Jan. 21, 1958 M. LEVIN ET AL 2,820,362

APPARATUS FOR TESTING YARNS

Filed Oct. 31, 1955 3 Sheets-Sheet 1

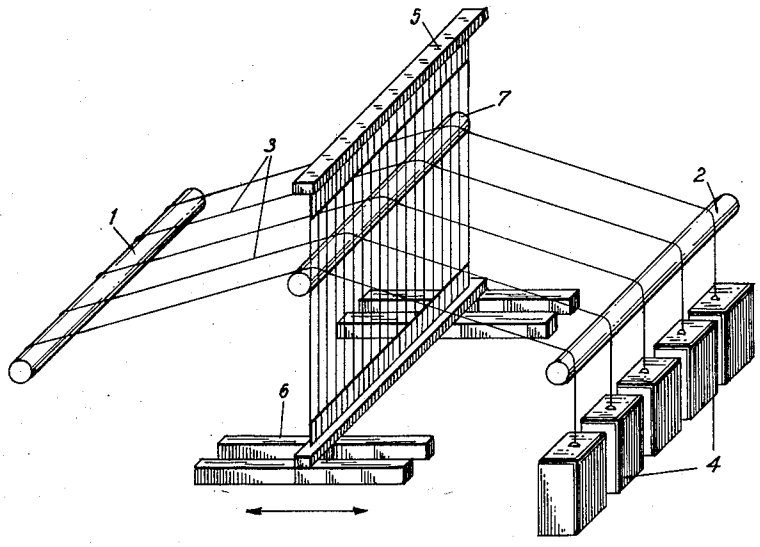

Fig. 1.

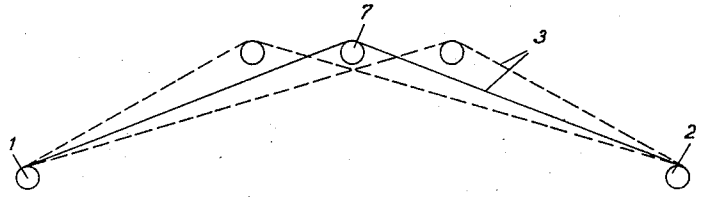

Fig. 2.

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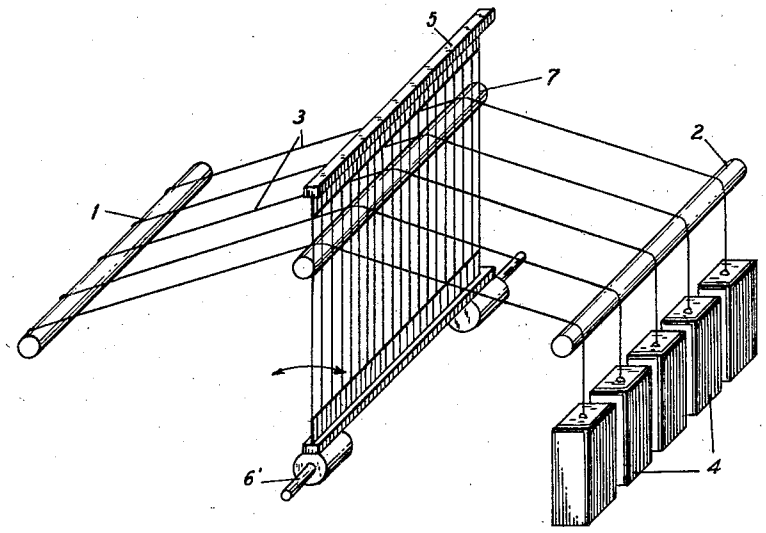

Fig. 3

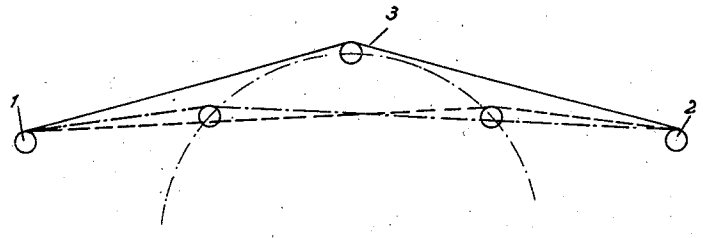

Fig. 4.

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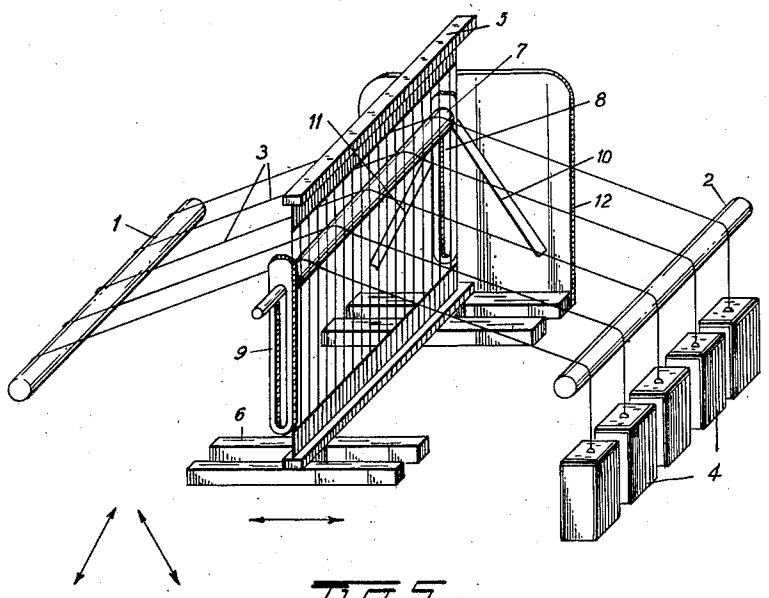

FIG. 5.

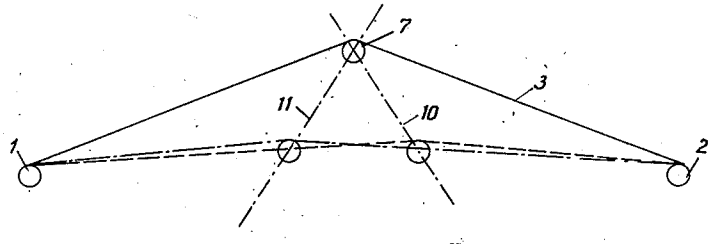

FIG. 6.

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2,820,362

APPARATUS FOR TESTING YARNS

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Application October 31, 1955, Serial No. 543,902

Claims priority, application Israel November 12, 1954

3 Claims. (Cl. 73—160)

This invention has the object to provide a yarn tester adapted to give a general estimate of the weaving properties of a yarn, especially of sized or unsized warp yarn.

The usual methods of testing yarn ascertain some properties of the yarn only, e. g. its tensile strength or elongation, but their results do not reliably reflect the weaving properties of the yarn.

It is, of course, possible to subject the yarn to a real weaving test on an experimental loom. This, however, also has some disadvantages, mainly in that a large quantity of yarn must be used for the experiment in order to obtain a significant number of yarn breakages.

The tester according to the invention is designed to subject the yarn to complex stresses similar to those occurring in the loom, without, however, imitating the loom. The invention is based on the assumption that in the loom the warp yarn is subjected to two main stresses: tension in the direction of the warp, and alternating bending in opposite direction transversely to the direction of the warp. The tensile stresses, heavy though they may be, do not seem to be the main cause of breakages. These are principally due to the bending of the yarn which tends to break the size and thus to expose the unprotected yarn to the abrasive action of the healds and reed of the loom.

With a view to reproducing these stresses in a controllable and measurable manner, the invention consists in a yarn tester comprising supports between which a plurality of parallel yarns can be stretched under controlled tension, and a yarn deflecting member ("deflector") disposed transversely to the yarns so stretched and movable in their longitudinal direction and/or normal thereto, and while thus moving, adapted to rub along the yarns while bending them sidewards.

The yarn supports may be bars (hereafter called "beams"), preferably disposed in a horizontal plane. The beams may be parallel to one another, where equal lengths of yarn are to be tested at the same time, or convergent in order to allow yarns of different lengths to be tested.

The controlled tension of the yarns between the supports may be obtained in different ways. For example, the yarns may be secured to both supports, and one of the latter may be mounted movably so as to be able to be approached to, or be removed from, the other support by suitable shifting means, e. g. a rack-and-pinion mechanism or the like. Or both supports may be mounted fixedly, in which case the yarns are fixed to one of the supports and run freely over the other support, and weights are suspended from their free ends.

The deflector may be a simple bar. Or, preferably, a reed similar to a loom reed may be combined with a transverse bar which latter serves as the deflector. In this case, friction takes place between the yarns and the transverse bar as well as the dents of the reed, whereby the natural weaving conditions are approximated still more closely.

The movements of the deflector may be rectilinear reciprocations, swinging oscillations, or a combination of reciprocations of the deflector in the direction of the yarns with motions normal thereto.

The invention is illustrated, by way of example only, in the accompanying drawings in which:

Fig. 1 is a diagrammatic perspective view of a tester according to the invention;

Fig. 2 shows a single yarn in three different positions of bending during the work of the testing;

Figs. 3 to 6 show similarly two further embodiments of the invention.

The tester illustrated in Figs. 1 and 2 comprises parallel back and front beams 1, 2 disposed in the same horizontal plane. The beam 1 is provided with means (not shown) e. g. small clamps, for securing thereto the ends of a number of yarns 3 to be tested. The clamps may have slots through which the yarns run, and the front beam 2 may have a corresponding number of grooves in which the yarns run unconnectedly. Weights 4 are attached to the free ends of the yarns below the front beam 2. The yarns are bent upwards out of the horizontal plane of the beams by means of a deflector.

This is a comb-like device 5 of a design similar to that of the reed of a loom. It will, therefore, be denoted herein "reed." The reed has a plurality of upright members which are denoted herein "dents" like the wires constituting the reed of a loom, and which are secured to transverse top and bottom members. The reed also includes an intermediate transverse bar 7 above the plane of the beams. The yarns, passing through the gaps between the dents, run over the bar 7, whereby they are bent out of said horizontal plane. The reed is mounted on supports 6 which are reciprocable in the direction of the yarns 3 by any suitable mechanical means (not shown). As the reed is thus reciprocated, the bar 7 and dents rub along the yarns.

The weights 4 are shown to have prismatic shape and to be disposed closely to one another. This arrangement is preferred as it prevents the weights from turning about their axes, which in turn prevents undesired changes in the original degree of twisting of the yarns.

Fig. 2 shows the end positions and a central position of the reed during its linear reciprocating motion. The position of the bend of the yarns is shifted along the latter, but the magnitude of the bend remains constant. This shifting of the bend has on the yarn an effect substantially equivalent to the alternating positive and negative bending of the yarn on the loom.

The magnitude of the friction between yarns and the bar 7, and also between the yarn and the dents of the reed, can be chosen arbitrarily by the proper selection of the form of the bar and the material from which it is made, and/or by the distance between the dents. It has been found that for most purposes the friction should be relatively small. In that case the bar will be round, and it may be made from a polished metal, e. g. stainless steel. A higher friction may be obtained by providing flutings on the bar and/or by using another material such as a polymeric plastic substance. If little friction only is desired between the yarns and bar 7, the latter may be arranged to be rotatable about its axis.

The speed of the reciprocating movement of the deflector will be chosen in accordance with test standards to be laid down. A number of about 280 cycles per minute was found to be satisfactory in laboratory tests carried out with a tester of the kind illustrated in Fig. 1. This tester had a bar 7 of polished and hardened silver steel with a diameter of 10 mm. and was built for the simultaneous testing of 20 yarns. For accurate results at least 40 yarns should be tested, which can thus be done in two runs of the tester. The weights suspended on

the yarns amounted to 250 gr. each. When a yarn breaks, the noise produced by the fall of the weight enables the operator to make a note of the fact and the time of the breakage. Of course, these details may be modified to suit any desired conditions.

In the embodiment illustrated in Figs. 3 and 4, the reed is not rectilinearly reciprocable but swings about an axis 6' and is linked by a crank arm or the like to a drive motor (not shown). The magnitude of the bend of the yarn is continually altered between two minima and one maximum coinciding, respectively, with the two end positions and the middle position of the reed. In addition the bend is shifted along the yarn similarly as in the first embodiment.

The embodiment according to Figs. 5 and 6 is similar to that shown in Figs. 1 and 2, but the bar 7 in this case is not attached to the reed. Instead, its ends, which are pins of smaller diameter than the main part of the bar, are slidably inserted in guiding slots 8 disposed in flanges 9 of the reed parallel to the dents thereof, and also in oblique guiding slots 10, 11 provided in plates 12 which are fixedly disposed on both sides of the track of the reed (one of these plates has not been shown in Fig. 5). The slots 10 and 11 are oblique and so disposed that the bar 7 is constrained to move upwards while the reed moves from either turning point towards the middle, and downwards again while the reed continues to move from the middle towards the other turning point. Fig. 6 illustrates the bending of the yarn in such a case.

The testers here described by way of example have parallel horizontal beams, and the deflector is disposed above the plane of the beams. With a similar horizontal

arrangement of the beams, the deflector may be disposed below the level of the beams. Moreover, the yarn supports may be arranged differently, for example in a common vertical plane out of which the yarns are bent sidewards by the deflector which is in this case located laterally to the yarns.

We claim:

1. A yarn tester comprising supports adapted for the stretching between them of a plurality of parallel yarns under controllable tension, and a deflector disposed transversely to the stretching direction of the yarns and adapted to move back and forth; said deflector including a reed which comprises dents in combination with a transverse bar, all of them adapted to rub along the yarns during the back and forth movement of the deflector.

2. A yarn tester according to claim 1, wherein the reed is adapted to reciprocate with a linear motion in the direction of the yarns, and the bar is movable relative to the reed and guided on the latter, and adapted to be reciprocated in the direction of the dents of the reed.

3. A yarn tester according to claim 2, wherein the bar is guided in slots provided in the reed, and in addition in stationary oblique guideways disposed at the ends of the bar.

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