction or the other, at the end of each traverse of the carrier, the rocking plate is moved, so that the gear which is in contact with the rack will be moved out of contact, and the other gear thrown in, in this manner the reverse direction of travel not changing the direction of rotation of the feed rolls.

It is very important to have the feed rolls feed the sliver correctly under all conditions, and in some cases different diameters of rolls are necessary in order to meet the requirements of the sliver. To provide a convenient way of changing these rolls, hubs are provided and different outside diameter rolls, as shown in Fig. 2, can be easily attached to them.

The studs carrying the gears are pressed toward each other by means of springs and therefore they immediately adapt themselves to any change made in the diameter of the feed rolls. The rocking plate 7 is kept in one position during a traverse in either direction, by means of a retaining spring 11.

Among the advantages claimed for this feeder are:—

An improved sliver, in turn resulting in a more even and stronger roving and yarn.

An increase of production, and saving of labor in the card-room.

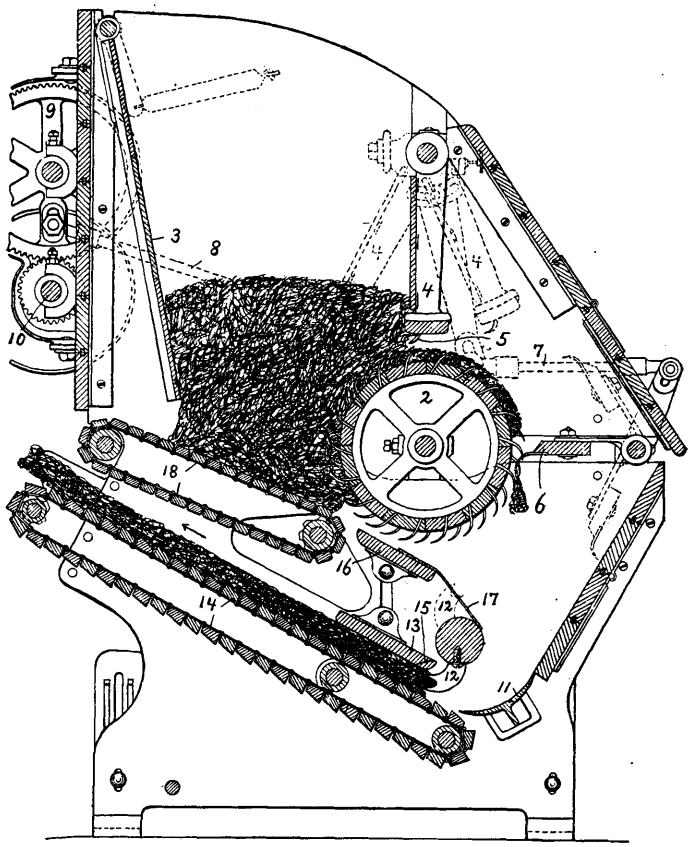
Waste in the card-room, as well as in the spinning-room is reduced to a minimum, since all side-drawing waste between the cards is prevented, as well as that from the creels and at the spooler.

The "Kemp" traveler lays the stock down on the table of the feed without strain, and so it goes to the feed rolls so evenly that fine ends are avoided.

There is as a rule a saving of space effected by the use of this "Feeder," and the card-room will be lighter, and improved in appearance. (Geo. S. Harwood & Son, Boston, Mass.)

THE FISHER CARD FEED.

The object of the machine is to make a uniform lap of the wool, which in turn is fed to the breaker card. The machine consists principally of a feed box for the stock and a device for delivering it uniformly into a receiving chamber of the machine, and from which it is compressed into a lap or mat of uniform thickness, and in this form delivered to the breaker card. The details of the construction and operation of the machine are best shown by means of the accompanying illustration, which is a cross



section of the machine, showing the position of the various parts.

Referring to the illustration, the stock is placed in the feed box 1 and is kept pressed against the spiked transfer roller 2 by a pressure board 3, which exerts this pressure from a spring through an arm, both being shown in dotted lines near the top of the illustration. Besides pressing the stock against the roller 2, the board 3 also produces an even feed from the chamber at all times, *i. e.* with any amount of stock in the feed box, by means of its connection to the driving mechanism of said roller 2. This roller may be driven at two speeds by throwing either of two gears into action through a clutch. The board 3 con-

trols this clutch through a lever and when the stock is low in the box, the board is in a forward position, which causes the large gear of the clutch arrangement to be thrown in and thus drive the roller 2 faster. When the feed box is full, the clutch puts the small gear in working contact and thus drives the roller slower.

Above this roller 2 is hung an opening comb 4, provided with teeth 5, said comb being oscillated to and fro, as indicated by dotted lines, and thus serves to even off the material on the transfer roller 2. This comb has four adjustments, up and down, backward and forward, and can thus be set as the different grades of stock may require. If short stock is to be fed, the comb should not be set low, so as not to push the stock back into the feed box and strip the roller 2. When using long stock, the comb must be lowered far enough so as to strip the cylinder sufficiently to prevent the stock from being brought around faster than required.

As the material is carried around on the roller 2, it is next engaged by a doffer comb 6, which is vibrated by shaft 7 through rod 8, connected to a gear wheel 9 as driven from shaft 10. The comb 4 also receives its oscillation from that mechanism through a lever shown in dotted lines. The material is thus removed in small quantities from the roller 2, said material dropping down onto a curved plate 11, where it is engaged by the revolving blades 12, and in turn deposited by them between the compressor board 13 and the endless delivery apron 14. The blades 12 also control the feed by automatically stopping the revolutions of the roller 2 when sufficient stock is in the receiving chamber to make the lap heavy enough. The roller 2 is driven from a worm with a clutch arrangement, which is thrown out through levers from the revolving blades when sufficient stock has been fed.

As the stock is taken away by the apron 14, the worm previously referred to is returned into working position with the gear on the roller 2 and is not again revolved until sufficient stock is fed to the receiving chamber. This allows an even feed at all times, no matter how much stock there may be in the feed box 1.

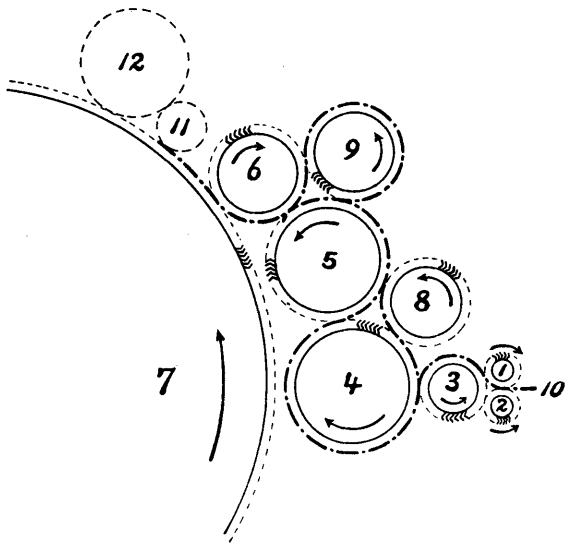
The compressor board 13 is provided with pins 15, which, in connection with the inclined bars of the delivery apron 14, keep the material from moving back. A board 16 and plate 17 prevent any material from dropping from the transfer roller 2 on the delivery apron 14. A traveling apron 18 keeps the material in contact with the roll 2 by traveling toward it. (Woonsocket Machine and Press Co., Woonsocket, R. I.)

BARBER'S FEED FOR WOOLEN CARDS.

The gist of the novelty refers to a special carding —on a small scale—of the stock previous to its delivery to the main cylinder, *i. e.* carding proper in the regular manner; the new attachment, although no doubt more particularly designed for the first breaker card, is applicable both to first and second breaker as well as finisher cards.

The object of the improvement is to thus provide a feed to woolen cards, by means of which more stock can be handled by a machine in a given time, and this at the same time in connection with an improved quality of the sliver if used in connection with breaker cards, or roving with the finisher card. The increased production results from the accelerated speed which it thus is possible to give a card, whereas the improved quality is brought about by working the lumps out of the material as fed, and getting the same into good condition before its delivery to the main cylinder. It is also claimed for the new attachment, that its use in connection with the first breaker, the first or second breaker, or all three engines of a set of cards, will permit the handling of a lower grade of stock for a given count of yarn, and thus lowering the price of production. The new attachment can be readily applied to old as well as new sets of cards, and in itself only slightly increases the length of the carding engine, to which it is applied, both being also two most valuable features for it.

The accompanying illustration is a diagram in outline, showing the new feeding attachment as applied to a carding engine, however only so much of the



latter being shown as is necessary to show its relation to the feed. A description of the construction and operation of the new attachment is best given by quoting numerals of reference accompanying our illustration, and of which:

1 and 2 indicate the two feed rolls between which the stock, or the sliver, as the case may be (first or second breaker or finisher) is entered to the machine, and from where it is, by means ot the leader or transferrer 3, delivered to the tumbler 4. From here instead of delivering the film of stock, which is now (especially if dealing with a first breaker card) lumpy, coarse, and uneven, directly to the main cylinder, the tumbler 4 delivers it to an auxiliary cylinder 5, which has a much more rapid surface speed than said tumbler 4. Cylinder 5 in turn delivers the web to the faster running doffer and feeder 6, and from which it is taken off by the rapidly revolving main cylinder 7. From this point on, the web takes the usual course and receives the usual treatment. By the time the web reaches the main cylinder, the lumps have been pretty thoroughly worked out and it is finer and more even, thereby adapted to produce a better grade of yarn than if carded without the attachment, owing to the additional treatment of carding the new attachment provides. Furthermore, the time required to produce this improved yarn is reduced by the new feed. In order to still further assist in preparing the stock in the best possible condition for the main cylinder, the two workers 8 and 9 are provided, and which in their turn split the web twice between the tumbler 4 and the doffer and feeder 6. The worker 8 takes the web, or a portion of it, from the auxiliary cylinder 5 and returns it to the tumbler 4, which delivers it again to said cylin-

der 5, and the worker 9 takes from the cylinder 5 and delivers to the doffer and feeder 6, which delivers the now united splits to the main cylinder 7. The slow running workers 8 and 9, operating with the comparatively fast running members 4, 5 and 6, augment the effectiveness of the latter and enhance the efficiency of the feed. The heavy dotted line 10 indicates the course of the web, through the attachment, thus explained.

The dotted circles 11 and 12 indicate the positions of the first worker and its stripper, respectively, of the carding engine proper, being referred to merely for the purpose of showing that the new attachment can be applied without disturbing such members when they are located as usual. In short, the only alteration required to apply the new attachment to an old carding engine, is the providing of suitable bearings for the new parts, *i. e.* to move back the tumbler, leader and feed rolls about an inch, or replace the old tumbler with one which is an inch or so smaller.

With reference to revolutions per minute and surface speed of the various members of the attachment, the following are a fair average:

Assuming that the:

Main cylinder.....	(7) =	125 r. p. m.	×	18095'	surface speed.
Auxiliary cylinder..	(5) =	260 " " "	×	7351'	" "
Tumbler	(4) =	130 " " "	×	4084'	" "
Doffer and Feeder..	(6) =	450 " " "	×	9896'	" "
Worker	(8) =	12 " " "	×	226'	" "
Worker	(9) =	8 " " "	×	175'	" "
Leader	(3) =	150 " " "	×	1484'	" "

Feed rolls (1 and 2) revolve very slowly, the speed varying according to the weight of stock per yard which is to be run between them.

Although speeds quoted are relatively correct, at least approximately, it is to be distinctly understood that such speeds must vary considerably in different machines and for different grades of stock.

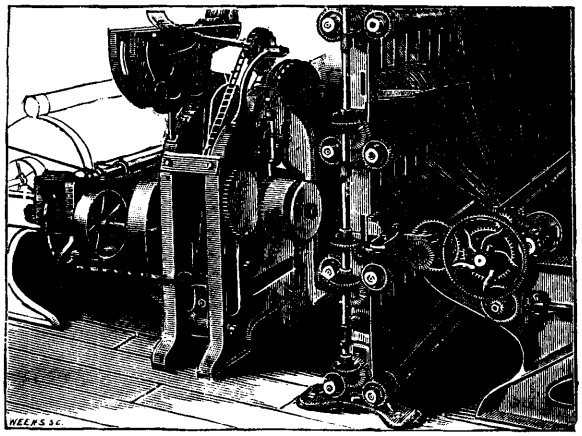
The arrangement of the card clothing, with reference to direction of pointing, on the various cylinders and rolls, is clearly indicated (exaggerated for the sake of clearness). When the arrangement is such that the points of two adjacent teeth upon associated members have the same direction, the teeth are said to be point to point, and when the arrangement causes the points of such teeth to assume different directions, the teeth are said to be point to back, the object of this being to so arrange the teeth as to handle the stock to the best advantage. The teeth on the tumbler 4 and the cylinder 5 are arranged point to back, and the same is true of the teeth on said cylinder and the doffer and feeder 6. The teeth on the cylinder 5 and each of the workers 8 and 9 are arranged point to point, while the teeth on the worker 8 and the tumbler 4 are point to back, as are those on the worker 9 and the doffer and feeder 6. The arrows associated with the cylinder 7 and other rotary members, in the illustration, indicate the directions in which said cylinder and members are adapted to revolve. (Moses Barber, Monson, Mass.)

THE TORRANCE AUTOMATIC BALLING MACHINE FOR WOOL CARDS.

This device, as its name indicates, is used in connection with wool cards for the purpose of automatically winding the sliver, as delivered from the first breaker card, onto spools, making a smooth and compact ball or spool, and at the proper time discharging the filled spool and replacing it with an empty one, all of the operations being performed automatically. These filled spools are afterwards placed in a suitable creel at the back of the next card for the purpose of feeding the slivers to this machine.

The balling machine consists principally in means for rotating the spool by frictional contact, an arrangement for giving a traversing motion to the sliver as it is being wound on to the spool, a mechanism for inserting and withdrawing the spindle from the spool, on which said spool revolves while being filled, a device for tearing or severing the sliver from the spool at the completion of said spool, and which at the same time starts the end of the sliver on to a new spool, a mechanism for discharging the spool after it has been filled, and an arrangement for entering an empty spool to replace the full spool.

A perspective view of the machine is given in the accompanying illustration, showing its position in relation to the card, and also showing a creel filled



with spools from this balling machine, said creel being located in back of the second breaker card to which the slivers are fed.

The winding arrangement is made up of a drum which is positively driven, being on the main shaft with the driving pulley, and on which drum the spool to receive the sliver rests, said drum being located between the two side frame plates of the machine, and a little higher than the centre of said frame plates.

The guiding arrangement for the sliver consists of an arm, pivoted near the bottom of the machine and extending upwardly toward the spool, its top end being provided with a slot through which the sliver passes. The arm is given a back and forth motion across the width of the spool, by means of a cam arrangement, and the sliver is thus laid smoothly on the spool.

At the completion of filling a spool, the spindle, on which the spool had been revolving and which had kept it in the machine, is automatically withdrawn by a lever and cam arrangement shown in our illustration on the outside of the frame plate. The lever is pivoted near the bottom of the machine and is actuated at the proper time by a cam, shown secured to the central gear on the frame plate, which gives it an outward and then an inward motion. The spindle is loosely secured in the slot at the top of the lever and consequently receives a corresponding motion to that of the lever.

The severing and starting arrangement for the sliver at the completion of a spool, is composed of a specially shaped breaker arm which is actuated through a lever from a cam, said motion causing said breaker arm to rise and engage the sliver and break the same, in turn wrapping the loose end around the

new spool which replaces the full one. In order to give the breaker a more positive and quicker return impulse after it has performed the two operations, a spring actuated return presser is provided, being arranged on one of the frame plates.

As soon as the spool is full, which is regulated by the setting of a screw on the retaining lever, and the spindle withdrawn, the discharging mechanism is brought into action and the spool removed. This motion consists principally of a bat, shown near the top of the machine, which is attached to a shaft carrying a sprocket. The chain as passing over this sprocket, also passes around a similar one situated between the two frame plates, said sprocket being on the same stud with the gear on the outside of the frame plate. This gear, as shown, is in mesh with another gear which is loosely collared on the main shaft, and has a pawl pivoted on its side, a lever from said pawl extending upwardly, and is engaged by the vertical retaining lever which is connected to the vertical slide, carrying the spindle, and in this manner the pawl is held out of contact with a ratchet which is secured to the main shaft, the arrangement receiving no motion while said pawl is held up. As the spool becomes larger, due to the winding on of the sliver, the slides carrying the spindle raise gradually, and at the completion of a spool, it has risen to such a point that the retaining lever moves out of contact with the lever extending from the pawl, so that the latter drops into contact with the revolving ratchet, which action carries it around with it and consequently also the gear on which it is pivoted. This motion is transferred through the other gear and sprockets to the shaft carrying the bat and this is in turn given a revolution, during which it forces the full spool out of its place. As soon as this happens the two slides drop down to their original position, as at the beginning of a spool, so that when the lever, extending from the pawl, is brought around by the pawl still being in contact with the revolving ratchet, said lever comes in contact with the lowered retaining lever and the pawl is taken out of contact with the ratchet, which of course stops the motion.

Just as soon as the full spool has been pushed out, an empty one takes its place, it being placed in position by a special mechanism, situated at the left hand side of the machine. The spools are held in reserve in a trough, shown at the upper left hand corner of the machine, and are fed from it by the mechanism referred to.

The spools, after being taken from the balling machine, are placed in a special creel at the back of the second breaker card, and the sliver fed directly from the spools to the card. The creel is known as a bank creel and is shown in the right hand side of the illustration. It consists of five horizontal pairs of rolls placed vertically over each other in the creel and sufficiently far apart to accommodate the spools on said rolls, dividing rods being placed vertically to separate the spools, said rods being oval in cross section to prevent accumulation of flyings about them. The rods are positively driven through gears shown, thus producing a positive unwinding of the slivers.

Among the advantages of the machine is a saving in waste, since the spools cannot be "run over" and made too large by the operator's negligence or while attending to other duties. More doublings can be made at the second breaker card, and consequently more even yarn afterwards produced. The old style creel and lap system are dispensed with, saving in turn labor, waste and room.

Less flyings are made where the creel is located, and the positive unwinding motion on the creel prevents strain and breakage to the slivers. (Torrance Manufacturing Co., Harrison, N. J.)

RUBBING MECHANISM FOR FURBUSH CARDS.

In this condenser, two sets of rubbing mechanisms are employed, viz.: A primary set for acting upon the narrow webs of fleece as they come from the doffer, and rubbing the same into the form of crude slivers or rovings, and a secondary set for acting upon these crude slivers or rovings and rubbing them into their final form, the two sets being independently driven, so that the second set may, if desired, be given a shorter stroke and a higher speed than the primary set.

Two different constructions of the primary set of rubbing mechanism are shown in our illustrations, viz.: In the arrangement shown in Fig. 1 a set of rub rolls is employed, whereas in the arrangement shown in Fig. 2 a pair of aprons is made use of for said primary set of rubbing mechanism of the condenser.

Examining the rubbing mechanism as shown in Fig. 1 (being a sectional plan view of the same, together with sufficient of the operating mechanism shown to convey a proper understanding of the improvement), we find used, as mentioned before, for the primary rubbing mechanism a set of rub rolls, having three rolls in each element of the set, both upper and lower, and as the secondary rubbing mechanism, we find used a pair of aprons, the primary set of rub rolls having sufficient control of the fleecy webs to properly form the crude slivers or rovings therefrom, and the aprons, owing to the fact that they grip the slivers from end to end of the run and exert no drawing action upon them, are well adapted for condensing said slivers by means of a short, quick rub.

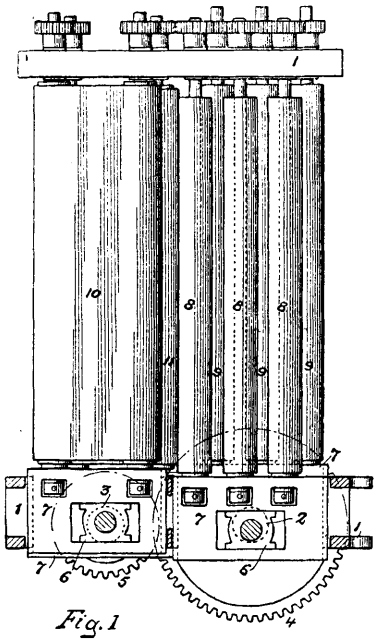


Fig. 1

1 represents the fixed frame of the rubbing mechanism, and 2 and 3 eccentric or crank shafts vertically mounted in bearings at one end of said framework, the shaft 2 imparting reciprocating movement to the primary set of rubbing devices, and the shaft 3 imparting reciprocating movement to the secondary set. The two shafts are geared together by spur wheels 4 and 5, which are so designed that the shaft 3 will rotate at a higher speed than the shaft 2, and the eccentrics or cranks of said shaft 3 have a shorter throw than those of the shaft 2, so that in connection with this higher speed of reciprocation of the secondary set of rubbing mechanism, there is a shorter stroke or lateral reciprocation of the same. The cranks or eccentrics of each shaft act upon boxes 6, which are free to slide laterally in yokes, each forming part of a frame 7, carrying one of the elements of one of the sets of rubbing mechanism, there being one of these frames for each element, upper and lower, of each set of rubbing mechanism.

The upper frame of the primary set of rubbing mechanism carries three rub rolls 8 and the lower frame carries three rolls 9, the upper frame of the secondary set of rubbing mechanism carrying the rolls for supporting and driving the upper apron 10 and the lower frame carrying the rolls for supporting and driving the lower apron 11.

In Fig. 2 the other construction (as previously referred to) of the primary rubbing device is shown, comprising in this instance a pair of rubbing aprons 8, 9, which take the place of the two sets of rubbing rolls 8, 9, shown in the former construction. Thus in the arrangement shown in Fig. 2, two pairs of aprons are employed in the rubbing mechanism, the primary pair being so driven as to form the desired crude sliver and the secondary pair being independently driven, whereby they are adapted to rub this crude sliver into a finished sliver of any desired degree of fineness. The first pair of aprons rub the narrow webs of fleece without any drawing action thereupon, and hence have no tendency to break even a fine and delicate fleece, and in the second pair of aprons also there is a lack of draft upon the partly-rubbed sliver, while, owing to the fact that the aprons grip the sliver from end to end of the run, they are well adapted for condensing the sliver by means of a short quick rub, being essentially the same in construction and action as the second pair of aprons, as shown in the rubbing mechanism previously explained and illustrated by Fig. 1.

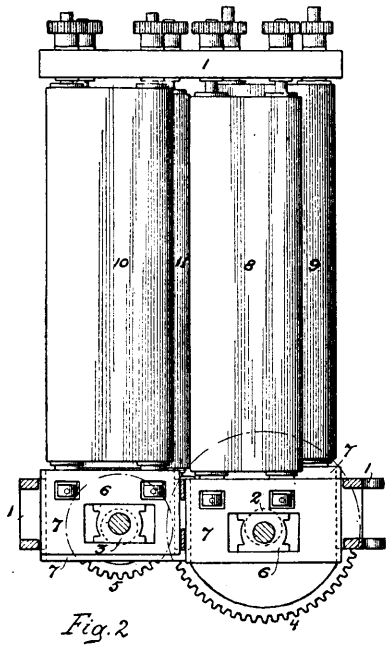


Fig. 2

The construction of the other parts of the rubbing mechanism is the same as the first explained mechanism, corresponding numerals of reference being used. (G. Barber, Phila., and J. Cromie, Camden, N. J.)

CHOQUETTE'S WASTE SAVER FOR CARDS.

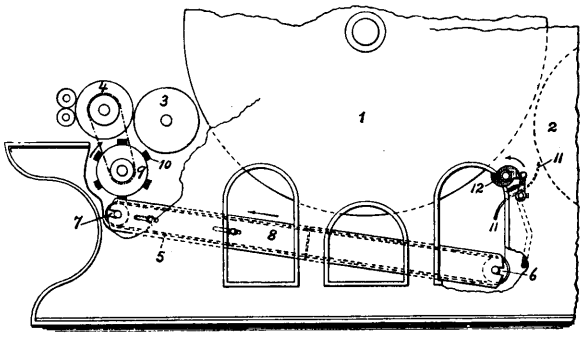
This device is used in connection with woolen cards, its object being to recover the good fibres from the waste as falling from the cylinder of the card, and return said recovered fibres to the feeding mechanism of the card.

The device consists principally of an endless apron, equal in width to the width of the cylinder, and passing around a guide roller at the front end and near the bottom of the machine, and another guide roll near the back of the machine, but which is sufficiently high as to make the apron travel at an angle toward the back of the machine. A brush cylinder is provided at the rear end of the machine at the point where the apron starts to pass around the guide roll. A shield is provided at the other end of the apron to prevent any waste from collecting on any braces, projections, etc., under the working part of the machine.

The details of the construction and operation of the device, as well as its application to the card, are shown in the accompanying illustration, which is a diagram giving a partial side elevation of the card with the waste saving device attached.

Referring to the illustration, 1 indicates the card cylinder, 2 is the doffer, 3 is the tumbler, and 4 the burr cylinder. 5 indicates the endless apron passing around a guide roll 6 at the front of the card and passing around another guide roll 7 near the rear of said card. On each side of the apron is placed a board 8 extending slightly above the level of the apron to prevent any of the waste from dropping off at the sides. Situated above the rear guide roll 7 is a wire brush cylinder 9, revolving in the direction of the arrow, being made up of parallel strips of straight wire teeth 10, similar to the teeth on a "fancy," said cylinder being just sufficiently high above the apron as to have its teeth just miss touching the apron, but which enables it to catch any fibres lying on said apron, without taking up the dirt which is also on said apron, and the relation of the speeds of the wire brush cylinder and apron is such that the dirt on the apron will be discarded. It will be seen that this wire brush cylinder is really the main point to attend to, to get good results, besides the arrangement of the teeth 10 on the brush cylinder is an important item.

In these cards, there are often braces or other stationary parts under the working part of the machine, and on which waste is apt to collect. To prevent this, a vibrating shield 11 is provided, the same as shown, being vibrated by a cam 12 and thus throws any waste collecting on it, down onto the traveling apron.



In the practical operation of the device, the apron is given a traveling motion in the direction of the arrow; and as the card continues to work, the waste and dirt will drop down on said apron and pass toward the revolving wire brush cylinder. The action of this brush will take the fibres up off of the apron and deliver them to the tumbler 3, to be again fed by it to the cylinder of the card, without taking the dirt, etc., along with it; the latter, as mentioned before, being discarded from the apron by the combined action of the brush and said apron. (Torrance Manufacturing Company, Harrison, N. J.)

ATTACHMENT TO CARDS FOR MAKING FANCY—SPOTTED—YARNS.

This attachment is used for making fancy spot or random roping on finisher cards, which when spun, and in turn knitted or woven into cloth, gives a

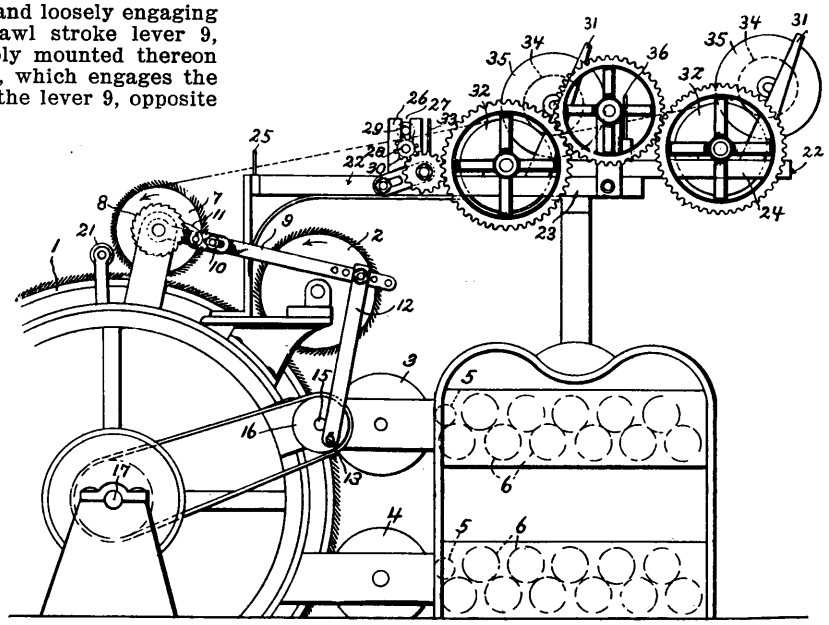
varied or fancy effect to the goods. The object is to produce one or more spots of any length or size on roving, of the same or different colors, and to have said attachment readily applicable to or removable from any make of finisher card.

The accompanying illustration is a side elevation of a portion of a finisher card, showing the attachment applied in operative relation thereto.

Examining this illustration, we find that the cylinder 1 is provided with a fancy 2, an upper ring doffer 3, a lower ring doffer 4, wiper-rolls 5, and rub rolls 6. In advance of the fancy is a supply roller 7, the teeth of which point away from the fancy 2 toward the feed end of the carding engine. By this arrangement the teeth of the supply roller 7 are disposed in the best position for carrying the roving or spotting yarn to the cylinder, and offers the least resistance when delivering it to the latter. Fixed to the roller 7 is a ratchet wheel 8, and loosely engaging the shaft of said roller is a pawl stroke lever 9, having a pawl plate 10 adjustably mounted thereon and movably carrying a pawl 11, which engages the ratchet wheel 8. To the end of the lever 9, opposite that engaging the shaft of the roller 7, the upper end of a connecting bar 12 is adjustably attached, and is also movably secured at its opposite end to a crank 13 on a pulley 16, held by a stub shaft 15, projecting from the frame of the carding engine; said pulley 16 being driven by a belt from the cylinder-shaft 17. It will be seen that the up-stroke of the bar 12 will elevate the lever 9, and thus the pawl 11 will be caused to throw the ratchet wheel 8 around the distance desired to produce a step-by-step feed of the roller 7, and the adjustment of the bar in relation to the lever 9 can be quickly regulated to increase or decrease the stroke of the lever and the movement of the roller to produce different results. Adjacent to the roller 7 is a guard 21, so placed that the spotting material, which is brought forward by the supply roller to the cylinder, is properly guided and is not broken or otherwise irregularly disturbed, when taken away by the cylinder, and a proper feed of the said material is thus produced. The roller 21 serves to prevent the spotting material rising above the surface of the roller 7 when pieces of spotting material are removed by the cylinder 1.

The main portion of the new attachment for producing the fancy effects to the yarn comprises a frame 22, bolted to the frame of the carding engine. This frame 22 includes a bed 23, with an extension 24, provided with bearings for the working parts of the attachment. One end of the bed 23 is located adjacent to the roller 7, and on said end are a plurality of the transversely-aligned upright guides 25. On the bed are opposite bearing-standards 26 with slots 27 opening out through the upper extremities thereof, and engaging said standards are lower and upper guide rolls 28 and 29, the lower guide roll 28 remaining at all times in the standards, and having at one end a driving pinion 30, the upper roll 29 being freely removable and normally held in operative position by its own weight. At opposite sides of the bed 23 and extension 24 are rearwardly inclined uprights 31, arranged in pairs, and mounted in suitable bearings adjacent to the lower ends of the uprights are iron cylinders 32, one in the bed proper and the other in the extension, both cylinders being transversely disposed in relation to the parts supporting the same and extending fully across the same. In front of the forward cylinder 32 is arranged a series of transversely-aligned guides 33 for directing the spotting material from the cylinders to the front guides 25. Between the front and rear cylinders are a plurality of transversely-aligned guides 36, similar to the guides 25, for directing the spotting material that comes over the rear cylinder to the front cylinder, as shown. Over the cylinders 32, at a rearward inclination in relation thereto, are spools 34 for the spotting material or roving, the said spools having flanged heads 35 at such distance apart as to be capable of embracing or moving downwardly over the ends of the cylinders.

The spotting material from the rear spool is



brought forward over the rear cylinder under the forward spool, and the strands from the two spools then caused to move together over the forward cylinder between the guide rolls 28 and 29, and from the latter the strands move between the guides 25 to the roller 7. By this arrangement it will be seen that the spotting effect can be produced in two colors, as the spotting material on the rear spool may be of one color and that on the forward spool of another color. Again either one of the spools may be used alone on account of the easy detachment of the one not desired for operation, and the spot may thus be produced in one color. (J. B. Platt and T. F. Marr, Ashland, N. H.)

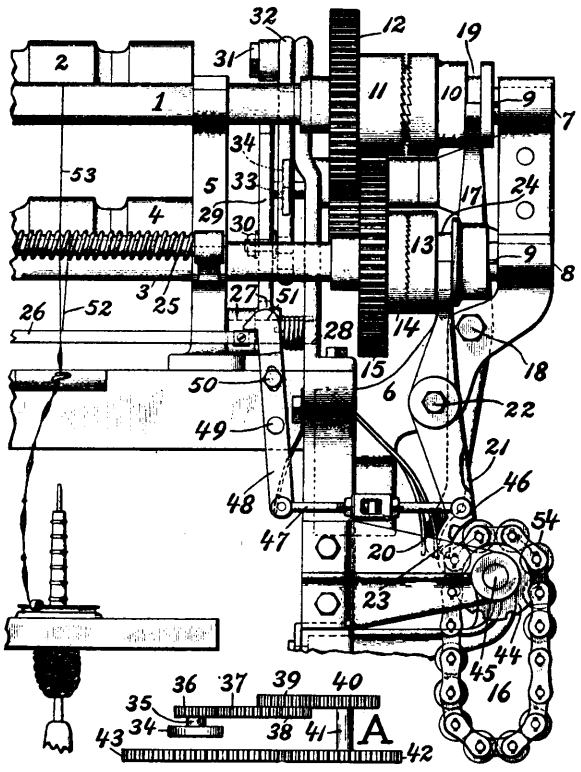
TWISTER FOR FANCY YARNS.

The purpose of this machine is to produce fancy yarns technically known as knob, bunch, spiral, variegated, or loop yarns, in a more economical manner than heretofore practiced, at the same time enabling a change in the variety of the fancy effects more readily to be made.

Previous to the introduction of this machine it had been customary to employ for this purpose two sets of delivery rolls in the twister, and to run one

set of said rolls at a faster speed than the other set, using in connection with said rollers, a vibrator for controlling the slack thread as delivered at the faster speed, said vibrator by its change of position, causing the slack thread which is delivered at the faster speed to be wound on the slower delivered body or core thread, to either form a bunch or knob or wind itself more or less spirally about the body thread. Another way of obtaining a similar result was to temporarily arrest, by means of a mutilated gear (mutilated according to effect in the fancy yarn required), the movement of one set of said rollers, so as to cause unequal delivery of one or the other threads, so that one of the threads will be wrapped about the other.

The mechanism employed in the new twister, for producing the fancy effect to the yarn, consists in a system of clutches which may be made to engage the rolls and drive the same, or may be disconnected therefrom to leave the rolls at rest, the engagement and disengagement of the clutches with the rolls being controlled by a pattern chain, similar to those as used in connection with the shedding motion of a fancy loom, the risers of which may be changed at will to adapt the action of the twister for the production of any desired pattern of knob, *i. e.* fancy effect in the yarn.



The accompanying illustration Fig. 1 is a partial front side elevation of a twister, having the attachments for producing the fancy effects to the yarn applied thereto. Fig. 2 is a diagram in detail, showing the gearing for moving the vibrator.

The twister is supplied with two series of delivery rollers 1, 2 and 3, 4 respectively, as carried in the roller stands 5 (one on each side of the machine and one or more throughout its length, in order to properly sustain said delivery rollers). The end of the frame of the machine has bolted to it a stand 6, having bearings 7 and 8 to sustain the extremities of the under rollers 1 and 3, the top rolls 2 and 4, of the delivery rolls being sustained by the under rollers. Each of the under rolls 1 and 3, is splined at its ends at 9. The splined end of the under roller 1, receives upon it the movable member 10 of a clutch, the coacting member 11 extending from a gear 12, loose on said roller. The front roller 3 of the lower set of delivery rolls has applied to its splined end a loose member 13 of a clutch, the coacting member 14 of which forms part of, or is extended from a gear 15, loose on said roller. The gears 12 and 15 are, by means of a suitable arrangement of gears, rotated continuously at a desired speed.

It will thus be seen that when the clutch parts are in mesh, as shown in the illustration in connection with clutch 13 and 14, then the under roller, with which said clutch coacts, 3 in this instance, will be rotated, again that when the clutches are separated, as represented by the clutch 10 and 11, then the rotation of their under roller, 1 in this instance, will be arrested.

From explanation given, it will be seen that by means of either throwing these clutches in or out of contact, the rotation of either under roll 1 or 3 is arrested, and consequently in connection with it the supply of the respective thread, a feature readily accomplished from lever connections shown in the illustration by means of raisers or sinkers in the pattern chain 16. In the illustration, the lever 17 as fulcrumed at 18, and which lever, by means of its forked-end working in groove 19, controls the clutch 10 and 11, is shown with its heel 20 to be acted upon by one of the balls or rolls, *i. e.* risers of the pattern chain 16, with the result that the clutch parts 10 and 11 are disengaged, and consequently the rotation of the thread delivery rollers 1 and 2 arrested. At the same time the lever 21, as fulcrumed at 22, is shown with its heel 23 resting against a tube, *i. e.* sinker of the pattern chain 16, with the result that its mate clutch parts 13 and 14 through the forked-end of the lever as working in groove 24, are engaged, and consequently the delivery rollers 3 and 4 to be rotating, *i. e.* delivering thread or yarn.

25 indicates a novel thread guide (a rod surrounded by a spiral spring) to keep the individual threads as delivered by sets of rolls 1 and 2, and 3 and 4 separate until past vibrator bar 26. This bar 26 is carried by elbow levers 27, connected with a rock shaft 28, extended lengthwise of the machine. Upturned arms 29 of said levers are slotted and have connected therewith, in a slot thereof, a stud 30, that may be adjusted in said slot according to the amount of movement it is desired to impart to the vibrator bar 26, that depending upon the variety or pattern of knob yarn to be made. To move the vibrator levers, a stud 31 is mounted on a lever 32, slotted to receive the stud 30 in any adjusted position in which it may be placed, said lever carrying a roller 33 which in turn is acted upon by a cam 34, mounted on a shaft 35 (see Fig. 2), to which is connected a gear 36. This gear is driven by a changeable intermediate gear 37, that derives its motion from a pinion 38, fast to the shaft, to which is attached the intermediate 39, said intermediate deriving its motion from a pinion 40 on a shaft 41, having at its opposite ends a gear 42, that derives its motion from the intermediate gear 43. The gears 36, 37, 38 and 39 are change gears, and their selection regulates the rotation of the cam 34. The pattern chain 16 is sustained by a barrel 44 as carried by a shaft 45, to which by means of a suitable arrangement of gearing (not shown in the illustration) and of which two are change gears, any speed desired can be imparted to the pattern surface.

A lever 46, of the same shape as the lower end of clutch mover 21, is connected by an adjustable

link 47 with the lower end of a latch 48, fulcrumed at 49, the upper end of the lever 46 having adjustable therewith through a clamp screw 50 a hoop 51, which in one position engages and locks the vibrator 26 in its lowermost position, and thus guides the thread as is delivering, 52 in this instance, so as to wrap itself around the thread, the delivery of which is arrested, *i. e.* the core thread 53 in this instance, in the shape of a knot, the size of this knot depending upon the time that the vibrator is held locked. A knot having been formed, the roll or riser on the pattern chain 16 passes the lever 46, and immediately the vibrator 26 is released and put under the control of the cam 34, which thereafter controls the speed of movement of the vibrator according to length of knot desired.

It will be readily understood that by a change of position of the rolls or risers in the pattern chain, it is possible to make any desired pattern of knob yarn, and either thread may be made to envelop and conceal the other at will, *i. e.* knobs in one color (the knobs formed by one of the threads) to alternate with knobs in another color (the knobs formed by the other thread) may be produced. If the rolls or risers 54 are temporarily omitted, then a variegated effect yarn can be produced which will present either thread enveloping the other as the core for any desired distance. As previously explained, the movement of the vibrator 26 is timed with relation to the movement of the pattern chain 16, and the cam 34 is always rotated one or more times with each complete rotation of the pattern chain 16.

It will be understood that the rotation of one or the other set of delivery rolls 1 and 2 or 3 and 4, is arrested only when the knob or knot is being produced, and that both sets of rolls are rotated while the yarns are twisted together between the knots. (Davis & Furber Machine Co., North Andover, Mass.)

TRAVERSE GRINDING MOTIONS.

There are two methods of traverse grinding, viz.: the Hardy and the Roy motion, both being used in the grinding machinery as built by B. S. Roy & Son. A description, illustrated, is herewith given of these two systems.

The Hardy Traverse Motion. This motion was the first internal traverse motion for grinding cards invented. As will be seen from the accompanying illustration, Fig. 1, which is a sectional view of this motion, the grinding wheel, while revolving, is traversed by means of a right and left hand screw, which is connected to the grinding wheel by a small "dog" or finger, as is shown in the central portion of wheel. The shell of this grinder must necessarily be small, as the right and left hand screw inside the shell must be nearly as large as the inside diameter of the shell to hold the "dog" in position against the shell. These shells are made from 2¼" to 3" diameter. The chief improvement to this grinder, since being invented, is to make the traversing end with a sleeve, where the screw end goes through the head, so that the screw itself does not make a bearing at that end, the bearing being the sleeve. The grinding wheel reverses instantly at each end.

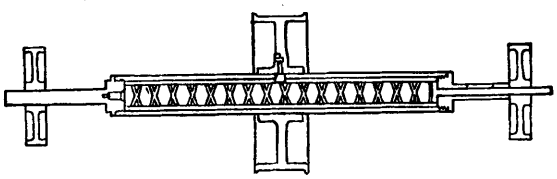


Fig. 1.

The Roy Traverse Motion. In response to the demands for a traverse grinder which (1) could be made with a larger shell (the shells then in use being so small that they were easily sprung, especially for wide cards); (2) could be traversed faster, so as to grind the card wire more on the sides thereby making a better point; and (3) one where the grinding wheel would momentarily stop or dwell at each end before reversing, so as to grind the ends of the roller, cylinder, etc., then grinding as much as the centre, and where the grinding wheel did not clear the card wire at each end before reversing, there were several traverse motions invented, the only successful one, which contained all of the requirements demanded, being the Roy or internal chain traverse motion, of which a sectional view is given in the accompanying illustration Fig. 2. The shells of this grinder are made from 3½" to 5" diameter. Owing to the light weight of the traverse motion, the shells can be made large without greatly increasing the weight. The endless chain is driven by a sprocket, the sprocket being driven by a bevel gear (see right hand end of shell) on the journal which runs through the head. At the opposite end is a flange pulley over which the chain runs, which flange pulley is adjusted by a suitable screw for keeping the chain tight. The chain is guided its entire length by a steel plate. On one of the chain links is a stud (see, about, central portion of grinding wheel) which engages the fork or "T-piece" which is connected to the grinding wheel, causing it to traverse back and forth. When this stud reaches either end it has to run over the sprocket or flange pulley before reversing, causing the grinding wheel to momentarily stop or dwell on the card wire, thereby causing the ends of the clothing to be ground as much as the centre, without being compelled to clear the grinding object before reversing. For cards wider than 36" this motion is almost exclusively used. (B. S. Roy & Son, Worcester, Mass.)

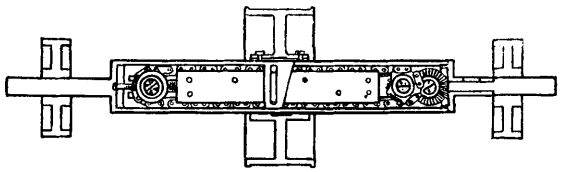


Fig. 2.

THE ROY BALANCING HEADS FOR ROLLERS.

These heads (see Fig. 1) are made with chambers or pockets in which are placed small lead balls. When a new emery cover is put on the roller, this as a rule will throw the roller slightly out of balance, thereby causing the same to grind only on one side. To remedy this trouble, the lead balls are then transferred from the heavy to the light side of the roller

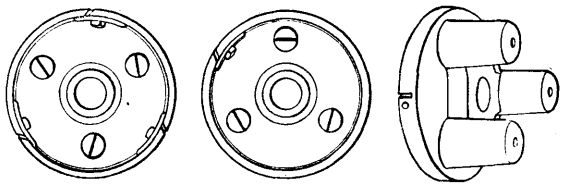


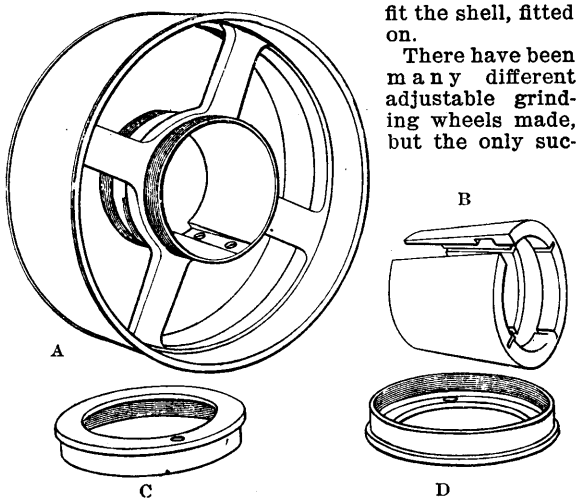
Fig. 3. Fig. 2. Fig. 1.

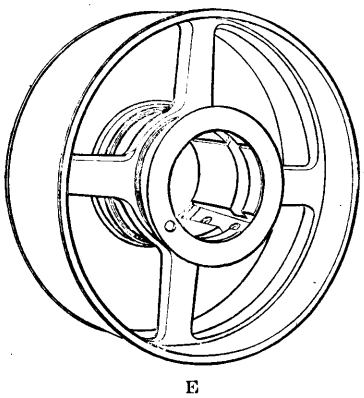
until the roller is perfectly balanced, a procedure which only will take a few moments. The illustration also shows how the clamps are arranged for holding the emery fillet. At one end, where the fillet is started (see Fig. 2), there is but one clamp and at the opposite end, where the fillet ends (see Fig. 3), there are three or more clamps, so that different widths of fillet may be used. (B. S. Roy & Son, Worcester, Mass.)

ROY'S PATENT ADJUSTABLE GRINDING WHEEL.

Ever since the traverse grinder was invented, it has been the constant aim of grinder builders to invent a successful adjustable grinding wheel. The ordinary grinding wheel soon became loose from constant traverse on the shell, and then perfect grinding was impossible. When this occurred, the old wheel had to be thrown away and a new wheel, bored smaller to fit the shell, fitted on.

There have been many different adjustable grinding wheels made, but the only successful one is herewith illustrated. Not even a nut or set screw is used in its construction, besides it is exceedingly simple. Instead of the hole being bored straight, *i. e.* in the usual way, it is bored tapered (see diagram A), and a tapered split bushing (see diagram B) with a chamber in same for a felt oiler, making it self-oiling, is inserted. Then a collar (see diagrams C and D — outside and inside views of it respectively) is screwed on each side of the wheel up to the tapered bushing (see diagram E). By loosening the collar at the small end of the tapered bushing and tightening the one at the large end, the bushing is pressed into the tapered hub of the wheel, and, being split and tapered, it contracts around the shell until a proper fit is obtained. The wheel can be taken up until the shell is worn out, and then, by putting a new bushing into it, it is as good as ever. The adjustment, being in the hub, can be put on wheels as small as 6½″ for 3½″ shells. The usual method followed in making adjustable wheels was to split the hub in quarters and adjust each quarter by means of adjustment in each spoke, consequently it could be applied only to large wheels, and, unless adjusted very carefully in a lathe, it was impossible to get the wheel true. The adjustable wheel with tapered split bushing, as shown complete in diagram E, will always run true, no matter how much it is taken up, as the adjustments and grinding wheel always remain in the same relative positions. (B. S. Roy & Son, Worcester, Mass.)



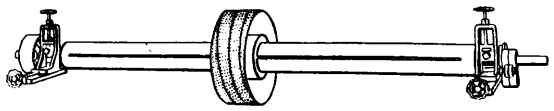


ROY'S TRAVERSE GRINDER FOR WOOLEN AND WORSTED CARDS.

The variety of traverse grinders made for woolen and worsted cards is almost unlimited. Most all of the different makes of cotton cards require the same diameter grinding wheel (usually from 6½″ to 7″) while woolen and worsted cards require different diameters of grinding wheels, the same ranging from 7″ to 30″. The cause for this is that the main cylinder and doffer of the card are, as a rule, ground at the same time, thereby requiring different sizes of grinding wheels, according to the sizes and positions of the cylinders and doffers. The usual method of grinding main cylinder and doffer together, is to run the grinder, set in suitable adjustable brackets and boxes, on the stands of the Fancy, although some are run in the poppett heads or extension bearings.

For grinding woolen and worsted cards the chain traverse motion is almost exclusively used owing to the large diameter of shell and fast traverse. Grinder shells have increased in diameter until the size now used is 5″. This is because of the fact that they are less likely to get sprung, and, owing to the increased area and the larger traverse motion which can be put inside, they wear much longer. The chief improvements for traverse grinders for woolen and worsted cards are the adjustable grinding wheel, the differential motion, and large steel shells.

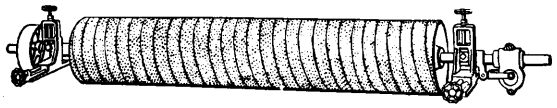
The accompanying illustration shows a perspective view of one of these traverse grinders which is now almost exclusively used where a nice point is required, the roller grinder being used only for truing and touching up the card clothing a little when time cannot be spared to properly grind with a traverse grinder. (B. S. Roy & Son, Worcester, Mass.)



ROY'S ROLLER GRINDER FOR WOOLEN AND WORSTED CARDS.

The accompanying illustration shows one of these roller grinders in its perspective view. This grinder, when used, which however is very seldom, is set on the card in the same manner as the traverse grinder previously explained. These rollers for this grinder are made either of wood, sheet metal, cast iron, or steel tubing, the last ones giving the most satisfaction. They are covered with the ordinary emery cover, glued on, or with emery fillet, same as for

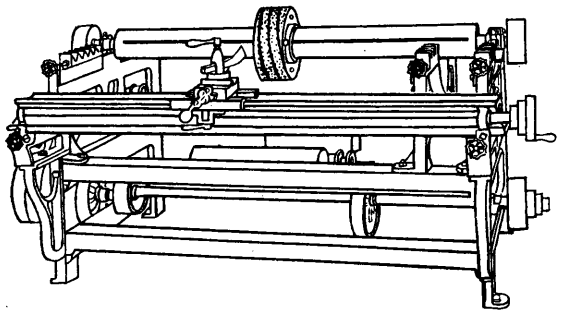
cotton cards. They are fitted with a reciprocating motion to traverse them back and forth while revolving, and the latest style is fitted with balancing heads.



As these rollers are made in rather large diameters —from 7″ to 14″—they are easily thrown out of balance—the usual cause being a new emery cover,— causing them to grind only on one side. To remedy this, the balancing heads, previously referred to, are applied thereto. These heads, as explained in the special article on their construction, operation and advantage, have a series of pockets in which are small lead weights. When then the grinder becomes out of balance, these lead weights are then simply transferred from the heavy to the light side of the roller until it is perfectly balanced. (B. S. Roy & Son, Worcester, Mass.)

ROY'S FLOOR GRINDER FOR WOOLEN AND WORSTED CARDS.

This floor grinder, and of which a perspective view is given in the accompanying illustration, is used for grinding the small rolls of the card, such as workers, strippers, etc.—two at the same time. It consists of a suitable frame fitted with V bearings (to accommodate shafts of different diameters) in which the rolls to be ground are placed, and either a traverse or roller (usually a traverse) grinder set between the rolls. One roll is set in the V bearings on each side of the grinder, and which bearings are adjustable so that the rolls to be ground can be adjusted to the grinder roll. The frame is of iron and made sufficiently heavy and rigid to insure true and even grinding. When different widths of cards are used in one mill, they are all ground on the same machine by using a crosshead, or intermediate head, which can be adjusted for any width narrower than



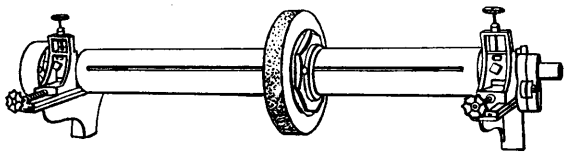
the extreme width of the machine. As this machine must be very accurate, care is taken in the construction of the frame that all the girths, heads, bearings, etc., are planed to a level so that there will be no variation in the heights of the rolls grinding, thus preventing any uneven grinding.

A turning rest, or straight edge is also provided for turning and truing the rolls before they are re-clothed. This turning rest is portable, so that it can be placed on the card, for turning and truing the main clyinder as well as the doffer before they are re-clothed. This lathe is sufficiently heavy and rigid so that it will not sag or spring, since otherwise it will turn uneven, it being also fitted with adjustable stands to adjust the ends parallel.

When a traverse grinder is used, the same can be fitted with an extra solid emery wheel, about 12″ diameter and 2″ face, to permit grinding Burr Cylinders, Garnett machine clothing, etc., in the frame. (B. S. Roy & Son, Worcester, Mass.)

ROY'S GARNETT MACHINE GRINDER.

The accompanying illustration shows this traverse grinder, as used for grinding the cylinders of Garnett machines, in its perspective view. Suitable brackets are fastened to the arches on which are set the adjustable stands and boxes in which the grinder is run. By means of these adjustable stands the grinder



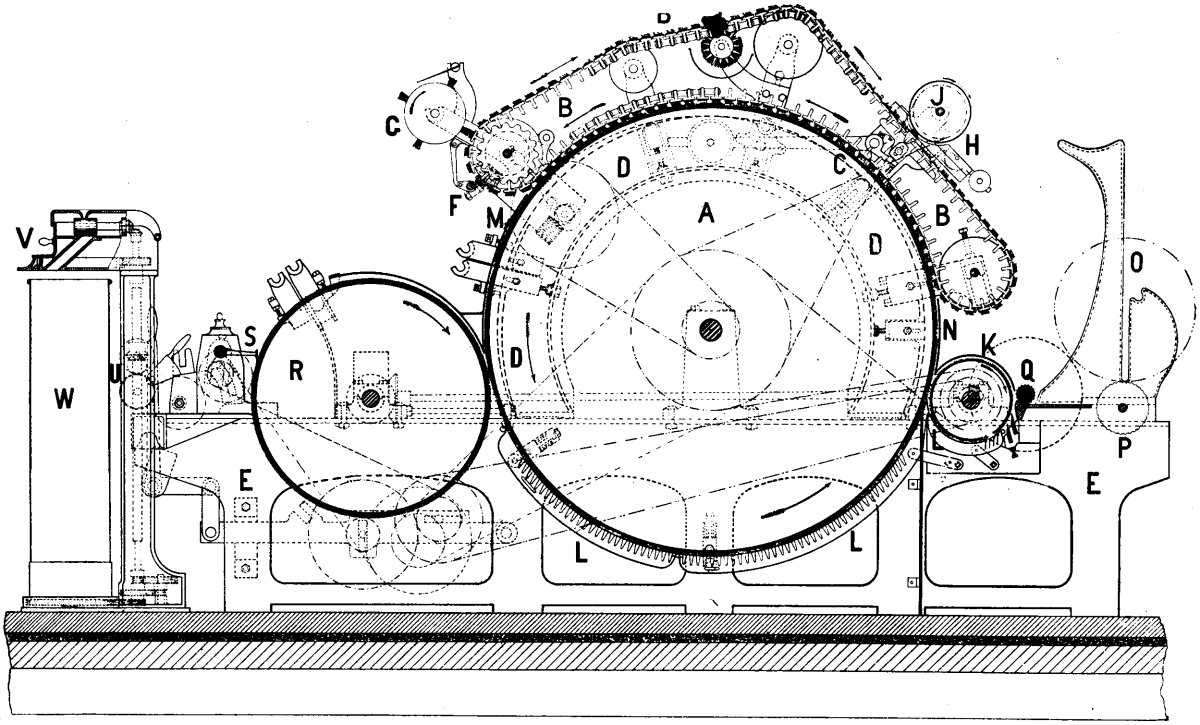
can be adjusted horizontally and perpendicularly, while running, to suit. The traverse grinder is fitted with a 2″ face, solid emery wheel, of the proper diameter, and with a special slow, positive, differential motion for slowly traversing the emery wheel, while revolving. This traverse grinder must be made with an extra strong steel shell, not less than 5″ diameter. (B. S. Roy & Son, Worcester, Mass.)

COTTON.

PLATT'S CARDING ENGINE.

The carding process is, in the opinion of many experts, the most important operation through which the cotton passes. It is at this point that the final cleansing takes place by the elimination of the impurities that have not been removed by the opening and scutching machinery, and the fibres, which are at this stage crossed in every conceivable direction, require to be placed in parallel order. The Carding Engine which accomplishes this the most successfully will give the most satisfactory results in the spinning; or, in other words, lead to the production of the best yarn. The premier position has now been unanimously assigned to the present form of the self stripping revolving flat card. Such a card is shown in section, in the accompanying illustration, and consists of a main carding cylinder A, and on its circumference the flats B—which are made in the form of cast iron ribs faced with card clothing—are seen connected, so as to form an endless traveling lattice, those at work resting upon flexible semicircular rings C, which are accurately fitted upon the fixed bends D, the whole being carried from the frame sides E. The flats when out of action—*i. e.*, when quitting the cylinder A—are stripped of any fibres or impurities adhering to them by the action of the patent vibrating comb F and the revolving brush G. The flats then pass over guide rollers to the grinding apparatus H, whereby the faces of all the flats are successively ground from their working surfaces by the grinding roller J, and the points of the wire leveled and sharpened while the card is working. The extra cleaning facilities afforded by this type of carding engine have been still further augmented by the arrangement of

the casings and knives applied to the cylinder A and the taker-in K respectively. A simple form of adjustment has been devised to give any desired result, and being regulated from the outside of the frame, it makes what was formerly a laborious duty into the simplest that the attendant has to perform. The casings and the covers are adjustable, to allow for any wearing of the wire on the respective parts they enclose, so as to prevent the formation of accumulations, which in older systems were the main cause of inefficient work. The unlapping of the fleece of the lap O is performed by the roller P, on which the lap rests, and it is then drawn forward under the feed roller Q, and delivered to the taker-in roller K, revolving in the direction of the arrow. At this point the carding or combing action commences, the fleece being held by the feed roller Q. The fibrous tufts of



cotton are carried round on the under side of the taker-in to the main carding cylinder A. The wire clothing of the carding cylinder sweeps off the cotton from the taker-in K, and carries it forward to the series of flats B. The wire clothing of the flats is set to face that on the main carding cylinder, and travels forward in the same direction as the surface of the cylinder, but at a very slow rate. The cotton thus undergoes a very thorough carding and straightening in passing the forty flats, which are always in contact with the top of the carding cylinder. The fleece of cotton after its passage through the flats is taken off in a continuous sheet by the doffer R, the wire clothing of which faces that on the cylinder, but runs at a much slower speed. The fleece thus receives a further straightening and stretching on leaving the carding cylinder, and is carried on the under side of the doffer to the vibrating comb S, which describes a short arc of 1¼ inches vertical movement, and is driven from a self-oiling oscillating motion which runs at 2,000 revolutions per minute or upwards without the slightest inconvenience. This comb strips the fleece from the face of the doffer in its down stroke and clears itself in rising. The thin fleece of the full width of the machine is then gathered in lateral guides to a width of about 6 inches, and finally into a smooth bell-mouthed funnel having a hole only ½ inch in diameter, through which the contracted ribbon or sliver is drawn by the calender rollers U, whence it passes to the coiler V and can W. The sliver is coiled by this arrangement until the can is filled, and then taken to the drawing frame.

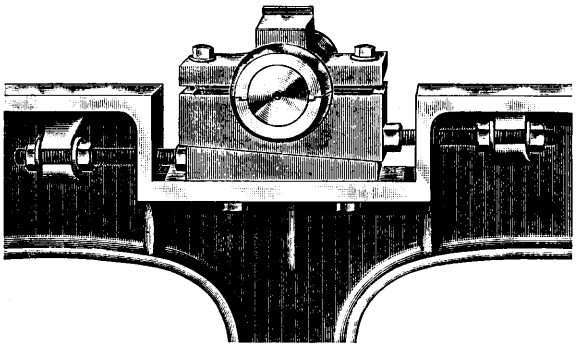
The lap produced on the scutcher, and placed behind the carding engine, is made of such a weight per yard as to produce a sliver of the average thickness required, the doffer of the carding engine being arranged to run at a suitable speed for the purpose. There is, however, a varying amount of waste in the carding, consequently the thickness of the sliver, as deposited in the coiler can, may vary to a certain extent, and it is the function of the drawing frame afterwards to make the sliver as uniform in thickness as possible. (Platt Bros. & Co., Ltd., Oldham, Eng.)

HOWARD & BULLOUGH'S ADJUSTABLE CYLINDER PEDESTAL FOR CARDS.

On a revolving flat card, it is very important to obtain a firm and adjustable bearing for the cylinder; firmness, in order that the small space between the teeth of the flats and the clothing on the cylinder may remain constant at all times and thus produce even carding and also avoid the liability of the clothing being injured by contact with the flats; and adjustability, in order that any wear in the bearings may not interfere with the proper position of the cylinder in the machine.

The adjustable pedestal for holding the cylinder bearing is shown in the accompanying illustration, which is a side view of a portion of the card framing, showing the application of the pedestal. As will be readily seen, the pedestal is designed so that both vertical and horizontal adjustments can be easily made.

The vertical adjustment is obtained by having the pedestal made in two pieces, the two sides which fit against each other being cut at an angle, so that by sliding one on the other, the bearing is raised or lowered, according to the direction of the movement.



Each piece of the pedestal has a threaded rod connected to one end, the two rods being on opposite sides as shown, and through which the proper adjustment is obtained. If a vertical adjustment is required without any horizontal movement, the lower piece is either moved inwardly or outwardly, according to whether the bearing is to be raised or lowered.

A horizontal movement is obtained by simply moving the two pieces bodily in either direction.

A combination of these movements will produce any desired adjustment of the bearing.

The construction of the card sides is such, that a firm bearing, free from vibration, is provided. The steps of the cylinder pedestal are made of phosphor bronze, which is very durable. It will be understood that one of these pedestals is used on each side of the card to hold the bearings for the cylinder shaft. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

MACHINE FOR APPLYING CARD CLOTHING TO CYLINDER.

The improvement consists principally in the method of moving the carriage of the mechanism across the width of the card cylinder to be covered, and its object is to reduce the strain on the vital parts to which they were previously subjected.

The whole mechanism for applying the clothing to the card cylinder consists of a traveling carriage which is movable across the width of the card cylinder, and is made for guiding the fillet or strip of card clothing which is being applied to the cylinder. Means are also provided for exerting a tension upon the fillet and for varying said tension, and also means for automatically indicating the amount of tension exerted. The carriage driving mechanism is adjustably connected to the same mechanism as used for turning the cylinder, so that the travel of the carriage may be varied to correspond in the necessary way with the surface speed of the cylinder.

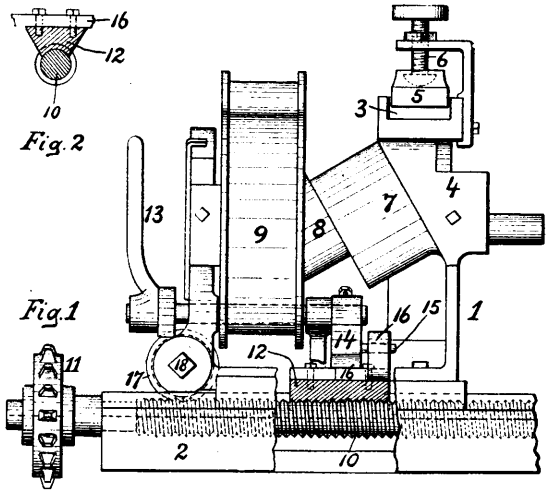
The details of the mechanism are best shown by means of the accompanying illustrations, of which Fig. 1 is a front view of the mechanism and Fig. 2 is a cross section of the screw and nut for operating the carriage.

Referring to the illustrations, 1 indicates the carriage which is mounted on the carriage stand 2 that extends across the width of the card cylinder, and the carriage is slowly moved across while the card clothing is being wound upon the cylinder, the movement of the carriage for every full revolution of the card cylinder being equal to the width of the fillet.

The guiding and tension devices consist of a recessed passage 3 in the upright piece 4, through which the fillet is passed, and on which the plate 5 presses to put tension on said fillet, the amount of tension being regulated by the screw 6. From the passage 3, the fillet passes over intermediate drums 7 and 8 and then around the lever 9 to the card cylinder.

The driving mechanism consists of a long driving screw 10 which is driven by a sprocket 11, said screw having a feeding nut 12 in threaded contact with it, the feeding nut being movably secured to the carriage, so that the latter may thus be actuated. The nut is in contact with about one-quarter of the circumference of the driving screw 10 as seen in Fig. 2.

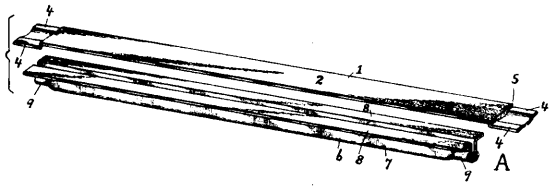
After the carriage 1 reaches the end of its travel, the nut 12 is raised out of contact with the screw 19 by means of a handle 13 which moves a rocking arm 14 carrying a pin 15 which passes through an opening in a lever 16. To this lever 16 the nut 12 is secured and is thus raised by the handle 13. The nut 12 is held down, when in contact with the screw 10, by having the lower end of the rocking arm 14 press against the lever 16 and be practically locked until released by the handle 13. The carriage is returned to the other end of its path by means of a worm gear 17 which is turned by a handle placed on the squared end of a shaft 18, on which said worm gear 17 is secured, the screw 10 in this instance being stationary, acting as a rack for the worm gear. When the device is in operation, *i. e.*, clothing the cylinder,



said worm gear 17 is free to move with the carriage, but in no way aiding the movement of the latter. (Saco & Pettee Machine Shops, Newton Upper Falls, Mass.)

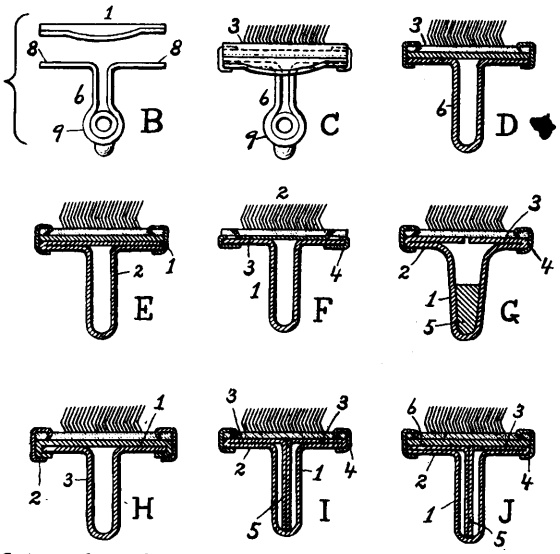
FLATS FOR REVOLVING CARDS.

Card flats, made of cast iron, are very liable to be sprung and thus lose their shape, a feature which tends to affect the shape of the card clothing attached



to it and consequently the operation of the carding engine. To overcome this disadvantage, flats of sheet metal are provided, which in turn are lighter than the cast iron flats, stiffer and consequently not as liable to spring out of shape, and remain so.

The flats are made in different ways, as will be shown, the principal requirement being to provide a



flat surface for receiving the clothing and one or more hollow ribs for stiffening it. At the same time it may be constructed so as to provide a means for stretching the card clothing attached to it. The flats also have guiding surfaces at their ends, which support them upon the flexible bends of the card and bear against the guides of the grinding mechanism.

The details of one style of flat as well as cross sectional views of other styles are shown in the accompanying illustrations, of which Fig. A is a perspective view of the parts of a two piece metal flat, before they are secured together, Fig. B being an end view of the same. Fig. C is an end view of the flat with the clothing attached.

Referring to these illustrations, 1 indicates a sheet metal piece for forming the face of the flat, having the flat surface 2 for receiving and supporting the card clothing 3 and having its ends made with guiding surfaces 4 and shoulders 5. The part 6 forms the back of the flat and acts to hold and stiffen the face 1. It is made of flat metal, which is shaped to form a hollow longitudinal central rib 7 and flat extensions 8, against the face of which the piece 1 fits and to which it is attached. The extreme ends 9 are shaped to be secured to the feeding chain for the flats on the card. The parts 1 and 6 are secured together by riveting, the card clothing being secured to the flat thus formed, as shown in Figs. C and D, the latter being another form of the two piece flat.

Fig. E shows a flat as made of one piece of flat metal, the part 1 being integral with the part 2 along one edge and being folded from that edge against the other part and so that the free edges shall be in line with each other.

Fig. F shows a flat as made of one piece 1, the clothing 2 having a stretching and backing plate 3, which serves to stretch and hold the clothing, and also by means of its extensions 4 to fasten it to the flat.

Fig. G shows a flat made of one piece of sheet metal and so constructed that it may also be used to stretch the card clothing and hold it stretched. It is shaped to form a hollow reinforcing rib 1, with lateral extensions 2, which fold back upon this to form the folded sections 3 upon the hollow rib. These reinforced portions serve to hold the clothing and are a part of the rib, being at the same time separable from each other, and by separating them slightly before attaching the edges of the clothing to the flat by the clips 4, the clothing may be stretched by slightly separating the sides of the rib. This may be done by inserting a separating plug 5 into the cavity of the rib between the sides and thus push them outwardly.

Fig. H shows a sheet metal flat in two parts, similar to the flat of Fig. A, with the exception that the part 1 is made wide enough to furnish the sections 2, which are bent around the edges of the wings of the part 3, in this manner not only fastening the part 1 to the part 3, but also forming an angular and stiffening reinforcement along each edge of the flat, which adds stiffness to said rib 3.

Fig. I shows a flat which is formed from one piece of sheet metal and which is similar to that shown in Fig. G, with the addition of inward extending stiffening sections 6 from the top forming parts 3. These inward extensions 6 rest against the inner surface of the rib, and serve to stiffen the structure of the rib, because of their width and also because of the angles which they form in conjunction with parts 3. The flat so made may directly receive the clothing, as shown in Fig. I, or it may have an additional plate 6 interposed for receiving it, as shown in Fig. J. (Saco & Pettee Machine Shops, Newton Upper Falls, Mass.)

HOWARD & BULLOUGH'S SETTING ARRANGEMENT FOR FLATS.

This arrangement has for its object the attainment of a simple and accurate method of setting Revolving Top Flats on Cards. The two accompanying illustrations clearly show the construction and working of the arrangement, Fig. 1 being a vertical sectional view, and Fig. 2 a plan view in section.

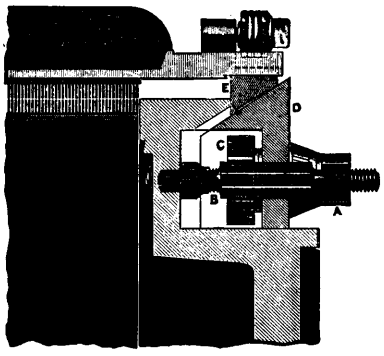


Fig. 1.

Letters of reference in the two illustrations indicate thus:—

A—is Index Nut which bears against outside of Rigid Bend D.

B—is Setting Key with fluted teeth, which gear into the teeth on Nut C.

C—is Toothed Nut which bears against the inside of Rigid Bend D.

D—is Rigid Conical Bend which is moved in or out.

E—is Flexible Conical Bend which rests on D and carries the Flats.

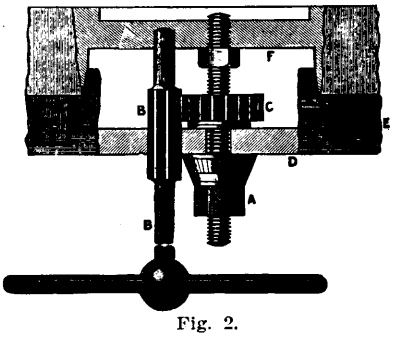


Fig. 2.

By turning the Index Nuts A and the Toothed Nuts C one way or the other, they move the Rigid Bend D in or out, and thereby raise or lower the corresponding Flexible Bend E which rests upon it.

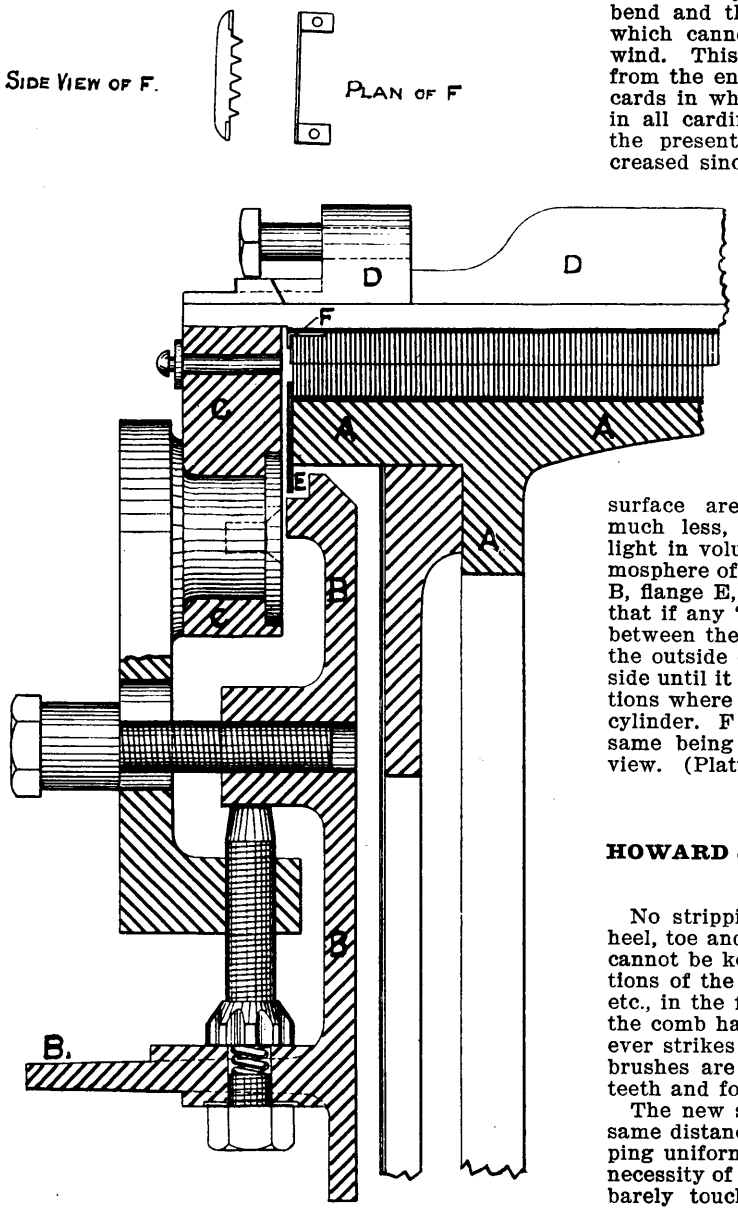
As the Flats rest upon the Flexible Bend E, they are raised or lowered with it. Each mark or division

on Index Nuts A represents the 1000th part of an inch, and by turning the Nuts the distance of a division in one direction or the other, the Flats are correspondingly raised or lowered to this extent.

The setting cannot be tampered with after the Key B has been used to tighten the Toothed Nuts C. The Key B and a special wrench suitable for turning the Index Nuts A should only be in the hands of the overseer. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

PLATT'S PERFORATED OR SLOTTED FLEXIBLE BENDS.

The principal feature in all revolving flat carding engines is the position of the fixed bends, which hitherto have been placed as close as practicable to the cylinder edges, the intervening space being filled up with linings or flanges made of wood or iron, or both. None of these methods however have had the desired effect of preventing the long standing evil known as "side waste," a feature however now successfully accomplished by an ingenious contrivance which permits the fixed bends to be placed under the ends or inside the cylinder, thus bringing the flexible bends or flat course to the position formerly occupied by the wood lining in former constructions. The advantages of the new construction will be readily understood by reference to the accompanying sectional view, a feature which at the same time will lead the observer to associate other and important changes, viz.: a shortened flat, the cylinder ends perfectly enclosed, resulting in improved selvages and the entire disappearance of side waste. The cause of side waste in former constructions undoubtedly lay in the large and exposed surface of the fixed bends to the action of the cylinder, the current of air created by each revolution became the disturbing influence by reason of being pent up between the bend and the cylinder, thus leading to a condition which cannot be better described than as a whirlwind. This action is constantly abstracting cotton from the ends of the flats, and especially in modern cards in which full width laps are used, and indeed in all carding engines that have been made, up to the present time. The evil has been largely increased since the introduction of heavy weights and large productions, for the higher the cylinder speed, the stronger is the current of air created and the larger the quantity of side accumulation made.



Again, a glance at the illustration shows at once the converse of the action just described. The fixed bend B is now placed inside the cylinder A, consequently the current of air made between it and the cylinder cannot escape so as to abstract any cotton from the flats D, this being prevented by the flange E. The flange E, 1⅛ in. broad, really takes the position of the fixed bent in the old card, and its surface area exposed to the cylinder being so much less, the currents of aid generated are so light in volume, that they are dispersed into the atmosphere of the room. From the position of the bend B, flange E, and flexible bend C, it will be observed that if any "side waste" is made at all, it must pass between the flange E, and flexible bend C and on to the outside of the bend B, and not gather on the inside until it is rolled into lumps, as in other constructions where the fixed bends are on the outside of the cylinder. F shows one of the end plates of a flat, the same being shown also in detail in side and plan view. (Platt Bros. & Co., Ltd., Oldham, Eng.)

HOWARD & BULLOUGH'S "FLAT" STRIPPING MOTION.

No stripping motion hitherto made will clear the heel, toe and middle of the flats equally, as the comb cannot be kept at the same distance from these portions of the flat, and hence leaves more or less dirt, etc., in the flat. A bristle brush to clear away what the comb has missed is necessary, which brush however strikes much of this dirt into the flats. If wire brushes are used it entails risk of cutting both the teeth and foundation of flats.

The new system enables the comb to work at the same distance throughout the whole flat, hence stripping uniformly, and practically doing away with the necessity of brushes, or using them as simple dusters, barely touching the wire, at the same time run-

ning them only at about one-tenth of their present speed.

Ordinary wear naturally makes the lengths of chains driving the flats variable, and the flats "tilt," and there is no comb that will not catch the wire and damage it, if set close; however under the new system, no matter what the "tilting," the stripping is

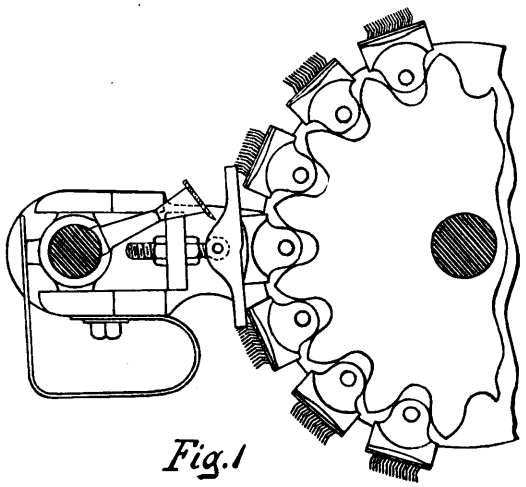


Fig. 1

done perfectly, and as well on an old card as on the newest.

Any high or low flats caused by bad setting or grinding are stripped as perfectly as the newest and most accurately set flats. Should dirt get underneath the flats and force them away no difference is caused in the perfect stripping, as the comb follows the flat.

The construction and operation of the new motion are best shown by means of the accompanying illustrations, of which Fig. 1 is a side view, showing the

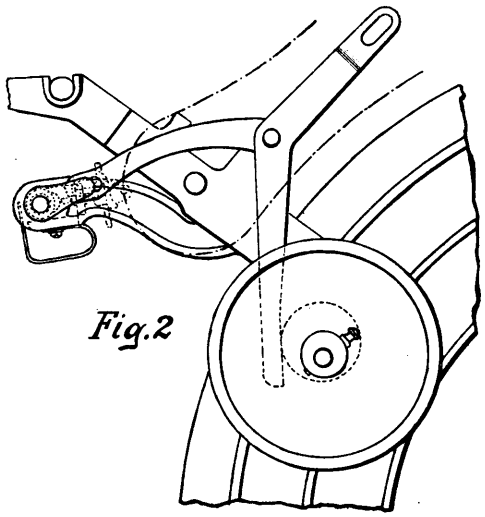


Fig. 2

comb and the flats in position for stripping; Fig. 2 showing the method of actuating the comb for the stripping purpose.

The comb for stripping the flats is mounted at each end in bearings, capable of sliding towards or away from the flats in suitable guides. These bearings are kept at a given distance from the flats by means of a shoe which presses against the working seating of flat, the shoe and seating being practically of the same width on face.

The comb is kept equidistant from the wire at any desired distance, by an adjusting screw on each end. The shoe is so shaped that it allows for the "heel" of the flat, and thus insures the comb being always kept at the proper distance from the wire, and thus prevents the possibility of any damage to the latter.

To keep the shoes well against the working seatings of the flat, the sliding bearings for the comb-stock are securely pressed inward by springs.

The comb being centred at a point in front of the chain of flats, and striking in a circle below the line joining the centres of comb-stock and front chain block, gives a receding motion to the comb blade, causing it to effectually pull all impurities out of the wire.

This action, together with the fact that it is impossible for the wire on the flats to be forced into the comb by accumulation of dirt or "fly" on the blocks or flat seatings, constitutes this arrangement a most perfect flat stripping motion. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

BATTEN AND HAYES' METHOD OF STRIPPING FLATS ON REVOLVING FLAT CARDS.

The object of this method of stripping the card flats is to facilitate the production of even and strong yarns by cleaning the stock more thoroughly, taking out a larger proportion of the short fibre, besides delivering the stock with its fibres straighter and in better parallelism than with an ordinary stripping arrangement on the card.

The new method consists in providing an additional stripping device which is located at an intermediate point between the licker in and the doffer, and by means of which the flats, after having performed a part of their travel in working relations with the main cylinder, are stripped, so that during the remaining portion of their travel upon the flexible bends they are enabled to act as thoroughly and efficiently in carding as they were after first returning to the cylinder, at the rear of the card. The details of the arrangement as applied to the card are shown in connection with the accompanying illustration, which is a side elevation of a portion of a card with the device applied.

With reference to the illustration, 1 indicates the main cylinder of a card, 2 is the licker in, 3 is the doffer and 4 the traveling chain of flats. 5 indicates the sheaves around which the traveling flats are passed, in order to guide the flats to the cylinder at the rear and to take them away at the front of the card. 6 is the intermediate sheave for supporting the upper length of the chain of traveling flats as it returns above the main cylinder from the doffer end of the card toward the licker in end. This sheave 6 is supported by a bracket 7, which is mounted on the main arch 8 of the card, said bracket 7 also supporting the flexible bend 9.

On the regular card the stripping of the flats is effected by means of a stripping comb 10, after the flats have left the flexible bends at the front of the card and are traveling back over the top.

The carding action between the main cylinder and the flats is most efficient when said flats first return to the flexible bends, in consequence of the flats being in a clean state, but as the flats move onward towards the doffer, the teeth of the card clothing on the flats fill up with dirt and short fibres and the efficiency consequently becomes less. As a result, the carding action during the latter half of the travel of

the flats upon the flexible bends is much less than during the first half of such travel. It is to overcome this fault and to have the flats in good working condition during the entire time they are on the flexible bend, that an extra stripping device is provided near the centre of the travel of the flats. For this purpose, bridge shaped bends 11 are used so that as the ends of the flats slide along the flexible bends 9, they will pass onto said bridge bends 11, and thus be raised from the periphery of the main cylinder. Holding down brackets 12, adjustably mounted upon the flexible bends, act against the backs of the flats to hold said flats down firmly against the flexible bends at the points at which the flats leave and return to said flexible bends in traveling over the bridge bends 11.

The periphery of the main cylinder between the point at which the flats are uplifted from the same and the point at which they are again returned to working relations with the main cylinder, is enclosed by a cover plate 13, which is beveled at each side so that it may fit as close as possible to the points where the flats leave and return to the cylinder. This plate 13 is made adjustable by means of screws and may be set radially to the periphery of the cylinder. In the space between the uplifted portion of the chain of flats and the cover plate 13, a stripping comb 14 is provided for cleaning the uplifted flats as they travel past said comb. This comb is similar to comb 10 and is vibrated through levers from the same eccentric 15 as said comb 10.

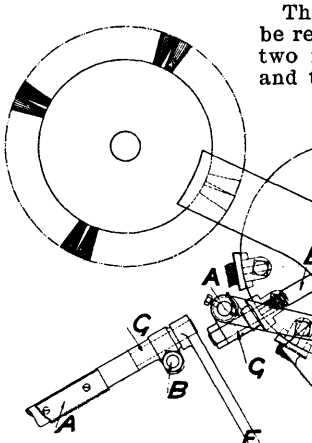
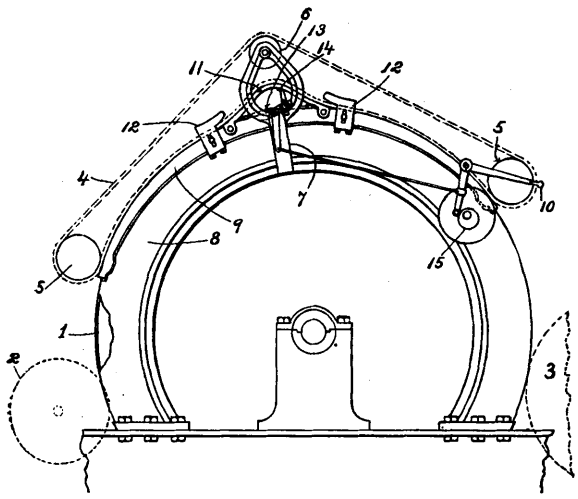


Fig. 2.

The outer portion of the middle bracket 7 is constructed in the form of an open arch, for the purpose of permitting inspection of the flats as they pass over the bridge bends 11, and also for the purpose of enabling easy access to be had to said flats and to



the stripping devices, for adjusting purposes and for removing strippings. The strippings at this point contain more dirt than strippings from regular cards where the flats travel the entire carding surface before they are cleaned, this feature showing that the length of time of working the flats before cleaning is excessive, so that without the additional middle stripper, as previously explained, the flats in their travel, fail to hold all of the dirt, etc., till time for stripping at the front, and consequently a certain amount of dirt will drop back on the cylinder and go forward into the delivered film.

With the double stripper arrangement thus explained, the strippings at the front of the card are very clean and can be put back into the good cotton for spinning medium counts, a feature which certainly is an advantage. (Mason Machine Works, Taunton, Mass.)

PLATT'S RECEDING COMB,

For stripping the flats employed in self stripping revolving carding engines.

The construction and operation of this comb will be readily understood by means of the accompanying two illustrations, of which Fig. 1 shows the comb and the apparatus for operating it, in its side view,

Fig. 1.

showing also that portion of a revolving flat carding engine to which the comb is applied. Fig. 2 is a view in detail showing the comb in its front view.

The comb itself is indicated in both illustrations by A, the same being moved in the arc described by the stripping comb arm B by its connection C with the cam D as usual, but at the end of this downward or stripping stroke, the new mechanism consisting of the additional lever E, cam F, and cannon bracket G, comes into action, as shown in Fig. 1, producing a secondary or receding movement, entirely maintaining the comb at a safe distance from the card wire during the upward or return stroke, thus preventing the possibility of damage being done to the wire. The auxiliary cam F then passes out of action, leaving the ordinary cam D to complete the down stroke, and so on. The receding angle of the comb in relation to the card wire can be varied by the cam F if required.

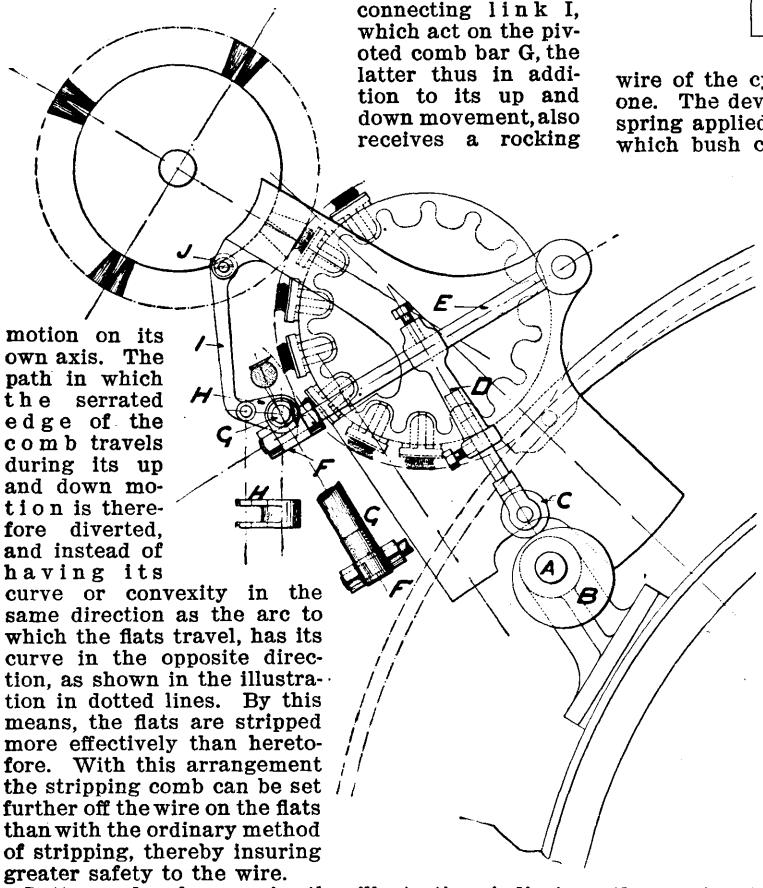
The advantages obtained by the adoption of this comb are:

(1) It permits of closer setting without damage to the card wire, for the reason that its secondary or receding motion draws or lifts the strips out of the flats before making the upward or return stroke. (2) The possibility of angular setting with relation to the card teeth. (3) By the withdrawing action at the termination of the downward stroke, the strips may be reduced to an extent utterly impossible with the old type of stripping comb. (4) The economy consequent on such lightened strips. (5) All danger of contact with the card wire in the return stroke is removed by the receding motion of the comb, and effectually disposes of any liability of disturbance of the angle of the wire well known hitherto as the cause of high wires on the flats. (Platt Bros. & Co., Ltd., Oldham, Eng.)

PLATT'S IMPROVED STRIPPING COMB.

This stripping comb combines an oscillating motion with the ordinary up and down motion, characteristic to these combs, and this at just the speed required for the combing movement essential to the perfect stripping of the flats.

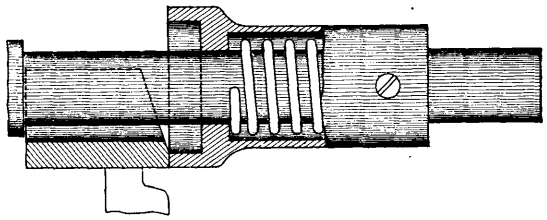
The action of the apparatus will be easily understood by reference to the accompanying illustration: The cam B, acting on the radial arms E, causes the comb bar G to rise and fall in the ordinary manner, but owing to the action of the crank H and pivoted connecting link I, which act on the pivoted comb bar G, the latter thus in addition to its up and down movement, also receives a rocking motion on its own axis. The path in which the serrated edge of the comb travels during its up and down motion is therefore diverted, and instead of having its curve or convexity in the same direction as the arc to which the flats travel, has its curve in the opposite direction, as shown in the illustration in dotted lines. By this means, the flats are stripped more effectively than heretofore. With this arrangement the stripping comb can be set further off the wire on the flats than with the ordinary method of stripping, thereby insuring greater safety to the wire.

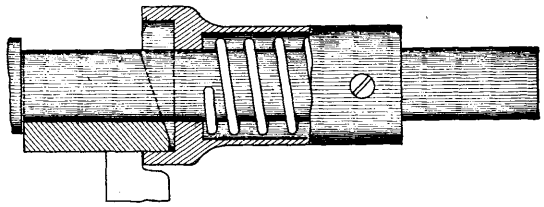


Letters of reference in the illustration indicate thus: A—Cam-shaft, B—Cam, C—Bowl, D—Filbow, E—Radial Arm, F—Comb Bar Bearings, G—Comb Bar, H—Crank, I—Link, J—Link Bracket. (Platt Bros. & Co., Ltd., Oldham, Eng.)

HOWARD & BULLOUGH'S LOCKING DEVICE FOR STRIPPING BRUSH ON CARDS.

This simple device is a patented invention of a practical carder, its purpose being to prevent the stripping roll from jumping and being forced out of its bearing and thus jamming or knocking down the

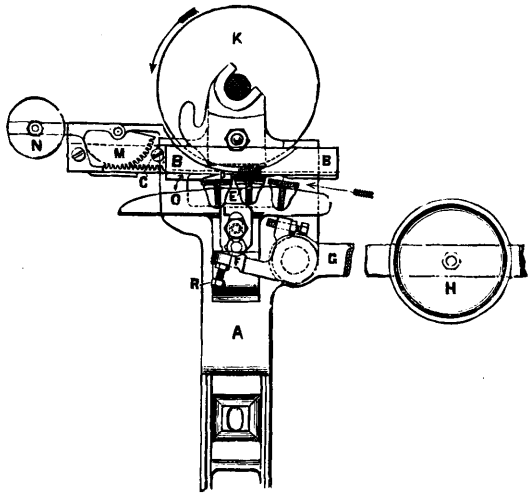




wire of the cylinder or doffer when stripping either one. The device consists of a special loose bush and spring applied to the shaft of the stripping roll, and which bush can be moved lengthwise on the shaft. The construction and application of the device is best shown by means of the accompanying illustrations, of which the top one shows the stripping roll shaft partly placed in one of the bearings provided for this purpose on the frame of the card. The lower illustration shows the stripping roll shaft in place and automatically locked, by the new device, to the bearing, by the flange of the bushing being pushed over the protruding end of the bearing by means of the expansion of the spring. After stripping, the roll can be instantly removed by sliding the bush slightly on the shaft, against the action of the spring. The advantages of the device are, that the automatic locking entirely prevents the jamming of the wire of the cylinder or doffer by the stripping roll jumping out of its bearings. It effects the saving of stripping rolls, as the same cannot be broken or damaged by jumping out of their bearings. It also saves time in stripping, as one man, with stripping rolls fitted with this device, can practically accomplish the work of two. On the ordinary stripping roll the ends of the filleting are the first to give out, as these are usually damaged by the stripping roll jumping out of its bearing, a feature prevented by the new device. With the application of this locking device, the wire at the ends of the rolls will last as long as any portion of the wire of the stripping roll. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

PLATT'S GRINDING APPARATUS FOR REVOLVING FLATS.

The apparatus will be readily understood by reference to the accompanying illustration, in which A indicates the grinding fixing, to which is fixed the bridge bracket B, in which a rack and bar C slide; to this is attached a shoe D, the lower surface of which is formed to the required bevel at which it is desired that the card wire shall be ground. The working or carding surfaces of the flats E are supported and regulated by the shoe D when grinding by the action of the lifter L, and the levers F and G,



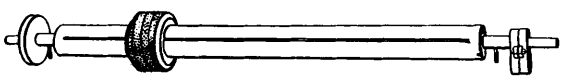
the opposite end of the latter being loaded by a weight H. Each of the flats as they travel along seize the "lip" or projecting end of the shoe D, is carried along until the wires have passed under the grinding roller K, when the flat drops off the lifter L, and releases the shoe D, which immediately returns to its original position by means of the positive movement derived from the rack C, quadrant M, and weight N. In case the flat E should not leave the shoe D at the right moment, it will be carried against the fixed incline or stop O, which will at once cause the flat E to release the shoe D with certainty. Every flat in the set is dealt with in the same manner, thus insuring a uniformity in grinding that cannot be excelled. The attendant should try every flat as it is lifted in the shoe D, and set the lifter L with the setting screw R, so that every flat is pressed tightly in the shoe D.

The apparatus may be placed either at the back or the front of the carding engine, the former position being now mostly preferred, on account of its accessibility to the light, and also for the facilities which its more advantageous position offers to the attendant when setting the grinding roller. (Platt Bros. & Co., Ltd., Oldham, Eng.)

ROY'S TRAVERSE GRINDER FOR COTTON CARDS.

For grinding revolving flat cards, two traverse and one roller grinder are used at the same time, the traverse grinders for grinding the cylinder and doffer, and the roller grinder for grinding the flats. The traverse grinders are made, as a rule, with steel shells from 2¼″ to 4″ diameter, the Hardy pattern with 2¼″ to 3″ shells and the Roy pattern with 3½″ to 4″ shells. The grinding wheels are made with 3″ to 4½″ face, the wider face grinding faster.

These grinders are made in different styles for different makes of cards. Some have brass bushings for V and U shaped poppett heads and some are for poppetts with regular round bearings. They are made with a pulley at each end, one for driving and



one for traversing, or with only one pulley for driving, where a differential or self traversing motion is used. The illustration in its perspective view shows a Roy pattern traverse grinder with differential motion and adjustable grinding wheel (see special articles on "Traverse Grinding Motions" and "Adjustable Grinding Wheel," pages 87 and 88). The grinding wheel is usually covered with emery fillet, which, when worn can then be easily renewed. (B. S. Roy & Son, Worcester, Mass.)

ROY'S ROLLER GRINDER FOR COTTON CARDS.

This grinder as used for grinding the flats of cotton cards, and of which a perspective view is given in the accompanying illustration, is made of cast iron, sheet metal, or steel tubing, those made of steel tubing being the strongest and lightest. The heads at the ends of the roller are common heads, same as is put in any cylinder, or balancing heads for re-balancing the roller when thrown out of true by a new emery cover or from other reasons (see page 87). These rollers are also covered with emery fillet, held in place at each end by suitable clamps.

The roller is given a reciprocating motion by means of a worm and worm gear, enclosed in a casing, connected to the shaft of the roller and to the poppett head. This mechanism is called a reciprocator. (Roy's patents 276,884 and 540,926.) The

traverse of the roller is usually 1″, consequently the roller is made 2″ longer than the width of the card clothing on the flat, so that the roller will always remain on the card clothing of the flat while grinding. (B. S. Roy & Son, Worcester, Mass.)

PLATT'S DRAWING FRAME.

The object of this machine is to place the fibres of the sliver as coming from the carding engine, or the comber, more parallel and at the same time render the sliver as uniform as possible in its thickness. The accompanying illustration of this machine is given to assist in describing its construction and operation. It is fitted, as a rule, with four rows of top and bottom rollers (sometimes five or six), and to each coiler or delivery six or eight cans are placed at the back, according to circumstances.

The slivers as drawn from the cans A pass over the tumblers B back of the stop motion, through the guides C of the traverse bars behind the rollers, and through the draft rollers to the trumpet D of the front stop motion. The sliver then passes between the calender rollers E, through the tube of the coiler, and is deposited in the can. Underneath the coiler wheel of one of the cans of each head, a loose plate F is so arranged that when the can is full the plate is lifted by the coils of sliver, and being in