Sept. 16, 1930. M. B. BEHRMAN 1,775,928

PILE WIRE CUTTER

Filed Feb. 2, 1928

Fig. 1.

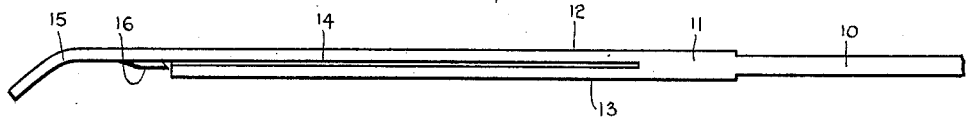


Fig. 2.

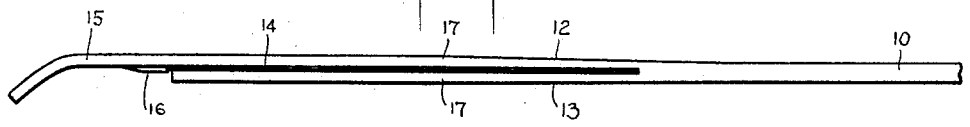


Fig. 3.

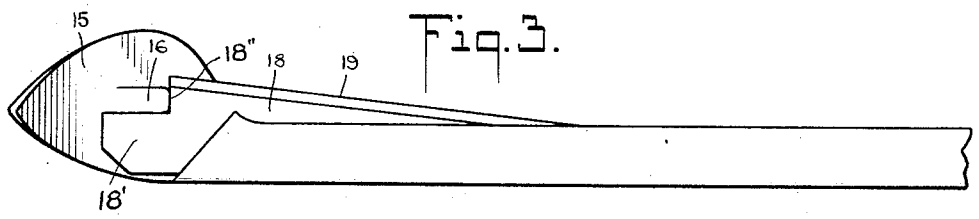
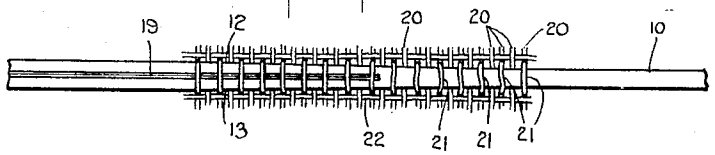


Fig. 4.



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UNITED STATES PATENT OFFICE

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PILE-WIRE CUTTER

Application filed February 2, 1928. Serial No. 251,274.

My present invention relates generally to pile wires, and more particularly to certain improvements therein and in the entire pile wire assembly whereby increased cutting efficiency, among other things, is achieved.

It is well known that in looms which employ pile wires during the manufacture of pile fabrics, the warp threads are generally looped over these wires during the weaving, the pile wires being subsequently withdrawn. In the manufacture of cut pile fabrics, blades or cutters are so associated with the pile wires that when the latter are withdrawn the blades will operate to cut through the loops. Due to the rapidity with which such pile wires are withdrawn and the number of threads which are cut by each blade during each withdrawal, and for other well-understood reasons, the cutting edges of the blades are subjected to extreme wear.

It is an object of my present invention to provide a pile wire assembly, and more particularly, a pile wire wherein the wearing qualities and efficiency of blades of the foregoing character are greatly increased.

I achieve this general object by so constructing the pile wire that in the employment thereof, a maximum cutting efficiency is attained. More particularly, I have provided a construction wherein the mutual encounter between cutting edge and loop is in each case of a character which results in having the cutting edge most effectively and most efficiently pass through the material of the loop. This is of particular importance in the manufacture of fabrics wherein the loops to be cut are of relatively tough material such as goat's hair, or where the threads are not thoroughly washed, or where the threads for similar reasons impose increased demands upon the cutting edges of the blades.

One phase of my invention has already been described and illustrated by me in my co-pending application No. 6,687, filed February 4, 1925. I have found that in pile wire assemblies wherein the cutting edge of the blade is positioned at an angle to the axis of the pile wire, the nature and character of the actual cutting operation changes its character entirely at a predetermined critical angle of the cutting edge to that axis. That is, where the angle is such that the individual loops or threads are made to encounter always a single point or substantially a short length of the cutting edge, the cutting edge is soon rendered valueless and the blade must be discarded. Apart from this disadvantageous continual wear upon a limited point or portion of the cutting edge, an arrangement of this character relies in a large measure upon the impact between the cutting edge and the loop. This impact is not only wearing upon the cutting edge but also upon the pile wire as a whole, and is by no means incident to the art of efficiently cutting a thread by means of a blade.

As described in the aforementioned pending application, I have found that where the angle of the cutting edge to the pile wire axis is reduced to or beyond a critical angle of approximately 10°, and to an approximate angle of five degrees, the entire nature of the cutting encounter changes, and instead of an impact serving as an important factor in the cutting procedure, such impact is dispensed with entirely, and the sudden disadvantageous "chopping" is supplanted by a gradual and efficient sawing action. An encounter of the latter character serves to cut through the loops gradually and serves also to increase the effective life of the cutting edge because of the uniform subjection of the entire edge to the encounter with the loop.

Although certain phases of my present invention are quite independent of the employment of the foregoing construction of relatively small cutting edge angularity, I have found the practice of my present invention to be particularly effective in connection with such an arrangement for the following reason.

The efficiency of a cutting encounter between a sharpened or cutting edge and a thread is increased in a well known manner if the thread is relatively taut. Pursuant to the general object of my present invention, I aim to achieve an encounter of this character. One feature of construction which leads to this goal lies in the employment of a low angularity arrangement of the character

mentioned above and described in my previous application. For, obviously, along with the smooth and gradual cutting encounter which such a low angularity effects, is the unquestionable gradual tensioning which the cutting edge itself achieves much in the manner of a wedge, this gradual tensioning or tautening being practically impossible of achievement where the angularity of the cutting edge is greater than the critical point mentioned and where the encounter between the cutting edge and loop is in the nature of a sudden impact or chop.

Directed toward the achievement of this same general object is the important feature of my invention which provides means for gradually tensioning the loops preparatory to the cutting thereof by means independent of the cutting edge itself, and more particularly, by means associated with the pile wire and operable during movement thereof. An important feature of my invention lies in providing means for tensioning the loops in a direction or directions transverse to the plane of the blade. Accordingly, where a low angularity blade arrangement is employed, I achieve a gradual tensioning of each loop in practically three distinct directions, thus serving not only to increase the efficiency of the cutting encounter, but also to assure a thorough sawing through of the loop by the low angle blade.

In the embodiment herein illustrated, I have shown a pile wire wherein a portion is constructed to accommodate a blade of the character mentioned; and I have constructed this portion with opposite surfaces which diverge so as to constitute wedge surfaces for the purposes above outlined. The arrangement is such that a gradual tensioning of the loops is successively accomplished beginning at a time prior to the first cutting encounter and continuing until the cutting operation has been completed.

Obviously, the last-mentioned phase of my invention, relating to the means—independent of the cutting edge or blade—for tensioning the loops, is wholly independent of the employment of any particular type, shape, or arrangement of blade; and for example, fulfills its highly desirable function even in connection with a blade whose cutting edge is parallel to the pile wire axis.

For the attainment of the foregoing objects and such other objects as may hereinafter appear or be pointed out, I have constructed a device embodying the features of my invention and illustrated in the accompanying drawings in which—

Figure 1 is a top view of the forward end of a pile wire partially treated to embody the features of my present invention;

Figure 2 is a view similar to Figure 1 after the treatment has been completed;

Figure 3 is an elevational view showing a low angle blade operatively positioned within the pile wire shown in Figure 2; and

Figure 4 is a top view upon an exaggerated scale of the pile wire operatively associated with a series of warp loops during the cutting of the latter.

In Figure 1, I have shown the forward end of a pile wire, this end being, for the purpose of explaining the present invention, formed upon the body of the pile wire. Obviously, it is immaterial from the present standpoint whether or not this end is independently constructed and subsequently associated with the body of the pile wire. 10 represents the main portion of the pile wire, and it will be noted that the forward end 11 is of increased width. Figure 1 shows one method of constructing a device of the present character, and it will be noted that the opposite sides 12 and 13 of the portion 11 are initially parallel to each other.

A channel or groove 14 is provided in the portion 11 in any desired manner and of any desired structural nature for accommodating a wafer type blade therein. At the extreme forward end of the pile wire an enlarged spoon-shaped head 15 is provided in a well known manner, the latter being provided with a struck-up tab or abutment 16 for predetermined engagement with the blade for holding the latter in position.

The device of Figure 1 is then treated to cause a gradual merging between the opposite sides of the body 10 and the opposite sides 12 and 13. This is accomplished by grinding or similarly beveling off the rear portions of the sides 12 and 13, the embodiment illustrated showing this bevel as extending toward approximately the middle of the channel 14, i. e., to approximately the points 17 of Figure 2. After this grinding or beveling has been accomplished, it will be noted that the sides 12 and 13 converge in a gradual manner toward the rear of the pile wire.

In Figure 3 I have shown a wafer type blade 18 cut away at one end to provide the finger 18′, and so dimensioned that when the blade 18 is in position within the channel or groove 14, with the wall 18″ in engagement with the adjacent end of tab 16, the finger 18′ will extend beyond and to the left of the tab 16, thus positively preventing the finger 18′ from moving upwardly and into the space below the tab 16.

The cutting edge 19 is inclined to the axis of the pile wire in a manner which is broadly well known; but I have shown the blade with its cutting edge 19 arranged at the relatively small angle mentioned hereinbefore and in my previous application, this angle being approximately five degrees.

The operation of my device will be obvious from what has gone before. Thus, in Figure 4 I have shown, for illustrative purposes, a set of warp threads 20, the alternate ones thereof providing loops 21 which extend

over the pile wire 10. To each side of the pile wire 10 I have shown a weft thread 22.

It will be understood that the pile wire 10 of Figure 4 is only one of many which will probably be associated with the fabric during its manufacture. At the proper time, all of the pile wires are withdrawn to the right, thereby advancing the cutting edges to encounter and cut the loops overlying the respective wires. In Figure 4 I have shown the pile wire 10 in the position it would assume after a short portion of its movement to the right has been effected. Approximately the four loops 21 at the right of Figure 4 are still relatively loose. The wedge surfaces 12 and 13 have already encountered and commenced to tension the fifth, sixth, and seventh loops. The remaining loops are shown in varying degrees of encounter with the cutting edge 19, the loop furthest to the left being shown tensioned to the maximum degree by the surfaces or sides 12 and 13. It may be that the latter loop has already been cut partially through by the cutting edge 19, but whether this is so or not, the continuous movement of the pile wire to the right will complete the cutting thereof in a gradual and efficient manner. The same is true successively of the other loops to be encountered.

It will thus be seen that although my device is an extremely simple one, nevertheless it achieves a cutting of loops in a highly efficient manner, resulting in an increased life of the blade employed, in a total absence of shock and strain, and with full appreciation of the numerous factors entering into a cutting encounter of maximum efficiency. Many of the details herein described and illustrated for the purpose of explaining the nature of my invention may be changed by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is therefore intended that these details be interpreted as illustrative and not in a limiting sense.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:—

1. In a pile wire which includes a blade and which is designed for employment with a loom wherein movement of the pile wire advances the blade to cut certain loops of the fabric being made, means associated with the pile wire and operable during the movement thereof for tensioning said loops preparatory to the cutting thereof, said means comprising a blade-holding pile wire portion having gradually diverging walls.

2. As a new article of manufacture, a pile wire comprising a U-shaped channelled blade-holding portion adapted to receive a blade in the channel with the cutting edge thereof projecting thereabove, the opposite exterior surfaces of said portion converging gradually toward the rear end of the pile wire whereby the loop to be cut will be tensioned preparatory to and during the cutting operation.

3. In a pile wire assembly, the combination with a wafer type blade having a cutting edge, of a pile wire provided with a channel for supporting said blade therein with its cutting edge arranged at an angle of less than 10° to the axis of the pile wire, said channel having its lateral exterior sides converging gradually in the direction in which the pile wire moves when the cutting edge functions.

4. In a pile wire assembly, the combination with a substantially triangular wafer type blade having a cutting edge, of a pile wire provided with a channelled portion adapted to receive said blade therein with its cutting edge arranged at an angle to the axis of the pile wire, the opposite interior walls of said channel being substantially parallel to accommodate the blade therebetween, and the external opposite sides of said channelled portion being shaped to converge gradually in the direction in which the pile wire is moved in order to cause said cutting edge to function.

In witness whereof I have signed this specification.

MARCUS B. BEHRMAN.