

Knitting Department

A WARNING TO MANUFACTURERS.

A recent report on depression in the knit goods trade in China and the closing of Chinese knitting mills carries a warning to the United States where similar causes are in operation and the same results are inevitable unless prompt measures are taken to apply the remedy. China is on a silver basis, and during the past three years the silver dollar has doubled in value from 41 cents to 82 cents in gold. This advance has had the effect of doubling the cost, measured in gold, of Chinese products, while a gold dollar's worth of foreign goods can be imported into China for just one-half the amount of silver money that would have been required three years ago.

Changes arising from similar causes and having like effects are now in progress in the United States. Owing to the great excess of exports over imports, exchange on nearly all European countries is at a discount, which means that measured in European money the United States dollar has increased in value just as the Chinese silver dollar has increased in value when measured in the gold currency of other countries. The increase in the value of the United States dollar amounts to about 15 per cent., compared with English money; 38 per cent. compared with French; 46 per cent. compared with Italian; and even more when compared with the money of the enemy nations with which the United States will again be doing business at some time in the future.

These currency changes, while due to different causes, will have the same effect in the United States as they are having in China, imposing an obstacle to the export of goods and promoting imports by reducing the domestic value of imported products. The remedy is the same in both China and the United States—protective measures to restrict imports. Unfortunately China's hands are tied. Being without an army or navy to defend herself, China not only can be robbed of Shantung, the richest part of her domain, but is not permitted to increase her tariff without the consent of foreign countries that are profiting by a low Chinese tariff. The United States is still free to regulate imports without the consent of foreign countries, and that freedom will continue to be ours if we keep out of the League of Nations.

The obstacle to our exports that is created by the depreciation of European money is an advantage to the United States because of its influence in reducing prices at home and thus tending to relieve the most serious of domestic difficulties—the high cost of living. The stimulation of imports, however, is another matter. Europe has no large stock of raw materials to ship to the United States, consequently European exports to the American market must consist almost wholly of manufactured goods, which will come into direct competition with the products of American labor. While there is yet time and the United States remains independent, let protective measures be adopted in order that the American market may be supplied by American labor. Following is the report by Consul General George E. Anderson of Hongkong

Three out of the nine well-known knitting factories of Hongkong have suspended business in the past few weeks as a result of conditions in the trade.

By far the most unfavorable factor in the present situation is the high exchange value of silver and the experience of

these Hongkong factories in operation is significant in that the same conditions apply to all industrial undertakings in China at the present time or under present conditions. While the Hongkong or other silver dollar is so high in terms of gold all local costs,—wages, rent, light, power, transportation, depreciation, interest on local capital and all,—run just about twice what they are on the basis of a normal dollar.

Aside from the materials purchased abroad it costs just as much in local currency at the present time with Hongkong dollar worth 82 cents gold to operate the factories as it did three years ago when the Hongkong dollar was worth 41 cents gold or less,—in other words doubling the gold cost of the product. On the other hand Japanese or other competition operating on the basis of a gold standard currency can operate today with substantially the same costs aside from the fluctuating cost of the yarns which all factories meet alike. Every industrial establishment in China operates under similar conditions.

So long as only local competition is faced and so long as the product is sold in China there is little or no difference in the situation but a large portion of the product of the Hongkong knitting factories has been exported to the Philippines, Straits Settlements, India and other gold standard countries and of course costs have mounted in gold with every advance in exchange. Even in competition in China, Japanese goods manufactured on a gold yen basis have the advantage of high exchange when the high priced silver dollar is translated into gold. The present high rate of exchange in China acts as an immense subsidy on foreign manufactures in competition with Chinese made goods.

In the Hongkong knitting field there have been other difficulties such as the increasing cost in local currency of labor, rents, exceedingly high electric light and power costs due to high priced fuel and transportation, and other advancing cost items.

The closing of these knitting factories is of especial interest to exporters of American yarn for they were large importers of American materials previous to the war and have anticipated renewing their relations with American exporters as soon as a supply of American yarn could again become available at fair prices.—*Consul General George E. Anderson, Hongkong.*

TRADEMARKS IN THE HOSIERY TRADE.

A bill (H. R. 1113) to establish a standard box for apples has been introduced in Congress. In addition to fixing the size of the box this bill provides that the container shall be marked to show the quality and variety of the apples packed in it. During the hearing on the bill before the Committee on Coinage, Weights and Measures, Congressman John Reber, of Pottsville, who represents the twelfth Pennsylvania district, referred to the question of stamping the packer's name on each box and told the committee of the custom in the hosiery trade in which the jobbers object to having the goods bear the name of the manufacturers:

Mr. Reber: May I ask one question, in regard to one item I saw in here? It says the name of the packer should appear on the outside of the box. Now, in the business that I have been engaged in (hosiery manufacturing) the bulk of the business is done through jobbers, the distribution is made through jobbers and the jobbers object to the manufacturers having any mark whatever either on the goods or on the label or on the box to designate who the manufacturer was or where the goods come from. You take, for instance, the Onyx hosiery. You are all familiar with the Onyx hosiery. It is distributed by Lord and Taylor, of New York City, in immense quantities. You would naturally suppose that the Onyx Hosiery was made by Lord & Taylor, but the facts are not such at all. The Onyx hosiery is made by many hosiery manufacturers all over the United States, or Europe, for that matter, who see fit to do business with Lord & Taylor: but Lord & Taylor insist that the word "Onyx" be stamped on the goods, on the label, on the band and on the box.

Mr. Raker: And maybe there are 20 different varieties of Onyx socks?

Mr. Reber: Oh, 50 to 100, I will say.

Mr. Raker: Some good and some bad?

Mr. Reber: All qualities.

Mr. Rose: You all use Stetson hats. Stetson never made a hat in his life.

Mr. Raker: The public is being deceived?

Mr. Reber: Sure. I have made lots of Onyx hosiery and have made hundreds of side brands of hosiery for different jobbers; and so has every other hosiery mill.

Mr. Briggs: That is true of assembling parts of an automobile; they buy the parts and assemble them. Is that not so?

Mr. Reber: This is different. These people do nothing but distribute them.

Mr. Briggs: There are many distributing agencies. They buy them from other manufacturers?

Mr. Reber: As an excuse for that, I should like to say that the jobbers want to eliminate the manufacturer, prevent the manufacturer from having his brand known to the consumer or the retailer and prevent the manufacturer from going direct either to the retailer or to the consumer with his goods. So that, to protect himself, not to deceive the public, the jobber does that.

THE MANUFACTURE OF KNIT GOODS.

BY JOHN CHAMBERLAIN.

AUTOMATIC KNITTING MACHINES.

These machines have of recent years been greatly improved, and the latest types of machines are fully automatic in their mechanical movements, and rotate at a speed of 270—300 r.p.m. As a medium gauge machine possesses 200—220 needles, it will be understood that the stitches, although singly formed, are produced at a high speed. The machines when making heel and toes are oscillated at a slower speed, usually from 100—140 oscillations per minute, owing to the fact that individual needles are "picked" during the oscillation, as well as to the fact that oscillatory movement is of necessity slower than rotatory motion.

Two main types of machines are in common use: (1) Stationary needle cylinder machines; (2) rotating needle cylinder machines. The former are the older type of machine, and cannot be driven as fast as the latter. Moreover, they do not admit of yarn changes, with the exception of ordinary heel and toe splicing, unless rotating bobbins—*i.e.*, bobbins travelling in an orbit round the needle cylinder in co-ordination with the cams—are employed. Nevertheless, on certain classes of work, especially in the making of children's socks, they are still largely used, owing to their simple construction, low initial cost, and low renewal charges. The revolving cylinder machines are the more recent; can rotate at a higher speed owing to the driving of the well-balanced needle cylinder; admit of numerous yarn changes without rotating bobbins; have simpler devices for splicing, high splicing, and thickening the soles; but possess the slight drawback of causing the knitted fabric to rotate so that the operator cannot so readily observe defects. As, however, all the recently evolved machines work on this principle, it is evident that they must now be considered to be the premier type of machine.

All modern rotating cylinder machines possess the following fundamental parts—*viz.*: (1) Needle cylinder with sinker ring; (2) two-speed driving gear, with mechanism for oscillatory motion; (3) cam system for knitting, with automatic control of stitch length; (4) instep needle control; (5) narrowing and widening pickers; (6) yarn-changing guides; (7) splicing and high splicing mechanism; (8) timing chain and controlling drum.

These parts are constructed, positioned, and controlled in varying ways, but the machines are gradually approaching to a standard type, and there is now a great similarity in the build and definition of the machines. If the principles are thoroughly understood, it is not a difficult matter for a trained

mechanician to master any machine by ascertaining where and how the above classification of parts is arranged. For explanatory purposes a general view of one of the simplest and most largely used machines is shown in Fig. 17.

1. The frame or housing 1 of the machine is carried on legs 2, and at the top of the housing is attached the bed 3. The rotating needle cylinder 26 is screwed to the bevel-wheel 4, which is driven by the wheel 5 pegged to the shaft 6. Grooves are cut in the needle cylinder, for the reception of the needles 25. The needles have two lengths of controlling butts—short butts for the heel half and long butts for the instep half.

The butt is the part turned at right angles to the length of the needle, and it is by means of this part that the needle is given its movement by means of stationary cams. Attached to and forming a fundamental part of the needle cylinder is the sinker or web holding ring 29, which is also tricked for

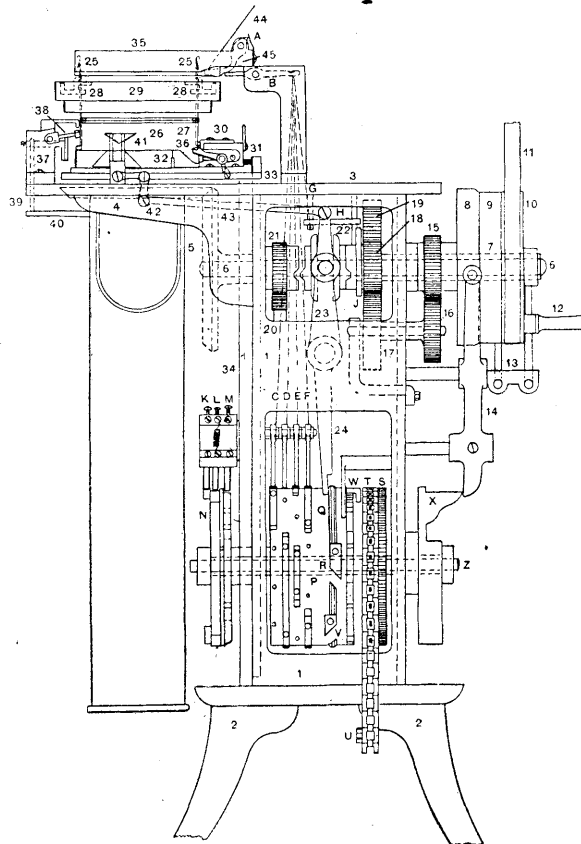


Fig. 17. Automatic Knitting Machine.

the reception of the sinkers or web holders 28. These sinkers work between the needles, and the needles draw their loops upon them; while in addition they are given a slight rectilinear movement so that as the needles rise, the loops are prevented from rising by the small catches in the upper part of the sinkers. The sinkers remain in their inward position until the loop formation is again about to occur.

No drawing-off mechanism or additional weight is required when the machine is knitting on a decreasing or increasing number of needles, and although some machines are fitted with drawing-off rollers for pulling off the tubular fabric, many machines possess no apparatus whatever for this purpose. The needles are kept in position by means of spiral springs 27, which encircle the needle cylinder, whilst the sinkers are either kept in position in a like manner or have their butts traveling in a closed cam groove.

2. The driving gear is carried on and about the main driving shaft 6, and encircling this shaft is a hollow sleeve 7, to which is screwed the slow drive pulley 9 and the pinion 18, so that a direct drive is obtained when the belt 11 is on the pulley 9.

When the belt is on the high-speed pulley 8, which is made slightly larger to ensure a tight belt, the sleeve (7) is driven through the gears 15, 16, 17, and 18, the pinion 15 being attached to the pulley 8 which rotates on the sleeve 7. Pulley 10 is the loose pulley. The sleeve 7 drives the main driving shaft 6 through the agency of the clutch hub 22, which has a sliding movement on a feather on the solid shaft 6, and when the clutch is in the position shown in the diagram Fig. 17 the needle cylinder is rotated at a high or slow speed in accordance with the position of the belt-shipper 14 and belt-fork 13.

Running freely on the solid shaft 6 is another pinion 21, which is oscillated by means of the large gear-wheel 19, the curved rack or quadrant 20, and intermediate levers (not shown). When the clutch hub 22 is moved laterally to the left it engages with the boss of the pinion 21, so that the drive from pinion 18, which is in all cases the main driving pinion, is now obtained through the gear-wheel 19, intermediate levers (not shown), and quadrant 20, whereby the solid shaft 6 is oscillated by the movement of pinion 21. From this it will be seen that all wheels, pinions, and quadrant are constantly in mesh, and are always running; but the position of the clutch hub 22 decides whether a rotatory or oscillatory drive is given to the needle cylinder and sinker ring.

3. The needle movement cams are carried on the cam block 30, which rests on the table 33, and is held close to the needle cylinder by the spring 31. On the table is a cylindrical ring 32 with up-throw inclines, so that the needles when not knitting occupy a comparatively high position, and the loops are below the needle latches. To prevent the latter from closing, either through the rise of the needle or by the centrifugal force given by the quick rotation of the needle cylinder, the needles are surrounded at their upper end by a circular latch guard 35.

The needle cylinder is open for the greater part of its circumference, so that needles may be removed and replaced at any point except where they are in actual contact with the cams. The various cam systems will be explained in detail later, but it will be seen that the stitch length is controlled in the first place by the height of the cam block, which is decided by the vertical slide 34, to which is attached a block carrying pins and adjustment screws K, L, M. Screw K gives the stitch length for the foot, screw L for the leg and ankle, and screw M for the heel and toe.

4. The instep needles, which possess long butts, are raised to a high position, in which they are clear of the cams, by means of the lower cam on the block 41. This cam acts on the long-butted needles only, and is raised by the lateral movement of the clutch hub 22 through the agency of the lever 43 and bell-crank lever 42. The upper cam on the block 41 lowers all needles to their knitting position when the clutch hub is returned.

5. Two narrowing pickers 36 are employed, and these are fulcrumed on the cam block 30, and are aligned so that at each oscillation of the needle cylinder the first of the on-coming short-butt needles makes contact with the picker 36, pushes the picker upwards and outwards, owing to the disposition of the picker fulcrum, so that it is itself raised to a high non-knitting position clear of the cams, and knitting takes place on one needle less at each oscillation during the making of the first part of the heel.

This action, which is automatically caused by the raising of the long-butt needles and the reversing of the motion, is continued throughout the making of the whole heel or toe; but in order that the knitting may be increased one loop at each oscillation during the second part of the heel or toe, a widening picker or pickers 38 carried on the block 37 are brought into action by means of the spindle 39 and lever 40 at the commencement of the second part of the heel. This

picker is shaped so that two needles are brought into knitting position at each oscillation, thus leaving the required net gain of one loop at each course, and effecting, what it is now admitted is the superior, the 2-and-1 join. On some machines two widening pickers are employed. This method is usually adopted on the machine illustrated, although a single picker cut on each side has been used. On other machines a single picker cut on all four sides has been employed, so that it can act either as a narrowing or as a widening picker. In fact, machines have been built with one, two, three, and four pickers, but the larger number is generally used on plain machines, as the control is thereby rendered simpler.

6. The yarn 44 is fed to the needles through the thread guides 45, which are held in feeding position by the spring A. The change of yarn is effected through the intermediate levers B, wires C, D, E, and F, the yarn guides which are not required to feed being raised to a height so that the needles do not receive the thread.

As the thread guide is raised the out-going yarn is cut and held by mechanism not shown. As the yarn guide is lowered the yarn is held until the needles receive it, so that the latter can draw the yarn positively from the bobbin or cone. The heel and toe yarns pass through a take-up which is controlled by a small lever situated on the instep block lever 43, but not shown, so that the movement of the clutch hub 22 to the heel or toe position automatically brings in the take-up necessary to keep the thread tight at the returning points of the oscillations.

7. In order to splice the heels and toes it is usual in this country (England) to leave the guide carrying the legging yarn in action and to lower a second yarn guide carrying a fine splicing thread; while in the U. S. A. the legging yarn is retired and a thicker heeling yarn brought in. This is effected by the ordinary yarn-changing mechanism. To high-splice heels—*i.e.*, to reinforce the half immediately above the heel—another yarn guide is requisitioned, and is operated so that it is in a low feeding position when the low or short butts pass, and in a high or non-feeding position when the high or long butts pass. This movement is given by means of a cam J carried on the pinion boss 18. The cam has high and low concentric semi-circular edges, and through the agency of the rocking spindle H and wire G gives the necessary movement. To stop this movement cams or studs are placed on the drum P when the high splicing or double sole is not being knitted. On the half where the yarn is not knitted it is left in a floating condition, and the threads are afterwards cut or torn out, as on power machines it is not safe to cut and trap the thread at each rotation.

8. In the machine illustrated the movements are timed and controlled by mechanism arranged about the lower shaft Z. Loosely mounted on this shaft is a ratchet-wheel S which is racked by a pawl (not shown) carried on a spindle attached to the quadrant. Adjoining and attached to the ratchet-wheel is a sprocket carrying a chain T. This chain has plain links, the number of which decides the number of knitting courses, and consequently the length, and controlling links which raise the pawl controller W so that a second pawl (not shown) can rack the ratched-wheel V. This ratchet-wheel is attached to the camshaft, and possesses varying lengths of teeth. A low controlling link on the timing chain causes the shaft to be racked through a small arc, a medium link through a large arc, and a high link through a still larger arc.

The relative positions of the timing and drum ratchets are important, and distinguishing marks are usually made so that the co-ordinate positions can be obtained at the commencement of each hose or half-hose. Cam N gives the correct setting of the stitch length for the foot, leg and graduated

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