

Dec. 18, 1923.

1,478,082

C. WHITLOCK

WARPING PROCESS

Filed Jan. 13, 1927

2 Sheets-Sheet 1

Fig. 1.

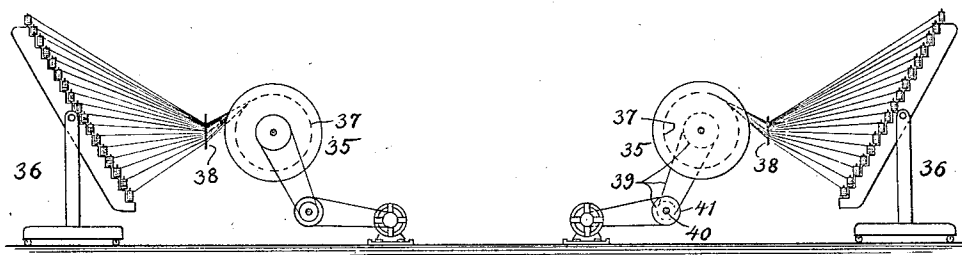
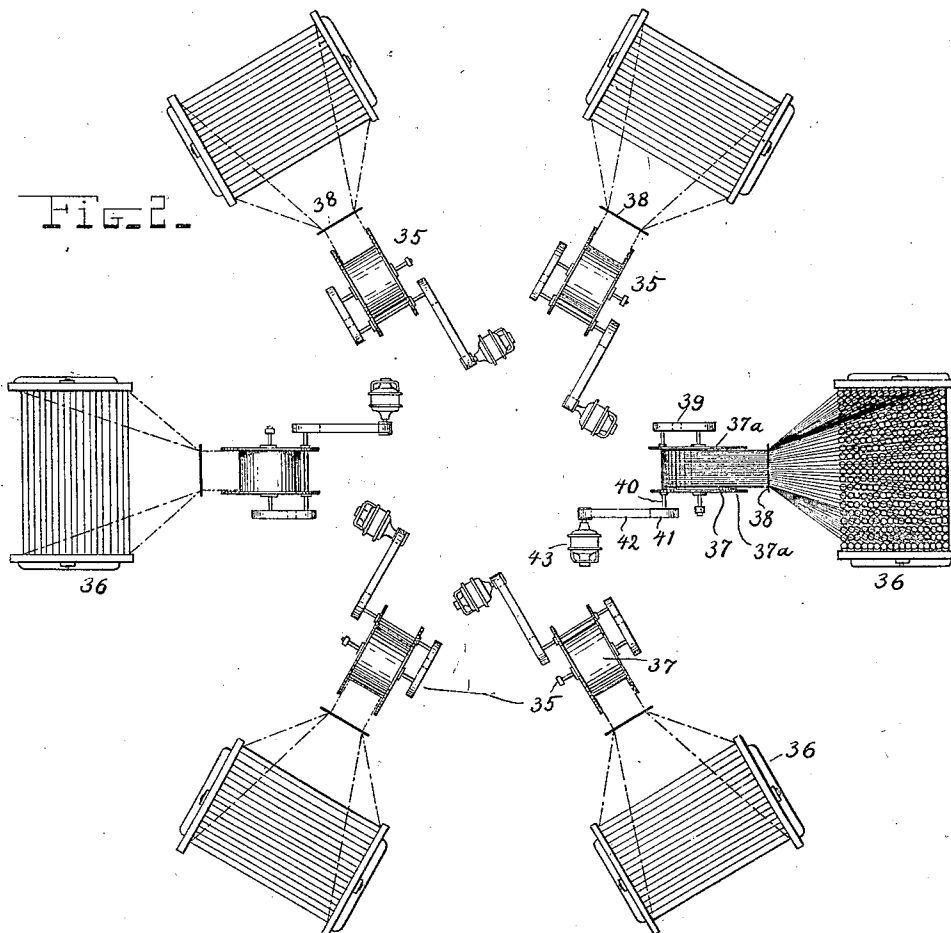


Fig. 2.



INVENTOR

Cleveland Whitlock

BY

Richard H. Hoffmann
ATTORNEY

Dec. 18, 1923.

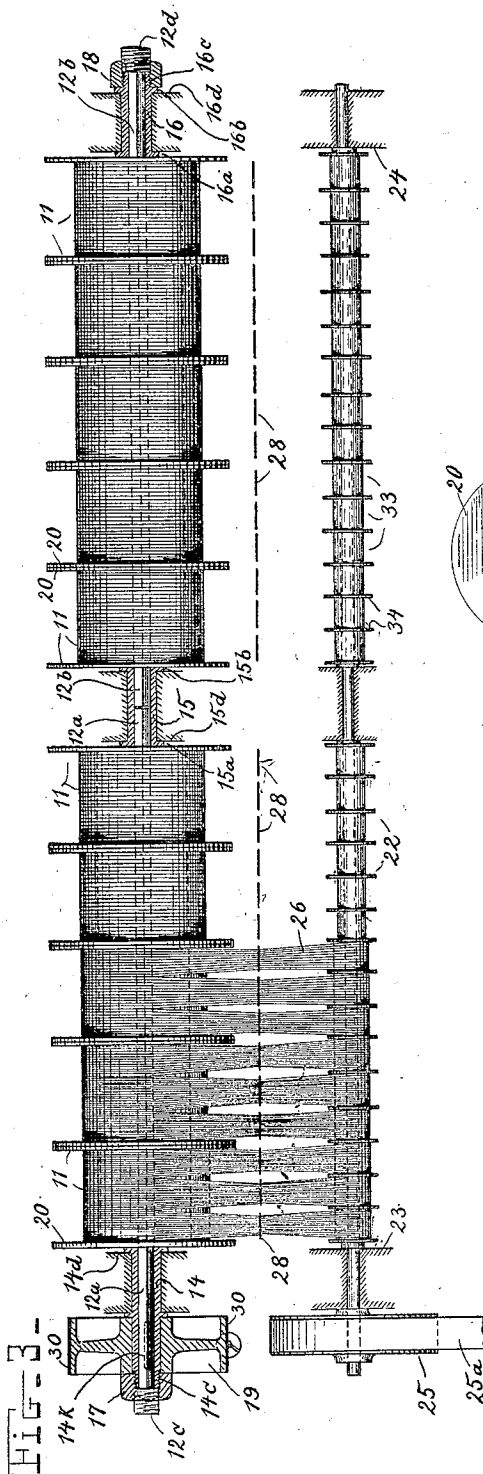
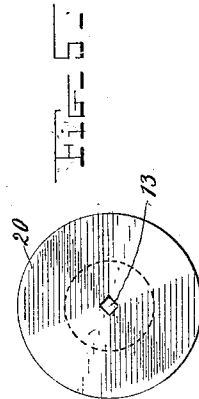
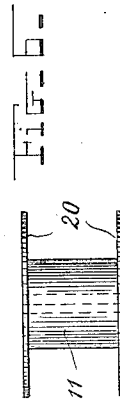
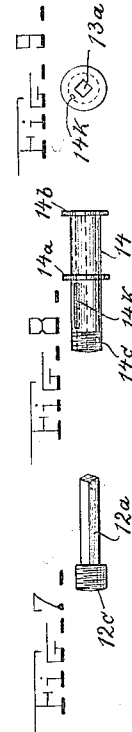
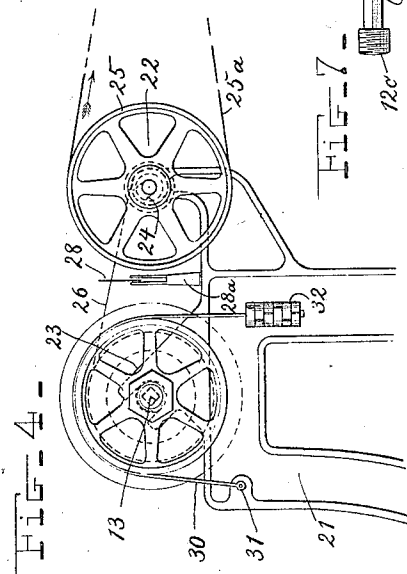
1,478,082

C. WHITLOCK

WARPING PROCESS

Filed Jan. 13, 1922

2 Sheets-Sheet 2



INVENTOR
C. Whitlock
BY *Richard H. Hoffmann*
ATTORNEY

UNITED STATES PATENT OFFICE.

CLEVELAND WHITLOCK, OF BROOKLYN, NEW YORK.

WARPING PROCESS.

Application filed January 13, 1922. Serial No. 528,902.

To all whom it may concern:

Be it known that I, CLEVELAND WHITLOCK, a citizen of the United States, residing at 196 Hall Street, Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Warping Processes, of which the following is a specification.

This invention relates to the process of preparing warps, adapted to enter a loom, and has different objects which will be specifically stated. All of these however tend to make the process of "running on" and "beaming off" more expeditious, considerably cheaper, and yielding better results.

It is also involves for its successful operation certain minor mechanical changes in the construction of the warping mills, that could be effected in various ways and will be described and suggested in their simplest form in the following disclosure.

The first object of this invention is to devise a practical process of warping requiring less skill and attendance than the old known process and therefor reducing the manufacturing cost for highly paid skilled labor.

A second object is to devise a warping process, making a division of the work to be done among skilled and unskilled help possible and profitable.

The third object of the invention is to enable a warper to attend to more than one bobbin frame or jack at a time without reducing the productive speed which each jack attains when separately handled.

As a fourth object the novel process aims at the production of warps of greater length than are possible or profitable with the present method.

The fifth object of the new process is to reduce and partly eliminate the unproductive periods of the warper, at present consumed with supplementary or corrective work.

A sixth object is to prevent the occurrence of a troublesome and obstructive circumstance, commonly called "rolling" which will be defined and spoken of in its proper relation.

The seventh object is to enable the warper by a novel arrangement of machinery, made possible in its turn through the main principle of the new invention, to superintend

the different operations necessary to complete the warp, more successfully and conveniently.

For its eighth object the new process aims to make the resulting work of better and more even quality and greater quantity than is possible by the hitherto used method.

A final and ninth object is to devise a process which makes the employment of other specific modern improvements of a more mechanical nature, as for instance: automatic thread-break stopping devices, measuring apparatus and so forth more available and effective, thus resulting in and contributing to better work in less time and at lower cost than has hitherto been possible.

These various objects are attained by means, described in the following exposition and illustrated, as far as their mechanical features are concerned, in the accompanying drawings, wherein,

Figure 1 is an elevational view, showing in a diagrammatical way the arrangement of two bobbin frames or jacks, the warp threads drawn through the brasses and winding onto their respective warp drums, also the counter shafts and the motor driving the warp drum. This elevation is taken diagonally alongside any one of the three symmetrically arranged and opposite couples of warp-mill sets which form the radial arrangement shown in the following figure.

Figure 2 is a plan view showing one form of the radial disposition of jacks and warp mills, recommended in connection with and forming a part of the complete new process.

Figure 3 is a partly diagrammatical representation of a composite warp-mill and the "beam", adapted to the principles of the new process.

Figure 4 shows an end view of this warp-mill and the beam, temporarily mounted on the warp-mill frame.

Figure 5 shows an end view and

Figure 6 a side view of the single drums on which the units of the new composite warp is wound.

Figure 7 shows a detail of the end of the polygonal shaft on which these single drums are mounted.

Figure 8 shows a detail of one of the quill shafts, through which the polygonal shaft passes.

Figure 9 is an end view of this quill shaft,

Up to the present time the different operations, of which the process of warping consists must be attended to by one operator and as warping is connected with many slips and set-backs, resulting in unproductive interruptions and "going-back" to repair and patch up the faults, not to mention the often considerable waste of material, it is a slow time-consuming task.

For instance a warp, 180 inches wide and of the usual length of say 2400 yards for the bottom beam of the loom and 3600 yards for the top beam, a highly skilled warper can hardly complete in less than 40 hours of labor. Often it takes more.

The threads are run from movable and exchangeable jacks, usually containing 336 spools, through brasses onto one common long warp drum, each jack separately and in succession. A warp, 180 inches wide, will absorb about 15 jacks and requires therefore just as many successive milling operations.

The warp mill consists in the main of a drum of large diameter and of the maximum length of a warp, journaled in a frame and driven by a motor or other power, usually through a belt drive.

Broken threads in the process of filling the warp mill cause many delays, not only through the necessary stops, while the threads are mended or at least a "mark" is made calling for later remedies, but also through the entangling of the broken threads with other threads and so called "smashes."

It is true that certain devices have been invented and patented which are supposed to automatically take care of broken threads. They have however not proved very satisfactory. For even if they were correct in themselves, it is difficult to apply these apparatus to the migrating jacks, essential to the present system.

In addition to these difficulties, caused by broken threads, there occurs a phenomenon, commonly called "rolling". By this is meant, that the edges of the warp on the starting end of the drum as well as on the working end pile up and fall over the upper layers again,—or even in some cases over the flanges and off the drum,—afterwards causing much trouble in the process of "beaming off." This condition is caused by the steadily increasing side pressure of the succeeding layers of the warp, as they are run onto the drum, and grows in proportion with the length each separate warp originally contains.

This tendency of long warps to roll, against which at present there is no remedy, puts by itself a limit to the length of warps which now it is possible and profitable to make.

The "running on" being finished, the warp-

er must "beam off" the warp, which means, that he must back-wind the whole width of warp simultaneously onto drums of a smaller diameter and capacity, but of full length, suitable for entering the looms.

In this operation which in its details is similar to the running on, first described, the same difficulties and still more of them are met with and demand their tribute in time and labor.

Automatic thread-break stopping devices would prove a great help in both the running-on and the beaming-off operation, and accurate thread-measuring registers, if such were available, might also tend towards the elimination of extra spools, which must be run afterwards to supplement spools put out of action, and thus result in a more even product and steady production, were it not, as already indicated, that all these auxiliary means are hard to combine and to connect with a system of movable jacks, occupying the receiving side of the warp mill, coming and going to make place for the next one.

As the present practice goes, the thread break stopping devices have almost solely proved practicable, when applied to stationary looms, and are of very questionable value to the warper's handicraft.

Summing up the undesirable interruptions and unproductive periods, inseparable from the present method of migratory jacks, short warps and old fashioned warp mills, it may be said that an average of three days in eight working days is devoted to unproductive delays, drawing in short warps, patching up defective work and auxiliary manipulations, which might partly be eliminated by an improved process.

The basic principle of the new process is the dissection of the warp into transportable units, adapted to be completed simultaneously instead of consecutively, and to be assembled when completed into a composite warp to be beamed off in one operation with fewer interruptions and yielding a more uniform and tractable product.

The next subsequent principle emanating from this fundamental change is the stationary location of the bobbin frames or jacks to which the empty warp drums are transported and from which they come when filled to take their place in the assembly warp mill frame.

A third principle, the previous objections to which are overcome by the new general arrangement of the "running-on" machinery, is the putting into practice of multiple reeling, that is: simultaneous unwinding of several jacks.

Other consequences and advantages resulting from the new working method will be dealt with later.

A dissection of the warp into transportable units requires a mechanical divisibility

of the receiving drum of the main warp mill and also presupposes the installation of one or more smaller reel frames for the reception and filling of these partitional warp drums, these reel frames being adapted to assume the same function, that the main warp mill in the old process had exerted.

A new division of labor thus results, as the services of the main warp mill in the new process are dispensed with for the running-on and confined to the beaming-off solely.

It will be seen in Figure 3 that the warp drum, instead of being a long continuous integral drum consists of a multiplicity of short drums 11, shown separately in Figures 5 and 6, mounted on a common shaft which may be a single one or more than one, coupled together. See 12^a and 12^b. These short drums are each separately provided with flanges 20, high enough for the maximum length of warp, intended to be run on each drum.

In order to be removable and at the same time temporarily attachable to the shaft, the drums cannot be provided with smooth circular borings only, but must have either square or polygonal apertures as shown at 13, or may run on a straight continuous key. They may likewise be provided with other means of temporarily fixing them on the common shaft. If the drums have square or polygonal borings, the common shafts are better made of the same corresponding section throughout the whole length and provided with quill shafts at the ends and sleeve couplings, to run in the mill journals, as shown by quill shaft 14, 15 and 16, running in the journals 14^a, 15^a and 16^a.

To prevent the inner shafts from slipping out of the quill shafts, their outer ends 12^a and 12^b, as far as they protrude from the quill shafts, are upset and threaded.

The adjoining ends of the quill shaft must be flush and threaded in alignment with these ends, as shown at 14^c and 16^c. Over these short threaded parts fits a nut 17 or 18, coupling the sleeves to the protruding ends of the quill shaft. The middle quill shaft 15 of course could dispense in this arrangement with such provisions. To secure the quill shafts lengthwise in the bearings they are also provided with flanges 14^a, 14^b, 15^a, 15^b, 16^a and 16^b. The quill shafts are perforated in a way which corresponds to the section of the inner solid shaft. See 13 and 13^a in Figures 5 and 9. One quill shaft, in this case 14, is moreover provided with a keyway 14^k to fix the brake pulley 19 on it.

This brake pulley and the subsequent parts described and enumerated in Figures 3 to 9, are parts that may be found on any warp mill hitherto used, and are therefore not confined to the use of the novel method.

They are only mentioned for a better understanding of the working mechanism.

The numeral 21 in Figure 4 represents the frame for the support of the warp drum and the beam 22. The bearings 23 and 24 are open fork-like bearings, as indicated, for the temporary insertion and easy removal of the warp drum and the different beams that are to transmit the warp to the different looms supplied by the warp mill.

Any one of these beams must be provided with a driving pulley 25 to receive a driving belt 25^a, coming from a counter shaft or a motor directly.

The warp thread 26 of the first three drum units is shown as drawn through the brasses 28, mounted on the support 28^a, and for the remaining drums it is shown as not drawn through these brasses yet. When beaming off, the upper periphery of the drums and of the brake wheel 19 as well is run towards the beam, and the brake belt 30, fastened at one end at 31 and carrying the weight 32 at the free end will, when passed over the brake wheel in the running direction, provide by its friction on the wheel the necessary tension to the warp thread. The beam drum is divided by flanges 34 into as many compartments 33, as may correspond to the warps, or as may be deemed convenient for the arrangement of the brasses.

While all these parts are essential to the beaming-off process only, Figure 2 illustrates in a suggestive way rather than in a definite form the running-on of the warp onto the drum units, as it would seem appropriate and most economical in the new composite-warping process. The radial disposition of the warp reels 35 is the one affording the best means of supervision for the operator, moving about in the free central space of the arrangement. The six jacks 36 which can be of any ordinary type, are radially disposed on the periphery of the arrangement with as many of the warp drum units 37, mounted in front of and in radial alignment with them. The jacks may be vertical ones or inclined jacks, as the drawing shows, and they may be mounted on casters, as the usual jacks are, or permanently fastened to the floor. At any rate they do not need to be moved and shifted about for the running on process, as they can be filled with spools in their working position.

The threads are run from the jacks through the brasses 38 in the usual way, and the brasses are supported as is customary and convenient. The single drum units 37 are mounted on any suitable frame, not specified in the diagram, and provided with a drive 39 and countershaft 40. On these countershafts are mounted the receiving pulleys 41 which are driven by belts 42 from the motors 43.

The central arrangement affords also the possibility to handle the individual drums by means of a simple rotary jib, not shown in the diagrams.

5 As these individual drums are the only parts to be transported and exchanged in the working process, and all other machinery is stationary, it is obvious that any auxiliary devices, as for instance thread-break stop
10 mechanisms or counting registers can be installed permanently and utilized to the full benefit that they may accord. These additional helps tend to make the whole process more automatic and independent of the personal attention and skill of the warper. The
15 new process in its completeness also facilitates a division of labor between skilled and unskilled help hitherto impossible.

Another immediate advantage of the
20 drum unit system is the practical elimination of any danger of rolling. The side pressure cannot exert its influence in the small distance of twelve inches, the presumable widths of the drum units between the
25 flanges 37^a, which would correspond to the usual widths of a warp furnished by one jack. It is therefore possible and advantageous to increase the capacity of the drum and therewith the length of warp, up
30 to a reasonable limit, which will greatly depend upon the capacity of the spools. These increased capacities in themselves will result in longer productive runs and reduce the number of repetitions of unproductive
35 drawings-in, or introduction of extraspools and so forth. As millings can be made of almost any desired length, they may be made sufficient for several warps. For instance, if there were 50,000 yards on the composite
40 drum, they could be beamed onto 5 beams, thus making 5 separate 10,000 yard beams.

The running-on department can be separated from the beaming department, the transportation and mounting of the drum
45 units as well as the filling of the jacks with spools being attended to by juniors or unskilled labor.

The different phases of the new warping process would then be the following.

50 The filling of the jacks with threads of the exact required length and quality could be done by minors or helpers. Then the warper draws the threads through the brasses and fastens them to as many individual drums as seems practical and
55 convenient to run simultaneously.

After these individual drums are filled they are transferred to the beaming-off department where they are simply filed and
60 assembled upon the common shaft of the warp mill. From this point on the operations are analogous to those of the old process, except that in the beaming-off also automatic thread-break-stop machinery can
65 be applied to its fullest advantage. All

dangers of "rolling" and "smashing" however are eliminated by the new process and no unproductive interruptions of any appreciable lengths need occur.

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

1. A composite warping process comprising the filling of separate and individual warp drums of similar construction and capacity with threads of predetermined quality and length, the assembling of these individual drums into a composite warp drum and the substitution of this composite warp drum for the integral one-piece warp drum in the usual process of beaming-off warps, as hitherto practiced.

2. A composite warping process, comprising the winding of a warp thread onto a multiplicity of warp mills, and the assembling of the separate thread-quantities of these mills upon a drum of higher thread-capacity, adapted to be beamed-off onto beams or bobbins; suitable to enter a weaving machine.

3. A composite warping process, comprising the simultaneous filling of a multiplicity of separate warp cylinders, adapted to be assembled upon a common shaft, so as to form a warp cylinder of greater width, suitable to be unwound onto the several beams which enter the loom.

4. The combination with a warping process, consisting of filling a multiplicity of warp mills with removable drums; of a beaming-off process comprising the assemblage of the filled removable drums upon a common shaft, and the subsequent simultaneous beaming-off of these various drums, onto beams adapted to enter a loom.

5. A composite warping process, consisting in completing the running-on of the single warps, resulting from the unwinding of separate bobbin frames, on as many separate warp drums, and beaming them off simultaneously, onto beams or bobbins, suitable to enter a weaving machine.

6. In a composite warping process, consisting essentially in "running on" threads from bobbin frames to several sectional warp drums of smaller capacity, assembling them into a warp drum of larger capacity and beaming this composite drum off onto beams, adapted to enter a loom, the employment of a polygonal warp drum shaft, a plurality of separate drums, with hubs perforated to fit this polygonal shaft, said drums being adapted to be used separately or in aligned assembly in the running-on and beaming-off of the warp.

7. A composite warping process, comprising the employment of stationarily placed bobbin frames, the employment of a multiplicity of warp mills, corresponding in capacity to each one of the bobbin frames, the

assembly of these warp mills, in alignment with their corresponding bobbin frames, into a simultaneous working unit and the assembly of the finished warps into a working unit
5 for the simultaneous beaming-off onto beams adapted to enter a loom.

In testimony whereof, I have signed my

name to this specification in the presence of two subscribing witnesses, this 17th day of September 1921.

CLEVELAND WHITLOCK.

Witnesses:

ALBERT F. MORIARTY,

E. J. HOLLAHAN.