"A Better Product With Less Loom Breakage"

The above illustration is a photographic reproduction of two pieces of cloth (woven at the same mill) before they were boiled out, scoured or bleached. The "size" mixture, yarn, etc., were identical except that each piece of cloth was sized at different temperatures.

Note the difference in texture—how much softer and more uniform in appearance the texture is where the warp has been sized at a lower temperature and uniformly maintained at 185° F. by having the size box equipped with "TAG" Self-Operating Size Box Temperature CONTROLLERS

Moreover, the mill superintendent reports that "the warps are now woven easier with less breakage of yarn and the cloth is superior in feel and cover."

You, too, can secure this decided advantage by determining the exact temperature at which your size" mixture will produce the best weaving results and then be sure to avoid harmful temperature fluctuations by equipping your size boxes with "TAG" Self-Operating Temperature Controllers. No compressed air or other auxiliary motive power is required.

For further information write for Bulletin T-387 and include details of your specific requirements.

C.J. TAGLIABUE MFG. CO.
TEMPERATURE ENGINEERS
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FOR WOOL AND SHODDY

Always
Uniform
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KNITTERS
BODY MACHINES
Every Pound of Cotton You Use One Cent Less

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Try it.

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Parks-Cramer Company

Engineers & Contractors
Industrial Piping and Air Conditioning
Fitchburg Boston Charlotte
ESTABLISHED 1815

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SHUTTLES FOR ALL KINDS OF LOOMS
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acquired the interests of the

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THE increased facilities for distribution made possible
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Orders for any of the products of CATARACT
REFINING & MFG. CO. and SWAN & FINCH
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Quality Oil and Grease Products Since 1853

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New York
November 15, 1919

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GM daylight lamps reproduce daylight conditions throughout your plant. Not the dazzling white light that results in eye strain and possibly permanent injury, but a clear, diffused light that simulates true daylight exactly. Government authorities find that daylight lighting conditions have the following average effect:

- 10% increased output
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The daylight effect of the GM lamp is produced by a tinted glass bulb that eliminates glare and adds the blue element essential to natural daylight. Clear, even illumination is assured.

GM High-Efficiency Tungsten Lamps are made in all sizes and in all types. The GM 60 watt daylight lamp is the only vacuum daylight lamp made, the only daylight lamp suitable for local lighting. We have named it the Isaver. The larger gas-filled GM daylight lamps are particularly adapted to general mill lighting.

To supplement our GM lamp service we are sales agents for the Ivanhoe-Regent* and Amco* industrial lighting fixtures. In fact, we are prepared to take care of your lighting requirements in every detail. Complete lighting recommendations and layouts are given on request.

GM lamps are low in cost. Discount schedule will be sent at your request.

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For Cotton Piece Goods

“We are pleased to say that adding the Breton Minerol ‘F’ in our boil has given us a softer finish.”

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BOSTON  PHILADELPHIA  
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The Perfect PATENT KNIT-ALL Cone

The smooth round polished point allows the yarn to knit off without catching and breaking

SEE THE POINT

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Made by

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ESTABLISHED 1868

B. S. ROY & SON CO.  
Textile Grinding Machinery  
WORCESTER, MASS.
of all kinds
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The “HURRICANE” Line of Drying Machinery
Includes
Automatic Loop Dryers For Underwear, Toweling, Piece
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A SELF-CONTAINED American dyestuff industry means, first of all, protection to America and American industries.

Protection to the nation in time of war in that it furnishes the plants, the technique and the intermediate products for the manufacture of high explosives and poisonous gases.

Protection to our one source of supply for the synthetic medicinals that are the chief reliance of medical science in relieving pain and in fighting disease.

Protection to the textile, leather, paper, printing ink, paint and other dyestuff consuming industries producing over two and a half billion dollars of manufactured goods a year, employing over one million people and representing upwards of two and one-half billion dollars in invested capital.

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PROTECTION OR FREE TRADE.

Now that the sovereignty and independence of the United States have been protected by the rejection of the German treaty with the league of nations, it is fortunate that the President in his message to Congress has drawn the line sharply on the other great issue of free trade or protection to American industry. After stating the well known facts as to the huge debts that Europe owes to the United States, the great excess of our exports over imports, the inability of Europe to ship gold in payment, and the danger of increasing the present stock of gold in this country, the President advocates free trade in these words:

"The time has nearly passed for international governmental loans and it will take time to develop in this country a market for foreign securities.

"The productivity of the country greatly stimulated by the war must find an outlet by exports to foreign countries and any measures taken to prevent imports will inevitably cut tail exports, force curtailment of production, load the banking machinery of the country with credits to carry unsold products and produce industrial stagnation and unemployment. If we want to sell, we must be prepared to buy. Anything, therefore, which would tend to prevent foreign countries from settling for our exports by shipments of goods into this country could only have the effect of preventing them from paying for our exports and therefore of preventing the exports from being made."

This proposal to change the settled policy of the United States from protection to free trade, like that of abandoning the policy of Washington for a league of nations, must be judged, not by the temporary and extraordinary conditions created by the World War, but by the conditions that will exist when the world is restored to a normal basis.

Under the present abnormal conditions, not only is Europe unable to pay her debts with gold, but the greater part of Europe has been deprived temporarily of the ability to produce goods with which to pay these debts. In some sections this loss of productive power is due to devastation; in other sections, to the lack of raw material. But in all sections of the continent the disability is temporary and the return to normal production but a question of a few years under the skilful management for which Europeans are so well fitted.

When the present prostration has passed and European mills and workshops are again in operation, any attempt to pay the huge debts to America with manufactured goods would disorganize American industries and cause widespread unemployment.

It was the fear of demoralized industry that led the Peace Council at Paris to reject the idea of allowing Germany to pay her indemnity with manufactured goods. As one of the Entente representatives put it: "The very government that proposes this plan would be the first to revolt against it if put into effect." And yet with that fact so clearly demonstrated at Paris, the President now proposes that Europe's gigantic debt to America shall be paid with European goods.

The remedy for the present extraordinary situation in international trade is not to be found by opening the gates for a devastating flood of manufactured goods into the United States. It is to be found in the regulation of both exports and imports on the principle that the citizens, not only of the United States, but of every country on earth, have the first right to the consumption of what they produce and to the production of what they consume.

Instead of admitting foreign goods free of duties, the mad struggle for export trade should be abandoned. The true American policy is to provide for the needs of the American people with American goods so far as nature makes that possible, letting foreign countries adopt the same policy of industrial independence for themselves. That principle, not the league of nations, is the secure foundation for world peace. Under the extraordinary conditions now existing the United States by the power of mere example can do much to secure its general adoption by the nations of the earth.

The President not only advocates free trade for the United States, but in the extract from his message quoted above views with approval the policy of granting ultimately great loans to Europe for financing our export trade. By endorsing it the President has fallen a victim to the money madness that has taken possession of so many influential men and who are obsessed with the idea that the welfare of the American people depends on shipping as great a quantity of goods as possible to foreign countries. Among the exponents of this policy we find former Secretary Redfield seriously proposing that the American people lend $5,000,000,000 to foreigners that the foreigners may use the money to buy American goods. In this way we are to pay ourselves for the goods we sell. The same scheme is advocated by W. E. Filene, of Boston, who urges a great popular loan of $4,000,000,000 as a starter, "with securities issued in denominations as low as $5 so they will be within the reach of everybody."

Anyone with ordinary horse sense knows that the Redfield-Filene scheme would mean no payment at all, but merely a transfer of the credit from the American exporter, middleman and banker to the American public; and furthermore that such loans mean a huge interest charge, which at 6 per cent, on Mr. Redfield's loan would amount to $480,000,000 a year, or $4,800,000,000 every ten years, against countries that cannot now pay what they owe.

But the most serious result of this scheme would be its effect on the cost of living. The only real remedy for the social unrest and the labor troubles in the United States is a reduction of the cost of living. The Redfield-Filene scheme would bring with it an immediate increase by aggravating the scarcity of all the necessities of life. This would be brought about at a time when, as a result of the war conditions and the demands of labor for shorter hours with reduced output, production not only has been overtaken by consumption, but is now far short of the necessities of American consumers. Under this scheme anyone with five dollars in his pocket can increase the cost of living by lending his money to foreign creditors in countries that are bankrupt or on the verge.

The foreign borrower will use American money to buy the necessities of life in the United States, taking them away from the American consumer.

The foreigners will have the goods. The exporter, middleman and banker will have the money and the profits. The American investor will have a finely engraved piece of paper on which someone somewhere promises to pay something sometime. The American producer and consumer will have the privilege of paying higher prices for the necessities of life and the materials that make up the cost of production. With the rising prices will continue the hopeless and demoralizing struggle to raise wages to the level of the cost of living, with the certain result of increasing social unrest and the strain on the social order.

(Continued on following page.)
World Trade Club Chronology Continued

Since the first edition of this statement appeared, on Sept. 27, the World Trade Club of San Francisco has continued its pro-metric propaganda.

Sept. 7. A booklet entitled "An Evening at the World Trade Club" is distributed purporting to give an account of a Wednesday night "meeting" of the "Club." As usual, the name of Mr. Z does not appear, but the booklet refers to "some of the notable men who have written or wired, or aided the World Trade Club in advocacy of the metric units," among whom are the following: Henry Ford, John Hays Hammond, James Speyer, Otto H. Kahn, and George W. Perkins.

San Francisco correspondent No. 3 makes the following report of this "meeting":

"I am enclosing a pamphlet recently issued entitled "An Evening at the World Trade Club." The meeting referred to in this pamphlet is a meeting of the Foreign Trade Club of San Francisco, of which Mr. W. H. Hammer is President. It is evident that the transposition of names has been made with the tacit consent of the officers of the Foreign Trade Club. At least we have not heard of any objection being urged."

Here the World Trade Club is seen appropriating temporarily the membership of what is apparently a real organization. After what has been discovered, even this fake is not surprising. But what is to be thought of the organization that allows its members to be used in this way for the purpose of deceiving the American people?

The World Trade Club report the "meeting" begins with this:

"At 6:15 o'clock on the evening of 18 June, 1919, there met in the banqueting hall of Hotel St. Francis a company representing the leading 500 manufacturing merchants of San Francisco. It was a gathering such as takes place every Wednesday—a meeting of members of the World Trade Club. The banquet room furnished an appropriate setting for this occasion. It is a room 27 meters long, 15 meters wide, 5 meters high."

And ends with this:

"The meeting closed. As these leading merchant-manufacturers were leaving they were still talking among themselves on the interesting subject of meter-liter-gram. In groups they passed into the balmy atmosphere of a perfect San Francisco night. As they made their way homeward, the stars shone out, gleaming with incandescent brightness in a setting of richest ethereal azure—a beautiful California evening sky."

And to think that such humbug is possible under such a canopy.

HOME OR FOREIGN MARKETS.
(Continued from previous page.)

There is to be no regulation of exports. The American products taken from American consumers will be used, not only to supply the real necessities of suffering peoples in distant countries, but to gratify the vanity and feed the extravagance of foreigners who are not suffering, while foreign governments, relieved of the burden of providing for the needs of their nationals, will be able to turn their resources to the support of armies and navies for world conquest and dominion, directed perchance against the United States itself. This plan is not only in the minds of schemers, it is so far advanced that the Edge bill authorizing United States charters to banking corporations for financing it, has already been passed by both House and Senate and may be a law before these words are printed.

This banking scheme to lend American money to foreigners should be cast with free trade and the league of nations into the everlasting discard.

The Propaganda and the Bureau of Standards.

Oct. 25. The World Trade Club issues a leaflet giving the results of a canvass of 58,226 "meter-liter-gram petitions received by the United States government up to September 15, of which all but 434 were in favor of the metric system. Here is an extract from the introductory note:

"The results of the petitions were referred to the Department of Commerce at Washington. Without cost to the United States Department of Commerce and at the expense of World Trade Club of San Francisco, these petitions were classified and carefully counted under the direct supervision of W. Mortimer Crocker, 156 5th Ave., New York."

After noting the collaboration between the United States Department of Commerce and the World Trade Club of San Francisco, let the reader direct his attention to the following additional evidence of this connection between the United States Government and organizations of individuals carrying on a propaganda to compel the use of the metric system and forbid the use of English weights and measures under penalty of fine and imprisonment:

The "Club" Canvasses the Petitions.

Oct. 29. The World Trade Club sends to the press a "re-release—immediately—please-insert-current-date news item," announcing the result of its own canvass of the petitions it has instigated:

"Out of 58,226 petitions relating to exclusive use of metric weights and measures in U. S. America, now in keeping of the Bureau of Standards, Department of Commerce, 57,800 petitions or 99.27 per cent. favor this progress, and only 426, or less than 1 per cent. oppose it. This unqualified endorsement of metric standards for U. S. America is brought out in the analysis just completed at Washington by representatives of World Trade Club of petitions sent to President Wilson and America's national legislators. The petitions have come as a result of the efforts of World Trade Club of San Francisco and the Metric Association of New York in explaining the great advantages of world-wide standardization of weights and measures. The petitions were referred to the U. S. Department of Commerce, and without cost to the United States Government, World Trade Club had them carefully counted and classified."

Oct. 29. The World Trade Club sends to editors throughout the country "a suggested editorial" on the canvass of the petitions, from which this extract is taken:

"Common Sense Wins."

"A great victory has been won by common sense over prejudice."

"Competition has triumphed over ultra conservation and inertia."

"World Trade Club of San Francisco and the Metric Association of New York have just received a classification of the petitions mailed within the past few months to President Wilson and national American legislators, and by them referred to the Bureau of Standards, Department of Commerce."

Nov. 3. The World Trade Club supplies additional evidence of the close connection between its propaganda and the Bureau of Standards by enclosing a blank petition addressed to President Wilson and also an envelope addressed "Bureau of Standards, Department of Commerce, Washington, D. C." Under this arrangement the President of the United States is not to have the privilege of receiving and considering the petitions which his countrymen address to him. These petitions are to be framed by Mr. Z. in San Francisco to favor the metric propaganda, the citizens having no idea they are the work of one man, misled by the name "World Trade Club" into thinking that the movement is backed by a real trade organization, are to sign them on the dotted lines; they are then to be sent to that metric hothouse, the Bureau of

(Continued on page 32.)
Driving the Winding Rolls.

The rollers of the winding motion have a horizontally vibrating motion as well as a rotary movement and are driven ordinarily in two ways. In the winding devices of carding machines and single or double-roll winders on gill boxes for combed sliver, the roller Bo slides on shaft a, Fig. 118. This shaft imparts the rotary movement to the roller Bo, whatever may be its lateral position, by means of a key o in the shaft, as shown, or in the bore of the roller Bo; in the latter case there is a key-seat in the shaft a in which the key o slides.

In the winding devices of drawing frames the rotary movement of Bo is obtained by the toothed drum D, Fig. 121, keyed on an extension of the drawing-roll, Fig. 121, and meshing with a pinion gear P keyed on the shaft of the rollers Bo.

**Fig. 118. Winder for Card.**

The horizontally vibrating motion of the winding roller is obtained in different ways. On cards and on certain gill-boxes it is obtained by a driving plate. On a cross piece b fastened to the supports s, Fig. 118, there is bolted a guide in which a stud g fastened to the plate pl revolves. The plate pi is driven by bevel gears x x' and the chain gears y, i, z. This arrangement, shown in Fig. 104, has a vibrating motion which is uniformly accelerated and retarded. The elliptical 68-tooth gear keyed on pi, meshes with the 34-tooth eccentric gear, which is driven at a uniform speed. The speed ratio being 2 to 1 and the guide C being perpendicular to the greatest diameter of the 68-tooth elliptical gear when it coincides with the center of the Pi, it follows that the stud g is driven with a planetary motion that is uniformly accelerated and retarded at each half revolution pl, with the result that Bo vibrates with a uniform movement.

**Fig. 121. Winder for Drawing Frame.**

Fig. 137 illustrates the application of the same principle by a crank in place of pl. This crank is driven by two eccentric bevel gears. One with 48 teeth is keyed on the crank shaft, and the other with 24 teeth is keyed on a shaft driven by two 36-tooth gears. This drive gives the crank a uniformly accelerated and retarded movement at each half-revolution, whence results the uniformity of the vibrating motion of the carriage T and then of Bo.

In the porcupine drawing-frames the drive for the vibrating the winding devices consists of an endless gear rack C, Fig. 121, with interior teeth. Fixed on the carriage T of the winder is a casting a to which is attached the rod L carrying the gear rack C which rests on a fixed slide g. The pinion gear p set in a stationary bearing is driven by the gears z, i, y, x, x', and meshes with the teeth of the gear rack C, being guided by the fixed plate f fastened to the gear rack. This drive gives a uniformly vibrating movement to the carriage T of the winder. The curves of the gear rack C being of small diameter there is a very brief dwell when the direction of the movement is changed, so that the movement to the right and left can be considered as uniformly continuous, whence results the winding of the sliver into the form of a cylinder.

Because of the sudden change of direction of the gear rack C, the casting a is sometimes movably attached on a shaft parallel with T. The position of a on this supplementary shaft is determined by the tension of two spiral springs wound around the shaft, which exert pressure on each side of a. The springs thus absorb the shock resulting from the sudden reversal of the movement of T causing a slight lateral displacement of a, which immediately resumes its original position by the reaction of the springs.

The gear rack is also arranged in other ways. Instead of being horizontal it may be vertical; the gear rack, in place of being movable, remains stationary in a fixed position and the pinion gear p oscillates by pivoting on a point corresponding with the center of the conical gear x'. In the latter case the gear C is adjusted to the desired oscillation of p.

Tension of the Sliver.

The rotary movement of the winding roller being constant, the vibration of the sliver causes a variation in the tension on the sliver. If we represent the width of the vibration of Bo by C D, Fig. 122, and the rotary movement of Bo by A D during the same period, the length wound on the ball will be equal to the hypotenuse A C of the right-angle triangle A C D. The length of the sliver delivered is equal to A D. Placing A D on A C we find the tension of the sliver to be equal to C D'.

This excess of tension does not have any influence on the section of the sliver and roving because of the natural elasticity of the material, which permits a certain momentary stretching, which is corrected when the sliver is unwound. It is, however, necessary that the vibrating motion of the winder be uniform, in order that the stretch may not exceed certain limits and cause an irregularity in the sliver.
"Straight Line" Textile Calculations

By Samuel S. Dale

It follows that the cotton No. is found by dividing the constant (1000) by the grains per 120 yards. 1000 ÷ 25 = 40, cotton No. 1000 (grains) ÷ 40 (cotton No.) = 25 grains per 120 yards.

Below will be found the formulas for reducing yarn numbers from one basis to another:

**Runs. (1600-Yard Lengths per Pound).**

Used for carded woolen yarn. As the runs indicate the number of 100-yard lengths per ounce, the run system is practically identical with the yard per ounce system used in England for silk.

- Runs × 1.905 = Cotton No.
- Runs ÷ 2.67 = Worsted No.
- Runs × 0.61 = West of Eng. No.
- Runs × 55 = Linen No.
- Runs × 0.64 = Yorkshire No.
- Runs × 1.60 = Yards per pound.
- Runs × 3.23 = Metric No.
- 2790 ÷ Runs = Denier No.
- 160 ÷ Runs = Dram No.
- 525 ÷ Runs = Grains per 120 yds.
- 437½ ÷ Runs = Grains per 100 yds.
- 218½ ÷ Runs = Grains per 50 yds.
- 109½ ÷ Runs = Grains per 25 yds.
- 87½ ÷ Runs = Grains per 20 yds.
- 9 ÷ Runs = Jute No.

**Cotton Count. (840-Yard Lengths per Pound).**

The world's standard for cotton yarn. Also used for spun silk.

- Cotton No. × 0.525 = Runs.
- Cotton No. × 1.5 = Worsted No.
- Cotton No. × 2.8 = West of Eng. No.
- Cotton No. × 2.3 = Linen No.
- Cotton No. × 2.28 = Yorkshire No.
- Cotton No. × 0.840 = Yards per pound.
- Cotton No. × 1.693 = Metric No.
- 375 ÷ Cotton No. = Denier No.
- 305 ÷ Cotton No. = Dram No.
- 1000 ÷ Cotton No. = Grains per 120 yds.
- 833½ ÷ Cotton No. = Grains per 100 yds.
- 416½ ÷ Cotton No. = Grains per 50 yds.
- 208½ ÷ Cotton No. = Grains per 25 yds.
- 166½ ÷ Cotton No. = Grains per 20 yds.

**Worsted Count. (560-Yard Lengths per Pound).**

Used for worsted yarn.

- Worsted No. × 0.35 = Runs.
- Worsted No. × 0.25 = Cotton No.
- Worsted No. × 1.875 = West of Eng. No.
- Worsted No. × 2.333 = Linen No.
- Worsted No. × 2.833 = Yorkshire No.
- Worsted No. × 0.560 = Yards per lb.
- Worsted No. × 1.129 = Metric No.
- 7972 ÷ Worsted No. = Denier No.
- 467 ÷ Worsted No. = Dram No.
- 1500 ÷ Worsted No. = Grains per 120 yds.
- 1250 ÷ Worsted No. = Grains per 100 yds.
- 625 ÷ Worsted No. = Grains per 50 yds.
- 312½ ÷ Worsted No. = Grains per 25 yds.
- 250 ÷ Worsted No. = Grains per 20 yds.

**West of England Count. (320-Yard Lengths per Pound).**

Used for carded woolen yarn in the west of England.

- West of Eng. No. × 5 = Runs.
- West of Eng. No. × 20 = Runs.
- West of Eng. No. × 0.381 = Cotton No.
- West of Eng. No. × 0.571 = Worsted No.
- West of Eng. No. × 1.07 = Linen No.
- West of Eng. No. × 1.25 = Yorkshire No.
- West of Eng. No. × 0.320 = Yards per lb.
- West of Eng. No. × 0.645 = Metric No.
- 13,551 ÷ West of Eng. No. = Denier No.
- 800 ÷ West of Eng. No. = Dram No.
- 2.565 ÷ West of Eng. No. = Grains per 120 yds.
- 2.185 ÷ West of Eng. No. = Grains per 100 yds.
- 1.094 ÷ West of Eng. No. = Grains per 50 yds.
- 437½ ÷ West of Eng. No. = Grains per 20 yds.

**Linen Count. (300-Yard Lengths per Pound).**

The world's standard for linen and hemp yarn. Used in the Philadelphia district for woolen yarn and there called the "cut" system.

- Linen No. × 0.19 = Runs.
- Linen No. ÷ 5.13 = Runs.
- Linen No. × 0.357 = Cotton No.
- Linen No. ÷ 2.8 = Cotton No.
- Linen No. ÷ 0.534 = Worsted No.
- Linen No. ÷ 15.16 = West of Eng. No.
- Linen No. × 1.17 = Yorkshire No.
- Linen No. × 3.00 = Yards per lb.
- Linen No. × 0.605 = Metric No.
- 14,582 ÷ Linen No. = Denier No.
- 853 ÷ Linen No. = Dram No.
- 2,800 ÷ Linen No. = Grains per 120 yds.
- 2,333 ÷ Linen No. = Grains per 100 yds.
- 1,167 ÷ Linen No. = Grains per 50 yds.
- 583 ÷ Linen No. = Grains per 25 yds.
- 467 ÷ Linen No. = Grains per 20 yds.

**Yorkshire Count. (256-Yard Lengths per Pound).**

Used in England for carded woolen yarn.

- Yorkshire No. × 0.16 = Runs.
- Yorkshire No. × 0.305 = Cotton No.
- Yorkshire No. × 0.467 = Worsted No.
- Yorkshire No. × 0.8 = West of Eng. No.
- Yorkshire No. × 0.853 = Linen No.
- Yorkshire No. × 2.56 = Yards per lb.
- Yorkshire No. × 0.516 = Metric No.
- 17,440 ÷ Yorkshire No. = Denier No.
- 1,000 ÷ Yorkshire No. = Dram No.
- 2,281 ÷ Yorkshire No. = Grains per 120 yds.
- 2,734 ÷ Yorkshire No. = Grains per 100 yds.
- 1,367 ÷ Yorkshire No. = Grains per 50 yds.
- 684 ÷ Yorkshire No. = Grains per 25 yds.
- 547 ÷ Yorkshire No. = Grains per 20 yds.
- 50 ÷ Yorkshire No. = Jute No.

**Yards per Pound.**

The size of yarn is sometimes indicated by the number of yards per pound.

- Yards per lb. × 1600 = Runs.
- Yards per lb. × 840 = Cotton No.
- Yards per lb. × 560 = Worsted No.
- Yards per lb. × 320 = West of Eng. No.
- Yards per lb. × 256 = Yorkshire No.
- Yards per lb. × 496 = Metric No.
- 4,464,528 ÷ Yards per lb. = Denier No.
- 256,000 ÷ Yards per lb. = Dram No.
- 840,000 ÷ Yards per lb. = Grains per 120 yds.
- 700,000 ÷ Yards per lb. = Grains per 100 yds.
- 350,000 ÷ Yards per lb. = Grains per 50 yds.
- 175,000 ÷ Yards per lb. = Grains per 25 yds.
- 140,000 ÷ Yards per lb. = Grains per 20 yds.
- 14,400 ÷ Yards per lb. = Jute No.

**Metric Yarn Number (496 Yards per Pound).**

This system of numbering (1000-meter lengths per kilogram) is used on the Continent of Europe, principally for carded woolen and worsted yarn.

In France cotton yarn is numbered to indicate the number of 1000-meter lengths per half-kilogram (592 yards per pound, making the French No. equal to one-half of the metric).

- Metric No. × 0.31 = Runs.
- Metric No. × 0.39 = Cotton No.
- Metric No. × 0.856 = Worsted No.
- Metric No. × 1.65 = West of Eng. No.
- Metric No. × 1.65 = Linen No.

(Continued on following page)
The Mechanics of Textile Processes

In the case of irregular bodies or bodies that are not homogeneous in structure, the center of gravity is found by balancing the body on a knife-edge support or other test, and in many cases by calculation of graphs.

Pulleys and other revolving bodies, no matter how carefully they are made, may have their center of gravity out of the center of the pulley. They are said to be out of truth or out of balance and when running are liable to cause serious trouble. All such bodies are carefully balanced by adding Fig. 151.

or removing portions of the material until they remain at rest in any position when supported on their geometrical center.

If a uniform lever is supported on its center, its weight will act directly on the support and will not affect the balance; but if such a lever is fulcrumed on one side of the center of gravity, the weight of the lever must be taken into account.

Ex. A uniform lever 18 in. long is pivoted at a point 3 in. from one end. From the short arm hangs 36 lbs. How many pounds must be hung from the long arm to obtain equilibrium? The weight of the lever is 6 lbs., Fig. 151.

Moment of W round F is \( Wz \)

Moment of G round F is \( Gd \)

The moments on either side of the fulcrum must be equal.

\[ Py + Gd = Wz \]
\[ P15 = (6 \times 6) = 36 \times 3 \]
\[ P15 = 108 \]
\[ P = (72 \div 13) = 4.8 \text{ lbs.} \]

Ex. A safety-valve is 2½ in. dia. A lever 22 in. long is pivoted 4½ in. from the center of the valve and a weight of 60 lbs. is hung 18 in. from the fulcrum. What is the total pressure on the valve, and the pressure per sq. in.? The weight of the lever is 6 lbs. and the center of gravity acts at 12 in. from the fulcrum, Fig. 152.

The pressure \( P \) is the unknown quantity.

\[ P \times WF = W \times WF + G \times GF \]
\[ P \times 4\frac{1}{2} = (60 \times 18) + (6 \times 12) \]
\[ P = 1152 \div 4.5 = 266 \text{ lbs. total pressure on valve.} \]
\[ \text{Area of valve} = 4.9 \text{ sq. in.} \]
\[ 256 \div 4.9 = 52.24 \text{ lbs. per sq. in.} \]

MECHANICAL ADVANTAGE

In a previous article the velocity ratio was defined as follows: The movement of the first driver = the movement of the last driver.

This statement may assume a variety of forms all meaning the same thing: the first movement in a given time = the last movement in the same time, or space moved over at driving end = space moved over at finishing end.

It is thus seen that in any given arrangement of driving mechanism it is a simple matter to find how much faster or how much slower the resulting speed or movement is than the starting speed: starting movement = resulting movements = velocity ratio.

This method of comparing movements is applicable to practically all kinds of mechanism and is very often the basis of methods for calculating any advantage we obtain by the use of mechanism. If by the use of some appliance a force of 10 lbs. will enable a person to lift 50 lbs., there is clearly a gain of four-fold, which means that the appliance has enabled the person to move something against a resistance, to lift a load or to exert a force equal to five times the amount of the force applied. This would be termed the mechanical advantage of the appliance: force at the terminal end = force at the starting end = mechanical advantage, or load lifted = load applied = mechanical advantage.

This may be illustrated in the case of a simple lever, Fig. 153. If the load applied is 8 lbs. and a weight of 32 lbs. is required to balance it on the other arm in the position shown, then: load lifted = load applied = 4, mechanical advantage.

If instead of a weight being used we applied other forms of force, such as a driving effort, there would be exerted also at the other end a resultant effort or load, so that the effect can be expressed in this form: load = driving effort = 4, mechanical advantage.

Suppose that the lever moves round its fulcrum as in Fig. 154. When the lever has moved from position AB to CD the end A has traversed a portion of a circle AC and the end B has moved in the circular path BD, so that AC + BD = the velocity ratio.

It is easy to show that since AP is four times longer than FB, the arc AC is four times longer than the arc BD, and that therefore the velocity ratio is four, but the usual method is to prove it by drawing CH and DE at right angles to AB and then from the similar triangles show that:

**HC + CP = DE + DP**. Then:

**HC + DE = CP + DP = 4**

As HC and DE represent the respective arcs AC and BD, we have

**HC + DE = 4**, velocity ratio.

"STRAIGHT LINE" TEXTILE CALCULATIONS.

(Continued from previous page)

<table>
<thead>
<tr>
<th>Metric No.</th>
<th>X 1.94 =</th>
<th>Yorkshire No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric No.</td>
<td>X 496 =</td>
<td>Yards per lb.</td>
</tr>
<tr>
<td>8,000 = Metric No. = Denier No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>516 = Metric No. = Dram No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,693 = Metric No. = Grains per 120 yds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,411 = Metric No. = Grains per 100 yds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>796 = Metric No. = Grains per 50 yds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>353 = Metric No. = Grains per 25 yds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>282 = Metric No. = Grains per 20 yds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 = Metric No. = Jute No.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ HC + CF = DE + DF \]

\[ HC + DE = CP + DP = 4 \]

As HC and DE represent the respective arcs AC and BD, we have

\[ HC + DE = 4 \], velocity ratio.
The Construction of Weaves

By E. Bittner

Color Effects on Satin and Other Weaves.
A great variety of attractive effects can be obtained by arranging the colored warp and filling threads on satin and other weaves.
Sharply defined stripes are produced with a warp satin weave by arranging two or more colors in the warp and weav-

ing with closely set and solid color filling, as the filling shows very little or not at all on the face.
Warp stripes only are woven with a corkscrew weave, but

Fig. 558. Fig. 559.

checks are produced with crepe weaves by introducing multiple colors in both warp and filling.
Various patterns are shown at Figs. 551 to 567.
Fig. 551. A cross stripe with a 5-leaf satin. Warp, 2 dark 3 light. Filling, 1 dark, 1 light, 1 dark, 2 light. Light warp is raised over the light picks; the dark warp over the dark picks. The pattern is shown at top and right of draft; the weave in lower left-hand corner.
Fig. 552. A wider cross-stripe on the same 5-leaf satin.
Fig. 553. Long stripe on a 5-leaf warp satin. Dark warp is down when dark pick is woven; light warp is down when light pick is woven.
Fig. 554. Long stripe on a 7-leaf satin.
Fig. 555. Cross stripe on an 8-leaf filling satin.

Fig. 560. Fig. 561.

Fig. 562. Fig. 563.

Fig. 564. Fig. 565.

Fig. 566. Long stripe on an 8-leaf warp satin.
Fig. 557. Cross stripe on a 10-leaf filling satin.
Fig. 558. Long stripe on a 10-leaf warp satin.

Fig. 569. Fig. 570.

Fig. 561. (Continued on following page)
The Identification of Textile Fibers
By Dr. Louis J. Matos

In examining undyed wool fibers of any grade under the microscope, attention should be given to some fibers that appear distinctly white; also in dyed wool some fibers appear to be but slightly stained. These fibers are known as kems and are generally devoid of the characteristic markings that distinguish the normal wool fibre. Kems are somewhat horny in texture, appear flat, and are essentially dead fibers. They occur in almost all wools, some wools being distinctly "kempy," while in others such fibers seldom occur. They may be mistaken for vegetable fibers, but the alkali solubility test will confirm the identity, Fig. 25.

A very important chemical test to distinguish vegetable fibers from animal fibers, including natural silk, is to char a small portion of the sample in a dry test tube over a bunsen flame. In the mouth of the test tube place a small slip of red and blue litmus paper, and note the reaction of the fumes on the color of the paper. If the red paper changes to blue, the fibers are of animal origin, while if the blue paper changes to red, the fibers are vegetable. Animal fibers contain nitrogen, which during the heating is liberated in the form of ammonia, an alkali, which changes the red paper to blue. Vegetable fibers when treated as above give off acetic acid which changes the blue paper to red.

Natural silk is classed as an animal fibre, although it is a product of the silkworm. There are two commercially important silks, the ordinary natural silk, and the tussah, or wild silk. The chemical reactions of both of these are practically the same, but the microscopic characteristics are widely different and require notice.

Natural silk, in the raw state, always appears as a double filament. Each fiber is cemented to the other with the natural sericin or gum that is secreted by the worm during spinning, Fig. 26. Boiled-off silk appears as a single filament, quite clean and free from any gum. The filament in cross-section is round.

Tussah silk, on the other hand, though double, is distinctly flatterish in the raw state, and besides shows under a moder-

THE CONSTRUCTION OF WEAVES.
(Continued from previous page)

Fig. 559. Cross stripe on a 12-leaf filling satin.
Fig. 560. Check on a 6-leaf thousand-square weave.
Fig. 561. Check on 8-leaf radiating twill.
Fig. 562. Check on 8-leaf crepe.
Fig. 563. Check on 8-leaf basket.
Fig. 564. Check on 8-leaf modified basket.

Fig. 565. Check on a 6-leaf thousand-square weave.
Fig. 566. Check on a 10-shaft thousand-square weave.
Fig. 567. Check on a 12-shaft combination weave.

Fig. 26. Raw silk fibres. Here is seen the natural silk gum or "glue" known properly as sericin, binding the double filaments together.

ately high power microscope stripe running lengthwise, Fig. 27. The size of the filaments of this kind of silk is relatively larger than that of the natural silk.

Chemically, the wild silks are not as readily acted upon by reagents as the true silk, and the microscope affords the best means of identification. The parallel chemical reactions of wool and silk are as follows:

<table>
<thead>
<tr>
<th>Reagents</th>
<th>Wool</th>
<th>Silk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schweitzer's reagent.</td>
<td>Insoluble after 1/2 hour immersion.</td>
<td>Dissolves.</td>
</tr>
<tr>
<td>Saturated solution of soda, without heating.</td>
<td>Wool dissolves. Silk is not attacked.</td>
<td>No change in color.</td>
</tr>
</tbody>
</table>

(Continued on following page)
Power Transmission in Textile Mills

By Charles L. Hubbard

Bearing Proportions.

The relation between the diameter of the shaft and length of the bearing depends upon the maximum pressure of the shaft against the bearing, expressed in pounds per square inch of "projected area," the latter being obtained by multiplying the diameter of shaft by length of bearing in inches. If, for example, a journal 3 inches in diameter by 10 inches in length carries a total weight of 3,000 pounds, the pressure per square inch will be 3,000 ÷ (3 × 10) = 100 pounds.

The allowable pressure depends upon the speed of rotation, the material and finish of the bearing surfaces to some extent, and largely upon the quality of the oil used and the thoroughness with which it is applied to all parts of the bearing. For the conditions of general transmission work tests show safe bearing pressures ranging all the way from 100 to 600 pounds per square inch, depending upon the speed and method of lubrication.

As the exact pressure to be provided for is not known under ordinary conditions, and furthermore as the length of bearing cannot well be changed for each piece of work, it is customary to assume a relation between diameter and length of journal which shall be safe for a given class of work. Thus for line-shafting and general power transmission a ratio of 2.75 may be taken for speeds below 100 r. p. m., while for speeds of 100 to 350 r. p. m., the ratio should be at least 3 to 1.

The catalogs of a number of manufacturers of bearings show

IDENTIFICATION OF TEXTILE FIBRES.

(Continued from previous page)

Plumbate of soda. Wool turns brown. No coloration.
In making microscopic mounts of wool fibers for factory or mill work, permanence of the slides is not necessary, consequently distilled water will serve all purposes, but when permanence is required, the use of a gum-arabic-glycerine-water mixture, known as Farrant's Medium, will prove useful. It may be bought of most dealers in microscopic supplies, and a few ounces will make several hundred slides.

Fig. 11. Oilless Loose Pulley.

the shaft. To get the best results both the box and mandrel should be heated, otherwise the molten metal will not flow freely and the result will be an imperfect casting. A cold mandrel also produces a thin chill or hard film on the face of a bearing which is likely to be torn from the softer metal back of it by the grinding action of the shaft. Heating burns off any grease which may happen to be present on the box or mandrel. This prevents the formation of gas and resulting blowholes. It is the most economical in the end to use the best grades of babbitt made up of pure metals and free from

(Continued on following page)
Purification of Water for Boiling Off and Dyeing Silk

By J. L. Girard, Chemical Engineer

Precipitation Process.

Theory. Calcareous water contains lime salts and to simplify the theoretical explanation we would refer to the salts of magnesia which are subject to identical reactions. Lime is found in water in two forms:

(a) Bicarbonate of calcium formed by the dissolving of carbonates by the action of free carbonic acid which is present.

(b) Sulphate of lime soluble in cold water in very appreciable proportions.

When the water is boiled the bicarbonate of lime is decomposed, releasing carbonic acid and depositing insoluble and neutral carbonate.

The sulphate of lime on the contrary remains in solution and causes the permanent hardness of the water which resists boiling. The two products combined constitute the total hardness of the water.

The total or permanent hardness of the water is indicated in France by the hydrometric degree, corresponding to one centigram of carbonate of lime per liter (1 part by weight per 100,000 parts of water). I will leave the hydrometric analysis of water for a special article as it does not come within the practical limits of the subject.

The precipitation process is based on the two following reactions:

(a) The bicarbonate of calcium is treated with lime which absorbs a portion of the carbonic acid and is converted into an insoluble carbonate in accordance with the following equation:

\[ \text{(CO}_3\text{)}^2\text{Ca} + \text{Ca} (\text{OH})_2 = 2 \text{ Ca}^\circ \text{Ca} + 2 \text{H}_2\text{O} \]

(b) The sulphate of calcium is treated with carbonate of soda which by double decomposition gives sulphate of soda and carbonate of lime as follows:

\[ \text{SO}_4\text{Ca} + \text{CO}_3\text{Na} = \text{SO}_4\text{Na}^- + \text{CO}_3\text{Ca} \]

The lime is finally precipitated in the form of insoluble carbonate which is removed by decanting and filtering.

Practice. The precipitation process is carried out in two ways:

(1) By intermittent action with purification tanks.

(2) By continuous action with various purifying systems.

The intermittent installation gives a small production and requires more labor than the continuous method, but uniform results are more easily obtained with it. The intermittent plant consists simply of a tank in which the water to be purified is mixed in suitable proportions with the lime and carbonate of soda. The water is decanted to dispose of the precipitate and the clear water is thus obtained. A very convenient installation for a small production is arranged as follows: Two tanks are operated alternately, one decanting while the other is being emptied. The tanks are rather shallow with two draw-off valves, one in the bottom for cleaning out the tank, and the other about four inches above the bottom to draw off the clear water. Near the water supply pipe there are placed two small tanks in which the purifying materials, carbonate of soda and lime, are dissolved.

The water and the purifying solution are run together into a pipe at a point as far as possible from the settling tank in order to obtain a thorough mixture. It is a good plan if at this time the water is thoroughly agitated, preferably by an injector blowing air or steam. The action of the chemicals and the deposit of the precipitate are hastened by heating the water.

POWER TRANSMISSION IN TEXTILE MILLS.

(Continued from previous page)

the impurities that add to the frictional resistance of the bearing.

Experience has shown that bearings lined with high-grade metals will usually run from ten to twenty times as long as those in which the ordinary grades have been used, thus greatly reducing the cost of labor and lessening the chances of shutdowns for repairs.

Anti-friction Bearings.

There are a number of bearings upon the market constructed of such material as to require a minimum of lubrication, while others dispense with oil entirely. The first type, Fig. 40, has small graphite cylinders embedded in the babbit lining. This, it is claimed, adds greatly to the life of the bearing and at the same time reduces the consumption of oil to a minimum.

Another device, specially adapted for countershafts, loose pulleys and light machine bearings of various kinds, consists of a bushing or lining of wood chemically treated, which requires no lubrication whatever. Bearings of this type are well adapted to textile machinery where the dropping of oil upon the product may cause serious loss, also to loose pulleys, which are always difficult to lubricate because the oil will not stay at the center of the bearing, having a tendency to work out and be thrown upon belts and surrounding objects. A bushing of this type, applied to a loose pulley, is shown in Fig. 41. These bearings have in some cases been in continuous use for this purpose for nine or ten years and are still giving good results. As a rule they are best adapted to pulleys carrying belts not over 6 inches in width, not too tight nor too long.

\[ \text{Fig. 4. Silk boiled in distilled water.} \]

\[ \text{Fig. 5. Silk boiled in calcarceous water.} \]

It is naturally much better to prepare the water in the evening in order to let it settle during the night. It is also advisable not to clean out the tank oftener than once a week, as the presence of the precipitate helps to purify the water. The tank is cleaned simply by opening the draw-off valve in the bottom and clearing out the sediment with a broom and a stream of water. An excellent arrangement is obtained in a very small space by placing two rectangular tanks end to end or side by side with the water supply apparatus between the two.
The Scouring of Wool
By Prof. Everett Hinckley, New Bedford Textile School

Importance of Controlled Temperatures.

It is my intention in this article to illustrate the absolute necessity of a properly controlled temperature in wool scouring. It is a well recognized fact that excessive temperatures in this process set the dirt, discolor the wool, make the fiber hard and destroy its luster.

Experience over a number of years has taught us that the temperature of the scouring liquors should at no time exceed 150° F. In the case of the more lustrous fibers, this limit may be dropped as low as 100° F. Practice varies somewhat, but the majority of the scouring is done between 120° and 130° F.

The methods used are based on a particular kind of wool, certain types of scouring material and the personal equation of the operator. The control of these first two points are easily within the management of the plant, but the control of the operator is at all times a difficult point. Aside from neglect, the question of judgment arises, which, with the best of intentions, may result in temperature conditions that are unfavorable to efficient scouring.

Of course, with constant vigilance the operator can keep the temperature of a scouring bowl fairly constant, but, as conditions exist, he neither has the time nor inclination to keep his eyes constantly on the thermometer and one hand on the steam valve so that he can detect and check the fluctuations of the temperature. That these temperature changes are frequent, due to variations in the weight of the wool being fed, in the circulation of the scouring liquor, and in steam pressure, is a matter of common experience. That these changes are large is not so well known, however.

Hence the need for a reliable automatic device to control the temperature of the wool scouring liquor, is apparent. Such devices as mercurial thermostats have been used many years in chemical laboratories with considerable success, but constructed as they were of glass, they were fragile and liable to damage. For this reason they were not suitable in wool scouring.

Within recent years, however, metal thermostats have been developed, which act upon the same general principle as the familiar laboratory apparatus. These regulators are simple in operation, durable in construction, and, compared with labor, very inexpensive. When the temperature in the scouring bowl reaches the point for which the controller has been set, the steam valve is closed automatically. On the other hand, when the temperature falls below this pre-determined setting point, the controller automatically opens the steam valve.

In actual applications, these fluctuating demands occur constantly, and the rise and fall of the temperature is kept within very narrow limits. Fig. 1 shows a typical application of a self-operating temperature controller. Many mills, recognizing the value of such a device, have had them installed and are now obtaining results that are highly satisfactory to the practical man.

To determine exactly what the actual performance of such a device is after being in service over a period of time, several tests were made. These tests indicated that heat conditions in the several mills were similar, and the following data was selected as typical.

On one range, the temperature was regulated by an ordinary steam valve on the handle of which a weight was hung to prevent it from turning. On the other range, the temperature was controlled by a "Tagliabue" self-operating temperature controller. Fig. 2 is a photographic reproduction of the actual installation used.
The steam for each train was obtained from the same main, and the quality of wool handled was the same, so that conditions were identical. By means of recording thermometers installed on the first bowl of each range, charts were obtained showing the actual temperatures of operation. These charts are shown in Fig. 3 and 4 respectively, the records on which need little explanation.

The chart obtained on a hand control, Fig. 3, shows a frequent rise and fall of the temperature, twice reaching as high as 446°F., once 144°F., and 157°F., and also running as low as 118°F. in the course of a day, the actual variation amounted to 28°F.

On the other hand the chart from the bowl fitted with the self-operating controller, Fig. 4, shows that the temperature was maintained practically at 123°F.

By hand regulation an actual temperature variation of 28°F. is shown, while the controller kept it within 1°F. of the point desired.

The self-operating controller automatically maintained the scouring liquor at 123°F. under most difficult conditions. It is evident, therefore, that hand control is unreliable, and results in fluctuations in temperature that produce dirty, discolored and unevenly scoured wool. There can be no doubt but that these conditions are being duplicated in other mills to a greater or less extent.

This conclusion is certain: By the use of a self-operating temperature regulator of the type named, the temperature in the scouring bowl is maintained automatically within limits so narrow that absolutely no danger of overheating of scouring liquor can occur, and all necessity for close attention on the part of the operator is avoided. The fact that the self-operating regulator used in these tests has been in operation day after day under usual mill conditions over an extended period of time proves conclusively that the instrument is absolutely reliable and practical.

The above tests demonstrate that in the self-operating controller a practical solution of control of temperature in wool scouring has been reached; that the danger of over-heating wool scouring liquors is avoidable, and, therefore, that the damage done to the wool fiber by high temperature is wholly inexcusable.

**HOW THE “FLAPPER” WORKS.**

In England they apply the expressive name of “flappers” to the superfluous employees who draw their bread and their pay in the Government departments. The species, however, is not confined to the British Government. When the armistice was signed it was confidently expected that the army of employees on the Government payroll in Washington would be reduced one-half without delay. Eight months later the host in the departments was actually on the increase. How the American “flapper” manages to put in his time was recently told by Senator Jones of Washington in a Senate discussion of a resolution calling for information as to the duplication of work by Government bureaus in the promotion of foreign commerce:

On yesterday morning two employees from the Adjutant General’s office came to my office. It seems, from their statement, that the Secretary of War has issued an order requiring the clerks there to work half an hour overtime, the ostensible reason given being that the necessities of the Adjutant General’s office and the different bureaus require the clerks to give this extra time. Those clerks told me very positively that they did not do more than an hour or at the outside more than two hours of real genuine work a day, and that frequently their chiefs would come around and tell them to make a showing of being busy. They further stated that they were satisfied that this order requiring extra time, and so forth, has really been issued for the purpose of impressing Congress with the necessity of extra appropriations. I have not any doubt that these persons were telling the truth. It discloses a condition of things that we ought to try to get at if we can possibly do so.

Mr. Smoot. The Senator from Washington is a member of the Appropriations Committee, and he knows that no matter how much money Congress appropriates for any department of this Government—perhaps with a single, solitary exception—all of it is spent, and the heads of the departments will see that it is spent. If they cannot spend it legitimately, they will employ people enough to require the expenditure of every dollar of the appropriation. One reason for that is that they think if they should happen to turn any unexpected balance back into the treasury at the end of the fiscal year the Congress of the United States would take that as an indication that the money they had asked for was unnecessary. The departments of our Government have now gotten into a position where they not only ask for the amounts they know they have to have, but they ask for all they think they can get, with the idea that Congress is going to cut some of it out anyhow, and they will be on the safe side. That practice must be stopped.”

A strong man is needed, strong mentally, morally and physically, to take charge of affairs at Washington, get rid of the “flappers” and establish the Government service on a basis of economy and efficiency.
Influence of the Atmosphere on Wool

By A. Kertesz

(Read before the Association of German Chemists in 1916 and suppressed by the German Government during the War.)

It has surprised many intelligent observers that the appearance of the clothing worn by many of the soldiers on leave had very much altered, in that the surface of the cloth had completely disappeared, laying bare the threads of the cloth so that the uniforms looked like badly-worn cotton material.

According to the present state of our knowledge, the following could be possible causes of this:

1. That the raw material was of low quality.
2. That the wool had been deteriorated in the dyeing or in course of manufacture.
3. That the uniforms had been affected by conditions prevailing on active service, for example, poison gases, or gaseous products from high explosives.
4. That the faults had been caused by too severe or too alkaline steaming during the disinfecting process.

The last named suggestion was considered very probable, because the dirt and earth present in the uniforms might easily react alkaline when steamed and thus cause the damage.

The examination of hundreds of garments taken from the different hospitals proved, however, that the above suggestions as possible causes of the extraordinary deterioration of the uniforms were wide of the mark, because clothing which did not come within the scope of the above possible causes was equally badly affected.

Further experiments showed without any possibility of doubt that the effect on the cloth was due in the first place to the action of atmospheric influences on the wool, and that the observed differences in the uniforms were due to the degree and length of exposure to which they had been subjected. The hitherto accepted idea that the appearance of the cloth was an indication of the excretions and fatigue through which the wearer had passed was proved to be incorrect in its general form. The change in the cloth was rather an exact measure of the length of time the wearer had been in the open.

These faults had not shown themselves hitherto on this scale, because uniforms had never previously to this war been submitted to so long, continuous, and severe exposure to atmospheric influences, so that these faults had now developed after months instead of after years, when they were attributed in the latter case to general wear.

It was noticed by A. Rechberg in Hersfeld that atmospheric influences had a strong action on the wool fiber. This firm found in 1913 on making long exposures of German blue-gray uniform cloth, made respectively from two blends of colored wool in which white wool and chromed wool were used for blending purposes, that the white wool in the mixture became tender while the chromed wool did not.

The experiments carried out by me on this basis completely confirmed the supposition of Rechberg, and showed that wool on exposure to the atmosphere became tender and finally completely destroyed. The destruction was most pronounced if the wool was in its natural state. The destruction is most pronounced on white scoured wool, less pronounced on dyed wool, and still less pronounced on chromed wool. Acid salts, alum, or iron salts delay the destructive effect on the wool, but not to the same extent as chrome salts. The effect is the strongest in the summer months with most sunshine.

The action is most easily seen if a cloth made from a mixture of dark dyed wool and white wool is exposed to the atmospheric influences and carefully examined from time to time. The cloth begins to grow darker and darker after 3 to 4 months' exposure, due to the fact that the white wool falls out and the cloth becomes quite dark and tender after a few more months.

On examination of uniforms which had been worn on active service it was estimated that the markedly changed appearance of the cloth could also be attributed to the action of the sun and weather. This was confirmed by fastening blue-gray uniforms on to a board and exposing them for 8 months. At the end of this period the cloth had completely lost its wool character, and after the dirt and dust had been removed possessed exactly the same bare appearance that had been noticed in the case of many uniforms returned from active service.

Experiments were now made by exposing for 8 months undyed cloth which had been previously treated as follows:

1. Undyed gray cloth.
2. The above boiled 1¼ hours with 4 per cent. sulphuric acid.
3. The above boiled 1¼ hours with 4 per cent. formic acid.
4. The above boiled 1¼ hours with 3 per cent. bichrome, 2½ per cent. tartar.
5. The above boiled ¼ hour with 3 per cent. potassium bichromate, 6 per cent. lactic acid, 1 per cent. sulphuric acid.
6. The above boiled 1 hour with 2 per cent. sulphuric acid and then 2 per cent. bichrome added and boiled ¼ hour later.
7. The above boiled 1 hour with 2 per cent. formic acid and then 2 per cent. bichrome added and boiled ¼ hour longer.
8. The above washed ¼ hour at 122° F. with 2 gr. ammonia, ½ gr. hydroxylsulphite, ½ gr. universal oil per liter.

<table>
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<tr>
<th>BEFORE EXPOSURE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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</thead>
<tbody>
<tr>
<td>Strength ......</td>
<td>35</td>
<td>35</td>
<td>33.4</td>
<td>34</td>
<td>33.2</td>
<td>35.4</td>
<td>35</td>
<td>33.2</td>
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<tr>
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<td>75</td>
<td>76</td>
<td>72</td>
<td>79</td>
<td>76</td>
<td>72</td>
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<table>
<thead>
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<th>AFTER EXPOSURE</th>
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<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>Strength ......</td>
<td>23</td>
<td>27.4</td>
<td>28</td>
<td>28</td>
<td>29</td>
<td>28.2</td>
<td>27.6</td>
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<tr>
<td>Elasticity ......</td>
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<td>64</td>
<td>64</td>
<td>67</td>
<td>65</td>
<td>60</td>
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</table>

Test on the rubbing machine after preliminary extraction with ether.

<table>
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<th>LOSS AFTER EXPOSURE</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
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</table>

The experiments also showed that the softer the cloth handled the severer was the effect of exposure; for instance, cloths treated with lanolin on the application that the lanolin would protect the cloth were more affected than cloths not treated with lanolin.

The physical properties of the cloth play a part in that cloths with a soft handle are more sensitive to atmospheric influences than cloths with a hard handle. An examination of the above results shows that No. 5 gave the best result, that the most effective protection is oxide of chrome, and the cloth that contained the most oxide of chrome was the best, thus No. 5 is better than No. 4, owing to the lactic acid producing more oxide of chrome than tartar. Nos. 2 and 3 behave like Nos. 6 and 7, while No. 8 behaves similar to No. 1 which suffered the most.

The further experiments were directed to find out which of the atmospheric influences had the greatest effect. There comes into consideration besides moisture the oxygen or ozone of the air and the light rays.

Woolen yarn and cloth were submitted for several weeks to the action of ozone. A bleaching action was soon observed, and after 8 weeks' exposure the fiber had deteriorated 35 to 40 per cent. In strength. The alteration in the wool caused by the action of the ozone was quite different from that caused by atmospheric influences. Ozone does not cause
the fabric to lose its soft woolen character, whereas on exposure to the atmosphere the wool loses its woolen character and grows increasingly hard. Also on exposure to ozone there was no difference between chromed and unchromed wool.

The experiments in which different wool samples were exposed to the illumination of a mercury vapor lamp, which is known to be very rich in ultra-violet rays, were much more decisive. In a very few days it was manifest that exactly the same results were obtained as by exposure to the atmosphere. The employment of this lamp offered the additional advantage that absolutely comparative tests could be carried out in the laboratory without taking the weather into consideration. That the reaction of the lamp was similar was shown by the fact that the differently exposed wools behaved almost the same and that the tendered wool in both cases showed the same characteristic reactions.

The surface of the exposed wool showed the surprising property of being much more readily attacked by alkali than non-exposed wool, in that weak soda or ammonia solutions had a solvent action on the same at moderate temperatures. If solutions obtained by this method are submitted to the Biuret reaction for albuminous bodies. (Becke, Farber Zeitung, 1912, p. 45; 1913, p. 101) experience has shown that the reaction is very useful for determining to what degree the wool has deteriorated.

Method of Examination.

Samples of cloth 4-5 cm. long by 2-3 cm. wide were allowed to stand for 1 hour at 60-65 deg. C in a test glass containing 10 c.c. soda ash solution (1 per cent.) after being well wetted out, during which process rubbing must be avoided. The soda solution was then poured off and 10 c.c. normal caustic soda and 2 c.c. copper sulphate solution (1:20) added. After some time the affected wool shows a violet coloration, which is compared with a prepared scale. It may be inferred from the sensitiveness to alkalies that the breakdown of the albumen molecule is caused by the light rays assisted by the moisture and oxygen of the atmosphere. This inference is supported by the fact that pure unwighted silk suffers the same deterioration and that the degree of the deterioration may be estimated by the Biuret reaction.

Only one difference shows between wool and silk in that tender wool shows a marked acid reaction, because the sulphur in wool oxidizes to sulphuric acid when it breaks up, while there is no acid formed in the case of the silk because the silk molecule contains no sulphur. The fact that raw unwighted silk is sensitive to light rays has already been proved earlier by Ristenpart (Zeitschr. f. angew. Chemie, 1909, §18).

Moisture alone does not play an important part, because the same reaction is obtained with the mercury vapor lamp whether the cloth is wet or dry. Further experiments will be necessary before it can be determined whether individual colors increase or decrease the absorption of the light rays. Experiments as far as they have been completed show that dark shades deteriorate less rapidly than pale shades.

The degree of deterioration of the wool may also be determined by dyeing with Methylene Blue in an acetic acid bath at 122° F. The deteriorated wool dyes much heavier than the non-exposed wool.

Before practical conclusions may be drawn from the above results further study and many experiments will be required.

For the moment I may recall my earlier publication (Farber Zeitung, 1908, No. 13) that wool treated with acids and mordants increased in strength. It may now be accepted that this increase in strength is coincident with its increased resistance to atmospheric influences.

One may rightly assume that a closer study of wool will enable a better wearing cloth to be manufactured than hitherto. The above experiments also show that wool does not possess the highest wearing properties, and that these may be improved.

Later experiments have confirmed all the results given above.

The cloths most resistant to atmospheric influences are those which contain 1 per cent. oxide of chrome calculated on the weight of dry wool. The difference may easily be seen by exposing side by side for a few months untreated woolen cloth and cloth treated with chromium acetate 3°-5° Bé. Moreover, it may also be stated that sulphuric acid used in dyeing wool is detrimental to the resistance of the wool to atmospheric influences, while organic acids are much less detrimental.

The substitution of mineral by organic acids is strongly recommended, at least for fabrics for which the best wearing properties are required.

For the testing of deteriorated wool the Biuret reaction may be strongly recommended. With a little practice reasonably accurate determinations may be made of the degree of deterioration.

SYSTEM FOR THE SPINNING MILL.

The accompanying form is used for reporting to the manager’s office the weekly production, waste and supplies in the spinning department of a cotton mill. The report is so

**TEXTILES**

**SPINNING**

**PRODUCTION AND AVERAGES**

<table>
<thead>
<tr>
<th>KIND</th>
<th>STANDARD NUMBER</th>
<th>AVERAGE NUMBER</th>
<th>SPINDLES RUN</th>
<th>POUNDS SPUN</th>
<th>PER SPINDLE PER DAY</th>
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<tbody>
<tr>
<td>Worst</td>
<td>13</td>
<td>62.24</td>
<td>10,936</td>
<td>69,827</td>
<td>9.34</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>15.59</td>
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<tr>
<td></td>
<td>15</td>
<td>15.59</td>
<td>7,480</td>
<td>14,175</td>
<td>8.30</td>
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<tr>
<td></td>
<td>18</td>
<td>15.97</td>
<td>11,800</td>
<td>12,175</td>
<td>9.76</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>15.97</td>
<td>8,430</td>
<td>10,793</td>
<td>8.33</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>15.73</td>
<td>6,210</td>
<td>15,924</td>
<td>7.86</td>
</tr>
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</table>

| OILS USED | 63 GALLONS |
| SUPPLIES | 2,433.55 |

WASTE ROLLER | 168 |
SANDING | 1,263 |
SWEEPING | 1,075 |
TOTAL | 2,961 |
WORKED OVER | 14.31 |

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C., 1914

**TEXTILE SCHOOL GRADUATES.**

Lieut. W. A. Kennedy, who was with the 317th Field Artillery in France, has been appointed Southern representative of the Electro Bleaching Gas Company of New York. Lieut. Kennedy is a graduate of the North Carolina Textile School. West Raleigh. Another graduate of this textile school, M. Stough, is in the dyeing laboratory of the Du Pont Company of Charlotte.

**ATLANTIC DYESTUFF CO.**

T. James Brown of Everett, Mass., has taken a position in the main office of the Atlantic Dyestuff Company in Boston. Prior to going into the service, Mr. Brown was for many years with one of the leading dyestuff houses of Boston in a technical capacity, and is therefore well fitted for both technical and sales duties in his present position.
QUESTIONS AND ANSWERS

SILK GRASS.

Editor of TEXTILES:

We receive from time to time inquiries regarding the vegetable silk fiber extracted from the Central American and South American "Furcraea gigantea" (Giant Lily), in Chas. Richards Dodge’s excellent work, “Useful Fibre Plant of the World,” which was published by the United States Department of Agriculture some years ago.

Mr. Dodge quotes a number of fiber experts regarding the commercial value of this material, who go into the subject in considerable detail.

In addition to Dodge’s work, which “Fibro” will undoubtedly find in the Department of Agriculture, we suggest that he consult the officials of that department, and also the Bureau of Insular Affairs. We have had occasion to consult both of these departments regarding the value of tropical fibers, and found them both interested and well informed.

YARN CALCULATIONS.

Editor of “Textiles”:

1. What is the count of the single yarn composing a 2-ply yarn that is equal in weight to a single 16s and is composed of single yarns of the same size?

2. A copy of 120s cotton filling yarn weighs one ounce. How many yards does it contain?

The yarn can be properly bleached. In addition to this loss there will be a small additional loss of weight due to the bleaching process itself, this probably amounting to not over 3 to 5 per cent.

We would suggest that “Crescent” have the yarn tested for oil before bleaching, in order to determine whether the spinner is leaving an excessive amount of oil in the yarn. It is not unusual to find worsted yarn losing as much as 12 per cent in scouring.

REDUCING SET OF A JACQUARD FABRIC.

Editor of “Textiles”:

A jacquard machine is tied up on 1,224 hooks and is weaving a warp of 3,672 ends and set 51 inches wide in the reed. It is desired to weave a warp in this loom reeded 66 ends per inch. How many hooks must be cast out?

NEEDLE FOR DISSECTING CLOTH.

Editor of “Textiles”:

Where can I obtain a needle for dissecting cloth? I want one in which the point can be reversed and the instrument carried in the pocket. Am inclined to think you gave an illustration of such a needle in one of your interesting articles of last year, on “How to Duplicate Finished Fabrics.”

The best instrument needle for dissecting cloth that we have found is the ordinary machinist’s scriber, shown in the illustration. The point can be reversed and the instrument carried in the pocket. This was described in the issue of May, 1918.
The Manufacture of Knit Goods.

By John Chamberlain.

Gauge of Seamless Hose Machines.

The gauge of seamless hosiery machines is given in England in terms of needles per diameter. Thus a machine possessing the gauge marking 200–3½ has 200 cylinder tricks in a diameter of 3½ in. This system of gauging does not enable comparisons to be made at a glance, and should be replaced by giving needles per circumferential inch and diameter. To obtain the number of needles per inch from the present system of gauging it is necessary to divide the total number of needles by the circumference. Hence—

\[ \text{Needles per inch} = \frac{\text{Total needles} \times 3.1466}{\text{circumference}} \]

Machines are built in varying diameters from 2½ in. to 5 in., the former making the smallest sock sizes for children, and the latter men's outsizes. Machines are built increasing 1¼ in. in diameter for two sizes. Thus 00's and 0's may be made on 2½ in. or 2⅞ in. machines, 1's and 2's on 3 in. or 3½ in., 3's and 4's on 3¼ in., 5's and 6's on 3½ in., and 7's and small women's on 3¾ in. machines. Full women's or outsize sizes are usually made on 3¾ in. or 4 in. machines, but there is no standard, and by using a coarser yarn per gauge and a correspondingly longer loop, the width of the hose may be increased.

Yarn Count per Machine Gauge.

Plain seamless hose machines may knit from a wide scope of yarn counts, but taking average counts used on the various gauges and plotting as shown in connection with the gauge of wrought hosiery machines, it will be found that

\[ \text{Gauge} = 4.2 \times \text{square root of cotton count} \]

Hence, when the yarn count is known, the gauge required can be calculated. Thus the gauge (needles per inch) required for 14s single cotton is: 4.2 × square root 14 ≈ 16. Hence, 14s single cotton could be worked on a 3½ in. machine containing 176 needles, or on a 4 in. machine having 200 needles.

Rib-Top Machines for Half-Hose Tops.

The manufacture of half-hose, even of the plain variety, necessitates the use of a knitting machine capable of making ribbed loops. Plain half-hose have the upper part or top knitted from ribbed fabric, and can be produced either on a single machine which will automatically change the stitch from rib to plain, or on a set of two machines, one of which makes the ribbed portions in string formation, and the other a plain automatic knitting machine such as has been previously described. The two-machine method is more preferable, because, although the transferring of the ribbed tops to the plain machine is a comparatively slow and tedious operation, the complicated form of looping mechanism employed on the stitch-changing machines renders it impossible to drive these machines at more than 120 r.p.m., whereas the ribbed tops may be produced at a speed of 180 r.p.m.; or if a change-gear is used, the main part of the knitting may take place at 200-220 r.p.m., while the automatic knitting machine, as previously stated, will rotate at 270-300 r.p.m. Moreover, the stitch-changing machines cannot be constructed in the finer gauges.

A machine specially designed to produce the plain half-hose automatically was introduced into this country some years ago, but although a few machines are still working, its success with regard to the reduction of the gross cost of production was not sufficient to warrant an extensive employment. Some manufacturers use fine machines of the XL type—the type upon which the military ribbed half-hose are made—but these are used chiefly because they are also capable of making ribbed legs, and not definitely for the single purpose of making plain half-hose. Rib-tops are therefore usually produced on a separate machine in single formation, and one rib machine will make enough tops to keep from four to six automatic knitting machines in constant employment.

A rib-top consists of: (1) Welt; (2) plain 1 × 1 rib; (3) slack course for transferring; (4) locking courses; (5) separating courses. Some manufacturers prefer to omit the locking and separating courses on the ground that more tops are spoiled through the needle latches failing to open after the cylinder stitches are cast off, than through the carelessness of the rib-top cutter in cutting too near the slack course or in cutting the welt.

The welt is made first by causing the rib needles to cease knitting for four or six courses while still retaining their
loops. This forms a roll which will not unroll, although the row of stitches previous to the welt is cut. To strengthen the welt, it is fairly common practice to let the rib needles tuck—that is, receive the yarn but not cast off—for the first course of the welt. 1 x 1 rib is made to the required length, usually from 4 in. to 4¾ in. for men’s half hose tops, and a slightly longer course of loops is made so that the operator can clearly discern this row, and thus run the loops on to the transfer points with greater facility. Two or three courses are knit, and tuck and welt courses are made to form a locking zone beyond which the stitches will not run down. Two or three courses are subsequently knit, and the loops are cast off the cylinder needles. This causes the rib loops to become elongated, and makes a gauzy part which the cutter can readily discern. After the separating courses are made, the latches are opened by means of a brush, and knitting is begun for the welt of the next top.

The fundamental parts of a modern-rib top machine are shown in Figs. 20, 21, and 22. Fig. 20 shows the general arrangement of the knitting head. A is the fixed base of the machine carried on supports at a height of 3 ft. from the floor. Usually the needle cylinder E and the needle dial F are fixed, and the cam ring B bearing the bevel wheel C is rotated by means of a horizontal shaft V through the agency of the wheel D. The shaft may be driven from fast and loose pulleys, or by means of a clutch. The machines may possess one or two feeds, but for half hose tops usually the former. The cylinder needles N having projections or butts R slide in tricks, and are actuated by cams in a manner hereafter described.

The cam cylinder is made in two sections, which are screwed to the cam ring B, and the latter carries vertical posts which support the ribber arm M. The spindle J is suspended from the ribber arm, and rotates with it, being attached to it by set-screws. This spindle carries loosely the ribber needle dial P, in which the rib needles N having butts R slide. The dial rests on the stop G, and can be adjusted longitudinally by means of the knurled nut K. The dial is loose on the spindle J, and is positioned by means of the lug P coming into contact with the projection O on the needle cylinder.

The fabric passes between O and P, and when the fabric is being pricked on to the needles after it has accidentally been pressed off, care must be taken to introduce the fabric between the "dyes," as they are called, before putting any loops on to the needles. This comes between the needle cylinder and dial, especially when the former is the driving agency, is troublesome, and on large machines for making ribbed fabric alternative methods of keeping the cylinder and dial needles in relative position are adopted. On the small rib-top heads this method of positioning the two sets of needles so that they will work between each other is generally adopted.

The camplate H, to which are attached the cams for controlling the movements of the rib needles, is secured by set-screws to the spindle J, and the knitting movements of the rib needles may be timed with those of the cylinder needles by the circumferential setting of the camplate on the spindle J. An elastic spring S keeps the cylinder needles in their tricks. The roller Q is operated by a stud-carrying wheel, and assumes the number of positions requisite for the timing of the automatic changes.

Fig. 21 shows the internal view of one-half of the cam cylinder, the direction of the rotation of the cam being denoted by the arrow. A is the clearing cam, which is carried on the spindle G. This cam can be automatically made to assume a tucking position by the lowering of the clearing G through the agency of the projection at F and the lever N. D is the stitch cam which decides the length of the plain loops. This is also carried on a spindle H, which is recessed at its lower end to receive a spiral spring, so that it always rises to the setting of the set-screw J, except when held down by the slack course lever M carrying the set-screw K. The part C is formed on the cam-ring itself, and is not removed with the cam cylinder section. The cams B and E are guard cams necessary to keep the needle butts in the proper track.

Fig. 22 gives a view of the outside of the cam cylinder section, and shows how the movements are given to the internally placed cams. The slack course lever M is pegged to the spindle P which carries the control lever P. When the slack course is required, the roller Q, Fig. 20, is raised to the level of the lever P, so that the stitch cam is lowered and the loops are slackened. To cause the stitch cam to assume its normal position, a second spindle Q carrying the reverse lever Q is fitted. This spindle carries the toothed-wheel W, which gear with the wheel W attached to the lower end of the spindle P.

Before the cam cylinder has made a complete revolution the roller Q is repositioned to come in line with the lever Q. Thus the spindle Q' is oscillated, and by the gearing causes the oscillation of the spindle P' to take place in the reverse direction, so that the slack course lever M is released from the stitch cam, and the latter is again raised to the height determined by the set-screw J which is locked by the screw I.

Like manner the levers R and S on the spindles R' and T' carrying the wheels W' and W' decide the position of the clearing cam. In some cases a friction pad V is placed over the spindles in order that the movement may be increased by the force of the action, and so place the levers out of the easy control of the wheel. The cam cylinder section is screwed to its base by a single screw at S, but it is steadied by each end making contact with the upright spindles L (Figs. 20 and 21).

**RECENTLY BROUGHT OUT.**

**Buckley Opener.** Taylor, Lang & Co., Stalybridge, Eng. An improved model of the Buckley type of opener and cleaner for cotton. The dropping chamber and cleaning area have been enlarged, the cylinder remodelled and the number of blades increased, making it possible to avoid running the machine at an excessive speed.

**Hand-Threading Shuttle.** Preston Mill Finishing Co., Fishergate, Preston, Eng. An improved shuttle for threading by hand to obviate shuttle "kissing" against which there is an active agitation in England.

**Friction Linings.** Herbert Frood Co., Chapel-en-le-Frith, Derbyshire, Eng. A patented ply-fabric for clutch linings, the novel feature being in the method of stitching. Instead of stitching the ply-cloth by passing warp threads from face to back, the layers are stitched in progression; that is, one layer to two, two to three, three to four and so on. The ply-fabric is also bound together by a chemical process.

**Ribbon Loom.** Chorier et Guichard, St. Etienne, France. An improved ribbon-loom, which has been patented in the principal manufacturing countries. The warp is placed in a vertical position, giving easy access, improved visibility and reduced floor space. The loom can be run at 250 to 350 picks per minute, due to the heads being in a horizontal position and free from the usual trembling motion.

**Duster for Carbonized Wool.** T. Brook Crother, Ltd., Huddersfield, Eng. A duster equipped with eight pairs of heavy crushed rollers for carbonized wool.

**Scotch Beaming Frame.** Chorley Beaming Frame Co., Bolton St., Chorley, Eng., have recently brought out an improved beaming frame. A larger production and perfect work are claimed. From 40,000 to 45,000 yards of warp, 24s to 32s, can be put on back beams in 55 hours with this beamer.

**Faller Cam.** American Gill Screw Co., Providence, R. I. An improved cam for gill-box fallers. Stability and ease of replacements are among the claims.
VIGOUREUX PRINTING OF WORSTED.

By J. M. Gandil, in Revue Generale des Matieres Colorantes.

The printing of worsted sliver by the process called vigoureux from the name of the inventor, consists in the application of a color paste on the slivers by means of a suitable mechanism. Various ideas were tested when this process was first invented. One machine laid the worsted slivers side by side and passed them between two corrugated rolls of copper or wood, which printed them simultaneously on both sides. With another mechanism the slivers were first run through a drawing machine in order to form them into a thin sheet of wool, which was wound into balls on spools and delivered to a printing machine having only one corrugated roll.

At the present time the mills making vigoureux worsted use a machine by which the parts of the combed worsted are drawn from a rack and passed into a gill-box which draws the wool into a very thin sheet, which passes under the corrugated printing roll, from which it is drawn by a folding device which lays it on a truck. In this form the wool is steamed, washed and dried, then passed again through a gill-box in preparation for the drawing and spinning processes.

The illustration shows a vigoureux printing machine embodying the most modern construction, and for which Edward Jefferson, 13 So. Second St., Philadelphia, is the American agent. The machine consists of a gill-box and the printing mechanism, the tank, felt-covered roll and printing roll being shown at the left. The gill-box has a set-over of 21 inches, somewhat wider than in the ordinary box, the object being to obtain a thin vellum or sheet of wool in which the printing rolls can produce a thorough penetration of the color. The machine which we inspected had a reach of 20½ inches with a single thread screw of 5/8-inch pitch, and two rows of pins, 2½ in. and 2½ in. in each faller.

From the gill-box the vellum passes between a 6½-inch felt-covered roll and a 5-inch printing roll with spiral corrugations. The color is delivered to the felt-covered roll by a 5½-inch brass furnishing roll. An adjustable doctor-roll is placed behind the felt-covered roll, enabling the quantity of the color to be increased or decreased as required, and spread uniformly over the felt-covered roll.

From the printing rolls the stock is carried by a traveling rack over and back of the machine to a folder, which delivers it into boxes or on trucks for transportation to the steaming room. This machine is of simple and durable construction, the overseer who was in charge stating that he had run it for years with practically no repairs needed. So far as the mechanical process is concerned, it leaves nothing to be desired in vigoureux printing, the results depending on the composition and consistency of the color solutions and the subsequent steaming operation.

Vigoureux printing, although it appears to be a simple process at the first view, involves certain difficulties, which in the first instance caused serious trouble in spinning, weaving and finishing. To overcome these difficulties, it is necessary to understand thoroughly the operations through which the sliver must pass and also the object to be attained.

The object of the inventor of the vigoureux process was to obtain mixed fabrics in all shades and having the characteristics of mixtures made in the ordinary way with loose wool, but without the defects of the old mixtures. Now the characteristics of the ordinary mixtures are fastness to washing, to fulling and to light.

Undyed wool when mixed with the dyed wool retains its natural appearance throughout all of the operations. On the other hand, the inherent defects of the mixtures of loose wool consist in the variations of "flames" caused by the irregular distribution of the dyed and undyed fibers throughout the mass of wool. These inequalities cause what are known as "flames" in the mixed goods.

It has been demonstrated that, notwithstanding repeated passages of the wool through the preparatory machine, it is absolutely impossible to mix uniformly the fibers of contrasting colors, which are always arranged parallel to each other. The yarn spun from such mixtures shows very pronounced variations in the proportions of the different colors, producing flame effects in the cloth. The idea of the inventor of the vigoureux process was to overcome this defect by printing the fibers in such a way that the ground color and the undyed portions should always be arranged perpendicular to the fiber during the mixing operations.

The solution of this problem seemed very simple, but in practice various difficulties were encountered. In order to imitate the old mixtures of colored and white wool, it is necessary to have a series of corrugated rolls which give the same mixture effects as those obtained by mixing the dyed and white wool. It was supposed that it would be necessary merely to print the sliver with a roller that was corrugated in the proportion desired in the mixture, that is to say, based on the proportions of dyed and undyed wool.

Suppose, for example, that white wool and black wool are mixed in equal parts. To produce this shade by vigoureux printing without flame effect it is necessary in theory merely to print wool with a cylinder having the corrugations equal to 50 per cent. of the surface. Experience, however, proved that the cylinder must be cut in a certain proportion in order to avoid the flame effects.

Let us suppose for example a sliver of wool composed of several fibers, a, b, c, d, e, Fig. 1, of different lengths and representing the average of the combed wool. If these fibers are printed with a 50 per cent. roll having the corrugations
and raised portions as shown in Fig. 1, the result would be as follows:

Fiber a printed twice with two white spaces;
Fiber b printed twice with \( \frac{1}{4} \) white spaces;
Fiber c printed \( \frac{1}{4} \) times with one white space;
Fiber d printed once with \( \frac{1}{4} \) white space;
Fiber e printed once with \( \frac{1}{2} \) white space.

If we assume that at the next revolution of the printing roll an equal number of fibers are printed in the opposite manner, the result would be as follows, Fig. 2:

Fiber a' printed twice with two white spaces;
Fiber b' printed \( \frac{1}{4} \) times with two white spaces;
Fiber c' printed once with \( \frac{1}{4} \) white spaces;
Fiber d' printed once with \( \frac{1}{4} \) white space;
Fiber e' printed once with \( \frac{1}{2} \) white space.

It will be found that only one or two of them are printed in a 50-50 proportion. As a result the mixture will be imperfect, several fibers presenting the same black spaces or the same white spaces coming next to each other, with the result that the mixture will form the objectionable flame effects.

Although this first result is a failure so far as a remedy for the flame defect is concerned, the problem remains to obtain a theoretically perfect impression so that the wool will present black and white contrasting uniformly throughout the goods. The vigoureux printing rolls do not give the same result as when printing cloth. The combed wool continually presents inequalities in thickness due to the most diverse causes, which result in irregularities of printing, and these defects are aggravated by the width of the wool sheet to be printed. To overcome these defects the rolls were cut with finer corrugations about \( 1\frac{1}{2}" \) wide in 50-50 proportion, as shown at Fig. 3. This caused another difficulty, the goods having the appearance of a mixture of lightly printed spots without boldness or attractiveness, the contrast between the white and color not being sufficiently pronounced.

These two unsatisfactory results point to the remedy, which is to find the relation that should exist between the printed and unprinted parts of the fibers, avoiding spaces that are too wide and those that are too narrow, as shown at Fig. 4. If the printed and unprinted spaces in Fig. 4 are examined it will be found that each of the fibers is printed in a 50-50 proportion, so that when the shortest fiber is placed alongside of the longest fiber the two present the same proportion of white and color, forming a mixture free from the flame defect. It follows from the above that vigoureux printing is based on the following principle: All the fibers in a sliver of combed wool within certain limits should present the same proportion of white and color.

Having established this principle it is possible to produce mixtures that are darker than 50-50 and others that are lighter. In order to obtain more highly colored mixtures the rolls are cut in the proportion of 75 per cent. raised and 25 per cent. cut, Fig. 5. Lighter mixtures are made by cutting the rolls in the proportion of 25 per cent. raised and 75 per cent. cut. These three rolls are the three indispensable types for vigoureux printing. If darker or lighter mixtures are printed by increasing or decreasing the proportion of the raised part of the roll, the special effect of vigoureux printing is lost.

In practice, however, it is frequently necessary to produce darker or lighter shades than those obtained with the three fundamental types of rolls, either to tone down a color or change a shade. If it becomes necessary to darken a mixture it is better to add a small percentage of solid color. Experience has shown that such an addition, instead of being objectionable, makes the contrast of white and color more marked without causing the flame defect. On the other hand if it becomes necessary to make a mixture lighter, it is better to print one color with a 25 per cent. roll and thus reduce slightly the intensity of the ground shade.

(Co concluded in January)

**ALIZARINE ORANGE R P PASTE.**

The National Aniline & Chemical Company, Inc., announces the production of a new dye, known as Alizarine Orange R P Paste. As a wool color it possesses excellent fastness to both light and washing. Dyed upon an alum mordant, it produces orange; combined with chrome, a reddish brown. Because of its very good fastness to washing, it finds considerable application in calico printing.
One Branch of a Giant Industry

TEXTILES comprise fabric and color. The fabric is right when the color is right. They stand or fall together. This is why the dyestuff producer must consider his work as a factor in a larger industry.

The textile industry is a great industry. Its annual output is valued at more than one billion dollars. But it is singularly dependent upon the dyestuff producer. Fabric without color is unthinkable.

The National Aniline and Chemical Company, Inc., recognizes this relation to the textile consumer. It is here to serve the textile industry. It is dependent upon that industry for encouragement and for existence. If it does not serve that industry adequately it will have no reason for existence.

The production of dyestuffs is a share in the work of a giant industry.

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THE REWARD OF MERIT

Substantially one-half of the Sulphur Black now used in America is being made by us.

Users of our Atlantic Blacks know the reasons behind our enormous production.

Users of Sulphur Blacks other than ours would also benefit by finding out these reasons.

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Chicago Charlotte Providence

RECENT TEXTILE PATENTS.

Braiding-machines, Guide-plate for the bobbins of 1,315,265. E. Walter, Mellingen, Aargau, Switzerland.

Cloth-laying machine. 1,316,692. A. L. Cutter, St. Louis, Mo.

Dyeing, bleaching, or like treatment of cops. 1,317,220. W. Reisch, Binningden, near Basel, Switzerland.

Fabric-guiding device. 1,317,750. M. Swenson, Passaic, N. J.

Fabrics into strips. Machine for cutting sheer. 1,315,340. F. X. Scully, Brooklyn, N. Y.


Knitting-machine. 1,315,725. A. E. Stewart, Franklin, N. H.


Loom. 1,315,631. A. Lavigne, Brunswick, Me.

Looms for making hair goods. Hand. 1,315,912. S. S. Dewitt, Gallipolis, O.

Looms. Check for. 1,315,388. M. Nadeau and A. Bouvier, Lewiston, Me.


Loom for weaving. 1,316,810. C. Speiser, Gettysburg, near Basel, Switzerland.


Unwinding device. 1,317,544. C. A. Brink, Providence, R. I.

Weaving-machine safety appliance. 1,316,914. J. Meiklejohn, Lockport, N. Y.


SWAN & FINCH CO.

Announcement is made of the purchase by Swan & Finch Company of the Cataract Refining & Manufacturing Co. of Buffalo. The Cataract Company operates large lubricant plants at Buffalo and Chicago, and maintains branch offices and warehouses in both of the principal cities in this country, besides four in England, Scotland and Canada. The increased manufacturing and marketing facilities afforded by these will give to the Swan & Finch Company a pre-eminent place in the lubricant field.

The Cataract Company has given particular attention to the development of specialties in grease lubricants, such as cutting compounds, drawing compounds, etc., and practically every recognized form of lubricating grease is included in their line.

Swan & Finch Company, since 1853, has been one of the leading oil and grease producers of the country. It is the world’s largest refiner of Menhaden fish oil. Lubricating oils of all kinds, greases in great variety, semi-liquid oils, and also the numerous vegetable oils are among its products.

With the two refineries now operated by the Swan & Finch Co. and the Cataract plants at Chicago and Buffalo, there will be a production of unlimited capacity. The numerous warehouse stocks strategically situated from coast to coast will insire a service not heretofore possible.

Henry Fletcher, former President of Swan & Finch Company, is chairman of the Board of Directors; W. G. Moncrieff, formerly President of the Cataract Company, becomes President of the Swan & Finch Company; H. C. Hutchins, Vice-President of the Cataract Company, will become a Vice-President and Director of Sales; George Elliott Brown will be Vice-President and Secretary, and John T. Lee, Vice-President and Treasurer.
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RICE STARCH
PURE
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WOOL TRADE CLUB CHRONOLOGY
(Continued from page 12.)

Standards, where they are to be inspected, sorted and counted by paid employees of Mr. Z., who is financing the metric propaganda, and the results of this cooked-up agitation are then to be sent to the newspapers of the country in the form of fake news items and editorials written in San Francisco.

Will the Bureau of Standards Explain?

In the first edition of this statement I asked that Mr. Z. make known who is or are back of him, if he is not alone. This he has not yet done, although on Nov. 11 the World Trade Club issued a booklet in which Mr. Z. was described as "the one who receives the money and spends it for the World Trade Club metric movement."

I now ask the Bureau of Standards to explain its connection with the San Francisco propaganda.

How does it happen that petitions mailed to Congress are sent to the Bureau of Standards?

How does it happen that the San Francisco promoter of this metric propaganda can ignore the President of the United States and arrange to have petitions that are addressed to the President mailed directly to, received by and canvassed in the Bureau of Standards?

How does it happen that representatives of a man calling himself "The World Trade Club of San Francisco" are allowed access to petitions sent to Congress and the President and deposited with the Bureau of Standards?

How does it happen that officials of the United States Government, whose salaries are paid by taxation of the people, work with men hired and paid by the World Trade Club of San Francisco in canvassing the results of the metric propaganda conducted by Mr. Z.?

Will ex-Secretary Redfield Explain?

If the Director of the Bureau of Standards, because of modesty, like Mr. Z., or for other reasons, fails to give the information desired, will not the Hon. W. C. Redfield, who was Secretary of Commerce when this work was going on and who is now diligently engaged in telling the American people how to run the world, pause for a moment and tell us how it happened that the Department of Commerce became an annex to the World Trade Club of San Francisco?

Let us know all about it. The people pay the taxes, bear the burdens of misgovernment, and have a right to know. If the Government at Washington has become a private snap, the sooner that fact is made public and the remedy applied the better.

BUSINESS LITERATURE.

Handbook on Warp Sizing; by Prof. Everett H. Hinckley; 56 pages 4¼x8½; C. J. Tagliabue Mfg. Co., 18 Thirty-third St., Brooklyn, N. Y.

As our readers will remember, the series of articles on sizing and slashing of cotton warps was based on careful tests in the mill to determine the comparative results of sizing and slashing under varying conditions, so as to enable the mill superintendent and overseer to regulate this process to give the largest production of cloth with the smallest number of imperfections at the lowest cost. These articles have now been published by the Tagliabue Co. in book form, making a very useful handbook for cotton mill men. The book begins by pointing out the importance of slashing, and then explains the principles on which the process must be based to get the best results, including the materials used, method of cooking, and adjustment of the machine. This is followed by the results of the mill tests. There are many excellent illustrations of starches under the microscope, slashing rooms, temperature regulators, knots, bunches, coarse threads, charts showing comparative results, and both yarns and cloths under the microscope.

The book also contains a descriptive list of sizing materials, directions for cooking size, tables showing capacity of kettles of different sizes, blank forms for recording sizing formulas, a number of useful calculations for textile work, tables of weights and measures, 'slasher production tables, comparative temperature and pressure tables, directions for (Continued on page 36.)
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The HUSE Improved Winder

Occupies only about half the floor space and runs with half the power required for ordinary winders.

Spindles friction driven—no bands.

No vibration. Adapted for winding small sized bobbins by simply changing the cans, or two sizes of bobbins can be run at same time.

Variable speed attachment furnished for klein winding. Extremely simple, durable, smooth-running and has very few parts.

Furnished with any number of spindles desired.

These are but a few of the many points of supremacy.

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This machine is made in any size desired from 2½ to 6 inches in diameter, and with attachments for making wefts, loose courses, tuck-stitches and stripes, double knee and high spliced heel.

Can also be used without extra attachments for producing straight ribbed work.

Adapted for making rib tops for half hose, rib legs for ladies', misses' and children's stockings, also for shirt cuffs, drawer bottoms, etc.

Built with either one or two feeds, as best adapted for work required.

Simple, very few parts, and well built throughout.

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HIGH GRADE LATCH NEEDLES

Thoroughly finished, durable and, we believe, the most satisfactory and economical needles that can be produced. Made by skilled needle makers, from the highest grade wire and on new, improved and accurate machinery.

These needles are carefully inspected before leaving our factory and no effort is spared to keep our output up to the very highest standard. We are confident you would be pleased with these needles. May we send you samples?
KNITTING.

The Washington Hosiery Mills Co., of Nashville, Tenn., a newly organized concern, will manufacture men's and women's hosiery as soon as the necessary machinery can be installed.

J. G. Scherf is erecting a knitting mill at Andalusia, Ala.

John S. Bowers, worsted and woolen yarn dealer, 242 Chestnut street, Philadelphia, Pa., has recently added a knitting yarn department to his business.

The Wergan Knitting Mill, of Reading, Pa., has recently been established at Mt. Penn by Alexander Werner and Adam Ganter. About fifty people will be employed at the start.

The Amazon Knitting Co., Muskegon, Mich., are establishing a branch in a building formerly occupied by a stone products factory.

Appel & Hall, manufacturers of knit goods, have purchased a factory building in Philadelphia, Pa. It is noted that they are planning to increase their capacity.

The I. E. Morrow Company, manufacturers of underwear, of New York City, will in the near future establish a plant in Fall River, Mass., in which they will employ from 100 to 150 men and women.

The H. B. Ferguson Manufacturing Co., of New London, Ct., will in the near future install 100 machines for the manufacture of underwear.

The Fox River Valley Knitting Co. will in the near future erect a plant at Appleton, Wis., and equip it with machinery procured from a mill in the western part of the State. Yarns will be spun from cotton grown in Oklahoma.

The Howard Mills, of Hagerstown, Md., will in the near future establish a plant with daily capacity of 125 pairs high grade half hose.

H. A. Vosel and H. S. Moody, of Athens, Tenn., have organized the Fashion Mill. They will erect a building and equip it for knitting silk hosiery.

The Advance Hosiery Co., of Philadelphia, Pa., has established a branch in Reading, where women's hose and men's half hose will be manufactured.

SILK.

The Walser Manufacturing Co., manufacturers of silk braids, etc., will erect a two-story factory and dye house addition to their plant.

H. L. Friend will erect a two-story silk mill at Dupont, Pa.

James A. Batty & Sons, of Gloversville, N. Y., are having plans prepared for the erection of a three-story silk mill.

The Bloomsburg Silk Mills, of New York City, have recently purchased a cotton mill at Richmond, Me., and will equip it with machinery for the manufacture of silk fabrics.

BLEACHERS!

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It costs nothing to get the dope from us about Peroxide bleaching.

Inform yourself. See how simple and safe it is and that it does not cost any more.

After that: Show it to the boss.

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In the Grey or Dyed on Cones as Wanted.

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ALSO REAL SILK
SAMPLES AND QUOTATIONS ON APPLICATION

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CLEAN WATER—GUARANTEED BY NORWOOD FILTERS

Every bit of dirt, grit and suspended matter is removed from the water by NORWOOD FILTERS—they are guaranteed to produce perfectly clean water.

Less time and less cleanser are required to wash with water filtered the NORWOOD way, and delicate tints and satisfactory bleaching is assured.

Tell us your needs and we will tell you how a NORWOOD FILTER will help you.

Norwood Engineering Co.
FLORENCE, MASS.

BUSINESS LITERATURE.
(Continued from page 32.)

using a hydrometer, density table, a chapter on temperature and heat, and charts from recording thermometers.

A complimentary copy of this book will be sent to anyone interested in textile manufacturing on application to the Taglubue Co.

NEW PUBLICATIONS.

Knit Goods Trade; 894 pages 4½x7½; Davison Publishing Co., New York; Price, $3.00.

The 1919 edition of this directory has been revised to bring it up to date and gives the usual information, including a list of knit goods manufacturers in the United States and Canada, arranged by States and places, a list classified by products and lists of hosiery dyers, mills with dye houses, dealers in yarn, raw silk and waste, manufacturers' agents, New York offices of mills, jobbers and retailers.

Knitted Fabrics; by J. Chamberlain and J. H. Quilter; 141 pages 4½x7½; Sir Isaac Pitman & Sons, London and New York; Price, $1.00.

While this book is written for the general reader who seeks information about the manufacture of knit goods, it is also adapted for those who are actually engaged in the knit goods industry. It gives an explanation of the different stitches and fabrics, also the methods manufacturing and finishing the different knit fabrics and garments, the contents being arranged under the following heads: Historical; preparatory operations; principles of knit fabrics; hand-knitting machines and knitting operations; manufacture of hosiery; manufacture of knit underwear; fancy knit fabrics and outer garments; trimming and finishing knit fabrics.

Applied Science for Metal Workers; by W. H. Dooley, Principal of New York Textile School; 447 pages 5x7½; The Ronald Press Co.; Price, $2.00.

The object of this book is to give a clear explanation of scientific principles underlying the metal working trades. It is written in a clear style, free from unnecessary technicalities, and forms a very useful book for the student and workman. Numerous illustrations are a valuable feature of the volume.

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Made of the highest grade steel, finished in the best possible manner, this needle has a permanent smoothness and long wear not found in other needles.

COREY LATCH NEEDLES are made in the largest and best individually owned needle factory in America, under the best factory conditions, by employees of great skill and long experience, and it is no empty boast that COREY LATCH NEEDLES are the best.

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RICE STARCH FOR SIZING AND FINISHING.

In the past two years, H. Kohnstamm & Co., 8393 Park Place, New York, have succeeded in manufacturing for the first time in this country Rice starch in crystal and powdered form, which is used extensively in the textile trade for sizings and finishes. Rice starch has a peculiar property that imparts a transparency to the finished product which no other starch will give.

Furthermore the manufacturers guarantee this starch to be absolutely pure and free from all adulterations. In fact they are so satisfied with the results that they have engaged an expert finisher who would be pleased to call at any plant in the country to demonstrate how to use this starch. This shows the confidence that the manufacturers of this starch have in the product and in its results.

WINONA MILLS COMPANY.

The Winona Mills Hosiery Company and the Winona Underwear Co. of Connecticut have been consolidated with the offices and factory at New Haven, Conn. The new Winona Mills Company is capitalized at $300,000, with $213,500 paid in. About $60,000 has lately been paid in in cash and the concern has orders exceeding its capacity. The company now has a strong board of directors, the latter including C. H. Jockmus, president Ansonia Mfg. Co., Adolph Mendel of Mendel & Freedman, New Haven, Khilion H. Marlin, formerly of the Marlin Arms Co., who is a director of the First National Bank of New Haven and the Beacon Falls Rubber Shoe Co. The company is headed by Robert J. Kennedy, the treasurer and general manager, who has a thorough knowledge of the business, gained by long experience.

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This mark will assure you of the same high quality of materials, the same Service and the same Uniformity in deliveries with which we have supplied our customers during the past sixty-nine years.

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As a means of rendering a still greater service to our customers we have established a service department for the purpose of furnishing definite and accurate advice in connection with use and application of any of our products. This department is unusual and distinctive in that it is in charge of a well-known textile chemical expert, who has had a wide experience in the textile finishing field. This service is at your disposal.

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DAVISON'S TEXTILE BLUE BOOK undoubtedly is referred to three times as often as any other Textile Directory because of these labels, and owing to this, it required nearly one month for us to fill the advance orders on the new edition.

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- Cotton Mills
- Woolen Mills
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- Carpet Mills
- Silk Mills
- Knitting Mills
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- Canada Mills
- Dyers, Finishers, Etc.
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- Commission Merchants
- Cotton Goods Converters
- Yarn Dealers
- Raw and Art Silk
- Cotton Dealers
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- Linter Dealers
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WHERE EMPLOYERS AND EMPLOYEES MEET

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Banner Superintendent and Fixer for new mill with eighty machines. Will have entire charge. Exceptional opportunity for future. State salary and experience. Address in confidence, Box 530, TEXTILES, 79 Milk St., Boston, Mass.

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We are exclusive selling agents for FIFTY-TWO MILLS producing all grades of underwear in all weights and in all fabrics for all climates in every part of the world. Our lines consist of—

Plat and ribbed wool and flat and ribbed cotton underwear in shirts, drawers, vests, pants and union suits for men, women and children.

There is no requirement in popular priced underwear that we cannot supply to the wholesale and export trade.

Our line of popular priced Sweater Coats is also complete for all demands.

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Special shades matched

FOR GREATER PRODUCTION AND LOWER COST
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PAYNE WINDER

Over 2,500 in Successful Operation in Progressive Hosiery and Underwear Mills

IMPROVED UPRIGHT SPOOLERS
To Spool from Cop, Skein or Bobbin. Doubling Spoolers for doubling 2, 3 or more ends into one. Upright Quillers, Quill from Cop, Skein or Bobbin.
Ring Dresser, Spooler and Reel Spindles. Cop Skewers, Warp, Spool, Spooler Guides, Bolsters, and Stops Made and Repaired at Short Notice.

GEO. W. PAYNE CO.  152 BROAD STREET
PAWTUCKET, R. I.
Established 1885—Incorporated 1903.
MILL NOTES.

The Anchor Duck Mills, of Rome, Ga., will erect an addition to their plant.

The Jennees Spinning Co., of Pawtucket, R. I., are erecting an additional building to their plant. This company will also build an extension to their present office.

W. T. Heffner, of Maiden, N. C., will erect a 5,000-spindle yarn mill.

The Burlington Textile Co., of Pawtucket, R. I., will in the near future erect a one-story addition to their plant.

The Southern Mercerizing Co., of Tryon, N. C., will erect an addition to be equipped for mercerizing textile products.

The Sharp Manufacturing Co., of New Bedford, Mass., have recently opened a first-aid building in connection with their plant.

The Notaslow Webbing Co. has recently established a plant which is equipped with twenty-four narrow looms.

The Fitchburg (Mass.) Yarn Co. will erect an addition to their picker house.

The Fultonville (N. Y.) Textile Company has awarded a contract for the erection of a plant.

The Rabell Manufacturing Co., of Selma, Ala., will install 2,000 additional spindles, all of which have been ordered.

The Kalbteich Chemical Co., of Waterbury, Ct., have awarded a contract for the erection of a factory addition.

The Sterling Spinning Co. of Belmont, N. C., have awarded contracts for the erection of a yarn plant.

The Warwick Mills, of Centotronie, R. I., have awarded a contract for the erection of additions to their plant. A four-story 150-foot addition to the spinning mill and a picker house 60 feet square are planned.

"Crest" Flaked Soap
88% or more real soap
12% or less moisture

WOODLEY SOAP MFG. CO.

SAVES SOAP

The Electric Smelting & Aluminum Co.
LOCKPORT, N. Y.
TEXTILES

PERSONALS.

W. L. Phillips, formerly overseer of spinning at the Avondale Mills, Birmingham, Ala., has taken the position of superintendent of the Social Circle (Ga.) Mills.

Charles D. Voss has been promoted from superintendent to general manager of the Buck Creek Mills, Siluria, Ala.

J. T. Hancock has been appointed overseer of weaving at the Jackson Mills, Monroe, N. C.

J. A. Snipes, formerly of Gastonia, N. C., has accepted the position of overseer of spinning at the Fidelity Mills, Charlotte, N. C.

C. K. Taylor has been appointed general manager of the McComb (Miss.) Cotton Mills.

C. E. Davis, formerly of Columbus, Ga., has accepted the position of superintendent at the Bibb Mills, No. 1, Macon, Ga.

M. T. Poovey, formerly of Kanapols, N. C., has been appointed superintendent of the Gastonia Mfg. Co., Gastonia, N. C.

C. H. Eldridge has accepted the position of superintendent at the Aldora Mills, Barnesville, Ga.

W. F. Campbell, formerly with the Dixie Spindle & Flyer Co., Charlotte, N. C., has accepted the position with the Erwin Cotton Mills, Durham, N. C.

George Messick, formerly of Hudson, N. C., has taken the position of master mechanic for the Pinkney Mills, Gastonia, N. C.

Arthur Brearley, formerly boss spinnerintendent of drawing and spinning at Pa., has accepted the position of spinner at H. C. Ball & Co., Manayunk, at the Penn Worsted Co., Philadelphia, Pa.

Andrew W. Smith, formerly employed at the Ponemah Mills, Taftville, Conn., has accepted the position of overseer of slack at the Page Mfg. Co., New Bedford, Mass.

COTTON.

The Ray Tire & Rubber Co., of Chicago, Ill., will invest $525,000 to erect and equip a large cotton mill in Birmingham, Ala.

Proximity Manufacturing Co., of Greensboro, N. C., are planning the installation of 1,000 additional new looms in their White Oak Mills.

The Easley (S. C.) Cotton Mills will construct a large community laundry, to serve four mills in that section.

FOR SALE OR RENT

Mill with Good Water Power

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Hosiery Knitting Machinerys,

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For Piece Goods, Silks, Plumes, Underwear, Toweling, etc.

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Weavers and Spinners on

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For cotton, woolen and worsted


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Approximately 3,000 Davis & Furrer Spindles for 7" bobbins. Immediate delivery. Sample on application.

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10 looms 92 to 117".

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4-49" Bramwell feeds.

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1-5 bowl wool scouring machine.

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Nine knitters for making fine tubular fabric one inch wide when flat. Apply P. O. Box 1604, Boston.

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Second-hand American 32-inch over-driven EXTRACTOR, motor driven for D. C., with or without motor attached. State price, condition and age. BRIGHAM-HOPKINS COMPANY, 409 W. Redwood St., Balti-

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HALF HOSE IN THE GRAY OR DYED AND BOXED, CASH TERMS. ADDRESS BOX 528, TEXTILES, 79 MILK ST., BOSTON, MASS.

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—A COTTON DRYER with continuous apron. Will buy quick for cash.

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Will Enable Any User To Improve His Business

Spring Needle Underwear Machine
A splendid machine for balbriggan underwear, stockingettes, eiderdowns and all kinds of fleeced fabrics.
Made in large variety of sizes with automatic take-up, etc.

New Spring Needle Rib Machine
Has new style feed, stop motion and take-up features.
Especially made to produce high grade ribbed underwear. Will make finest fabric on the market. An ideal machine with all parts handy to get at.

Improved Spring Needle Underwear Machine
New Spring Needle Rib Machine

Our late models challenge comparison. Write for further information.

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Circular Rib

Knitting Machinery

For making Ribbed Underwear, Combination Suits, Cuffs, Shirt Borders, Ribbed Hosiery, Fancy Knit Goods, Etc.

CORRECT Construction, Excellence and Durability—Quality of Fabric and Production Unexcelled—Latest Improvements.

NYE & TREDICK COMPANY
718-720 Cherry Street
PHILADELPHIA - - - PA.
RESEARCH IN THE COTTON INDUSTRY.
By Dr. H. E. House, Division of Industrial Research, National Research Council.

The Third International Cotton Conference afforded an excellent opportunity for discussion among those familiar with the progress of applied science in the cotton industry and the present status of the work in various parts of the world. There has been much individual effort in our country and certain industrial laboratories, textile schools and agricultural experiment stations have made many valuable contributions to the improvement of various phases of the cotton trade. It would seem, however, that the time has now come when more co-operation should be obtained between the various groups and new work undertaken. This may make it advisable to form a cotton research association somewhat along the lines of the British Cotton Industry Research Association, which has just been incorporated and is prepared for active work.

A cotton research association in the United States should have represented in it all the steps from the growing of the raw material to the marketing of the finished fabric. While this may make it necessary to set up special machinery for the problems of direct interest to various groups there is still much in common that these groups can work together to mutual advantage. As an outcome of the several discussions a committee is about to be appointed to study the question in its broad aspect, consider the problems which should be undertaken at once, determine the availability of men and facilities for such studies, and prepare a budget to cover the expense of the work. The committee will then report to the various organizations in the cotton trade in America in the expectation that associations and individuals will be prepared to join in financing the undertaking, which is at the same time both important and of self-interest to them. The universal interest in cotton would seem to make it possible for research associations in various countries to apply themselves to the study of problems of immediate national interest and to cooperate with each other in many studies of international importance.

The Committee on Research, Reports and Statistics of the Conference could do no more than initiate these two great projects, both of which will require much time for realization. They afford unusual opportunity for useful constructive work and will ultimately become foundation stones in the cotton trade both national and international.

MILL NOTES.

The Manchester Mills, of Rockhill, S. C., are erecting a new dye house.

The Edrtd Mills of Alhemarle, N. C., have awarded a contract for the erection of another 18,000 spindle mill to make yarns.

The Fairfax (Ala.) Mills have just awarded a contract to J. E. Sirrine, of Greenville, S. C., for an addition to their bleachery.

An equipment of 5,000 spindles for the production of high-grade carded frame-spun yarn will be installed by the Ernalden Manufacturing Co., St. Pauls, N. C.

An additional weave shed and other buildings will be erected by the Columbus (Ga.) Mfg. Co.

The Tennessee Mills, manufacturers of men's union suits, Knoxville, Tenn., are erecting an addition for the manufacture of shirts and drawers.

The Crompton & Knowles Loom Works will in the near future erect an addition to their plant at Tingley and Ashley streets, Providence, R. I., which will be used as a foundry.

The John S. Boyd Co., manufacturer of corduroy, Williamstown, Mass., have started work on an extensive addition to their plant.

The Park Yarn Mills, recently established, of Kings Mountain, N. C., will in the near future erect a mill of 5,000 ring and 2,200 twister spindles, for manufacturing coarse carded yarns.

The Ingraham & Tirrell Silk Co., of Phillipsburg, N. J., will erect an additional mill at Milford.

The Stewart Silk Mill of Easton, Pa., are erecting a new addition to their plant.

FOR SALE—All Size Flyers, Practically as Good as New, Polished Inside and Out at Bargain Prices.

Southern Spindle and Flyer Co., Inc.
CHARLOTTE, N. C.
Manufacturers, Overhaulers and Repairers of Cotton Mill Machinery
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Capacity, 300 Horses

Cotton, Oil, Gin, Raw, Grist, Fertilizer, Cane, Shingle Mill Machinery Supplies and Repairs and all Things, Shafting, Pulleys, Hangers, Wood, Coal and Sawdust Grate Bars, Pumps, Pipes, Valves and Fittings, Injectors, Belting, Packing, Hose, C. & H. every day. One hundred machines and good men ready to do your work quick.

T. L. Louis has been appointed superintendent of the Adworth Cotton Manufacturing Co., Aeworth, Ga.

G. B. McCombs has taken the position of superintendent at the Inverness Mills, Winston Salem, N. C.
TEXTILES

COTTON CLOTHS.
(Rapported by Louis Lowinson, cotton goods broker, 72 Leonard Street, New York.)
80/50 32\(\frac{\text{S}}{\text{N}}\) 4.00 plain cloths... 30
72/76 39 4.25 " 24
68/72 39 4.15 " 22\(\frac{\text{S}}{\text{N}}\)
64/76 40 3.75 18\(\frac{\text{S}}{\text{N}}\)
64/76 40 3.55 18\(\frac{\text{S}}{\text{N}}\)
60/72 38 3.95 14\(\frac{\text{S}}{\text{N}}\)
60/72 40 3.95 14\(\frac{\text{S}}{\text{N}}\)
60/72 42 3.95 14\(\frac{\text{S}}{\text{N}}\)
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DOMESTIC WOOL
Ohio and Pennsylvania Fleeces
Delaine washed... 1.00-1.02
XX... 74-75
Fine unmerchandise delaine... 90-95
Delaine unwashed... 85-90
Fine unmerchandise... 70-72
\(\frac{3}{4}\) blood combing... 85-85
\(\frac{3}{4}\) blood combing... 70-71
\(\frac{1}{2}\) blood combing... 65-66
\(\frac{1}{2}\) blood combing... 41-42
Common and braid... 41-42

SOUTHERN FLEECES
Lake mediums... 58-59
Georgia mediums... 59-60
Virginia, Kentucky, and Similar...
\(\frac{1}{2}\) blood unwashed... 85-86
\(\frac{3}{4}\) blood unwashed... 74-75
\(\frac{1}{2}\) blood unwashed... 67-68
Common and braid... 41-42

SCOURED BASIS
Texas
Fine... 12 months... 1.70-1.80
Fine 8 months... 1.50-1.60
Fine fall... 1.35-1.45

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BARDSPUN
2/20s \(\frac{3}{4}\) blood... 2.10-2.20
2/20s \(\frac{3}{4}\) blood... 2.50-2.60
2/20s \(\frac{3}{4}\) blood... 2.25-2.45
2/20s \(\frac{3}{4}\) blood... 3.15-3.20
2/40s \(\frac{3}{4}\) blood... 3.85-4.00

FRENCH SPUN
1/20s \(\frac{1}{2}\) blood... 2.05-2.15
1/20s \(\frac{1}{2}\) blood... 2.25-2.30
1/20s \(\frac{1}{2}\) blood... 3.30-3.50
1/20s \(\frac{1}{4}\) blood... 3.50-3.60
1/20s-64s... 4.15-4.30

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And Linen Yarns and Threads for All Purposes
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of all descriptions
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We have perfected a cotton tape belt for driving Universal Winders. We urge all users of these machines to write us for samples. We offer this with our full endorsement because exhaustive tests have satisfied us of its real merit.

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Spinning Tape Specialists, LOWELL, MASS.

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Cotton Yarns and Warps
WHITE AND COLORED

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QUALITY AND SERVICE
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OLD WOOLEN RAGS
GOVERNMENT MAXIMUM

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Fine
Coarse light
Coarse dark
Dark brown
Woolen black
Serges
Light
Brown
Blue
Black
Red
Green
Flannels
White (Fine)
Red
Blue
Knits
White
Blue
Black
Red
Brown
Silver gray
Skirted worsteds
Light
Black
Blue
Dark
Brown
Skirted cloth
Fine light
Light
Brown
Blue
Dark
Plain black
Skirted, tan cloth

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LARGEST GRADERS OF
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AND ALL KINDS OF REMNANTS

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H. F. JENKS COMPANY, Pawtucket, R. I.
Established 1879 Incorporated 1911

J. L. Brown, formerly at Winston Salem, N. C., has accepted the position of superintendent of the Piedmont Commission Co., Charlotte, N. C.
A. P. Ritchie, formerly with the Po- mona Mills, Greensboro, N. C., has been appointed superintendent of the Dixon Cotton Mills, Gastonia, N. C.
E. G. Putnam has been promoted from second hand to overseer of weaving at the Calcine Mills, Charlotte, N. C.

THE BRADLEY STENCIL MACHINE
Makes stencils in half an hour at reduced cost of 1.0 cent each

In Universal use by thousands of manufacturers and shippers.

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Carrier Engineering Corporation, New York.

Albino
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Automatic Feed
(Fish and wool)

Baling Presses
Economy Bailer Co., At 1 Arbor, Mich.

Bleaching
Kilns

Bleaching Machinery

Bleaching Plants

Bleachers and Bleaching Systems

Bollers

Boller Feed Grinders
Scalf & Sons Co., Wm. B., Pittsburgh, Pa.

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Bubble (for use)
H. J. Jofks Co., Pawtucket, R. I.

Carding Machinery

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H. J. Jofks Co., Pawtucket, R. I.

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Arnold, Hoffman & Co., Inc., Providence, R. I.

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Franklin Machinery Co., Providence, R. I.

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Eastman Machine Co., Buffalo

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South, H. L. & Co., Providence, R. I.

Cloth Washers

Cotton Bat Heads
Franklin Machine Co., Providence, R. I.

Cotton Yarn Bleachers
Home Bleach & Dye Works, Pawtucket, R. I.

Dyes and Chemicals
Arnold, Hoffman & Co., Inc., Providence, R. I.

Dyeing, Drying and Bleaching Machinery

Electrical Contractors
General Electric Co., Schenectady, N. Y.

Electric Lamps
General Electric Co., Schenectady, N. Y.

Electric Motors
General Electric Co., Schenectady, N. Y.

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Franklin Machine Co., Providence, R. I.

Extraction Apparatus

Hydrometers
Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

Iron Castings
Franklin Machine Co., Providence, R. I.

Knitting Machinery

Looms, Spinning and Twisting
Southern Spindle & Fly Co., Inc., Charlotte, N. C.

Metal Castings
Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

Mills Supplies

Mordants
Jacques Wolf & Co., Passaic, N. J.

Oil Mill Machinery

Oils
Bowen, Smyser Co., New York.

Peraxides
Roseler & Hassler Chemical Co., New York.

Pickers, Rag and Shoddy

Pipeless

Ftings
Franklin Machine Co., Providence, R. I.

Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

Recording Thermometers
Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

Regulators for Temperature
Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

Rolls
Southern Spindle & Fly Co., Inc., Charlotte, N. C.

Sawmill
Cohen & Sons, N. B., Chicago, Ill.

Sheets, Spinning and Twisting
Southern Spindle & Fly Co., Inc., Charlotte, N. C.

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Franklin Machine Co., Providence, R. I.

Shovels

Spring Mills
Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

Spooling Mills
Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

Stapling Machines
Taglabe Mfg. Co., C. J., Brooklyn, N. Y.

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Wright & Fisk, Rochester, N. Y.

Stentering

Textile Machine Works
Reading, Pa.

Textile Works
Reading, Pa.

Textile Works
Reading, Pa.

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- Silk Skirts
- Skirts and Toques with three color stripes
- Fleece-Lined Fabrics
- Sweaters with rack stitch, Jersey Cloth
- Stripes and selavage edge

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Arnold, Hoffman & Co., Providence, R. I.

Soaps
Arnold, Hoffman & Co., Providence, R. I.
Electric Smelting and Aluminum Co., Lockport, N. Y.

Special Textile Machinery
Franklin Machinery Co., Providence, R. I.

Spindles
Southern Spindle & Flyer Co., Inc., Charlotte, N. C.
Spunsilk Machinery
Franklin Machinery Co., Providence, R. I.

Starch
Arnold, Hoffman & Co., Providence, R. I.
Kohnstamm & Co., New York City. (Rice Starch)

Stencill Machines
Stooks (for mill use)
Jenks Co., H. F., Pawtucket, R. I.

Temperature Regulators
Carrier Engineering Corporation, New York.
Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.

Testing Establishments

Thermometers
Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.

Transmission Machinery
Franklin Machinery Co., Providence, R. I.

Tubing, Snap

Vacuuming Apparatus
General Electric Co., Schenectady, N. Y.

Waste Preparing Machinery

Water Softeners
Scalf & Sons Co., Wm. B., Pittsburgh, Pa.

Water Wheels
Davis Foundry and Machine Works, Rome, Ga.

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Pawtuck, Geo. W., Co., Pawtucket, R. I.

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