HAND-LOOM WEAVING; RIBBON LOOMS.

(For Description, see opposite Page.)
WEAVING.—No. XXIV.

THE RIBBON LOOM.

The common hand loom for weaving ribbons was formerly known as the Dutch engine loom, and it was also called the swirl loom. Before it was invented ribbons were woven in small looms, and only one ribbon was woven at a time. But by means of the swirl loom from 8 to 10 or 20 to 45 ribbons, according to their width, could be woven, consequently it was an invention of great importance, and its introduction caused a considerable amount of trouble as will be presently seen.

More than a century ago, and long before Dr. Carkwright's time, the swirl loom had been made self-acting, for all the principal operations of the loom were made automatic. The shedding of the warp, throwing the shuttle, and beating the web together were effectually accomplished by means of cranks, tappets, &c., almost in the same manner as used at the present time.

These improvements appear to have been carried out both in France and England, at about the same time. They really formed the first successful application of power to work the loom instead of the usual operations of the weaver. In fact, the history of the swirl loom, and the application of the bar, &c., to it, is the history of the first successful attempts at power-loom weaving, and on that account it deserves more than usual attention.

The "bar" loom, or the "a la bar" as weavers often call it, was introduced in the following manner, according to the evidence of Dr. Bowring before a select committee on the silk trade in 1831-1832.

The question asked was, "Whether the bar loom had been introduced subsequently to the Jacquard loom, and if its introduction had met with similar difficulties?" His reply was: "Yes; that it was a Swiss invention, and it was taken into the neighbourhood of St. Etienne by two brothers who were themselves persecuted and abandoned to extreme misery; the last of them died not long ago, in a hospital, in consequence of the obscurity and neglect to which he was subjected. Since then the use of the bar loom has become nearly universal in the immediate neighbourhood of St. Etienne."

According to this evidence the loom was introduced in the early part of the present century, or since the introduction of the Jacquard loom. But both of the great French Encyclopædias, Diderot and D'Alembert's, and the "Encyclopædia Metheo
dique," give detail drawings of the loom thirty years before that time. Therefore Sir John (then Dr. Bow
ing) must have been misinformed on the subject.

It will be preferable to give the history of the Dutch loom first and then refer to what is known concerning the improvements made in it. For this purpose Beckmann's account is more than usually clear and interesting, from which it appears "that it is probable the ribbon loom had its rise in the Netherlands or Germany, either about the end of the 16th or the beginning of the 17th century, although Mr. Jacobson believes the Swiss invented such looms. The old account with which he was acquainted seems to be in favour of Germany and the 16th century."

Lancellotti, in a work published at Venice in 1655, says: "Anthony Moller, of Dantzic, relates that he was in that city about fifty years before a very ingenious machine, on which from four to six pieces could be woven at the same time; but as the council were afraid that by this invention a great many workmen might be reduced to beggary they suppressed it, and caused the inventor to be privately strangled or drowned. Who this Anthony Moller was I do not know; but that he saw a ribbon loom at Dantzic is beyond all doubt. If the date of the printing of the book be taken as the time in which this account was written, then the printer has reason to believe that there was a ribbon loom at Dantzic about 1586; use for several years to the great injury and even total ruin of many thousands of workmen who were accustomed to weave ribbons on the common loom. This prohibition was renewed in 1639 and again in 1645, as appears in the same work. In 1661 the use of them was extended a little longer and definned with more precision. They were prohibited in Nuremberg in 1616, also in the Spanish Netherlands in the same year.

In the year 1665 there was to be seen at Frankfort-on-the-Main a loom which of itself wore all kinds of lace, tape, &c., provided the silk or yarn was properly arranged in the usual manner; but if a thread happened to break it was necessary that some one should again join it by means of a knot. The year following some person in that city applied, not only to the council, but even to the emperor, for permission to establish such a loom, but was not able to obtain it.

In 1676 the ribbon loom was prohibited at Cologne, and the same year some disturbance took place in consequence of its being introduced into England. It is probable that Anderson ("History of Commerce") alludes to the loom when he says, speaking of the above year, "As was also brought from Holland to London the weaver's loom engine, then called the Dutch engine loom." He, however, praises the machine without describing it, nor does he mention that it occasioned any contention.

The patent is dated 1745, No. 612, for a loom for weaving tapes, and it is in the names of John Kay, ofbury, Lancashire, and John Stell, of Reigate, York. It says: "The new invention to be added to the Dutch engine or loom now used for working the before-mentioned goods in narrow breadth is by fixing in the lower part of the said engine or loom a rower
The principle of the peg motion has been shown at Figs. 167 to 176 (side page 219 a side), where swivels exactly the same as in the ribbon loom have been fixed, and the body of the loom or the body of the cloth. A section of a common swivel loom is represented in Fig. 248, page 356, which probably differs very little from the looms used for the weaving of the spots on the cloth, which is in every way similar in effect to weaving separate ribbons, except that they are woven in the body of the cloth. The body of the cloth.

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The loom is provided with many reeds or small warp beams as there are pieces of ribbons to be woven, also with a similar number of cloth beams upon which the ribbons are wound as they are woven. If these were not the case every piece of cloth must be supplied with weft at every throw of the shuttle, and should one of the pieces fail to receive any weft there would be great difficulty in turning back as to keep all the pieces alike. In weaving plain ribbons the weft may be broken and pieced again at any interval, for the ribbon does not travel unless the weft is supplied. The reed in beating up the weft actually pushes forward the ribbon as it is woven, each beat of the batten pushing the ribbon according to the thickness of the weft, and the tension there is upon the warp and cloth beams.

In the figure let A represent one of the warp reeds from which the warp for one piece of ribbon passes over the pulley c and downwards to the weight a, which has a pulley under which the warp passes, and then continues its course over a second pulley at d, thence under cylinder or beam at e, and through the headless b and a and the reed as. After it is woven it returns under the cloth in the direction of the arrows, and under another weight and is finally wound on the reel as.

Now if both the weights a and b were equal it follows that the blow of the reed will beat the cloth up with a force equal to the friction to be overcome, caused by the silk passing under and over the various pulleys and rails, and as the weight a rises the weight b falls, carrying with it the ribbon as it is woven. Thus by altering the relative proportion of the weights more or less tension can be put upon the cloth, and the ribbon may be woven with more or less compactness in consequence.

When the weights have arrived at their full extent of motion they are replaced in their former position by slackening out more warp and winding up the woven ribbon. Small wedges or other contrivances are used at e to hold the warp and cloth firmly during the process of weaving.

The weaving is performed by means of headles and treadles in the usual way, but in this loom the weaver can arrange or dress his warp to a certain extent without leaving the front of the loom, for the warp passes through a small reed or comb p, and by moving it upwards at g the threads can be placed in proper order.

The shuttles, or swivels, are arranged in a batten, and slide between two flat plates or "planes," as they are "jerked" across the opening and consequently through the shed, from side to side alternately. Each shuttle alternately occupies the place of the adjoining shuttle.

Figs. 248 to 254 show the method of throwing the swivels by means of the rack and wheel motion. This motion seems to have been invented in France about the middle of the last century, as before stated.

The shuttles have a small rack inserted, and by means of that they are geared in the same manner as. These wheels are worked by the rack B, and as this rack works all the wheels by its alternate motion (see Fig. 177), the shuttles are thrown from side to side of the openings through the warp w. The advantage of this motion is that the shuttles are forced completely and surely through the shed, and are not liable to stop half way as when driven by the driver used in the Dutch loom.

Fig. 256, page 485, shows a plan of a shuttle as