

## HEILMANN'S EMBROIDERING MACHINE.

CONSTRUCTED BY THE SÄCHSISCHE STICKMASCHINEN-FABRIK (FORMERLY ALBERT VOIGT), KAPPEL, NEAR CHEMNITZ.



## TEXTILE INDUSTRY AT THE VIENNA EXHIBITION.—No. XXI.

By DR. H. GROTHE.

## EMBROIDERING MACHINES.

As we have already mentioned in our general review, the embroidering machines attracted a great deal of interest at the Vienna Exhibition, the machines there shown representing four systems.

1. The large embroidering machine, for single and double work, by Heilmann.
2. The embroidering machine by Bonnaz.
3. The tambouring machine, and
4. The embroidering machine with shuttles.

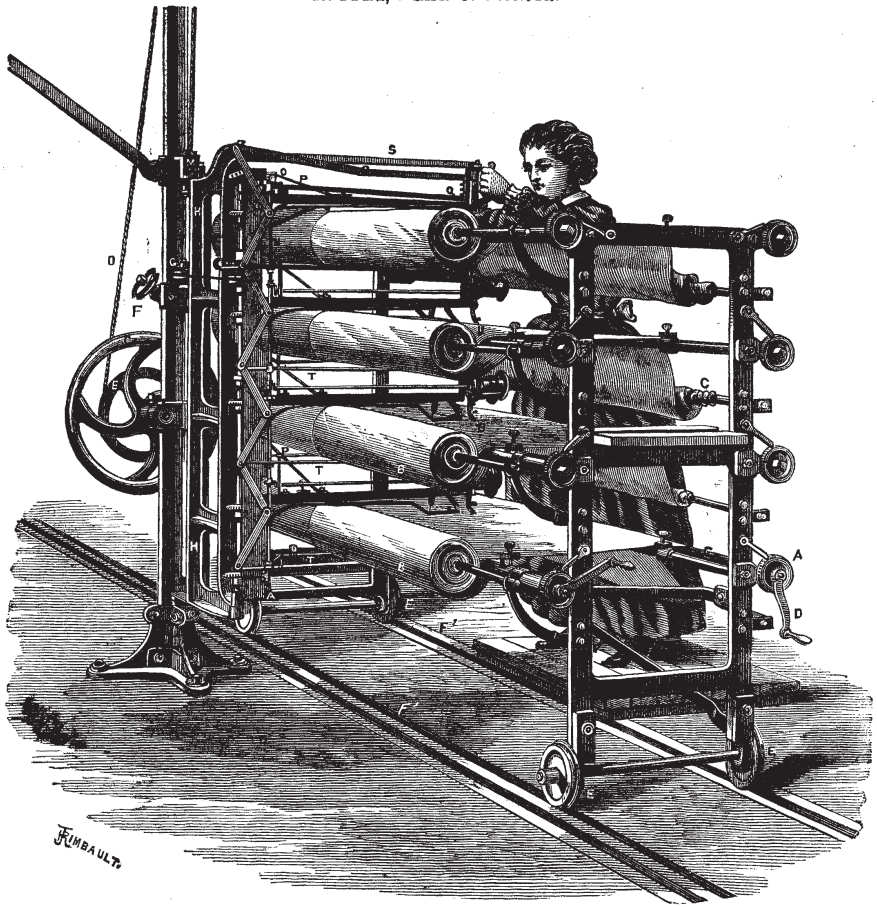
Of these systems, No. 4 may be considered an old one, and as belonging to the class of weaving machinery, so that it may be omitted here, while No. 2 is a sort of sewing machine, and will be described later on. Even the tambouring machine is properly speaking nothing but a sewing machine with a crochet needle; but as an excellent example of this machine was exhibited at Vienna by the same firm which showed the large flat embroidering machine to be described hereafter, namely, the Sächsische Stickmaschinen-fabrik, formerly Albert Voigt, of Kappel, near Chemnitz, we shall have to say a few words about it here.

Speaking broadly, the large flat embroidering machine is a large sewing machine, which imitates hand sewing more exactly than any of the ordinary sewing machines now in use. It is interesting to observe how this machine with from 176 to 672 single needles in one line, makes per minute three stitches with each needle (and as many back again), thus about between 528 and 2016 stitches per minute with all needles, whilst a sewing machine makes with one needle about 500 stitches. This is the reason why sewing machine work has not yet been substituted for that done by Heilmann's large embroidering machine.

The illustration on the present page represents an embroidering machine with two lines of working needles, but these machines are often built with four lines of needles, and, as we have before stated, with from 176 to 672 needles in one line. This embroidering machine consists of a strong upright cast-iron frame, which carries the roller Q for the material to be embroidered, the material passing thence over a second and lower roller, by means of which it is stretched in a sort of frame, in front and behind which are placed sliding frames, the mainshafts T of which carry the needleholders by means of seven arms. These needleholders are all uniformly connected with a mechanism which allows all the holders of one or two lines of needles to be opened or closed simultaneously. The needles have two points, and the eye of each needle is at the middle of its length. The sliding frame in front is brought by suitable gear close to the stuff, and the needles provided with threads are gripped by the holders, whilst the second sliding frame is behind the stuff

## QUADRUPLE TAMBOURING MACHINE.

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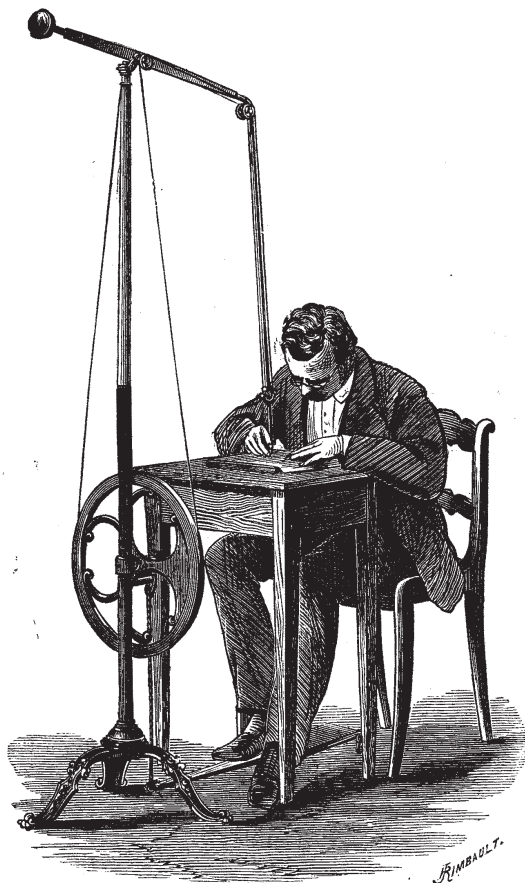
with open holders. In bringing the first frame up to the stuff, however, the needles it carries have been passed through the material, and on account of the exactly corresponding position of the holders of the two frames, those of the second can take hold of the ends of the needles extending through the stuff. At the moment this takes place the holders of the first frame release the other ends of the needles, and

the second frame is then removed from the material, and the threads are drawn at their full length through the latter. The second frame is brought now close to the stuff, the needles pass with their free ends through the latter, are taken hold of at the other side by the first frame, and the same operation takes place as before, and is thus continually repeated.

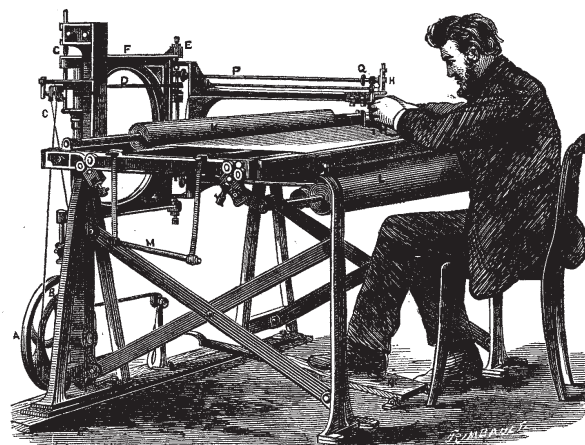
In order to produce a pattern, the rollers with the stretched material forming a combined frame are made movable and adjustable; this frame is connected at M by rods with the levers K,

long, and also the rod B, in order that the circular motion of the point B upon A may approximate to a straight line, whilst for the same reason the parallel connecting rods between the two levers D and E are made as short as possible. With these arrangements the influence of the circular motion of the pin upon the pattern when transferred to the stuff is very insignificant. It is now evident that if the point of B travels upon the pattern A in a horizontal line from the left to the right-hand side, the lever apparatus G H O does not alter its position, but the frame is moved sideways in the proportion as the motion is transferred from B to C. This proportion depends upon the pattern, but it is generally 6 : 1, whence the pattern is drawn six times the size of the finished work. The machines just described embroider generally over a width of 4 metres (13 ft. 1½ in.), and the lateral distance between the needles is between 15 and 35 millimetres (0.59 in. to 1.38 in.). The weight of one machine is about 2 tons, and it occupies a space of about 215 square feet.

top of a column, one end of this lever being connected by a joint with a rod which carries the pricking needles operating on the pattern placed on a table underneath it. By means of a footboard with flywheel the needle is given a rapid reciprocating motion, and in this manner the pattern can easily and conveniently be pricked.



PATTERN-PRICKING MACHINE.



SINGLE TAMBOURING MACHINE.

the fulcrum or supporting point of which is formed by the rollers L, the position of which is constantly altered. These rollers are fastened to the ends G of the two levers which turn round the joint H, while their other ends each carry weights P, which are provided with toothed segments in such a manner that that of the one lever gears into that of the other lever. If both levers have their arms H O exactly horizontal, and if the one arm G is moved, the other arm follows exactly the same motion, on account of the connexion by means of the segment. The lateral movement of the frame corresponds with the free motion of the rollers L between the connecting rods of the lever K, whilst the vertical movement depends upon the length of the toothed segments O. Both the vertical and horizontal motions are limited but of sufficient extent for the patterns of embroidery work. When the admissible height has been embroidered, the finished stuff is wound round the roller and a new surface is placed between the needles and sliding frames.

The pattern is drawn on ruled and squared paper in the same manner as for weaving and hand stitching, and the number of the squares in the horizontal line corresponds with the number of horizontal stitches. The workman puts, therefore, the lever B upon the pattern A at a horizontal line, and commences by making all the horizontal stitches corresponding with this horizontal line of the pattern by a lateral motion of the frame with the stuff. Having thus finished one line of the pattern, the workman puts the point of the lever upon the next horizontal line of squares of the pattern and works each stitch along this line. It is thus clear what the various parts of the whole mechanism—the levers P, H, G, and K, the roller L and the racks O—have to do. In order to control the two motions, a parallel motion D, C, B has been adopted, that is to say, the lever D turns round F and is connected by means of arms with the lever G, whilst the lever C is connected with the frame for the stuff, both levers, however, being connected with each other by a rod B. The parallel levers D and C are made

We have now to describe the tambouring machine, a simple form of which is represented on the present page. The material to be operated on passes over the rollers K L, and is thus sufficiently stretched. By means of the footboard N the wheels A and B are put in rotation, and the motion of the latter is transferred over the roller E to the vertical shaft E of the frame F, and from thence by means of bevel wheels to the shaft P, which forms part of the working frame of the machine. This frame, with the shaft P, turns round E, whilst the frame F turns round G. In this manner the motion of B is transferred to P under any position of the parts, whilst the lengths of the driving bands are not altered. The shaft P gives motion to the tambouring hook J through the aid of Q and H, whilst a simple movement upwards is sufficient to place the tambouring apparatus out of work, without stopping the motion of the machine entirely.

In order to increase the amount of work turned out, these tambouring machines have been combined two or four in one frame, when for these number of embroidery surfaces one controlling apparatus only is required. Such a quadruple arrangement is shown on the opposite page. The apparatus is fastened to a movable frame carried by wheels E running upon rails F, but the machine has to be fixed during work. The motion is transferred by a cord passing over the rollers F and G to the vertical shaft of the frame H, which is connected in the ordinary way by bevel wheels with the tambouring appliances, which are also carried by movable frames extending over the surfaces of the stuff to be stitched. The work begins and is stopped simultaneously on all four surfaces by a combination of levers.

We have finally to mention the so-called pattern piercing or pricking machine, which is used for making the pierced patterns by the aid of which the patterns can be stencilled on the material to be embroidered. An illustration of this machine is given on the present page. A lever is fixed at the