THE TEXTILE WORLD RECORD
KINK BOOKS

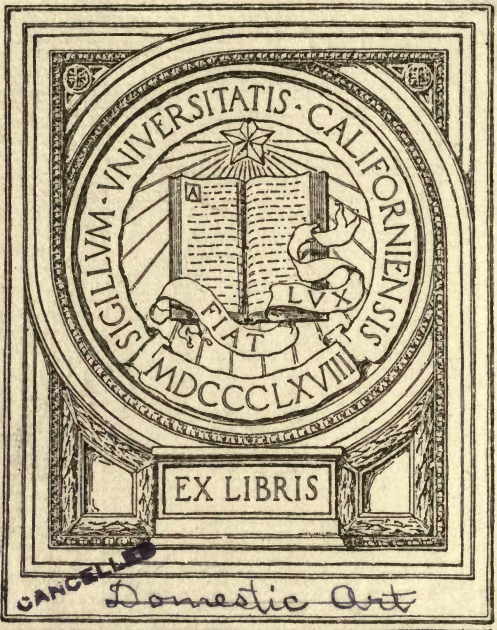
Kinks on Wool Carding and Spinning

Second Edition

Compiled from the
QUESTIONS AND ANSWERS DEPARTMENT
of the
TEXTILE WORLD RECORD

PRICE 75 CENTS

LORD & NAGLE COMPANY
Publishers
Boston, Mass., U. S. A.



Domestic Art

THE TEXTILE WORLD RECORD
KINK BOOKS

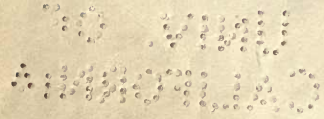
Kinks on Wool Carding and Spinning

Second Edition

Compiled from the
QUESTIONS AND ANSWERS DEPARTMENT
of the
TEXTILE WORLD RECORD

COMPILED AND EDITED BY
CLARENCE HUTTON

LORD & NAGLE CO.
PUBLISHERS
BOSTON, MASS., U. S. A.



PREFACE

The success which attended the publication of Kinks for Wool Carders and Spinners, a large edition having been exhausted, has led us to compile this book of practical experiences in Woolen Yarn Manufacturing.

The editors of the TEXTILE WORLD RECORD are at all times face to face with the problem of securing practical information. For years its subscribers have been invited to make free use of its columns in asking questions relating to woolen manufacturing, and it occurred to us that if some of the most important and most interesting of the practical questions that have been answered were gathered together in a handy form for quick reference, it would meet a wide-spread want.

This book contains information which has been supplied by manufacturers, superintendents, and overseers from their private record books and their stores of knowledge gained by experience.

Many questions are answered and much information given, but subscribers should remember that if there is any information they desire which is not given in this volume,

it is their privilege to ask the Questions and Answers Department of the TEXTILE WORLD RECORD, and every effort will be made to publish the information for them provided the question is one of general interest to the trade.

No effort has been made to arrange the subjects in the order of precedence in manufacturing, but the book is fully indexed, which should enable anyone to find the information he seeks in the shortest possible time.

Grateful acknowledgment is due to the men who have supplied the information, and if Kinks on Wool Carding and Spinning should benefit any of the large number of men for whom it is intended, both they and the publishers will feel that its mission has been accomplished.

TEXTILE WORLD RECORD,
LORD & NAGLE COMPANY,
Publishers.

Kinks on Wool Carding and Spinning

Trouble in Carding Shoddy

In a shoddy mill using 60-inch cylinders, 3 in a set, running 100 revolutions, we have much trouble with uncarded threads and short staple. What is the best size of wire for the cylinders, doffers and workers for this class of work? Is a slow, thick feed better carding than a fast, thin feed, where the production remains the same? Carder (1160).

Shoddy should be laid down in the picker room and properly oiled for at least twelve hours and if possible twenty-four hours. It would pick and card better as the rags are then soft and pliable. The teeth in the picker should be sharp. The number of teeth depends on the grade of stock and the staple wanted. It is important to set the feed rolls properly to the cylinder and wrap them with a damp strip of cloth as tight as possible to fill up the distance from the center of the feed roll to the teeth of the cylinder. If the feed roll is properly set good results should be obtained. One hundred revolutions on 60-inch cylinders is too fast. It does not give time to

card properly and only shortens the staple and makes a lot of waste. I would advise running 80 revolutions; even 75 would not be too slow, and the card clothing will last longer. I would prefer a medium heavy feed running the feed rolls slow, rather than a thin feed and running them fast. I would advise 32 wire on the first cylinder, 33 on the second and 34 on the last. Set the first with a 30 gauge, second with a 32 gauge, and third with a 34 gauge. If the cards are in good condition and properly set there is no reason why good results should not be obtained. All this can be spoiled by trying to do too much in a given time. It is better to do less and have the work right than to get off a large production and have it spoiled. Rogers.

Matching Mixtures

How can I determine the proportions of each color in the enclosed samples of black and white mixed cloth? Mixture (440).

The best way to match textile mixtures of different colors is to make a small sample, weighing the stock on a grain scale, and carding and mixing the different colors on a hand card. One hundred grains is a convenient weight, as each grain is equivalent to 1 per cent. After it has been carded the stock is washed in neutral soap, dried and compared

with the sample to be matched. Repeated tests are made until the right proportions are obtained. If facilities are at hand, it is a good plan to verify the hand-card sample by making a larger one of, say two pounds, carding it on the breaker card. A small card for this purpose is built and it is a very useful machine in a mill making mixed goods.

Twisted Rolls in Carding

I send you with this letter samples of twisted rolls or nubs which form on our cards in carding English wool graded as 46s. These rolls form between the fancy and the doffer. I can lie on the floor and see them drop under the card after having been drawn down by the cylinder. I changed the speed of the tumbler thinking that it held the stock too long, but there was no improvement. The card is 48 by 48 with 34 wire on the cylinders. The fancy is 9 inches in diameter clothed with 28 wire, open set. I have tried setting the workers close and away off, but without helping matters any. The difficulty is encountered only with this 46s grade of wool. It occurred to me that the rolls might be caused by the wool being gummy. I would like very much to have you tell me what will remedy the trouble.

Carder (1163).

These rolls are made by the fancy which has too coarse a wire for the cylinder. The fancy wire should be at the most only two numbers coarser than the cylinder wire. In most cases the same wire is used. The stock like sample

requires but little work from the fancy, it lies on the points of the cylinder wire, and in this position it is in the right place to be rolled by the fancy. A 28 wire fancy running on a 34 wire cylinder would be about right for rolling the stock. Sometimes a coarse fancy will throw bits of stock on the doffer where the draft of the fancy will keep it rolling until it goes back in the card or drops on the floor. A fancy stripper can be used to good advantage on some kinds of stock to prevent rolling.

Lytton.

. . .

It would be very easy to locate the trouble if I had an opportunity of examining the work on the card, but it is difficult to point out the remedy at a distance and with only such particulars as "Carder" gives. The stock is long and hard to raise and card out. There is a natural tendency for it to roll. To do good work the card must be in A1 condition, with all belts tight, especially the lickerin and fancy belts. The cards should be set fairly close, especially the doffer and fancy. The speed of the fancy must be just right to raise and clear the cylinder, otherwise it will load and cause rolls. It might be a good plan to reverse the workers. This will card the stock out better, but it will be harder on the staple and on the wire. I think most of the trouble

is due to the setting and speed of the fancy. The fancy belt should be tight and the clothing kept sharp. More work is spoiled on the card by the fancy than at any other point.

Rogers.

Equipment and Operation of Carbonizing Plant

We have been in the habit of using wool more or less burry as we have no means of getting rid of the burrs before sending the stock to the cards, the wool being put to the cards with the burrs in and the result is that the card clothing is in bad shape. I have been considering introducing a burr picker, but am in doubt whether it would do the work as well as carbonizing. For that reason I would like to see some good articles on carbonizing, giving full instructions as to how it could and should be done and the probable cost and equipment for a carbonizing plant, that would handle about 500 pounds of wool a day.

Buxton (1244).

Carbonizing is by far the most satisfactory method of removing burrs from wool, unless the burrs are very large or are what is known as "hard" burrs. These may be all knocked out of the wool by burr picking which will leave the stock in better condition than by the carbonizing process, as the latter has a tendency to weaken the wool. To carbonize the

wool for hard burrs the vat should be filled with cold water and enough sulphuric acid added to bring the bath up to about 6° Tw.

After the bath is brought up to the required strength the scoured wool is entered and allowed to soak for about three hours and then forked out, drained and thoroughly extracted. The wool may be put into the acid bath either wet or dry, but in putting in the dry stock more liquor is absorbed and consequently when it is taken out more water has to be added, which weakens the bath, and, of course, more acid is required to bring it back to its former strength. This is an essential point as the bath should not be allowed to run down if the stock is to be carbonized thoroughly.

The next step in carbonizing is the drying and baking process, which can be done either on the old fashioned table dryers or in the Stone dryer manufactured by the James Hunter Machine Co., or the Sargent carbonizing plant. If the table dryer is used a set of heavy crush rollers and a cone duster would have to be installed in order to crush the burrs and free the wool from the dust and pieces of burrs which cling to the stock.

If the table or drawer dryer, Fig. 1, is used, the stock must be spread out evenly and not too thick on these drawers, and the fan should be started, the sliding door in the air

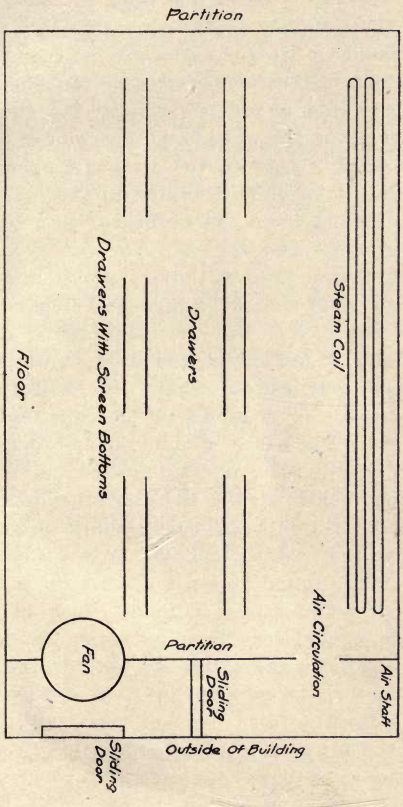

Partition
Roof
Steam Coil
Air Circulation
Air Shaft
Drawers
Drawers With Screen Bottoms
Floor
Partition
Fan
Sliding Door
Outside of Building
Sliding Door

FIG. 1.

shaft closed, and the sliding door in the outside of the building opened. In this way the stock should be dried considerably as the cold, damp air is driven outside. The fan should be left running about two hours, the steam then turned on, the outside sliding door closed and the sliding door in the air shaft opened. There should be enough piping in the coil so that the drying room can be heated to a temperature of at least 220° F. The fan if kept running all this time will give a good circulation. The wool should be turned over once in a while so that it will dry thoroughly, and should not be taken off the dryer until the burrs are well baked, when they will turn black and can be crumbled up between thumb and finger. The stock should then be passed through heavy crush rollers and a cone duster, and then neutralized. In neutralizing the stock enough alkali and soap should be used to remove the acid, or to have the stock smell sweet. If too much alkali is used it turns the stock yellow and makes it harsh. In building the table or drawer dryer as many drawers can be put in as are required. One dry room with about 5 drawers, 3 by 3 feet square. makes a pretty fair room to heat, and, of course, the fan should be in proportion to the size of the room built. Tambura.

Calculating Weight of Sliver

The first breaker of a set of woolen cards is fitted wih a Bramwell feed, the second breaker with a Torrance creel, and the third breaker or finisher card with an Apperly feed or a creel. What is the method of calculating the weight of ends or sliver that should enter these feeds in order to give a 6-run roving?

Milton (867).

No set rule can be given for calculating the size of the drawing for a given size of roving. The carder must use his own judgment, taking care not to have it too heavy or there will be difficulty in passing it through the guides on the second breaker. If the drawing is too heavy on the feed table of the Apperly feed the roving is apt to be lumpy; the finer the drawing and the more of it on the feed table the better the roving. With a creel on the second breaker and an Apperly feed on the finisher the size of the roving is regulated by an adjustment of the gears. Sam Driver.

Carding Cotton Mixes

I am having trouble carding cotton mixes. The cotton is fairly well matted; the picker does not do very good work and neppy yarn is the result. We have an old wooden frame card, and lately when we moved from one floor to another the card was so racked and worn that we could not set it close enough to take out the neps. What would be the best method of setting, and to what size gauge? It is set to 29 now. Where is the setting most

liable to help, and will the fancy help or cause the neps? We are now making 1 1/2-run yarn; about 1 1/2 draft on the spinning machine or about 48 inches of roving. The stock contains from 20 to 50 per cent. cotton. The ring doffers make about 14 turns a minute.

Clinton (774).

If the card is in such shape as Clinton says it is, the best thing to do is to open the window and throw it out. If the mixing picker is not doing good work, have the machine fixed so that it will. The mixing picker has nothing to do with making neps. Run the cotton and the stock that is mixed with it separately through the picker before mixing. I never set a card closer than 29-gauge on any kind of stock. If Clinton can set the stock with a 29-gauge without having it strike, the card is all right and the fault must be somewhere else, probably in the fancy. Set the fancy so you can just hear it on each side; then set both sides firmly into the cylinder. See that the stripper belt is tight; run the first breaker doffer faster so as to get the stock out of the card quicker. Speed the ring doffers up to 18 or 20 turns and the condenser accordingly. The roving is apparently about right.

Sam Driver.

Even and Uneven Roving

I am boss spinner in a woolen mill. About two weeks ago the weavers complained about

lumps in the filling which broke in the eye of the shuttle. The mules are set just the same as they always were. Can you tell me where the trouble is? Grant (994).

Since carding and spinning go hand in hand in woolen manufacturing, it is first necessary to refer briefly to carding. As a rule the carder calculates his roving to be drawn down to about one-half, on the mule, in order to assist in drawing out and reducing any lumps or other irregularities in the roving in the final yarn produced. There will be no trouble in drawing out a good even roving made from long, even-stapled wools, this one-half or more in spinning; however, the best spinner will find it impossible to draw out uneven roving or such as made from short staple stock more than one-third, without keeping the mule standing most of the time piecing up broken ends.

With reference to uneven roving delivered to the spinning room, the lumpy sorts will be the ones making the most trouble, in fact if not impossible for a fine thread to be spun out of it, since it is a well-known law in spinning that the lumps will take the twist only after the thin places between the lumps are twisted extra hard. This naturally tends to increase in proportion the size of the lumps, and in turn reduce the thinner places still more.

In order to explain this subject, the accom-

panying two illustrations are given. Fig. 1 represents an uneven, lumpy, unspun roving or carded wool. Examining the illustration, we will find that instead of having an even surface, the roving is lumpy, caused either possibly on account of dull card wires, or insufficient carding, or improperly prepared stock, etc. Such roving may now and then occur in any mill, but it should be seldom the case, and if found, the trouble at once remedied by proper attention to the set of cards where it was made.

1

2.

In drawing out this roving on the mule, the same receives a few turns per inch as the carriage backs off. The drafting occurs at this point, and since the tendency is for the twist to take effect between the lumps, as previously mentioned, it follows that the lumps are more or less untouched with reference to twists by the mule, remaining soft and pliable, and being drawn out only slightly in size. The thinner places between the lumps have taken all the twist which actually ought to have

gone in the full length of the thread under operation, said fine hard twisted portions of the yarn not drawing down any to speak of. For this reason the mule does little toward correcting such imperfect roving, resulting in an uneven yarn as readily seen by means of examining diagram Fig. 2, where we see that the bunches, as mentioned before, although slightly drawn out as to size, are yet distinct in the thread, the thinner portions of the thread having taken all the twist, clearly showing too much of it. The reason for this is found in the fact that the larger in circumference a body, the harder it is to revolve it, and since the lumps in the roving are of a larger diameter as compared to the thinner portions of the thread, it consequently follows that said lumpy portions of the thread acquire little, if any, twist compared to the thinner portions; in fact all the thinner portions in the full stretch of roving under operation must be twisted solidly into a wire, as we might say, before twist is put in the larger places, i. e., the bunches, each bunch acting as a pin of a fixed lever for the length of the thin roving adjoining.

The proper amount of the draft to be put in the yarn at the mule, requires good judgment, the rule usually observed being that the longer and coarser the stock, the quicker the drawing

should be. If the roving pulls out from between the draft rollers during drawing, it is a sure sign that the draft is too slow, and for which reason put on a larger draft gear (backing off gear), or let out on the upper steady rope and take up at the bottom. If the roving snaps off about half way between the draft roll and the tops of the spindle during drawing, it is an indication that the carriage is backing off too quickly, the twist not having a chance to take hold, and in which instance reverse the previously given advice.

Conrad.

Vigogne Yarn

I am informed that the enclosed sample of vigogne yarn, or in fact any vigogne yarn, is not made in this country. Can you tell me where it is manufactured?

Manufacturer (1199).

The sample enclosed was a cotton and wool mixed yarn. Our French correspondent in replying to this inquiry gives the following account of the genuine vigogne fiber and the fabrics made from it:

Of all the special wools obtained from South America such as lama, guanaco, alpaca, vigogne, etc., it is the last named which excels all the others. The vigogne hair is used in the manufacture of shawls, fishing nets and cloaks. The different shades of vigogne hair

are first separated. The inhabitants of the countries where vigogne hair is grown produce a very solid fabric from it which compares favorably with the best grades of wool goods. It is completely waterproof and at the same time fine and light. The best vigogne fabrics come from Catamarca in the Argentine Republic. Since 1890 an imitation of vigogne has been made. This consists in mixing wool and cotton in variable proportions. In many cases the wool is replaced by the hair of the angora rabbit and sometimes of the ordinary rabbit. I will try to send you a few samples of vigogne fabrics in a few days. Gaul.

Changing to Coarse Stock

We have changed our cards over to a coarse clothing for long coarse stock but have not changed the fancy. Now the doffer cannot take the stock from the cylinder and the clothing is choked up. We have tried setting the fancy deeper into the cylinder, running it faster, and have even bent the wire forward. Is there anything you can suggest that will help us out? Foster (967).

This seems to be a case of saving the old fancy at any cost. As there is only one fancy on a card and as the cost of reclothing it with wire suited to the work would be small, I would suggest that Foster get clothing a little coarser than that on the cylinder. All the

expedients for making the fancy do work it was never intended to do seem to have been tried, so I judge a very short stock had been previously used or the fancy was about worn out. The range of work that a fancy will do is large, but there are limits and when reached, the cost of new clothing should not be considered against the loss caused by makeshift devices. Burleigh.

Soap and Oil Solution

Please let me know what I can use to keep a solution of oil, soap and water from separating. This solution is made by boiling the following ingredients:

14 gals. prime lard oil,
30 lbs. olive worsted soap,
30 gals. water.

Perth (1263).

The quantities of materials indicated by our correspondent are not properly balanced; the quantity of soap, being only 7.9 per cent., is too small to emulsify the 27.3 per cent. of lard oil. As soap itself is an emulsifying compound, the greater the amount used the greater will be the result. It is suggested that our correspondent use not less than 25 pounds of soap in this mixture and increase the amount of water by 10 gallons. To effect a more thorough emulsification of the oil the addition of a few pounds of concentrated soda crystals is recommended, as it will aid materi-

ally. Very good results are obtained by the use of a few quarts of any good sulphated oil, taking the place of a corresponding weight of soap. It is presumed that our correspondent's mixture is intended for oiling wool, and if such is the case he will find should he use a mixture containing sulphated oil, that the lard oil will not separate after boiling, and that the scouring out of the lard oil will be more easily effected. Berwick.

. . .

If the soap is of a good quality, it alone should be sufficient to emulsify the oil and water present. The designation, "olive worsted soap" is, however, a rather indefinite one. If it is an olive oil soda soap containing about 25 to 30 per cent. of water, the proportion here given should easily carry the oil without any separation. If, however, the soap is only a soft soap made up with a large proportion of water, it is probable that there is not sufficient real soap present to properly emulsify the oil and water. To bring about such an emulsion that will not separate into its constituents, it will be necessary to add a small amount of alkali to the mixture in question. I would suggest the use of 3 to 4 pounds of soda ash. The latter should first be dissolved in some water to be used by boiling, and then the solution added to that of the soap and oil, and the

whole mixture well boiled up together. If it is not desirable to use soda ash on account of any special use to which the emulsion is to be put, a milder alkali like borax may be employed. About 4 to 5 pounds of borax should be substituted in this case for the soda ash. The use of borax will make the emulsion somewhat more expensive, but its alkalinity will be much milder. Howell.

Nubs for Knickerbockers

We are going to make a line of knickerbockers and I would like to get some information on making nubs; how to set the cards to get good yarn. Akron (983).

To make nubs for knickerbockers select short, fine wool and run it through the picker dry and then through a first breaker as follows: Feed on very light; set off the workers from the cylinder 3/16 of an inch; set the strippers just close enough to the cylinders to clear them; set the doffer with a 28-gauge. Do not run the comb; set the fancy just to touch the cylinder, start the card and the nubs will drop under the card. For nubs larger or smaller set the cards accordingly.

These nubs are then taken to the fulling room and fulled until quite hard, then dried and they are ready for mixing. When the batch is ready for the cards set off the workers of the first breaker from 1/8 to 3/16 of an

inch; let the strippers remain as they were, but set the workers off the strippers slightly; set the doffers as for regular work and the fancy the same.

Set the second breaker the same as the first, except that the worker next the fancy is set quite close to the cylinder. This is to regulate the size of the nubs required; set the fancy the same as on ordinary stock. Set the finisher the same as the first and second breakers, with the exception of the first and last workers. These can be set closer to the cylinder to regulate the size of the nubs. The best way to get the workers on both sides alike is to notice the number of turns on the nut before setting. Sam Driver.

Difficulty With Rub Rolls on Coarse Wool

We would like to know of a good means for overcoming the difficulty in making well rubbed roping from pure wool similar to the enclosed sample. What is the best lubricant for this class of wool? A great deal of stock drops below the card and the roping runs back on the mule on account of the roping being so loose and fluffy. Dexter (1158).

In carding coarse wool like the sample submitted, I found the following method to give the best results: The aprons should be set to a 32 gauge with the middle roll on the same level with the rest, giving them a long run and being careful that they do not rub together.

They can usually be run at 350 revolutions, but if they shake the card at a less speed they are either worn badly or set wrong. The one that is either too long or too short should be changed. Stop the aprons so that when the eccentric is moved it will go either towards or away from the card, as it will move easier in this position. The eccentric is held by two bolts on the under side. A leader should never be used on either pulley and the belt can generally be made to run properly by adjusting the idle pulleys. Keep the aprons damp or they will not do their work. The best dressing for aprons is made of three parts crude oil and one part degras. With very little heat this mixture will readily blend. Put this mixture on after stripping the cards and the work will go along smoothly. Coarse wool will sometimes drop under the card if the cylinders are allowed to get dull, or are run too fast. The cylinders on coarse wool should run about 70 revolutions a minute.

Lytton.

. . .

To answer this question intelligently one should be on the spot, as the question is rather indefinite. Much depends on the adjustment of the rub rolls. The Barker condensers can be made to rub anything if they are properly adjusted and oiled with the right kind of rub oil. Neatsfoot or Castor oil answers very well

as a rub oil. Some claim that they are too expensive, but no oil is too expensive that gives satisfaction. Many carders are handicapped by superintendents who insist that because an oil is cheap the carders must use it. Use enough oil or emulsion to keep the stock partly damp. Judgment must be used in oiling the wool. Get the stock damp, but not too wet, and it will work better. If the rubs get filled up with oil use some ammonia as this will cut out the oil and make the rubs take hold better and give better results.

If the stock drops below the cards they must be running too fast. For this grade of stock 85 revolutions per minute is fast enough. If run any faster, there will be a lot of waste made. Setting the cards properly and having them sharp cannot help but give good work. Adding a little powdered rosin to the rub roll will make them take hold better. If "Dexter" is using the old style rub roll he should take each set out and grind down even on a roller grinder and then set close with a little oil on each.

Rogers.

A Kink in Carbonizing

It will show how economy is consulted in the Yorkshire handling of rags if a leaf from the book of a Leeds firm is quoted. These dealers had an unlimited demand at one time

for carbonized waste of a maroon or brown color. They asked a dyer how they could carbonize and dye brown in one operation? He brought them some Azo-Carmine, which was dissolved in the acid for carbonizing. The latter was strong enough to discharge some of the original color and after the oven-drying and the subsequent willeying the mixed rags came out all wool and all brown of substantially the very shade wanted. The item is given as an encouragement to experiment and to ingenuity. Regent.

Causes of Uneven Roping

I read a list of Causes of Uneven Roping in the Textile World Record several months ago and I cut out the article. It has been lost and I want to get another one like it, for there are some points in it that I had not heard before, and I've been in the card-room since I was a boy. Perhaps it wouldn't do any harm if you published it again. Dobney (937).

The portion of the article referred to by Dobney is as follows: When using creels on the second breaker never have a full set in at one time; have partly filled spools on one-half of the creel and full spools on the other half; the roping will be more even in this way. When all the spools run out together there are so many splicings that they cause the roping to be heavy for a time. The more spools

there are in the creels the more doubling and the more even roping. One drawing out makes the roping finer.

Among the causes of uneven roping are imperfect cleaning and mixing of the stock, irregularity in putting on oil and composition, inaccurate weighing and feeding, feed rolls and other cylinders winding stock and filling up after stripping, strained drawings from second breaker to Apperly feed, belts and gears slipping, and inferior card-room help. Perfection in the form of all cylinders from the largest to the smallest is essential in making even roping.

If the ring doffer is out of true so that it comes nearer to the cylinder during one part of its revolution, there will be a gradual variation in the roping from coarse to fine and the increase and decrease will alternate in lengths equal to the circumference of the ring. If the main cylinder is out of true so that one side runs nearer to the doffer than the other, the variations in size of roping will be repeated in lengths equal to the circumference of the cylinder. Uneven roping may also be caused by the workers, leader-in, tumbler and fancy being out of true.

These imperfections may not always be apparent to the naked eye and are not very easily detected. There is no doubt that these small things are the cause of uneven roping

and of uneven yarn, besides an endless amount of trouble. The remedy is simple and consists in truing the small cylinder as well as the large one and keeping them true no matter how hard the cards may be driven. Quality first and then quantity is the best rule for both carder and manufacturer.

The feed rolls should be of the same size and perfectly true; if one is larger than the other, they will not deliver evenly, and this will be more or less perceptible in the yarn according to the difference in size between them. Another very frequent cause of uneven roping is the careless manner in which the pulleys are lagged with leather, making them untrue or lopsided, causing the belt to run slack or tight, thus driving them at unequal speeds and producing results similar to those from uneven surfaces.

A dull tumbler will cause uneven strands on the ends of the spools. Uneven feeds make uneven roping. Another cause is defective setting of the ring doffers. If the fancy on the finisher is set too hard or runs too fast or the card runs too long without stripping, or if the cylinder is dull, fine strands will be made on the ends of spools and heavy strands in the middle. The first full spools made after stripping the cylinder should be torn up.

Crowding the stock in the first breaker feed and then letting it run nearly out is the cause

of much uneven roping. The small pulleys of the Apperly feed should be cleaned and oiled every week. When weighing roping weigh the tops and bottoms, then the sides and the middle. The tops and bottoms should be run separately. If making warp and filling from the same lot, the tops will make the strongest warp. To ensure even roping, the feed rolls, leader-in and tumbler should be faultless. If they are allowed to get filled with stock, the best results will not be obtained.

Oiling Different Kinds of Stock

We would like to obtain all the information possible as to the use of oil or emulsion on woolen stock to be carded.

Should the consistency of the emulsion, i. e., the proportion of the ingredients, vary in a mill according to the different stocks it is using, or is it customary for a mill to use the same proportion of ingredients?

Are there a few standard proportions which could be given as suitable for the different kinds of woolen mill work?

What regulates the proper amount of emulsion to be used?

Are any better results obtained by using all oil instead of a mixture? Dalton (1025).

It is customary for manufacturers to vary proportions of the emulsions to suit the stock that is being carded.

There are no standard proportions that could be given for the different kinds of stock.

The materials used for woolen goods vary so widely that the exact proportions of oil and water can be determined only by actul tests. The amount of emulsion is regulated to produce the most perfect yarn with the least amount of waste.

Opinions vary widely among manufacturers regarding the relative advantages of using oil or a mixture of oil and water on wool. One of the disadvantages of using water is the evaporation which causes an irregularity in the stock. If effective means are taken to prevent excessive evaporation a moderate amount of water facilitates the carding process. Any water added to the stock in the picking room of course evaporates before it reaches the spinning process.

Soft Noses on Bobbins

We are spinning 7-8 to 1 1/4-run yarn on English and American mules and are troubled with soft noses on the bobbins which cause the filling to slip from the bobbin during weaving and make much waste. Can you suggest a remedy? Ridley (542).

We have secured the following expert opinions on this trouble, the cause of which is very difficult to point out without knowing all the conditions in the mill where it exists.

Be sure that the quadrant on the mule is not set too far back, as this will invariably cause the mule to wind hard on the shoulder and soft or slack on the nose. If it is a Davis and Furber machine be sure that the two center tracks are perfectly true and level, otherwise it will wind with soft places. The builder rail should also be in such a position as will insure an even wind. Holz.

. . .

In order to answer the question fully we ought to have full details of the style of mule, together with the number of teeth in the gears, the kind of quadrant plate, builder, etc. Soft noses on bobbins can often be remedied by setting the quadrant arm a little lower down. This has the effect of turning the spindles faster when the yarn is being wound on the nose, thus making them tighter.

The difficulty might also be caused by the faller leg knocking off the square stud too soon, or it may be that there is something that is imperfectly set just at the finish of the draw so that the weight is taken off the yarn and the yarn is not wound on the nose under tension. There are so many things that might cause this difficulty, and which vary with each type of mule, that we can give only general information without knowing more of the details. Wilts.

There are many things that might cause the trouble which Ridley mentions. The floor may be uneven; the track may drop as it goes toward the head and the machine get ahead of the wind; the faller might trip too quickly. If we could have one of the bobbins sent us we think there would be no difficulty in finding a remedy. Lincoln.

Preventing Soft Noses on Cops

How can a woolen or worsted mule be prevented from making soft noses on tops of cops without a nosing motion? Stamford (670).

There are various things that would cause a bobbin or cop to be soft on the top. First, if the quadrant arm is too far from the vertical the nose will be too loose. Second, the trouble might be in the builder shoes; they not being adjusted properly, as is often the case. Set the rail on the forward and back shoes so that when the builder is wound up the studs will be close to the top of the incline. The adjustment for both shoes at once is made by the slot in that part of the rail opposite the inclined side. If necessary change the position of the back shoe, without moving the front shoes, by the small rod connecting the two. For cops I would suggest that the shoe on the inside be set so that the end of the builder rail be just on the edge of the groove on the shoe,

ready to start down as soon as the builder starts to work.

It is sometimes necessary to have a special shoe on the front end of the builder rail. For cops this can be secured from the shops where the mules are made. At the rear end of the rail there should be a hinged flip, one end hinged to the rail and the other end resting on a set screw, and as the rail is lowered the flip, which is adjustable, becomes raised on a level with the rail. Now the end attached to the rail is lowered with it while the end resting on the casting remains stationary. As a result the angle on the corner of the flip becomes raised above the surface of the builder rail, and as the carriage comes against the back stops the builder rail traveler strikes the projection thus formed, and imparts a sharp flip to the winding faller. The effect of this is to wind a few turns of yarn down over the nose of the bobbin, making a firm nose and preventing the yarn from slubbing up the bobbin.

Then again the trouble might be in the drum gear, which is driven by the quadrant chain. This gear should be larger for the winding of cops. They have any desired number of teeth for this gear at the shops where the mules are made. Spinner.

Testing for Soap or Alkali in Waste Liquor

Would you please inform me if there is any chemical in liquid or powder form that when added to waste liquor from washing machines will determine any trace of soap or alkali?

Atwood (2038).

The testing of wash water to determine whether it is free from soap or alkali is not difficult, but in order to be sure of one's results it becomes necessary that the tests be made carefully with properly prepared chemicals. Testing for the presence of soap in any wash or rinse water is best done with a few drops of dilute muriatic acid added to a sample of the water contained in a clean glass. If soap in appreciable quantity is present, the water will become slightly turbid, due to the separation of free fatty acid. If, on the other hand, the amount of soap in the wash water is very slight, the degree of turbidity may be so faint as to be difficult to detect. As most mill soaps always contain free alkali, perhaps the best test is for free alkali, which, if found, is always a sure indication that soap is also present. A solution of phenolphthalein in alcohol (1 part of the former to 500 parts of the latter) is first prepared. It can be obtained at a drug store. Four ounces of this solution will be sufficient for hundreds of tests, as only one or two drops are used for a test. A glass of the water to be tested is

taken, and to it is added a drop or two of the phenolphthalein solution, when, if soap containing free alkali is present, the entire solution becomes tinted pink or reddish according to the amount present.

As the solution of phenolphthalein is very sensitive to alkali, the person who makes the test should wash a test glass thoroughly after each test, and keep it in a place where it may not collect dust. The bottle containing the test solution should have a glass stopper.

Beta-Naphthol.

Horse Power of a Waterfall

Please give the rule for estimating without instruments the flow of water over a waterfall. Also give me the rule for estimating the number of horse power where the height of the fall and the flow of water are known, the latter having been found by the rule asked for above. Maynard (1167).

The following is the method for the measurement of an open stream by velocity and cross-section to arrive at the theoretical horse power of the stream: Measure the depth of the water at from 6 to 12 points across the stream at equal distances between. Add all the depths in feet together and divide by the number of measurements made; this will be the average depth of the stream, which multiplied by its width will give its area or cross-

section. Multiply this by the velocity of the stream in feet per minute, and the result will be the discharge in cubic feet per minute.

The velocity of the stream can be found by laying off 100 feet of the bank and throwing a float into the middle, noting the time taken in passing over the 100 feet. Do this a number of times and take the average; dividing this distance by the time gives the velocity at the surface. As the top of the stream flows faster than the bottom or sides, the average velocity being about 83 per cent. of the surface velocity at the middle, it is convenient to measure a distance of 120 feet for the float and reckon it as 100.

Water Power:

English Rule: 33,000 pounds raised one foot in one minute = 1 h. p.

200 pounds of water (20 imperial gallons) 3 feet fall per second = 1 h. p. or 60 gallons 1 foot fall per second = 1 h. p. therefore: 224 gallons = 2240 (lbs.) × 3 (feet) × 60 (seconds) ÷ 33,000 = 12.2 h. p. Deducting 25 per cent. on account of turbine loss gives 9.8 actual or effective h. p.

If the sectional area is taken in small sections and different rates of flow, 10 per cent. for friction would be about right.

The gross power of a fall of water is the product of the weight of water discharged in a unit of time into the total head, or the dif-

ference of vertical elevation of the upper surface of the water at the points where the fall in question begins and ends. The term "head" used in connection with water wheels is the difference in height from the surface of the water in the wheel-pit and the surface in the pen-stock when the wheel is running.

A water wheel or motor of any kind cannot utilize the whole of the head since there are losses of head at both the entrance to and the exit from the wheel. There are also losses of energy due to friction of the water in its passage through the wheel.

F. S. Hinds,
Architect and Engineer.

Production of Woolen Finisher Card

Please state the best method of calculating the production of a woolen finisher card. I have calculated the production of our finisher cards, from the weight of roving and size of doffer rings, but the results vary from 15 to 25 per cent. from the actual product. The outside diameter of rings is 11 3/4 inches. The doffer makes 14 turns per minute. We are using 11 rub-roll condensers. The roving reels 1 1/2 runs as it comes from the condenser. There are 20 ends taken from each of the two doffers. Iroquois (342).

The error in Iroquois' calculation is evident from his explanation. He has neglected to take into account the draft of the roving by

the condenser. At our request Iroquois has informed us that the spool drum at the finisher is 29 inches in circumference, and makes 21 turns per minute, showing a surface speed of 609 inches per minute. The surface speed of the doffer, which is 11 3/4 inches in diameter and makes 14 turns per minute, is 517 inches per minute, consequently the spool drum winds 18 per cent. more length of roving than the doffer is delivering. This increase is due to the draft of the rub rolls. Iroquois' error was due to his calculating from the speed of the doffer and the weight of yarn at the spool drum.

Taking the speed of the spool drum and weight of the roving at the spool drum as factors we calculate the production of the card as follows:

609 (in. per min.) × 40 (ends) = 677 yds. roving per min.

677 (yds.) ÷ 150 (yds. per oz.) = 4 1/2 ozs. roving per min.

4 1/2 (ozs.) × 60 (min. per hour) = 17 lbs. roving per hour.

Operatives Needed for a Ten Set Mill

How many operatives would be required for a mill manufacturing wool goods like the enclosed samples, which are medium carded woolen goods? I wish that you would make out a list of the machinery for a ten set mill

equipped for this class of work, and give a statement of the number of hands required. I would like to have you give the number of each kind of operatives. Gaylord (1891).

In dealing with the equipment of a ten-set woolen mill, I will begin with the machinery for handling the raw stock. If it is the intention of the party to scour his own wool, it will be necessary to have a four-bowl wool scouring machine, a 21-foot dryer, an extractor, and burr picker, with two men to operate these machines. The next department should be the dye house, equipped with five dye tubs, 8 feet wide, and 4 feet deep, with perforated false bottom, made of cypress and fitted with at least a 3-inch pipe to allow an ample supply of water. It will be necessary to have three men to pole the stock in the tubs and attend to the extracting, with another man to run the dryer and double sheet the stock, and an overseer of dyeing.

The picker house comes next. There should be a fearnaught. This equipped with an automatic feed should properly handle all the mixing for a ten-set mill. It will also be necessary to have an oil tank in which to make and measure the emulsion for the stock, and a duster for the mill waste, also a blower system to convey the mixed stock to the different bins in the card room. Three men should be able to handle the mixing and dusting, under

the supervision of the overseer of carding, or his second hand, and attend to the stock.

In laying out the card room, large bins should be built, with a large galvanized iron pipe running overhead, with an opening and switch in each bin, and connecting with the picker house, so as to enable the picker man to blow his stock to any one of the bins. The cards should be four cylinder, 60 by 60 inches, with Bramwell feed for first breaker and Apperly connecting with finisher card, combination rubs and garnett breast, also one floor grinder and two traverse grinders. For help there will be an overseer, second hand, and a third hand to reel and weigh the roping. Two strippers, one man to attend to the Bramwell feeds, two men to care for the Apperly feeds, and two boys to attend the finishers.

The spinning room should have twelve mules, 2-inch gauge, four hundred spindles each, and using an 8-inch bobbin, and a filling machine for filling spindle bands. The help would be an overseer, fixer, one man to carry roping from the card room, a boy to sort waste, and twelve spinners.

In the spooling and dressing department, four spooling frames should be sufficient to handle the work, and two dressing frames equipped with size box and dryer for sizing yarn, one twisting machine and one skein winding machine. The help required would

be an overseer, one man to help around the room and take warps to the weave room, two dresser tenders, one girl each on the twisting and skein winding machines, and four girls to do the spooling.

In the weaving department it will be necessary to have three drawing-in frames, forty-five 82-inch looms for thirty harness work. These should be four-box looms. The overseer should have a man to attend to the reeds and harnesses and direct the drawing in. There would also be required two filling carriers, one boy to sort waste and pick up bobbins, three drawing-in girls, and in some places it will be found necessary to have boys or young girls to hand in to the girls that are drawing-in warps. One man to look over all warps before starting the loom in order to guard against wrong drawing-in or reeding. Two loom fixers, each one to take care of a section of nineteen looms. The remaining seven looms to be taken care of by either a spare hand, or the man who does the perching. The burling and sewing should be under the supervision of the overseer of finishing. The amount of help required depends altogether upon the class of goods made, and the class of weavers in the mill.

The finishing room should have five fulling mills, two 8-string washers, one extractor, one cloth dryer, one sand roll machine, three

shears, two steam brushing machines, one press, one dewing machine and one measuring and winding machine. The help in the department, besides the overseer, would include a second hand, two men for the fulling and washing, two men on the dryer, three men on the shears, one man on the press, and one to run the steam brush, or help in the shipping of goods. The engine and boilers would come under the care of the master mechanic, who would have an engineer, fireman and helper.

If the mill was located far from a city it would be necessary to have a fair sized machine and carpenter shop, with a master mechanic, boss carpenter and two helpers.

If some of the stock is to be carbonized, it will be necessary to add two cypress dip tanks with cages for acid, another extractor, and a neutralizing washer to the wool scouring department. The same dryer can be used for carbonizing as well as for wool drying, and one more man would have to be added to this department.

Manx.

Setting Mixing Picker

We are running a mixing picker with concave feed rolls which seem to raise havoc with the staple. Will you give me some pointers on how the machine ought to be set so I can compare them with our machine.

Daniels (1131).

1. The picker should be set on a solid foundation so that there will be no vibration.

2. The spiked feed roll and concave dish should be set as close as possible to the cylinder teeth and not strike. This will keep the feed roll from winding stock.

3. The feed roll should be set down in concave within half an inch of striking. If set way off the stock will dwell in concave and cause it to cut the staple. Save the staple.

4. The feed rolls and apron should run as fast as the cylinder will take it. This saves the staple, because there will be no chance for the stock to dwell in the concave.

5. The grates and outlet kept clean and not allowed to get filled up with dirt under the picker. This will give a better draft and the picker will do better work. The stock will be cleaner.

6. Plenty of ventilation back of the gauze room, and the belts all good and tight.

With a picker equipped with spur teeth feed rolls the feed rolls must be set as close to the cylinder as on concave feed; everything else the same. D. R. S.

The Belgium System of Woolen Carding

What is the Belgium system of woolen carding? How does it differ from the system generally employed in American mills?

Geister (1932).

Regarding the Belgium system of carding, I wish to say, it is a known fact that a great deal of fine short noils and waste from England find their way over to Belgium to be converted into fine spun, beautiful yarn running from 7 to 9 runs, and reshipped to England. Europe is noted for making fine shoddy and yarns. They have the system down to such a nicety that a high class of goods is a result. The Belgium system has not grown in the United States simply because it requires skilled help to run the machinery. There are only a few mills in this country that use the system.

Like our own woolen cards, the Belgium system has three operations, namely, first and second breaker and finisher. On account of the fine, short stock used, the cards are covered with hoods to keep in the fly. Unlike our own first breaker in the woolen system with its doffer and side creel to a bobbin, the first machine in Belgium makes laps or rolls that are fed to the second machine, the object being to give a more perfect blending of the stock, especially in mixtures. The second machine resembles our second breaker, but when the stock reaches the doffer it is combed off and runs on a railroad back of the third machine or finisher. There is a traverse motion going back and forth the width of the apron.

The stock comes out of the front of the

finisher in a thin web, and is subdivided into threads—passing through the rub aprons—and then to the spools. Narrow leather belts divide the sliver and there are four spools filling at a time from the front end of the machine instead of only two as is the case of the ordinary finisher or condenser. The belts dividing the ends are very narrow, about 1/4 inch wide, with 240 ends coming from a 60-inch card on to four spools. The Belgium system is noted for its using very short and very fine stock. It is not adapted for coarse stock. The construction of the finisher is complicated. The greatest care has to be taken in setting the motion, and if the man in charge does not understand the machine there is endless trouble for him. The workers and strippers on all the machines are covered.

Schwartzwald.

Fine Ends on the Apperly Feed

I am having trouble with the side ends coming fine on the finisher of a card that is equipped with an Apperly feed. Can you suggest any remedy? Bunker (731).

There are many things that cause the outside strands to be fine at times. I would advise Bunker to take out the doffers and give them a good light grinding. Then I should give them a good brushing with a hand card covered with wool. Grind all day if neces-

sary, or until they are perfectly true. Perhaps the waste ring is a trifle higher than the others. In that case I should move the outside or waste ring out 1/16 or 1/8 of an inch so the ring next to it on the other doffer would deliver heavier roving. The spare ring may steal from the ring next to it. When I had trouble with the outside end being fine I used to take out the packing of the spare or waste ring and move it out 1/16 or 1/8 and that would bring up the outside strands to their proper size. I should incline the overhead drawing on the side that was fine.

Sam Driver.

Setting of Workers and Strippers

We are running our cards on stock to be made into felt goods. This stock contains wool, cotton and shoddy in varying amounts, according to the quality of goods desired. There has been some discussion among carders as to the setting of the workers and strippers on the main cylinder. One carder maintains that to get good results from practically two cards, the setting of all workers should be the same. I maintain that the last two should be set closer than the first and second workers. We are using all fillett clothing, No. 33 wire on workers and main cylinder. Can you advise me which one has the better argument in regard to setting the cylinders for best results? At present we are running workers set about 32 gauge. Exeter (1935).

The 32 gauge is all right and the workers should all be set the same. One thing can be done that will greatly benefit this class of work, and that is to have the worker pulleys all of different sizes. Start from the feed end of the card and have each pulley one-quarter of an inch larger than the one before it. This will make a more even mix and smoother roving, the stock will spin better and make better yarn. It is also a good plan for second breaker card. The idea of setting a part of the workers off on a finisher card on this class of work can have but one result. The first that are set off will deliver the long stock and retain the short, consequently the long stock will go forward first and be put into the roving in the center of the strand; this will put the short stock on the outside, which is just the reverse of what it should be.

Lytton.

. . .

The first worker should be set with a 20 gauge open; the next worker set with the same gauge, but left a little looser; the next tight, and then graduating more closely until the last worker is set as close as possible without striking the cylinder. Set the strippers the same as the workers to cylinder, and set the workers as close as possible to the strippers. Set the doffer close to the cylinder.

The finisher or last card should be graduated only a little closer. Commence the first worker with a 27 gauge loose; the next one set a little close; and so on until the last one next to the fancy is set the closest.

Sam Driver.

Emery Cloth on Traverse Grinders

Can you tell me whether traverse grinders are ever covered with emery cloth? I have heard that they are but I have not seen one.

Bowie (1137).

Traverse grinders can be covered with emery cloth and are in general use in cotton card rooms. To fasten the ends of emery cloth or filleting, two small slits are sawed on each side of the emery wheel. Then the ends of the cloth are put through these slits and fastened on the inside of the wheel by small clamps. Put on a very light coat of glue and wind in the same as with any other filleting.

D. V.

Grinding, Settings and Care of Wool Cards

How often should a card be ground in order to keep it in the best possible condition on 50 per cent. good clean fine Territory wool, 50 per cent. fine shoddy?

What are the causes of rough, twitty or bunchy work from cards and how avoided?

How does a perfectly ground point on a wool card look?

What is the best size of wire and clothing to use on a set of woolen cards on all fine stock (strictly fine), in order to make good, smooth, even work free from specks or mixtures of all kinds?

How close can carding surfaces on a wool card be kept and not touch, and what thickness of gauge is best to use to do the setting?

What is the best for carding out specks, a rough point or an absolutely polished, smooth point, no matter what the shape of that point may be? Carder (1981).

Cards should be ground as often as they get dull. It is a good plan for the carder to look over his cards every day or two, to see if there are any dull places on either workers or cylinders. If there are, they should be ground as soon as possible. It is a good plan to use what is called a false worker, which is an iron shaft, to take the place of any worker that may be removed. The cylinder should also be watched for blisters. A card will never do good work when dull. It may have to be ground in three or four days, or it may run as many months.

Twits are made in a number of ways. A single wire may be pulled up in a ring so as to stand a little higher than the others. This will often cause a twit every time it comes to the wipe roll.

Rings should be watched carefully for high wires, which should be put in place with a tube. Noils will sometimes make twits. There

are usually short splinters in noils. One of these may get stuck between the wires of a ring, and make a twit every time it comes to the wipe roll. Twits are often made on the mule and the carder is frequently blamed for them. Many mules are run without a feed rope, the spinner turning the quadrant by hand.

If the spinner happens to be at the end of the machine piecing up, and thinks the mule will go in without breaking down, he frequently stays there instead of attending to the quadrant. In this way twits may be made the whole length of the mule. A single stretch in the mule may in this way make more twits than a carder will make in half a day. Dull wire will make rough work at any time, and bunchy work is usually made by the stock going in uneven on the feed end of the card. The top feed roll should always be covered with shorter wire than the bottom. The lickerin should be covered with short wire. In this way a great deal of bunchy work can be prevented. It is a good plan to have the worker pulleys of different sizes. This will prevent many bunches.

The appearance of a ground point on a wool card depends on what it is ground with. If it is ground with fine emery or an old worn out grinder, it will look like a chisel. If the emery is of good quality and No. 8 in size, it

will grind the wire more to a needle point, which is much to be preferred.

I prefer No. 32 for first breaker; No. 33 for second breaker; No. 34 for finisher; with a straight wire open set for the fancy. I never use filleting on a cylinder. I much prefer sheets. Filleting will fill up much more quickly than sheets, and the stock is harder to raise from it. Filleting will not make such even roving, for when the card is filled up the top doffer will take more than its share of stock.

If the rolls are true, carding surface on a wool card can be set to a 32 gauge and not touch when at work. A fine, sharp point is best for all work on a card. Lytton.

Winding Under on Woolen Mules

We are having considerable trouble with the yarn winding under the bobbins on our mules. This causes the yarn to break when it is spooled or woven from the shuttle. We think it is caused by the spinner's allowing the fallers to get too high. Are we right? If not, what is the remedy? Tippecanoe (377).

This trouble of winding under on woolen mules is very annoying and, unfortunately, very frequent in woolen mills. Attention to the care and management of the machine will generally remedy the trouble, but it is one in which constant attention is essential, otherwise the difficulty will recur. A prominent

builder of spinning machinery, to whom this question was submitted, writes the following:

"There are several things that can cause this trouble. In the first place the faller chain may be too high; secondly, the mule may be backing off too much, leaving the ends too slack; thirdly, there may be a flat place on the roll that runs on the rail; fourthly, the track may not be level, or there may be a low spot in the track as a result of the floor having sprung; again the trouble may arise from the shoe being too straight. The remedies for the above faults will readily suggest themselves."

Testing Grease Wool to Determine Shrinkage

Please give me information regarding the method of testing grease wool to determine its shrinkage as practiced in French conditioning houses. Sanborn (2018).

This inquiry was referred to our French correspondent who replies as follows:

Grease wool is rarely conditioned. A sample of about two pounds is drawn from the lot. This is obtained by drawing small portions from a number of bales. These samples are taken from the fleeces on the outside of some of the bales and on the inside of others. Naturally it is necessary to draw the samples from different parts of the fleece. In testing large lots it is necessary to take the average

of two or even three samples. The test sample thus obtained is weighed in grains. It is then scoured by the following process:

1. Washing in a solution of Marseilles soap at 120° F.

2. Rinsing in water at 80° F. The wool should be a clear white after this rinsing. The duration of the operations varies greatly, depending upon the condition of the wool.

3. Washing in a 1 to 2 per cent. solution of hydrochloric acid at a temperature of 120° F.

4. Rinsing in a 5 to 6 per cent. solution of carbonate of lime at a temperature of 120° F.

5. Rinsing in a solution of acetic acid at 80° F. After squeezing the water out by hand the sample is placed in an ordinary Persoz conditioning oven. The temperature is raised to 212° to 240° F. At the end of three-quarters of an hour the weight of the sample is found to be constant, which indicates that all of the moisture has been driven off by the heat. The weight of the sample in this condition is then increased by the conventional allowance for moisture, which in the case of wool is 19 per cent. The director of the public conditioning house at Amiens is not able to state the exact time required for conditioning raw wool, as the time varies with the condition of the wool. Gaul.

Qualitative Tests for Fibers

Can you give me a few qualitative tests for textile fibers? Walton (974).

The following is a list of tests that was published in the Textile World Record some time ago:

1. Microscopic Appearance.

2. Cotton burns without smell, while wool and silk shrivel up and give off the odor of burning animal matter.

3. A boiling solution of caustic alkali dissolves silk and wool, but has little action on cotton.

4. Concentrated sulphuric acid dissolves cotton and silk in the cold, while wool is little affected.

5. Schweitzer's reagent (ammoniacal solution of oxide of copper) dissolves cotton and silk, but not wool. Cellulose is reprecipitated by gum, sugar, or acids, but the silk substance by acids alone.

6. A solution of basic chloride of zinc dissolves silk, but not cotton or wool.

7. A solution of cotton in concentrated sulphuric acid gives a purple coloration with an alcoholic solution of alpha-naphthol. This reaction really indicates the presence of sugar, and is therefore not given by silk or wool.

8. Millions reagent (mercurous-mercuric nitrate) gives a red color with silk or wool, but not with cotton.

9. Wool (also hair and fur) is blackened by heating with a dilute solution of plumbite of soda, which is prepared by dissolving litharge in caustic soda. Silk and cotton, as they do not contain sulphur, are unaffected in color.

10. Nitric acid colors wool and silk yellow, but does not affect cotton.

11. An acid solution of indigo extract dyes wool and silk, but not cotton.

Nub Effects and How to Produce Them

We would like to have some information regarding the manufacture of nubs and how they are put into the yarn without carding out. Saxon (1245).

Bocker or nub yarns produce very attractive effects when properly made and used in cassimeres and dress goods. The nubs can easily be made if the process is understood. Short, fine wool of a good felting quality is the best to use for this purpose and by following the instructions here given, good results should follow. Take an old breaker card, set the workers and strippers off from the cylinder according to the size of the nub wanted, and remove the doffer comb. Any first breaker will answer, but one that is out of commission can be made to serve, thus avoiding the necessity of breaking into the regular work of other cards. Run in a sufficient amount of the stock to fill the card. Stop the feed and

allow the card to run, and the nubs will drop out in good condition. Fill the card again as required to produce the quantity wanted.

Felting the nubs will make them more firm and avoid the liability of being reduced in size in the after carding process. This is done in various ways, such as boiling, soaping and pounding, but there is danger of overdoing or a lack of uniformity where these methods are followed. The best results the writer ever had came from the use of a machine similar to a cylinder flock cutter with revolving forks or rods in the place of the cutter, the cylinder turning in one direction and the forks in the other, similar to the action of a revolving duster. I found this machine in use when I went to the mill, but do not know whether it was made specially for the purpose or was a remodeled flock cutter. The nubs were soaped slightly and put into the cylinder, and the felting was produced without the nubs being felted together, as often happens where other methods are employed. The forks kept the nubs well separated, and the felting was sufficiently slow to avoid overdoing the process. In coloring the nubs, care should be taken not to boil too hard or allow them to come in close contact with the steam, as this will tend to felt them too much or unevenly.

The amount of nubs required can be mixed with the lot at the picker, and the workers set

off a little in carding to avoid reducing the nubs in size. This method is often employed, but there are sometimes objections to it, especially where fine yarns are made. By setting off the workers the quality of the carding is somewhat impaired. If they are not set off the nubs are reduced in size, and the fibers carded from them go into the body of the yarn, tending to change the mixture or shade. We have seen rowy goods caused by the fibers of the nubs being carded out, producing irregular effects, due to the variation in the felted condition of the nubs, those that were felted the least being more easily carded out. This trouble can be guarded against by introducing the nubs in the card instead of the picker room. This can be done by a special feeding arrangement attached to the card, preferably the second breaker. The quality of the carding is not sacrificed, as the necessity of setting off the workers is avoided. The device consists of a V-shaped feed box about 16 inches deep and the same width at the top, with the length corresponding with the width of the card. There is a feed roll similar to the ordinary feed roll of the card, fitted to enter for about one-half of its diameter into an aperture at the bottom of the box. Against this feed roll, outside the box, is arranged a brush made with straight wire fancy clothing, the diameter to be about five inches. Inside the

box there is a shaft with iron pins passing through it at different angles, extending about four inches from the shaft in each direction.

Suitable bearings for all these can be attached to each end of the box. The device can be supported by a frame work resting on the floor, and placed so as to deliver the nubs directly back of the front worker of the second breaker. The feed roll may be driven from the shaft of the doffer on the end opposite the delivery of the card. The brush may be driven from the fancy shaft on the delivery side and the inside shaft with the pins can be driven with either belt or gear, from the brush shaft.

The feed roll is speeded to suit the required amount of nubs, and the brush is set high enough to free the nubs from the feed roll and deliver them to the card. The inside arrangement is to stir the nubs in the box and keep them constantly in contact with the feed roll. An adjustable strip of metal should be set along the edge of the feed aperture on the delivery side, which should be toward the card. The feed roll and inside shaft should turn in the same direction, and the brush in the opposite direction. The framework is fastened securely to the floor and the top braced from above or from the card frame. It will readily be seen that this arrangement makes it possible to keep the workers of the

first and second breakers set to suit the best results in carding and serves to retain the full size of the nubs. The finisher card will comb out the fibers of the nub sufficiently to make them spin well into the thread.

A very small nub giving an attractive, though subdued, effect can be made as follows: Where the creel instead of self feed is used for the second breaker, fill the workers with tallow as far in from the end as corresponds with the space taken by three or four drawings at the feed, and use drawings in that space of a color of the nub desired. Where the tallow has been used the carding effect will be destroyed, and the stock will roll into small nubs which will be delivered to the finisher in the drawing. The effect may be regulated by the number of drawings used and the width of the tallow insertion. The stock used should be similar to that used for other nub effects, and the drawings made separate from the regular carding and kept ready for use as required. On account of the small size of the nubs, strongly contrasting colors are desirable.

These nubs produce very good effects in dress goods and other fabrics not requiring much gigging. Elmo.

Random Roping

Will you publish in the Questions and Answers Department how Random roping can be made?

Random roping can be made with a creel on the finisher in conjunction with vibrating doffers. Everything must be adjusted just right, both doffers must be positive in their action and care must be taken to have the rings occupy their required space and position; then the rings will take up the required quantity of stock from each stripe. Every other drawing-in creel and guide is of a different color, say, red alternating with green, etc. The roping will have at certain intervals a clouded appearance and then grow less cloudy, approaching almost a clear color, and then gradually reverse until the opposite color predominates. D. R. S.

How to Mix Wool and Shoddy

We are getting very uneven results from wool and shoddy mixes and I would like to get an explanation of how it is best to handle them up to spinning. Devol (2129).

In the mixing of wool and shoddy, there is nearly always trouble arising from the tendency of the latter to lag behind in the picking and carding processes, causing an irregularity in the yarn, and not infrequently

serious imperfections in the cloth, such as streaky, rowey and cockled effects. In mixture effects and where the warp and filling are of contrasting colors, the results are often very unsatisfactory.

However carefully the stock may be laid down and blended in the picker room, when it comes from the machine the current of air accompanying it tends to carry the wool, which is the lighter stock, to the farther parts of the blow-room, while the shoddy, being heavier from the grease and dirt it contains, falls nearer the mouth of the picker, causing a partial separation of the two kinds of stock and an irregularity in the mixture, which is to some extent repeated every time the stock goes through the machine. As a result some portions of the lot are likely to go to the cards with a greater percentage of shoddy than others.

When the stock comes to the cards, the spike-apron of the self-feed takes the long stock more readily than the short, so that there is a tendency for the shoddy to drop back, whereby the percentage of this stock is increased as the amount of stock in the feed gets low. To remedy the difficulty in the picker room, various plans have been adopted, none of which wholly overcome the trouble. One plan is to hang a wooden apron in front of the picker at an angle to turn the stock to

the floor, not allowing the wool to fly to the outer parts of the room. Another good idea is to have the blow-room as small as possible, to do the work conveniently, thus giving less room for the wool to get away from the shoddy. After striking the walls of the room it is forced to fall back where the shorter stock is deposited, thus avoiding a separation.

In carding it is a good plan to keep the self-feeds well filled, whereby more uniform results are obtained than if the stock is allowed to run low in them. The writer was once called to a position where they were having serious trouble from rowey goods caused by the tendency to separation above referred to. We adopted a plan that entirely overcame the difficulty. We first made a mixture of 20 per cent. of wool and 80 per cent. of shoddy and ran it through a breaker card. The thorough mixing of this amount of wool with the shoddy put it into a condition that insured a more uniform mixture in the picker room and did away entirely with the tendency to separate in the self feed. The fibers of shoddy were so thoroughly combined with those of the wool that they were carried along with greater uniformity, both in the picking and the carding. One may get the same result by using fleeced shoddy, which is a stock similarly prepared by the shoddy manufacturer. The shoddy maker sometimes makes this com-

bination with stock that is too short to dispose of to advantage. The woolen manufacturer is often led to believe that fleeced shoddy is intended to deceive him, but it is really to his advantage if procured at a reasonable figure.

Where one has not the machinery to prepare the stock as suggested, he may get good results by selecting his shoddy, and then arranging with the party to combine with it the desirable percentage of wool. This the shoddy manufacturer can easily do, and one can know he is getting just what he pays for. If one were using a shoddy costing 16 cents per pound, he might hesitate about paying 24 cents, because it seemed excessive; but that is about what the combination would cost if made with 20 per cent. of wool at 55 cents per pound. It would be just as cheap, since the wool is simply added first instead of later in the picker room, and the advantage of this plan is without question. We adopted this plan on a line of goods in which we used all of our short waste and shoddy, and it gave excellent results, where we had been up against all kinds of trouble generally accompanying such low grade mixtures. If cotton is used in connection with wool and shoddy, it is a good plan to combine the cotton with the shoddy; as the heavy shoddy and the light cotton produce a mixture that will keep its place with

the wool in the picker room, and likewise be beneficial in the carding and spining. Any percentage of long stock may be used with the shoddy, even 5 or 10 per cent. being an advantage, but 20 per cent. or more will give the best results.

It will be readily seen that the mixture gives a loftiness to the stock that will cause it to go along with the wool more uniformly in picking. When it comes to the feeding to the cards, the spike-apron takes hold of the wool fibers, and the shoddy is so thoroughly combined with them that they cannot get away, as in the case when the shoddy is only combined with the wool in the picking. By a little careful calculation, the final mixture may contain the desired percentage of short stock, and the results obtained are well worth the trouble. A second hand breaker card can be procured for a song, and if placed near the other carding or picking machinery, the cost of running it is small. If it is desired to get similar results at less cost, a good selection of long stock, such as garnetted worsted, or the like, may be used with the shoddy; but care must be taken to have a good live stock, not too coarse. Coarse or wiry fibers will cause twitty yarn by slipping in the spinning.

Elmo.

Yarn Numbering

Please state the relation between the worsted and cut systems of yarn numbering. What would 2-20 cut yarn be equivalent to by the worsted system? Broome (358).

The Simplex Yarn Tables (published by Textile World Record, price 50 cents) give an explanation of the basis of each system and also enables one to find the equivalent of any system in the units of the others. No. 1 worsted = 2-3 cotton; 1.86 linen lea or woolen cut; .35 run. No. 1 linen lea or woolen cut = .535 worsted; .357 cotton; .1875 run. From this it is clear that No. 2-20 cut is equal to single 10 cut or No. 5.35 worsted.

As all our systems of yarn numbering are based upon the fixed weight of one pound, their proportions are expressed by the length of the skeins used for them. Thus: Linen or woolen cut, 300 yards; worsted, 560 yards; cotton, 840 yards; woolen run, 1,600 yards.

Changing Ring Doffers on Woolen Cards

We have four sets of 48-inch woolen cards with two doffers. We are taking off 36 ends of roving, 18 ends on each spool and two waste ends. We want to take off 54 ends and use 3 spools. The size of the roving is about 5/8 run, made from horse blanket stock. What changes will be necessary to get the best results? Hampshire (967).

In order to put 54 ends on a 48-inch card, or 3 spools of 18 ends each, it would be necessary to put 27 rings and 1 waste ring on each doffer. There should be 27 top rings, 13/16 inches wide, besides 1 wide ring to carry waste end. The bottom doffer should have 27 rings, 14/16 inches wide, and 1 wide waste ring. On the short side of the Apperly feed a 1 1/8-inch waste ring should be used; on the long side a 1 5/16-inch waste ring, as on this side the stock is more likely to bunch in. The lickerin has a better chance to comb out the stock on the short side of the feed. On the short side the feed rolls hold the fibers while the latter are being combed out by the lickerin; on the long side the feed rolls let go earlier. For these reasons it is better to use a 1 1/8-inch waste ring on the short side of the feed and a 1 5/16-inch ring on the long side. Most carders use 1 1/2 or 2-inch side rings. We have used all sizes from 1 1/4 to 2-inch, but the best results are obtained from the 2-inch outside rings. When more than 48 ends are taken from the doffers a narrower outside ring is used. A good rule to follow is

27 rings, 13/16 inch equal 21 15/16 inches.
27 rings, 14/16 inch equal 23 10/16 inches.
2 rings, 1 2/16 and 1 5/16 inch equal 2 7/16 inches.
Total, 48 inches.

One and one-half and 1 9/16-inch outside

rings can be used. This will make both outside rings near the same size and they will work fully as well.

The best way to run the ends is to take 9 outside ends from each side of top doffer to top drum, making 18 in all. The center 9 ends pass to the center of the middle drum; the 18 ends on center of bottom doffer, to bottom drum; the other 9 ends on outside of bottom doffer, to center drum of spool stand. This may look like a Chinese puzzle, but if the stock is good it works very well; if the stock is poor, the three-spool stand is a nuisance. A three-spool stand should never be used on heavy work. As "Hampshire's" work is 5/8 run on the card, 48 rings are all that should be used. For that size the rings should not be less than 7/8 and 1 inch wide. By using narrower rings the stock is packed tight on the ring to get the weight and it is hard for the wipe roll to take it from the doffer. This often causes twits and bad places in the roving, makes the work go bad on the card and all through the mill.

It would be a good plan to change the mule to take 24-end spools and use 24 ends on each doffer with outside rings. If this is not advisable it might be well to put the card in good shape and increase the speed of the doffer. A card on 5/8-run work should take off from 400 to 600 pounds of stock a day. Another

way of increasing production is to increase the size of the doffers. An increase of 3 inches in the diameter of the doffer would increase the production 50 per cent. If doffers 9 inches in diameter running 20 revolutions a minute and taking off 300 pounds of stock a day are exchanged for doffers 12 inches in diameter and running 20 revolutions a minute, the production would be increased to 450 pounds per day, a gain of 50 per cent. The larger the doffer the better the work as the cylinder has more surface to lay the stock on. Rogers.

• • •

Changing the number of ends from 36 to 54 will necessitate the use of narrower rings and probably have the effect of crowding the cards in getting the heavy roving required for 5/8-run yarn. On horse blanket stock and similar material, the top doffer will often collect more stock than the bottom doffer, making it necessary to run the former faster. To get 54 ends the rings can be arranged as follows:

2 waste rings, 1 1/4 inch.
27 top rings, 13/16 inch.
27 bottom rings, 14/16 inch.

When using 1 1/2-inch waste rings it is advisable instead of having a cotton or woolen web on the Apperly to use a leather band with wire set in for that purpose the width of

the webbing. The card will have to carry more stock in supplying the narrow rings. The ring doffers must be kept in good condition and points kept clear, by having dickeys put on the rings or by having wire wipe rolls set to the rings just so they will clear the points. It is preferable to have these rolls covered with a medium wire about 3/16 inch long with a knee so that it will not stand up straight. It is advisable to have the wire set in leather.

In running the dickeys the surface speed should be high enough to keep the points clear without having to set hard on the rings. If fancy wire is used on a 2-inch dickey with a 12-inch doffer running 20 turns, it will be necessary to run the dickey about 45 turns.

Ironside.

. . .

On the top doffer the use of 13/16-inch rings would be advisable, making a total length 21 15/16 inches. On the bottom doffer use 14/16-inch rings, making the total length 23 10/16 inches. This would leave about 1 1/4 inches for each waste end and 45 9/16 inches for the 54 regular ends, or 27 ends to each doffer. A 3-spool stand will be required to bring the roving on 3 spools of 18 ends each; the center spool receiving 9 ends from each doffer; this would necessitate an increase of stock on the breakers.

In placing rings on the doffer the wide ring must be put on the top doffer on the wide side of the feed. Newport.

Variation Allowed in Spinning Wool Yarn

In working low shoddy work, a stock containing a large percentage of clean and dirty card waste, the dirty card waste, however, being thoroughly cleaned and dusted before used, what variation would it be considered fair to allow the carder on his yarns, taking, for instance, 165 grains or 1 15/16 runs and 105 grains or 1 1/16 runs? We would also like to have the same question answered in regard to yarns ranging from 90 to 105 grains, and made of clean, low grade stocks which contain either a small percentage of cotton or wool as a basis.

In order that you may be able to judge better and give a more accurate answer we give you the following information regarding our equipment: Our picker house is equipped with a Sargent duster and a Fearnaught picker, the mixes being run through the picker three times in order to insure proper mixing. The card room contains six sets of cards, practically new clothing on all, with Bramwell feeds and Apperly feeds between the first and second breakers, the second breaker and finisher hitched together, and Barker rubs on finisher.

Carder (1989).

For the 165 grains, ten grains variation would be the extreme. For the 105 grains, eight grains ought to cover the variation. For the clean stock, 90 to 105 grains, four or five

grains ought to be enough variation. In making this statement I only estimate the variation at the card; the mule is not considered.

Lytton.

Production and Consumption of Wool

If you know of any statistics showing the number of spindles in the world's wool industry and the production and consumption of wool will you kindly print them?

Record (2247).

An interesting estimate of the world's production and consumption of wool appeared in a recent issue of Dalgety's Review. The wool spindles in all countries were given as follows:

England ..... spindles	6,684,526
Germany	5,084,069
France	3,078,013
Austria	850,000
United States	4,021,098
Belgium	656,677
Russia	800,000
Italy	250,000
Spain	150,000
Japan	400,000
Increase in former countries and number of spindles in other countries	1,025,625
Total	23,000,008

The Review then makes the following comment on the wool consuming capacity of these spindles and the actual supply:

In estimating 1,025,625 spindles, we take into consideration an increase in spindles throughout the entire world since 1907. Taking these 23,000,000 spindles in the whole world, and assuming that each spindle produces about 1.32 lbs. per week—23,000,000 × 1.32 lbs. = 30,360,000 lbs., and for 52 weeks—30,360,000 lbs. × 52 = 1,578,720,000 lbs.

It must not be forgotten, however, that in these 1,578,720,000 lbs. of yarns produced there are a large number of carded yarns in which cotton, silk, noils and waste enter in a certain proportion. Supposing that 489,600,000 lbs. of these yarns are produced with wastes and other kinds of material. This means that there is an annual production of 1,089,120,000 lbs. of combed yarns.

Taking then the production of greasy wool:

	Pounds.
The Argentine produces about..	584,000,000
Australia	1,102,000,000
Africa	160,000,000
Asia	216,000,000
Europe	811,000,000
North America	339,000,000
Total	3,212,000,000

The average yield of thoroughly washed wool can be stimated at 40 per cent. of 3,212,000,000 lbs. or 1,284,800,000 lbs. clean scoured wool. It seems then that consumption is

about equal to production after allowing for the weight of the waste in the combing process, viz., noils.

Size of Wire

Can you give us information or some sort of a table showing the best card-clothing wire for fine and coarse stock? Field (927).

The way the batches come along now in most woolen card rooms makes it a hard task to name just the right size wire that would be best for general use. One batch may be a nice, fine all-wool lot; the next may be a mixture of very coarse wool and shoddy, and the next of fine wool and shoddy, or it may be a silk mix or a hair mix, etc. The carder hardly knows what will go on next. If batches of the same quality could follow each other, much better and more even roping could be made and would save the carded a good deal of trouble and much valuable time and waste would be saved to the interest of the company. When batches keep jumping from one run to six runs and vice versa, it is no wonder there is so much trouble with uneven roping.

When the carder has a set of cards on a 500-pound lot, 5-run warp running just to suit him, the lot is nearly run out, and the next lot may be 2 1/2-run coarse wool and shoddy or some other kind much different from the

5-run lot. I should recommend the following scale and number of wire for a set of cards for general run of work:

FIRST BREAKER

Feed rolls, if not steel rings, which are decidedly the best.

Feed rolls, top and bottom, No. 18 convex or diamond point, straight steel wire.

Tumbler, No. 33 wire, steel.

First two workers, No. 32, the remainder No. 34 steel wire.

Strippers, No. 32, steel wire.

Cylinder, No. 33, the sheets steel wire.

Doffer, No. 33, steel wire.

Fancy, No. 30, sheets or filleting, steel wire

SECOND BREAKER

Feed rolls, top and bottom for creels, No. 18, convex or diamond point straight steel wire.

Leader-in, No. 24, diamond point steel wire.

Tumbler, No. 33, steel wire.

Two workers, No. 34, the remainder No. 35.

Strippers, No. 32.

Cylinder, No. 34, sheets.

Doffer, No. 34.

Fancy, No. 32, sheets or filleting.

FINISHER

Apperly feed rolls, No. 24 bottom, and No. 26 top, diamond point straight steel wire.

Leader-in, No. 24, diamond point steel wire.

Tumbler, No. 34.

First two workers, No. 35, the remainder No. 36.

Strippers, No. 34.

Cylinder, No. 35, sheets.

Ring doffer, No. 35.

Fancy, No. 34, filleting.

CARD CLOTHING FOR A SET OF CARDS ON COARSE STOCK

If a set of cards is running permanently on coarse wool, or coarse wool and shoddy mixed, the numbers of wire should be:

FIRST BREAKER

Feed rolls, if not steel rings, No. 18, convex wire.

Tumbler, No. 32.

Two workers, No. 30, the others No. 32.

Strippers, No. 30.

Cylinder sheets, No. 32.

Doffer, No. 32.

Fancy, No. 30.

SECOND BREAKER

Feed rolls, No. 18, convex or diamond point wire, straight tooth.

Leader-in, No. 24.

Tumbler, No. 32, steel wire.

Workers, No. 33.

Strippers, No. 30.

Cylinder, No. 33, sheets.
Fancy, No. 32, sheets or filleting.
Doffer, No. 33.

FINISHER

Bottom rolls Apperly feed, No. 18, convex or diamond point wire, straight tooth.

Top rolls Apperly feed, No. 18, convex or diamond point wire, straight tooth.

Leader-in, No. 24.
Tumbler, No. 34.
Workers, No. 34.
Strippers, No. 32.
Cylinder, No. 34, sheets.
Ring doffers, No. 34.
Fancy, No. 33, filleting.

Sam Driver.

Putting on Card Clothing

I would like information on putting on card clothing as regards the apparatus required and the method of doing the work.

Deary (1042).

It is necessary that every card room should be provided with a suitable frame and drum for winding on filleting. It is important that it should be wound on with as even a tension as possible. The frame should be made strong and wide enough so that the bearings of whatever is being covered will set firmly in the bearings of the frame. Place collars

on the shafts so that when winding on filleting they will not vibrate. Bolt on the frame a slotted bracket with a long stud and a small gear, with crank attached. Place a large gear on the shaft of whatever is to be covered, and gear into the small gear. By winding this way a much steadier motion and more even tension can be had than with a crank attached to the end of the shaft.

The drum, if for a 48-inch card with doffer 48 by 30, should be made 54 inches wide and 31 inches in diameter. The drum must be turned off true and smooth so that the backs of the card teeth will not get bulged. A stout frame must be built for the drum and bolted to the floor.

A piece of belt 1 1/2 inches wide, with small clamp attached, can be fastened to one end of the drum, another belt can be fastened on the floor on the other end and brought over the drum for friction. Some have the drum placed in front of the grinding frame, with a suitable bearing to bolt on the frame. When putting on filleting it should be wound on the drum quite tight. This will press and keep the backs of card wire in their proper place. The roll must be turned with a steady and even motion to keep an even tension.

The clothing should be wound on as tight as it will bear; if not, it will be apt to get loose

and strike the cylinder and cause bad work and be a source of trouble all the time.

D. R. S.

Speed and Size of Pulleys

Please give me a simple rule for calculating the speed and size of direct connected pulleys?

Manitoba (450).

Suppose two pulleys, A and B, are connected by a belt. Then:

Diam. of A × speed of A = diam. of B × speed of B.

From this it follows that:

Diam. of A = (diam. of B × speed of B) ÷ speed A.

Also that:

Speed of A = (diam. of B × speed of B) ÷ diam. of A.

Ex. A 12-inch pulley running 150 r. p. m. drives another pulley 225 r. p. m.

Find the size of the last named pulley.

(12 × 150) ÷ 225 = 8 inches, diam. of pulley running 225 r. p. m.

Ex. A 15-inch pulley running 80 r. p. m. drives a 10-inch pulley. Find the speed of the last-named pulley.

(15 × 80) ÷ 10 = 120 r. p. m. of 10-inch pulley.

The circumference may be used in place of the diameter if desired.

Core Yarn

Recently we have tried some experiments with a yarn composed of a cotton thread with a wool covering. These have not been wholly successful and if you have any information bearing on this work will you let me know how it should be done?

Burlington (2262).

There is no novelty in the idea of making wool yarn with a cotton core. As far back as 1878 two Leeds men patented provisionally a process for "embedding by rolling or otherwise an additional twisted thread in an unspun condenser sliver, the combined thread being wound upon a bobbin without any twist and used as a weft in weaving soft and strong fabrics." In 1901 two Halifax (Eng.) men took out a patent for a yarn consisting of "a sliver from a condenser rubbed round a core of cotton, the combined thread being wound on a condenser bobbin and spun in the ordinary way." There have also been patented schemes for covering a core of twisted paper with wool in a similar manner and for making cotton core yarn by drawing the cotton thread diagonally across the rings of the ring doffers, in place of running the thread and sliver side by side. There have been plenty of other attempts made in Yorkshire and yarns produced in this manner have been seen and tried often. Twenty years ago a

great many woolen men were puzzling over the problem of how to do away with the necessity for a separate twisting of the cotton and the wool, but the twisting method is practically universal today. Cotton is very extensively used as a supporting thread in the cheap carded woolens made in the Colne Valley. It is not used as a core, but as a tie thread. The wool sliver is spun on the mule cop and the two are brought together upon the ring twisting frame.

Following are the experiences of two eminently practical men in making core yarn:

Says A: The two ways I remember were:

"1st. Cotton spools placed under the condenser, the ends being led through the divider with the soft sliver. Thread and sliver were rubbed together and run on the bobbins in the usual way.

"2d. The condenser bobbins were taken direct to the twisting frame and the soft sliver was twisted with the cotton thread.

"Both methods were failures because a woolen thread is no good unless it is drawn during spinning."

Says B: "The drawback to running the cotton and woolen threads together on the mule is that you cannot draw the woolen when the cotton passes through the rollers at the same time. You do not get as nice or as strong a yarn as one that is drawn a little in the spin-

ning. Another fault is that there is too much space on the mule between the rollers and the spindle top, consequently the yarn has a tendency to show soft places owing to the greater thickness and heaviness of the woolen."

The theoretical purpose of using the cotton as a core instead of a companion thread is to make the former less conspicuous in the finished cloth. I send a sample or two of Colne Valley tweed to correct any impression that a two-fold cotton and woolen thread necessarily proclaims its character upon the surface. It will be agreed by anyone that whether judged by touch or sight the cotton support is well hidden in the softer cloth.

"Twisting is an extra," to continue my quotation from A, "but that is done very cheaply and the thread is good in every way. You can mill the cloth to get a good cover, raise it if necessary and use it pretty roughly and still have a sound piece of goods. Or you can alter your blend and ideas. You can make the cotton thread light in color and get fine worsted-twist-looking patterns in another finish."

Seeking further experiences of the production of cotton core yarn I turned to the patentee of a process for wrapping an untwisted worsted sliver spirally round a central thread of cotton. The work was done on an ordinary flyer drawing and twisting frame, permitting

the sliver to be reduced to the desired thinness. The cotton was led through the nip of the front drawing rollers to one side of the untwisted sliver and was then drawn diagonally across the front of the rollers, close to the nip and thence down to the spindles. The path of the cotton was kept close to the nip to avoid twisting the worsted, the intention behind the whole operation being the production of a yarn which should not shrink unequally and raise knots and lumps in the fabric under the hands of the cloth finisher. The patent has been allowed to lapse, but as Mr. Brogden's experience may be useful, I explain that the object of the experiment was the production of khaki cotton-faced drills with a wool back. The worsted sliver used was fine merino and the cotton core a good Egyptian. The warp of the cloth was Egyptian cotton also and without great difficulty a smart cotton-faced khaki drill fulfilling Government tests was produced. The maker was conscious of certain defects in the fabric and the Government experts found these out. The avoidance of twist in the sliver did not entirely prevent inequality of shrinkage. Worse still, the wool back did not wear well. Where creases were formed in wear the sliver was soon rubbed off the filling, leaving thin streaks in the garment. It is not improbable that carded woolen sliver which has only been rubbed on

a cotton core will also soon be rubbed off and the contingency deserves to be reckoned with and observed.

Pushing inquiry further afield, I sought the advice of a silk man who in his own time has been a bold experimenter. He had heard of a process, applied to silk and not necessarily inapplicable to wool, in which a silk roving was twisted round a cotton thread upon a twisting frame. Two rollers were used, one delivering silk, one cotton, the silk coming the faster. The two were passed to a spindle having a double flyer and set at such an angle that only the roving came in contact with the cotton at the point at which the bobbin was practically reached. He had examined also a collection of samples in which thrown silk had been twisted round a cotton core to make a sort of "rolled-gold" silk poplin and in which also thrown silk was twisted around flexible wire to make onde and spiral effects. It is clear that the production of core yarn has attracted notice in widely different directions. To name one other, one might refer casually to the different means taken for producing ropes with cores of steel or strong fibrous materials.

James Strand.

Broken Drawing on Breakers

Can you give me a reason for broken drawing on the breakers? Foss (959).

There are many causes for the breaking of drawings. The doffer may be running too fast, in which case a reduction of speed would be to the advantage of the work and would also tend to increase the strength of the drawing. The doffer comb may have been striking and been worn rough or it may need cleaning. Drawing may also break by being stripped too far below the center of the doffer. This may be remedied by raising the stroke of the comb.

Sometimes the drawing breaks down from too great a draft on the side drawing, in which case the end drawing will break as it leaves the doffer on the farthest end from the drawing rolls. Remedy: reduce the speed of the rolls. If the doffer gets dull, rough or out of true, the drawing will break down.

There are various ways of supporting the drawing as it passes to the rolls. On low stock it is a good idea to place a narrow apron under the comb, the same as for the Kershaw and Scotch feeds, and driven from the side drawing shaft.

Sometimes the short and long stock is not blended and picked right; this often causes a breaking of the drawing. Too heavy a feed making the drawing heavier at times than at others may be the cause. The comb may be too high or too low, too fast or too slow. Have good stripper belts and keep them tight and clean. When the side drawing breaks down

often extra work and waste results. Too much waste in the feed is another cause; also the stock getting too low or too high. If the drawing falls down raise the comb; if it pulls too tight, lower the comb. The center of the stroke of the comb should be a little above the center of the doffer. On long stock it is sometimes necessary to have a longer down-stroke and on short stock a longer up-stroke. Set the comb as close to the doffer as it can be and not strike, and keep the comb teeth free from grease.

All kinds of supports are used to keep the drawing from falling down, such as cone-shaped cylinders placed under the comb, wire and broomstick supports from the floor to comb, and many other contrivances. If the stock is really too low and short to make good drawing it is best to bring the first and second breakers together and place a short endless slat apron between after the fashion of the Blamire feed. Sam Driver.

Blending and Oiling

Can you give me the method of blending and oiling three lots of wool; viz., No. 1 blend; 500 lbs. of all-wool Saxony, Australian or No. 1 Ohio fleece, spun to 10 run; No. 2 blend, 500 lbs. of coarse wool; No. 3 blend, Oxford Mix, 500 lbs., composed of 125 lbs. black wool, 125 lbs. white pulled wool, 250 lbs. black shoddy? Deering (1068).

Carders as well as superintendents have a tendency to overlook the importance and value in this department of having their batches blended and oiled as they should be. Too much emphasis cannot be laid on the importance of having the batches properly blended and oiled to make good carding and spinning. Carders should watch with great interest this part of the operation for their own benefit, as well as for the company's.

FINE WOOL

No. 1 blend: 500 lbs. all-wool Saxony, Australian or No. 1 Ohio fleece, spun 10 run. We will first run it through the wool duster and then through the burr picker. Lay down in five layers. To each layer spread on 8 qts. of oil (olive oil would be best). Beat down each layer with a pole. When through blending, run through the picker twice, feeding light and mixing well in gauze room. It is now ready to sheet up. Let it lie four days in the sheets before going to the cards. When ready for the cards run through picker once. Eight quarts of oil to 100 lbs. No water.

COARSE WOOL

No. 2 blend: 500 lbs. of coarse wool run through duster and burr picker and laid down in five layers. To each layer spread on 4 qts. of oil and 10 qts. of water. Pole each layer.

Run through picker twice. Four quarts of oil, 10 qts. of water to 100 lbs.

No. 3 blend: Oxford mix; 500 lbs. batch wool and shoddy, 125 lbs. black wool, 125 lbs. white pulled wool, 250 lbs. black shoddy. Fifteen quarts of oil, 20 qts. water. This is allowing 6 qts. of oil to 100 lbs. of wool and 8 qts. of water to 100 lbs. of wool; nothing for shoddy. If desirable, more oil and water can be added. Mix black and white wool together and run through wool duster and burr picker. Run the shoddy through mixing picker. Make five layers of wool and five layers of shoddy. First layer of wool put on 3 qts. of oil and 4 qts. of water. Beat well with pole. Then put on layer of shoddy; beat with pole. Next, a layer of wool and then a layer of shoddy alternately until finished. In feeding, take top to bottom of pile. Feed on light and run through the picker three times, mixing well every time

You will notice that I do not put any oil or water on the shoddy, but put it on the wool. I will give my reasons for doing so: First, the shoddy has already received enough oil during the process of manufacturing. Second, it will not fill and gum the cylinder and doffer wire with flocks and fine dust. Third, the cards will run longer without stripping. Fourth, it makes more even, smoother and stronger yarn, and it cards and spins better.

The same rule for the blending and oiling

of this batch can be applied to any percentage of wool and shoddy. To those using emulsions, the same percentage of oil and water can be used and batches laid down the same way, but keep the emulsions from getting on the shoddy and cotton as much as possible.

Sam Driver.

Preparing White Wool for Mixtures

I would like information on the method of preparing white wool for mixtures.

W. W. (986).

When white wool is mixed with black in the raw state the mixture has a better appearance if the white retains a part of its natural yellow shade. Bleached white makes the mixture look harsh when mixed with black, on account of the sharp contrast. Moreover bleaching is expensive. Various methods have been introduced to displace bleaching by removing a portion of the yellow shade of the fiber, among them being the following:

1. For 100 pounds of wool, 1 1/2 pounds of oxalic acid and 1 pound of sulphuric acid 66 Be., are dissolved separately, then added to 2,000 pounds of water at 120° F. When starting the bath it is advisable to add double the quantities named. The wool is then entered and at the end of 35 or 40 minutes the yellow shade will be largely removed. The wool is then taken out and rinsed several times.

2. For 100 pounds of wool 1 1/4 pounds of chloride of tin and 1 pound of hydrochloric acid are dissolved in water and then added to the bath, which is heated to 165° F. and 1/4 to 4/10 of a pound of sulphate of indigo paste added. The dyer must regulate the amount of indigo to suit the requirements of each case. The wool is worked in this bath for one hour.

3. For 100 pounds of wool 1/4 to 4/10 of a pound of Prussian blue is dissolved with four times the quantity of oxalic acid, forming a concentrated solution. This is added to the bath with 13 to 14 pounds of sulphate of soda. The wool is worked from three-quarters to one hour at 150° F.

4. For 100 pounds of wool 1/4 to 1/2 an ounce of Formyl Violet S 4 B, 1/2 pound of acetic acid (increased if the water contains lime) and 4 pounds of sulphate of soda are dissolved in the bath in which the wool is worked at 160° F.

5. This is process 4 with 1 to 1 1/2 ounces of cyanole extra added to the bath.

6. The wool is worked in a bath of bisulphite of soda at 2° Be. at a temperature of 100° F., to which is added 1/3 of an ounce of methylene blue. The wool is worked for one hour, then taken out and rinsed. Any of the above methods will leave the wool in good condition for mixes, and all have the advantage of simplicity. P. Hoffman.

Density of Baled Wool

What is the density of Bagdad wool as imported in bales? How does its weight compare with that of water?

Douglass (2081).

A cubic foot of water weighs 1,000 ounces or 62 1/2 pounds. A bale of Bagdad wool recently imported measured 51 inches long, 17 inches wide and 17 inches thick; cubic contents, 14,739 cubic inches. The gross weight was 360 pounds, equal to 675 ounces, or 42 pounds per cubic foot. The weight of this bale was 32 1/2 per cent. less than that of water.

Core Yarn

In looking over the articles on core yarn contained in the March and April issues it occurred to me that your readers would be interested in additional particulars regarding this process. The cotton core is first wound on the regular roping spools and fastened on a frame work at the back of the card just above the rub rolls. A guide is placed near the doffing cylinder with guide eyes set so as to deliver the core in center of the doffer rings. The core is started between the wipe roll and doffer, carried back to roping spool, and delivered in the center of the doffer rings.

When going through the rub rolls the covering is rolled around the core in such a man-

ner that the core is almost completely hidden. Two of these threads are then twisted together. An improved method consists in delivering two ends to the doffing rings as near the center at possible and about 3/16 to 1/4 inch apart. When rubbed together the threads of the core are embedded so well in the fibers that when twisted either on a mule or twister the covering will not strip. This makes the thread almost if not altogether like all wool. This process has eliminated the trouble of stripping which was the result of yarn made with a single core.

There is another process called the "double covered" which is made by taking only one spool from the card instead of two. The yarn coming from the top condenser is taken through and under, and again delivered to the bottom roll, thereby getting a second covering. This latter process is the best for heavy stocks, as the covering is more even than that made by the single covered process. I have seen core yarn made and used for both warp and filing in woven goods and which did not strip when used as warp.

The finishing or twisting of the yarn from the card is best done on a twister, but can also be done on a mule. It is almost necessary to use a doubling twist scroll, as the ordinary scroll gives too much twist for ordinary knitting yarn. Garhwal.

Winding-Under on Woolen Mules

In regard to winding-under on woolen mules, I would like to state a few practical points worked out in my experience in the mule room. A high spot in the tracks will cause winding under. When the mule backs off, the faller locks and rests on a stud connected with the builder-arm, which has a roll connected on the end that runs on the builder rail. If all the parts are in perfect order so that there is no lost motion, the faller can wind only to a given point up or down. If the backing off chain is too long, allowing the mule to unwind too much yarn when backing off, the faller will dip and cause the yarn to wind under. The faller fingers may be out of line. Some of them may be too low. There may be a high place in the track so that the carriage is forced up a little, causing the faller to dip just enough to wind under, especially if there is a large shoulder or seat on the bottom of the bobbin. If there is a low place in the track it will cause a more open wind on the bobbin and a longer build. The front builder shoe may not be set right, the builder rail dwelling too long on top of the shoe before starting down the incline of the shoe or shaper, as it is sometimes called.

Woolen Spinner

INDEX

	PAGE
Apperly Feed, Fine Ends on	49
Balancing Solutions	24
Belgium System of Wool Carding	47
Bleached Wool for Mixtures	92
Blending and Oiling	89
Bobbins and Cops, Soft Noses on	34, 36
Broken Drawing on Breakers	87
Burr Picking and Carbonizing	13
Calculating Pulleys and Speeds	82
Calculating Weight of Sliver	17
Carbonizing	13, 29, 46
Card Clothing, Putting on	80
Card Clothing Wire for Fine and Coarse Stock	77
Card for Sample Mixing	11
Carding Shoddy	9
Causes of Uneven Roping	18, 30
Changing Ring Doffers	69
Coarse Stock, Changing to	23
Core Yarn	83, 94
Cotton Mixes	17
Cylinder, Speed of	9
Density of Baled Wool	94
Difficulty with Rub Rolls on Coarse Wool	27
Draft at the Mule	21
Dressing for Rub Aprons	28
Drying after Carbonizing	14
Dyeing and Carbonizing in One Operation	29
Emery Cloth on Traverse Grinder	52
Equipment and Operation of Carbonizing Plant	13
Equivalent Numbers of Yarn	69
Even and Uneven Roving	18
Fancy, Reclothing	23
Feed Rolls	32
Finers, Testing	58
Fine Ends of Feed	49
Fleeced Shoddy	66
Grinding, Settings and Care of Cards	52
Horse Power of a Waterfall	39
How to Mix Wool and Shoddy	64
How Twits are Made	53
Lumps in Yarn	19
Matching Mixtures	10
Mixing Cotton, Wool and Shoddy	67

PAGE
Mixing Wool and Shoddy 64
Mules, Winding Under on 55
Neppy Yarn in Cotton Mixes 17
Number of Wool Spindles in World 75
Numbering Yarn 69
Nubs Forming on Card 11
Nub Yarns 26, 59
Oiling and Blending 89
Oiling Different Kinds of Stock 33
Operatives Needed for Ten-Set Mill 42
Picker, Setting 46
Preparing White Wool for Mixtures 92
Production and Consumption of Wool 75
Production of Woolen Card 41, 71
Putting on Card Clothing 80
Quadrant, Setting 35, 36
Qualitative Tests for Fibers 58
Random Roping 64
Ring Doffers, Changing 69
Rowy Goods 66
Rub Rolls, Setting and Care of 27
Setting Cards for Nubs 26, 59, 63
Setting Mixing Picker 46
Setting Mule 34, 36, 56
Setting Workers and Strippers 50
Shoddy 9, 64
Size of Wire 77
Sliver, Weight of 17
Soap and Oil Solution 24
Soft Noses on Bobbins and Cops 34, 36
Speed and Size of Pulleys 82
Ten-Set Mill, Number of Hands Needed 42
Testing for Soap or Alkali in Waste Liquor 38
Testing Grease Wool to Determine Shrinkage .. 56
Trouble in Carding Shoddy 9
Twist in Lumpy Yarn 20
Twisted Rolls in Carding 11
Twits in Carding and Spinning 53
Uneven Roving 18, 30
Variation Allowed in Spinning Wool Yarn 74
Vigogne Yarn 22
Waterfall, Flow and Power 39
White Wool for Mixtures 92
Winding Under on Mules 55, 96
Wire for Cards 54
Wire, Size of 77
Wool, Density of Baled 94
Wool Dryer 15
Wool Yarn with Cotton Core 83
Workers and Strippers, Setting 50
Yarn Numbering 69

McBride System of Carding

Rotary Cloth Finishing Press

Manufactured by

Woonsocket
Machine and Press Co.
Woonsocket, R. I.

"Breton" Oils for Wool

1880 1912

have been used on all grades and kinds of woolen goods for thirty two years

Mills that adopted them when first introduced are using them now—conclusive proof of unusual merit.

Let us send a representative to discuss with you the grade of BRETON OIL FOR WOOL best suited to your conditions.

BORNE, SCRYMSER COMPANY

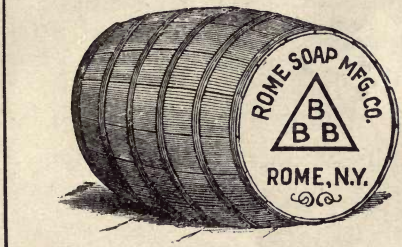
80 South Street, New York

Boston Fall River Philadelphia

Works, Claremont, N. J.

Rome Soap Mfg. Co.

ROME, N. Y.



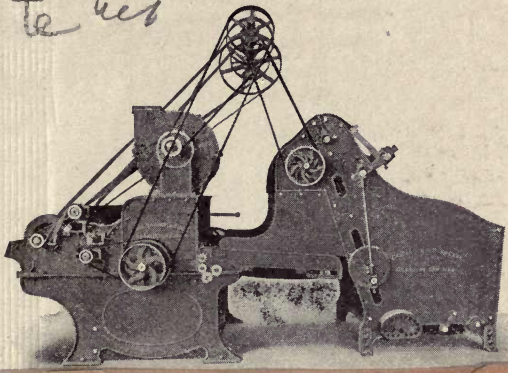
Olive Oils

Red Oils, Wool Oils

Wool Scouring Soaps

Am. Potashes and

Specialties



C. G. Sargent's Sons Corporation
Graniteville, Mass.