TEXTILE MACHINERY AT THE PARIS EXHIBITION.

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Our former articles dealt with apparatus for testing yarns; we will now turn to those relating to textiles, before examining the construction of the spinning and weaving machinery shown at the Paris Exhibition. In the first place, we must recall the fact that the dynamometrical testing of textiles has led to the general use of certain conventional methods. These relate (1) to the dimensions of the test piece; (2) to the manner of fixing the specimen to test them; and (3) to the mean number of tests required for a practical result.

Following the custom of the officials of the Ministry of War and of Marine, who test the strength of cloth and of linen, it is usual to operate on strips of a width of 5 centimetres, the tool is taken by the hand P, and is applied normally to the material in such a way as to put the blades parallel either to the warp or the weft, according to the way the test is to be made. If then the test is previously smooth, and at the same time moved down firmly, there are produced two slips which are then joined by a scissors cut. If it only remains to press with one hand the tongue-shaped piece thus detatched, and to draw it back, at the same time that the stuff is held by the other hand upon the table, to cut easily a band of the desired length. Certain tissues other than cloths—for example, silk gloves—lead themselves to this method of operation, but their number is very limited. Ordinarily, other measures have to be employed, varying according to circumstances. If felt be under test, the contribution of the band is first traced, and is then cut out either by aid of a rule or by scissors. With cloth:

method is followed officially in Paris, when the public desires to make tests of this kind.

After this preliminary explanation, we will consider the principal apparatus of this kind to be seen at the Exhibition. One of the most noticeable is the Perreux dynamometer, constructed by MM. Lefort et Duran, of Paris. It is represented in Fig. 2, and has been adopted in France by the Ministers of War and of Marine, and also by the Government of Sweden and Japan. The principal part is a rectangle of cast iron A, in which work two sliding-blocks carrying screws B, which work screw-threads D, C. The mechanics of this screw the clamp D can be moved towards or from the clamp D'. There is a divided rule by which the extensions of the textile can be measured. To prevent vibrations of the spring under the scale on the giving-way of the test-piece, the handle of the clamp is held by a small screw provided with an escapement, which prevents the stretching of the test strip. The rectangle is furnished with feet upon which it stands. At one extremity is the scale C, connected with a dynamometer spring, and at the other, a screw provided with an escapement, which prevents the stretching of the test-piece. The metric rule, which enables the extension of the test-piece to be registered, slides upon the rectangle, and is carried by the clamp D', in order that the zero of the system may always correspond with the zero of the scale. If it were fixed, the lengthening of the dynamometer under tension would disarrange the test piece. To produce comparative results, the handles of two textile material at the rate of once per second. In returning the clamp to the starting point, a higher speed of registration may be used, and this end is provided the peg B in the handle.

The employment of this instrument has led to the establishment of certain principles relative to the testing of textiles. It has been recognised that in linens and canvases the strength is the important point, while the extension is a secondary matter; hence it has been decided that for equal tensions the fabrics which stretch the most before rupture are superior to those which stretch less. It has also been found that, after the same tests have been repeated a certain number of times, the cloths given to the dynamometer a considerable range of motion. These tests, in their general appearance, are made of inferior or defective materials, often badly spun or badly woven. In wools, cloths, or stuffs, on the other hand, the elasticity which constitutes the principal point and the strength the secondary qualification.

The test was that when the wool has been the subject of dying or bleaching, the disappearance in great part of the elasticity is accompanied by a corresponding reduction in strength. With wools treated with other textiles, such as linen or cotton, its nature is modified; it offers a resistance in a proportion equal to the quantity of foreign textile material it contains, and hence the elasticity, which is the test of good wool, being destroyed, the tissue must be judged from another standpoint.

The Perreux dynamometer, which we have just described, has totally replaced in the French official trials the dynamometer invented by Commissioner Chevry. This latter was based on the employment of a counter-weighted lever in conjunction with a capstan, upon which was wound a chain that transmitted the pull to be registered.

Nevertheless, upon this principle there is based another dynamometer which is shown at the Exhibition by MM. Ollivier et Cie., of Paris, and which is illustrated by Fig. 3 annexed. It comprises a cast-iron table with levelling screws N; a vertical column H, carried upon bevel wheels, and a handwheel M. The head of the screw carries the lower lever, and at the rear side of the column is the gradient column D, and upon it slides a slide block carrying an index e, and moved by a counter-weighted lever CQ. The position of this lever is the force brought to bear on the test specimen, the lever rising as the tension is increased. The extremity of the specimen is first divided in half-centimetre. To use the apparatus, the operator fixes the extremities of the test-piece, the lever (Fig. 4) firmly in place, the entire test-piece is formed of two plates, with corresponding ribs and channels on their inner sides. The other action is to wind the capstan in the lower clamp, taking care that the strip of stuff lies evenly; this is an

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The method of cutting varies according to the material. For cloth as shown in Fig. 1, in which there are two blades A C, B D, connected to a handle P. These blades are attached at the outer end, and can be used in two directions, but at the inner end, and can be used in two directions, and are slightly curved. The test-piece is placed on the table as shown, and centre marked on it. In order to obtain reliable results, it is necessary to make several tests in the direction both of the warp and of the weft, and to take the means. This is a useful precaution, because there may be considerable variations in a piece of cloth. This

FIG. 1. INSTRUMENT FOR CUTTING TEST STRIPS.

FIG. 2. PERREUX DYNAMOMETER.

FIG. 3. DYNAMOMETER, CONSTRUCTED BY MM. OLLIVIER ET CIE., PARIS.

FIG. 5. PERREUX DYNAMOMETER.
important condition, if exact results are to be obtained. He then turns the handwheel to draw down the lower clamp. The pull is transmitted through the specimen to the can, which raises the counterweighted lever over the graduated arc. At the moment of rupture the lever stops, the catch engages with a tooth of the sector, and the index marks in kilogrammes the effort exerted. To put the apparatus ready for another test, the operator turns the handwheel in the opposite direction, and then he lifts out the catch and returns the lever to its starting point. Each dynamometer is provided, for purposes of verification, with an iron plate which can be attached by rods to the upper clamp. Upon this plate standard weights are put, and these, in combination with the weight of the plate and the rods, should correspond with the indications of the index.

An apparatus for determining the resistance of tissues to perforation has been invented by M. Persoz, of Paris. This test is designed to realise mechanistically, and in a way that can be registered, the trial practised daily by drapers and tailors, who holding a strip of cloth firmly stretched between the hands, press their thumbs against it in an endeavour to rupture it, and so to gain an idea of its strength. The method adopted in the machine consists, in principle, in holding firmly at its edges, upon a circular frame, between two rings F and G, Fig. 6, like the membrane of a drum, a piece of the cloth to be tested. In the centre of the stretched surface there is applied the extremity of a rigid rod, which is pressed by a constantly increasing load until perforation takes place. The pressure exercised can be measured exactly in kilogrammes, and the deflection of the diaphragm in centimetres and fractions. The perforator ends in a cone, which is capped with a ball or sphere B of a determined diameter. A small device P, called a "plano-scope," placed on the stuff to be tested before the operation is commenced, indicates by the opening of its two branches, the precise instant when the ball B begins to bear on the surface.

The apparatus comprises two slides r r moving easily upon one another, and can be used in conjunction with Ollivier’s dynamometer. It can be used for many different materials, such as paper, cardboard, cloth, linen, felt, and leather, sheet metal, &c. It appears useful for testing articles which have to support wearing strains, such as stuffs for clothes, sails, balloons, packing paper, &c.

We will conclude this brief review of the principal apparatus of precision for the textile trades by recounting the experiments—of which mention is made, at the Exhibition by Madame Vve. Michel-Alain—made at the Conservatoire des Arts et Métiers, Paris, by MM. Alain and Trasca upon the resistance of textile materials to friction. To this end they submitted cloths to the action of a brush, charged with powder, and operated by a handle. They determined by successive weighings the loss of weight due to the action of the brush after each 1000 strokes. The brush and the carriage on which it was fixed weighed together 26.7 kilogrammes (58.7 lb.), and the dimensions of the brush were 16 centimetres (7.1 in.) in the direction in which it moved, and 24 centimetres (9.4 in.) at right angles thereto. For each experiment the cloth was stretched upon a horizontal board by means of a slide exactly adjusted over a rectangular opening made in the plank. By this arrangement the entire surface of the cloth is left free, and its four edges are nipped between the walls of the opening, and those of the slide. The brush, driven by a reciprocating movement, acts only when moving in one direction, rising clear of the cloth on the back stroke. The experiments which have been made for purposes of comparison upon felts and ordinary cloth, show that the former bear twice as many strokes as the latter, without being more worn. The ordinary cloths were put completely out of service after less than 3000 strokes. The excess of thickness of the felted cloths, compared with the ordinary cloths, was the principal cause of their good wear. The same experimenters have also examined cloths from the point of view of permeability and absorption of water by capillarity. In these trials the ordinary cloths were shown to be more permeable, and to exercise a much more energetic capillary action than the felted cloths.

In comparing these results with those obtained in tests of resistance to traction, the authors arrived at the following conclusions:

1. By the process of felting, the fibres become incorporated in such a way as to form a whole of great strength, and of extraordinary power of resistance; but this effect is only obtained at the cost of flexibility and suppleness, which are important qualities in materials designed for conversion into garments. Woven material is therefore the best for this purpose; felted fabric, on the contrary, has the advantage when it has to be stretched or subjected to hard wear, either dry or wet.

2. Dyeing has an influence on the strength of the product. Other things being equal, a fabric made of natural wool—that is to say, wool which has not been subject to the action of tinctorial substances—will be stronger than a fabric which has been dyed; further, colours applied at a low temperature reduce the strength less than those which require the wool to be boiled more or less.

3. Uniformity of quality in two directions is more perfect the finer the material and the more equal the quantities of warp and weft.

(To be continued.)