Aug. 14, 1962 G. A. McFETTERS 3,049,151

ANTI-FRICTION INSTRUMENTALITIES FOR A LOOM

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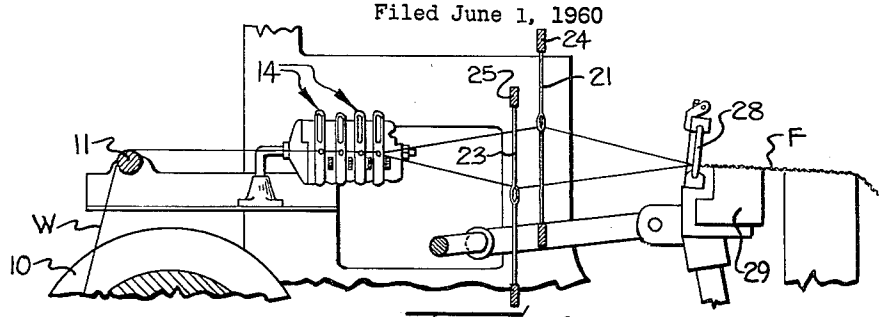


Fig-1

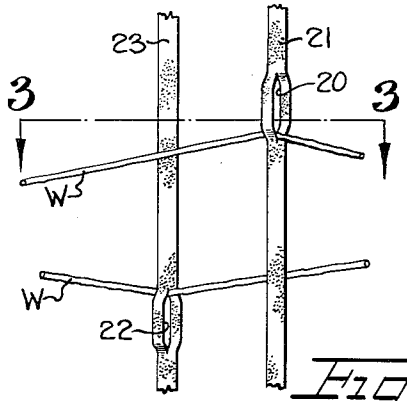


Fig-2



Fig-3

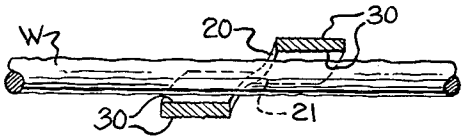


Fig-4

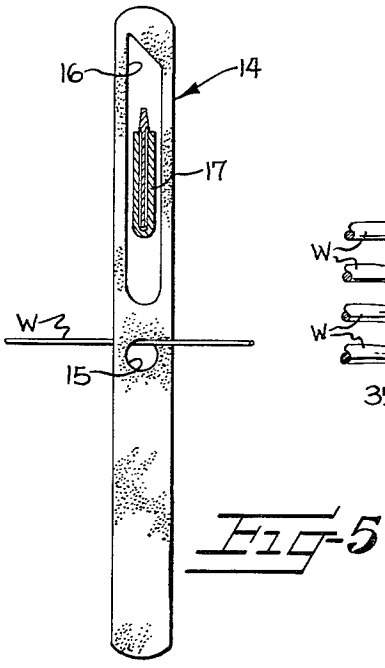


Fig-5

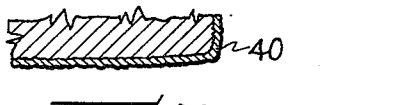


Fig-7

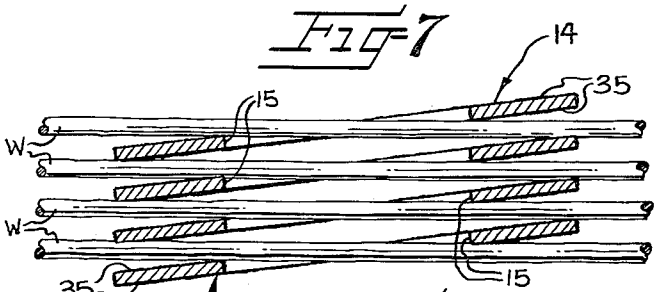


Fig-6

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ANTI-FRICTION INSTRUMENTALITIES FOR A LOOM

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This invention relates generally to improved instrumentalities for a loom which are adapted to reduce friction and static electricity when engaged by the warp threads as they pass in engagement therewith during the formation of cloth or fabric by the loom. More particularly, the present invention relates to improved drop wires and heddles having warp thread engaging surfaces which are non-specular and macroscopically roughened to reduce the friction and static electricity normally created as relative movement is imparted between the drop wires and heddles and the warp threads.

All known prior attempts to reduce friction between the warp threads and the loom instrumentalities have involved highly polishing the thread-contacting portions of the instrumentalities or utilizing specially constructed or designed instrumentalities in which the thread engaging portion is reduced in size to thereby reduce the amount of friction and static electricity produced by the rubbing action of the warp threads thereagainst.

With the foregoing in mind, it is a primary object of the present invention to provide a smoothly roughened surface on at least the thread engaging portions of the loom instrumentalities which acts to reduce the amount of friction and static electricity usually created by the warp threads passing in engagement with the instrumentalities.

It is another object of the present invention to provide friction and static electricity reducing portions on certain instrumentalities of a loom in such a manner that the friction reducing portions may be economically applied to the instrumentalities.

It is a more specific object of the present invention to provide a smoothly roughened friction reducing and static electricity reducing surface on at least the thread engaging portions of the drop wires of a loom to reduce the amount of friction and static electricity normally developed in the warp threads of a loom.

It is another specific object of the present invention to provide improved heddles for a loom in which at least the thread engaging portions thereof are smoothly roughened to reduce friction and static electricity normally transmitted to the warp threads passing therethrough.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a somewhat schematic vertical sectional view through a loom and showing the improved instrumentalities of the present invention positioned in operative relationship with the warp threads;

FIGURE 2 is an enlarged fragmentary elevation of the thread engaging portions of the improved friction and static electricity reducing heddles of the present invention;

FIGURE 3 is a fragmentary horizontal sectional view taken substantially along the line 3—3 in FIGURE 2, illustrating the relative positions of the individual heddles and the warp threads guided thereby;

FIGURE 4 is a greatly enlarged horizontal sectional view through the warp thread guiding eye of one of the heddles, illustrating the friction reducing roughened surface applied thereto;

FIGURE 5 is an enlarged elevation looking at one side of one of the improved drop wires removed from the

loom and supported on a warp thread passing through an eye therein;

FIGURE 6 is a greatly enlarged sectional plan view through a plurality of side-by-side drop wires and illustrating the relative positions of the drop wires in relationship with the warp threads passing through the eyes thereof;

FIGURE 7 is a greatly enlarged fragmentary sectional view, schematically illustrating the non-specular, irregular, smoothly pitted, satin finish on the surface of the instrumentalities and showing the irregular surface with chrome plated thereon.

Referring to FIGURE 1, it will be noted that the warp threads, indicated at W, are drawn from a warp beam 10, pass upwardly over a guide rod or roll 11 and then extend in substantially a horizontal position as they pass through banks of drop wires indicated broadly at 14. The drop wires 14 are normally supported on the warp threads W by passing the threads through an eye 15. The drop wire shown is adapted to be used with an electric stop motion which is actuated when the warp thread breaks or becomes overly slack. When the warp thread is broken or slack, it lets the drop wire move downwardly so that the upper end of the elongated slot 16 forms an electrical connection between the two elements of the stop motion bar 17. The present invention may be applied to any conventional type of drop wire, whether they may be associated with an electrical or a mechanical stop motion.

The warp threads W are usually divided and one group of threads pass through the guide eyes 20 of a series of front heddles 21 and the other group of threads pass through the guide eyes 22 of a series of rear heddles 23 (FIGURE 2). The heddles 21 are mounted in a front heddle frame 24 (FIGURE 1) which is moved vertically in timed relation with operation of the loom in a conventional manner and the heddles 23 are supported in a rear heddle frame 25 which is also operated in a conventional manner.

The warp threads W extend forwardly from the heddles 21 and 23, pass through a reed 28 and are formed into fabric, indicated at F. The reed 28 is supported in a reciprocating lay 29 which moves rearwardly to allow a filling thread to be inserted transversely of the warp threads and then moves forwardly to the beat-up position shown.

As shown in FIGURES 2, 3 and 4, the heddles 20 and 23 each are formed of relatively thin, elongated, substantially flat steel strips and have the respective warp thread guide eyes or openings 22 and 23 formed substantially midway between their ends. It is preferred that all surface areas throughout the complete length of the heddles 21 and 23 be provided with friction and static electricity reducing irregular surfaces, indicated at 30 in FIGURE 4. The irregular surface 30 may be produced in any one of a number of ways and in the present instance, a satin or matte finish has been obtained by a blasting process in which loose abrasive material is forced against the outer surface of the heddle by liquid and air pressure. This blasting process produces a smoothly pitted surface in which the amount of irregularity will vary in accordance with variations in the type of metal processed, the type of abrasive use and the pressure of the liquid and air, as well as the length of time the blasting operation continues.

During the formation of fabric, the heddle frames 24 and 25 are reciprocated in a vertical direction before each pick of the loom and as one heddle frame moves to an upper position, the other heddle frame moves to a lower position and then in subsequent picks, the heddle frame positions are reversed to reverse the positions of the groups of warp threads W carried thereby. As

the warp threads W are fed forwardly, they rub the eyes 20 and 22 of the heddles 21 and 23 and when the heddles are shifted vertically, the sides of the heddles rub against and engage the warp threads positioned on each side thereof. By providing the irregular surface 30 on the portions of the heddle which surrounds the guide eyes 20 and 22 as well as along the flat sides thereof, the amount of friction and static electricity normally produced by the rubbing action of the warp threads against the eyes and against the flat sides of the heddles 21 and 23 is greatly reduced.

The eyes 20 and 22 in the heddles 21 and 23 are shown as being formed by splitting the thin steel strips and then bending the metal at opposite sides of the split outwardly however, it is to be understood that the guide eyes 20 and 22 could be formed in any other desired manner.

Referring to FIGURES 5 and 6, it will be noted that each of the drop wires 14 is formed of relatively thin elongate metallic strip material and the drop wires 14 are positioned in relatively close relationship to each other. The warp threads passing through the eyes 15 engage portions of the drop wires positioned on each side of the drop wire supported by any particular warp threads. Thus, friction and static electricity is normally created by the warp thread rubbing the drop wire in the vicinity of the guide eye 15 as well as rubbing engagement with other portions of the drop wires 14. Also, during normal operation of the loom, vibration will cause the normally light-weight drop wires to bounce or dance on the warp threads and thereby tend to create additional friction and static electricity.

It is preferred that the complete surface of the drop wires 14 be provided with a friction and static electricity reducing irregular surface 35 which may be a satin or matte finish obtained by a blasting operation in the same manner as the irregular surface 30 on the heddles 21 and 23. It is to be understood that the drop wires may be provided with the irregular surface 35 in the area adjacent the warp eye 15 only, if desired.

If desired, the irregular surfaces of the heddles and the drop wires may be provided with a thin plate or layer of chrome 40 (FIGURE 7) to prevent corrosion of the metal and reduce wear of the heddles and drop wires. As shown in FIGURE 7, the layer of chrome 40 is of uniform thickness and conforms to the irregular surface of the loom instrumentalities.

The present invention is of particular value when weaving synthetic man-made fibers or threads, however, the improved friction and static electricity reducing instrumentalities may also be used to an advantage when weaving other types of thread. When weaving a continuous filament man-made thread, in addition to reducing the amount of friction and the static electricity built up in the threads, the matte or irregular surfaces on the instrumentalities also provide additional protection against filament breakage and scuffing of the finish of the filament. The instrumentalities having the irregular surfaces may also be used to an advantage when weaving threads formed of staple length fibers, whether the fibers be natural or man-made fibers, and in addition to reducing the amount of friction and static electricity built up in the thread, the irregular surfaces on the instrumentalities lessen the amount of lint and fly accumulation, cause less distortion of the fibers in the threads and provide better tension uniformity.

In practice, it has been found that when conventional smooth faced weaving instrumentalities are used, the coefficient of friction increases rapidly with increased speed of operation of the loom and the resulting increase in speed at which the threads guided thereby are engaged by the instrumentalities. However, when instrumentalities of the type disclosed in the present application are used, the coefficient of friction increases only slightly as the speed of the loom increases. Thus, with the use of improved instrumentalities of the type herein disclosed, it is possible to operate the loom at a faster than normal rate of speed while reducing the amount of friction and static electricity created.

Throughout the specification, the terms irregular, satin, smoothly pitted and matte have been used to identify the finish on the surface of the improved loom instrumentalities disclosed. This finish might also be described by comparing the appearance of smooth or polished surfaces with the appearance of the irregular surface when viewed with the naked eye. The surface of smooth or polished metal is macroscopically smooth, shiny and specular while the surface of the instrumentalities disclosed herein is macroscopically rough and non-specular and presents a dull grey-like metallic appearance to the eye.

However, a properly prepared matte-finish should be semi-dull in appearance and smooth to the touch. Actually, a flat dull finish is undesirable. The desired finish may best be described by reference to a standard gauge for measuring surface roughness by the height of the irregularities with respect to an average line with the heights being expressed normally in macro-inches. In most instances, the root-mean square (R.M.S.) value is used, which value is equal to the square root of the sum of the deviation of individual points above or below the average line divided by the number of points measured. The standard gauge employed for measuring surface roughness is a Profilometer in which a sharp diamond stylus is moved at a constant rate across the surface to be measured and the rise and fall of the stylus are amplified electrically and indicated on a meter which is arranged to indicate directly the R.M.S. values of the surface. This type of apparatus is manufactured by Micrometrical Manufacturing Company of Ann Arbor, Michigan.

It has been determined that when the coefficient of friction is plotted as an ordinate against surface roughness in macro-inches as the abscissa, for nylon particularly, the polished or shiny chrome surface range is indicated between zero and twenty R.M.S. and the matte finishes will range from twenty to two hundred R.M.S. The preferred range for the macroscopically rough and non-specular matte surface of the instrumentalities herein disclosed will lie between seventy and two hundred R.M.S., depending on the denier or other properties of the threads to be woven.

By providing the weaving instrumentalities with a matte or satin finish, the amount of friction between the threads and the instrumentalities as well as the amount of static electricity built up in the thread is greatly reduced and additionally, the threads are less likely to be damaged. It is preferred that the instrumentalities be finished or provided with the matte surface before they are assembled in the loom and this may be accomplished in a continuous conventional blasting process in an economical manner.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Improved loom instrumentalities such as drop wires and heddles formed of flat elongate metallic strip material and having an opening through a medial portion thereof through which a warp thread is adapted to be guided, the improvement comprising each instrumentality having a non-specular, irregular, smoothly pitted, satin metallic finish on at least the proximal surfaces surrounding the opening through which the warp thread is guided.

2. Improved loom instrumentalities such as drop wires and heddles formed of flat elongate metallic strip material and having an opening through a medial portion thereof through which a warp thread is adapted to be guided, the improvement comprising each instrumentality having a non-specular, irregular, smoothly pitted, satin metallic

finish on at least the proximal surfaces surrounding the opening, and the finish extending lengthwise from the opening in a continuous manner in opposite directions therefrom and throughout a major portion of the length of the instrumentality.

3. An improved drop wire for a loom having an opening therein through which a warp thread is adapted to pass, the improvement comprising each drop wire having a non-specular, irregular, smoothly pitted, satin metallic finish on at least the proximal surfaces surrounding the opening through which the warp thread passes.

4. In a drop wire according to claim 3 wherein the irregular finish has a Profilometer rating of R.M.S. 70 to 200.

5. An improved drop wire for a loom having an opening therein through which a warp thread is adapted to pass, the improvement comprising each drop wire having a non-specular, irregular, smoothly pitted, satin metallic finish on at least the proximal surfaces surrounding the opening through which the warp thread passes, and a chrome coating on each drop wire having its outer surface conforming to the underlying surface of the drop wire.

6. An improved heddle for loom harnesses having an

opening through which a warp thread is adapted to pass, the improvement comprising each heddle having a non-specular, irregular, smoothly pitted, satin metallic finish on at least the proximal surfaces surrounding the opening through which the warp thread passes.

7. In a heddle according to claim 6 wherein the irregular finish has a Profilometer rating of R.M.S. 70 to 200.

8. An improved heddle for loom harnesses having an opening through which a warp thread is adapted to pass, the improvement comprising each heddle having a non-specular, irregular, smoothly pitted, satin metallic finish on at least the proximal surfaces surrounding the opening through which the warp thread passes, and a chrome coating on each heddle having its outer surface conforming to the underlying surface of the heddle.

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