JACQUARD HARNESS MOUNTING.

The "Split" or "Scale" Harness.

By F. Bradbury.

This method of tying up a Jacquard harness is designed to weave the finest figured silks, linens and cottons. The system is chiefly used for fabrics which are *set* much closer in the warp than in the filling. Some of the rich fine silks are woven with about 400 threads of warp per inch and half the number of picks of filling.

The chief mechanical details of this method of mounting and weaving to increase the relative figuring

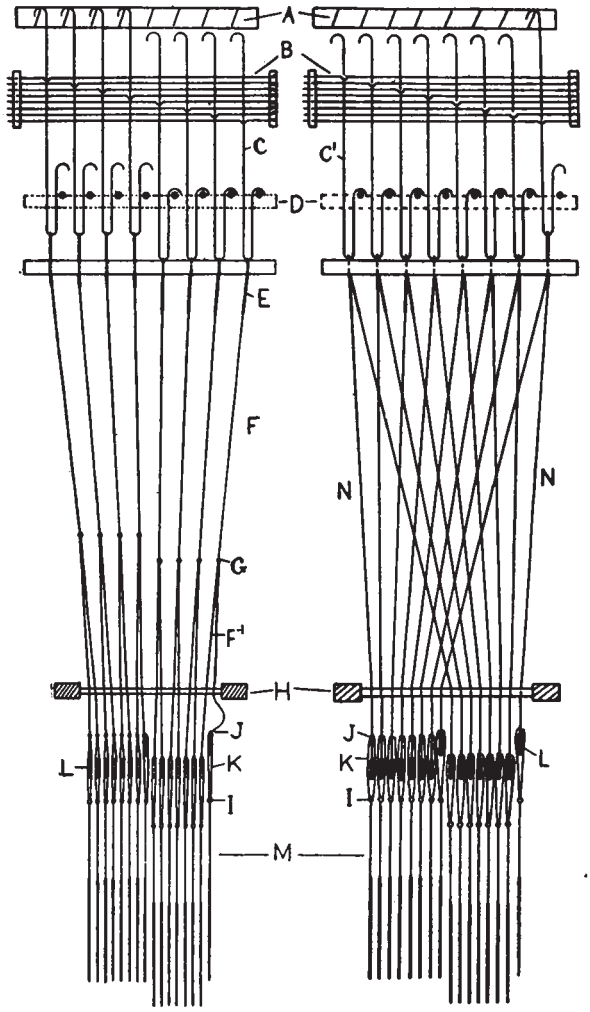

Fig. 1.

Fig. 2.

capacity of the Jacquard machine are illustrated in Figs. 1 and 2. The former shows one row of hooks, harness cords, mails and lingoes, together with the transverse section of a special set of shafts, introduced for binding purposes; Fig. 2 shows one row of spare hooks of the machine, to which strong cords are looped, which in turn support the binder shafts. The same letters in each illustration refer to similar details.

The ordinary griffe bars are shown at *A*, the needles, etc., at *B*, the hooks at *C*; C^1 are the spare hooks which combine with and lift the heddles; they are placed immediately in front of the hooks *C*. The resting board and bars for the hooks are shown at *D*, the neck cords at *E* and the harness cords at *F*. To each of these harness cords *F*, at the point *G*, two harness cords F^1 are knotted fast. Each of these twines is then passed through the comberboard *H* and threaded through the mail *I* and then turned upwards and knotted fast about six inches above the mails at the point *J* to form the loop *K*. Through the loops of each row of harness in the comberboard an iron or hard wood shaft *L* is passed, $\frac{1}{8}$" thick, $1\frac{1}{2}$ to $1\frac{1}{4}$" deep. There may be 8, 12, 16 or 24 shafts, according to the number of rows of harness from front to back in the comberboard, or to suit the required binder weave. The lower couplings and lingoes, suspended from the mails are shown at *M*. The strong cords *N* (Fig. 2) connect one row of spare hooks C^1 with the shafts *L* in the order shown, and each hook controls two shafts to weave in eight end twill or satin order. Sometimes a second row of spare hooks is employed and connected with the shafts 9 to 16 inclusive, to bind the pattern in sixteen end satin order. One or two rows of spare hooks, on the opposite side of the machine, are similarly connected to the opposite ends of the shaft *L*.

The Jacquard controls the figure, each hook lifting the harness and warp-threads in pairs, to form the warp figure, while the groups or masses of warp-threads left down by the Jacquard, in multiples of two constitute the filling or ground portion of the figure. The binding operation in the ground is accomplished by lifting one shaft out of any number, and in any order, on every pick, to suit the predetermined pattern. The binding in the warp portion of the figure is obtained by leaving down one hook in any order or number to suit the pattern. The shafts lift the binder threads singly in the ground, but the Jacquard hooks bind down the warp figure in two or multiples of two, according to the number of neck bands which are attached to each hook. This is a serious defect, since it tends to give the fabric a coarse appearance except where very closely set.

It is, however, possible to split the two binder threads and lift one of them by the shafts *L* but the order of connecting the cords *N* with the hooks *C* and shaft *L* must be designed to coincide with the order of depressing the binder harness.

When figured patterns of large repeat have to be very closely woven, two or more neck cords, each supporting two mails and lingoes, are connected to and operated by the same hook. Each harness cord is, however, threaded on to a separate shaft and operated in any predetermined order by the spare hooks in the Jacquard machine. The latter, which rise on every pick with the Jacquard head, may be controlled by the ordinary pattern cards or independently, if the hooks are placed near enough to the ends of the cylinder to permit short cards to operate outside those used for figuring.

If the fabric is woven *face upwards* the filling or ground portion will be bound singly and the warp portion of the figure in twos or multiples of two,

according to the number of neck cords connected to each hook; these conditions will be reversed when the fabric is woven face downwards.

It will be seen in Fig. 1, that one half of the hooks are lifted, to form the figure; the remainder being left down for the ground portion of the pattern. In Fig. 2, only one of the binder hooks, with shafts 1 and 9 is lifted on the first pick for binding the ground; the remaining hooks are selected and lifted in the usual satin order on each subsequent pick.

The advantage of the foregoing weaves is that they increase the normal figuring capacity of the Jacquard machine in multiples of two or more for each neck cord attached to every Jacquard hook.

Lustering Cotton Goods.

By W. Stoll.

Imparting luster to cotton goods, so as to make them resemble silk, is past history. Wearing coats lined with silk provided a suitable opening for the innovation, as the cheaper lustered cotton cloth could be substituted for the more expensive silk, without being so noticeable.

Lustering was first produced by chemical methods, superseded afterwards by mechanical methods.

The chemical methods may be classed under such as which effect a chemical change in the cellulose of the fibre, and those which coat the fibre with a layer of a substance having a high index refraction made by treatment of the fabric so that the coating is made from it and is not laid on in the ordinary way.

Chemical Methods.

In the first class may be placed mercerization, although this does not give a luster bright enough to satisfy fashion. There is also the more modern method in which the surface cellulose of the fabric is converted into nitro-cellulose or acetyl-cellulose. In other methods the silk lye is replaced by solutions of collodion or of nitro-cellulose in alkalis, whereas in another process the outer part of the fibre is converted into nitro-saccharose. The worst of these methods is that they do not pay, hence, barring mercerization, they have been abandoned in favor of

Mechanical Methods.

The oldest of these are pressing and calendering, and the first improvement of consequence on these processes was the invention by Robert Deissler of engraved calender rollers. The finish produced by their use has found much favor under the name of Schreiner finish or silk finish.

A later improvement consists in using ribbed rollers set at an angle to each other. This arrangement gives a better luster with blunter edges on the cylinder grooves. The action depends on friction at an angle to the length of the warp. Various modifications of this system were made with the idea of getting a luster which, in addition to being very considerable, should also be fast to water and ironing.

In Sharp's process, the goods are covered with a uniformly damped or steamed linen blanket and then pressed or calendered under high pressure.

In Depierre's method for finishing cotton fabrics, the goods are calendered while still damp under heavy pressure with hot smooth metal rollers, which dry and luster them at the same time. The greasy luster thus obtained is often covered by putting the fabrics through a ribbed calender afterwards.

In Rumpf's process strong heating of the goods is used as a means of fixing the luster fast to water and ironing, greasy lustered goods being run in a state of tension between hot rollers or passed over gas flames. They are then given a soap-and-water bath, whereby the greasy luster is removed and the silky luster which has been super-added remains alone.

By another process heating is made to produce as well as fix the luster, but then temperatures above 400° *C.* are necessary.

In connection with another method of producing luster fast to water and ironing the fabric is soaked with a solution of albumen, goffered, and dried. The drying coagulates the albumen and fixes the goffering. This process was found to labor under the practical difficulty that the albumen made the goods stick to the goffering calenders. This was partly remedied by calendering with rollers which are heated, but not sufficiently to coagulate the albumen. This was done by further heating after the goods had left the calender. At the same time, the luster got by goffering with a calender not very hot was inferior, and the tendency of the goods to stick was still considerable, especially with finely engraved cylinders. To overcome this difficulty the goods were dried after having been albumenized, but while still uncalendered at a temperature insufficient to coagulate the albumen. The coagulation is then effected by the calendering, reinforced by steaming or by treatment with formaldehyde. To prevent too much stiffness, oil may be added to the albumen solution, which may also be applied on one side only of the goods.

Coatings.

We now come to processes in which the lustered surface is covered and protected by an independent insoluble waterproof coating.

According to Eck's method, an acid solution of gelatine-formaldehyde is applied by means of rollers, and coagulated on the fabric without heat by means of the fumes of ammonia. It had before been proposed to coat the surface of the goods with collodion by spraying them with the solution of nitro-cellulose in a mixture of ether and alcohol. The film thus produced on the fabric is opalescent owing to the presence of water, and is distinctly visible. This was prevented by making the collodion solution not with the usual mixture of ether and alcohol, but with amyl acetate or amyl formate, which give liquids which contain 1 to 2 per cent of nitro-cellulose and can be dyed with any dye, soluble in the amyl salt. Bernhard Zittau uses a solution of india-rubber or gutta-percha, together with paraffin wax or ceresine in some sort of hydrocarbon, preferably benzole.

In comparing these attempts to produce mechanically a luster fast to water and ironing, it is noteworthy that the result is obtained by strongly heating the goods, or else by covering their fibre with an insoluble coating. It appears that the requisite fastness to ironing and damp cannot be secured by the mere application of heat, without raising the temperature so high as to damage the fibre seriously. But it must also be remembered that the expense of applying a waterproof coating is very great.