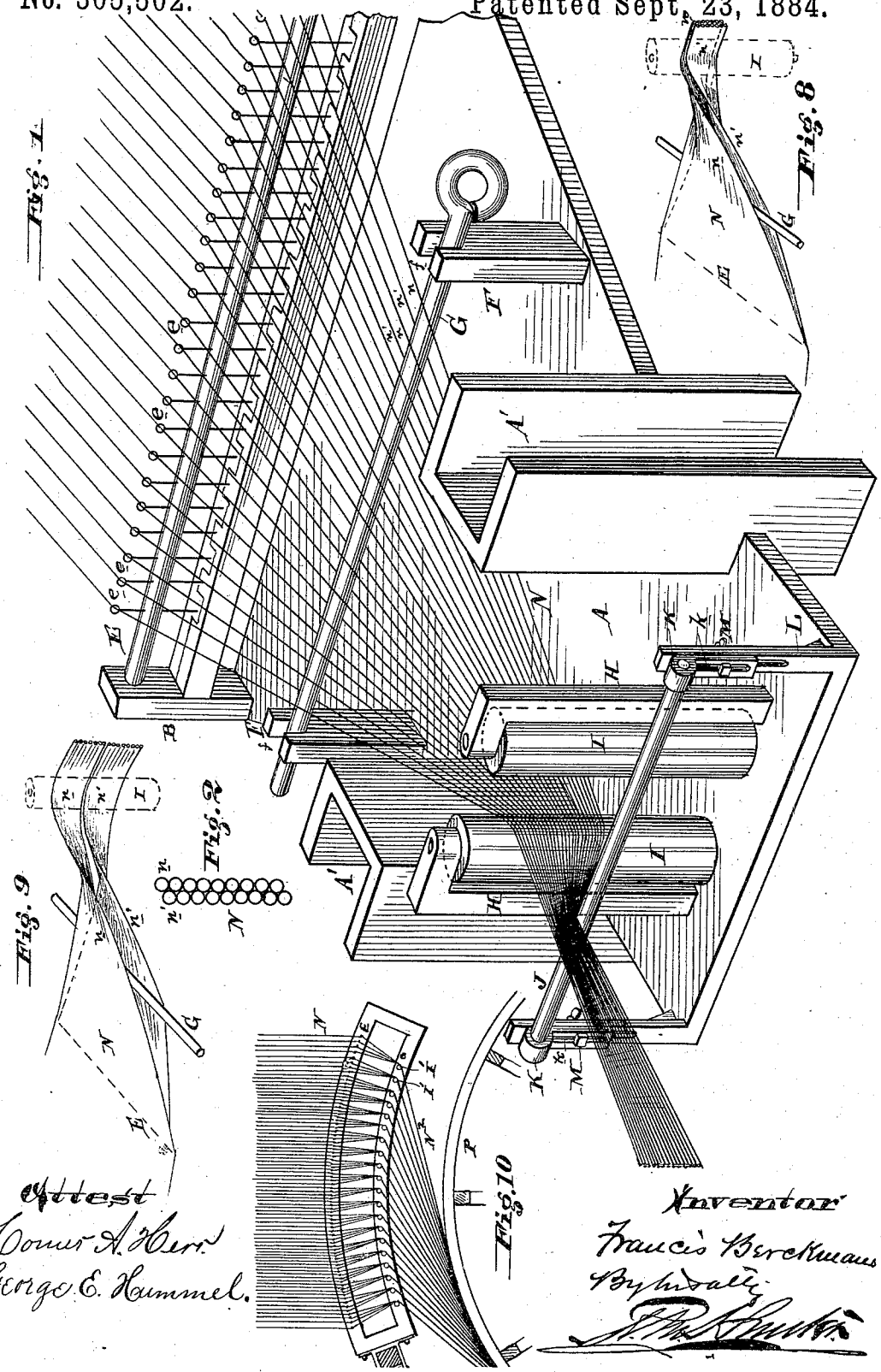
(No Model.) 2 Sheets—Sheet 1.

F. BERCKMANS.

WARPING MACHINE.

No. 305,502. Patented Sept. 23, 1884.



Attest
Homer A. Herr
George E. Hammel.

Inventor
Francis Berckmans
By his Atty
[illegible]

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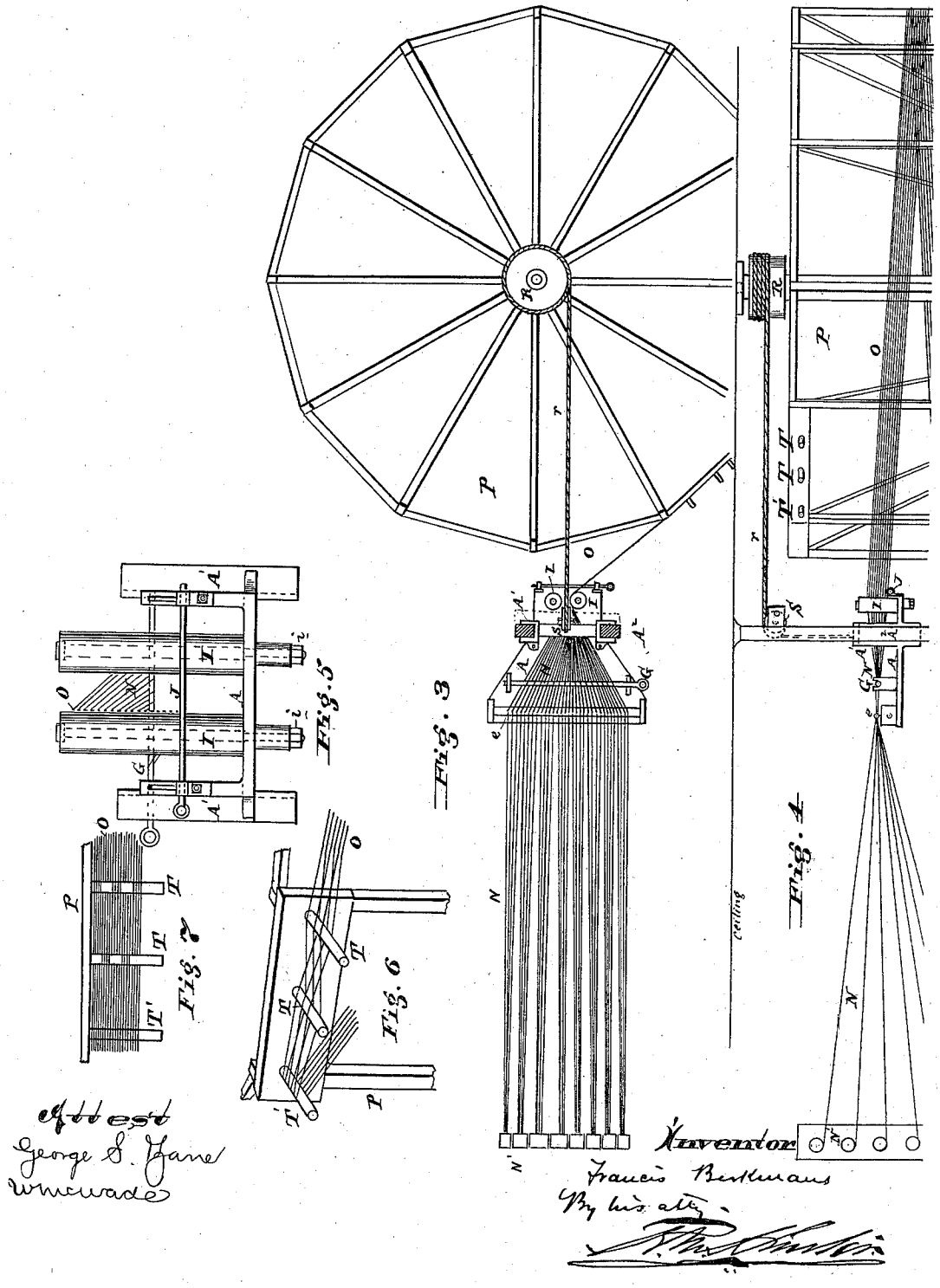
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2 Sheets—Sheet 2.

F. BERCKMANS.

WARPING MACHINE.

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UNITED STATES PATENT OFFICE.

FRANCIS BERCKMANS, OF GLOUCESTER, NEW JERSEY.

WARPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 305,502, dated September 23, 1884.

Application filed July 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS BERCKMANS, of the city of Gloucester, county of Camden, and State of New Jersey, have invented an Improvement in Warping-Machines, of which the following is a specification.

My invention has reference to warping-machines; and it consists in certain improvements fully set forth in the following specification and shown in the accompanying drawings, which form part thereof.

In the drawings, Figure 1 is a perspective view of my improved device for placing the warp-threads in open lease upon the reel of the warping-machine. Fig. 2 is a cross-section through the yarn as it passes to the reel. Fig. 3 is a plan view of my improved warping-machine as an entirety. Fig. 4 is a side elevation of same, showing a portion of the reel. Fig. 5 is a front elevation of the mechanism for causing the threads to arrange themselves in open lease. Fig. 6 is a perspective view of the thread-lease arranged on the pins at top and bottom of the reel when using my improvements. Fig. 7 is a plan view of the pin-lease as is commonly used at one end of the reel, (the same not being in thread-lease.) Fig. 8 is a perspective view illustrating one arrangement of the threads with my device, showing them as forming two layers in open lease. Fig. 9 is a similar view showing the arrangement of the threads somewhat modified, and Fig. 10 is a plan view of the kind of machine most in use at the present time for warping yarn.

As at present carried on, threads N are passed through the heck E, (see Fig. 10,) and then they are caused to pass in fours between the pins I', and when the threads pass to the reel P they consist of compound threads N^2, each formed of four separate threads. These compound threads N^2 lie upon each other, they being placed upon the reel in any manner they automatically assume, and the same may be said of the threads which form the compound threads N^2, from whence it is perceived that these threads may twist and tangle in being delivered upon the reel, and also when removed therefrom, and in handling in the subsequent operations of sizing, dyeing, and dressing for the warp-beams of the looms. The great objection to this method of making the warps is not readily perceived until the yarn has passed into the warp-dressing department, for here the threads have to be separated and laid uniformly and evenly upon the beams, and the yarn, after being dyed, must be divided for pattern-work. Now, in the first instance, if the threads should in anywise become tangled or twisted together the dresser encounters great difficulties, and unless he operates with great caution the threads will be broken, involving a great loss of time and injury to the warp, and from this lack of the threads being arranged in open lease the operator must slowly brush them forward and backward to insure the threads separating and not breaking, and which operation takes up much valuable time and makes the cost of dressing a warp far in excess of what it should be. In the second instance, in splitting the warp for pattern work caution and slow progress must be resorted to; otherwise the threads, which are always more or less tangled, would be broken, and, if so, great trouble is experienced in finding the ends and bringing them once more into their proper position.

The object of my invention is therefore in part to overcome these existing objections by causing each and every thread to automatically arrange itself upon the reel in open lease, whereby no two threads are enabled to become tangled, so that when the said warp is taken to the dressing-department it may be split readily in strands of any desired number of threads to be subsequently made up into pattern-warps, and when placed upon the warp-dressing machines the machine may be run almost continually and with great speed.

These improvements are particularly advantageous when treating single-thread yarns, which are so delicate as to be incapable of withstanding anything but the most gentle manipulations, and in which the slightest tendency to tangling insures great loss of time and annoyance in the dressing-department. In using single-thread yarns it is evident that if the yarn should break it would tend to untwist, and if laid in with several other threads it would be almost impossible to adjust it properly in its true position again, and as in practice the reel will often revolve once or twice

before the operator stops it after a thread breaks, the work of finding the broken thread and endeavoring to bring it in its proper position is much labor and a slow operation, and practice indicates that it is almost an impossibility, as the warp, when removed from the reel and taken to the dressing-department, shows that the threads in many instances are crossed and recrossed, making rapid dressing an utter impossibility. If a thread should break with my machine, the operator simply passes around the reel until the end is found, and then, after attaching a thread thereto, passes his hand through the warp, dividing it, so as to allow the thread to lie in its proper place, and walks around the reel and unites the broken thread, and once more proceeds. The result is that there is no crossing or tangling of threads in any manner, no matter how many breaks may occur.

My improvements are also adapted to a ready arrangement of the threads upon the reel-pins in open lease at both ends, this operation being done in an instant, whereas with the present method the threads which pass between the pins in fours must be separated one at a time on the fingers until all are taken up twice, when they are placed upon the pins in thread-lease, which operation is extremely slow; and as there is no surety as to which of the threads are taken up first such a thread-lease at each end would be practically useless; hence in practice one end only is arranged in thread-lease and the other end in pin-lease, in which the threads are gathered upon the fingers as before, only this time four threads at a time. With my method of arranging the threads in thread-lease at each end, I am enabled to start at either end of the warp in dressing or splitting, as I have a thread-lease at each end, and if a knot should prevent further progress from one end I can readily begin from the other end.

In warping-machines such as illustrated in British Patents No. 645 of 1869, No. 2,296 of 1856, No. 978 of 1863, and United States Patent No. 110,225, of 1870, which substantially represent the state of the art so far as patents are concerned, the devices used to handle and dress the yarn are all more or less complicated, and are incapable of accomplishing the results accomplished by my machine.

These machines could not handle a delicate single-thread yarn, as the means employed to clear the yarn of knots, lumps, &c., and separate the threads would produce sufficient friction to continually break them, and in many of the devices the yarns would tangle greatly before reaching the reel.

Referring to the drawings, A is a bed plate or frame, which may be made, in any suitable manner, of wood or iron, or a combination of both, and provided with suitable guides, as at A'.

B are uprights or standards, and support the heck E, which is provided with the guide-eyes *e*. These standards B are arranged at one end of the bed-plate, and at the other end are arranged standards L, which support and guide the adjustable pieces K, provided with vertical slots *k*, through which bolts M pass, to secure them in any desired position upon the standards. It is evident that these adjustable pieces K and their supports may be greatly modified, if desired.

Supported by the pieces K is a rod, J, or they may support a roller in lieu of said rod, the function of which is to guide the layer of threads after it passes from the rollers I, and before it passes to the reel, causing it to be fed thereon uniformly, and also to cause the threads forming the layers *n n'* to lie close together and occupy as little space as possible consistent with the threads remaining parallel to each other. Immediately behind said rod J are supports or bearings H of any suitable construction, preferably open at the top, (to allow the hand to be run down the yarn to find the end of a broken thread and in making a thread-lease on the reel-pins,) in which are loosely journaled the two vertical guide-rollers, I; or, if desired, the supports or bearings may be dispensed with and the rollers supported by vertical pins *i* alone, as shown in Fig. 5. Located between said rollers I and the eyes *e* are standards F, having slots *f*, which support the rod or bar G, adapted to separate the yarn into open lease.

The warp-threads N pass from bobbins N' through the eyes *e*, and one-half of them are guided above the bar or rod G, and one-half are guided below the same, being arranged alternately above and below, as shown, whereby all of the threads are kept in proper order and are guided to the rollers I, around which they pass one above the other in a single or double layer. This rod G separates them into open lease, and causes them to lie side by side without twisting or tangling when turned, and arranged vertically one above the other in passing over the rollers I, as shown in Fig. 1. The threads leave the heck separated from each other to a considerable extent; but after being arranged in open lease by rod G they pass around the rollers I close together; and in practice it is most desirable to adjust the guide-rod J, so that the two layers of yarns *n n'*, forming the warp, shall lie upon each other in passing around rollers I, as shown in Fig. 8, and also Fig. 2, for then they lie compactly and do not take up too much room vertically upon the reel. By depressing the guide J sufficiently the two layers *n n'* may be made to lie in the same plane one above the other in passing around the rollers I, as shown in Fig. 9, or the same result may be produced by raising the rod G, or making it of great diameter. It is evident that only one roller I might be used; but in that case to reverse the machine it becomes necessary to remove the threads and place them on the other side of the roller. After being drawn into flat layer or layers of yarns by rollers I they pass

over the rod or roller J to the warp-reel P and lie upon said reel in open lease.

The devices described and shown in Fig. 1 are arranged to move vertically up and down in a suitable frame, as is customary in machines of this class, and as clearly shown in Figs. 3 and 4.

The frame may be provided with guides A′, which slide upon uprights A^2, and the said frame A, with its devices raised or lowered with a speed commensurate with the speed of rotation of the reel by means of rope *r*, pulley S, and drum R, on the axis of the warp-reel P, which is provided both at top and bottom with the usual pins, T T and T′, the two former being used to arrange the yarn in thread-lease, and the latter to allow the yarn to be drawn over when changing the direction of rotation of the reel. After the reel has been filled from bottom up the yarn is arranged in thread-lease over the two pins always found on the upper end of said reel, and the same again over the pins at the bottom of the reel when it has been filled in the downward working of the machine.

The open lease on the reel is produced as follows: When the reel is full and the upper pins, T, are reached, the threads are arranged alternately above and below said pins T in their proper order, and this is easily done as each thread is separate and distinct on the rod G, and when all of the yarn-threads are arranged on said pins in open thread-lease the yarn is passed over pin T′ and the reel reversed. The frame A is now fed downward, and after the reel is again filled and the lower pins are reached the same operation of laying out the threads in open thread-lease is again had recourse to, and, as the arrangement of the threads is always carried on from one end of the rod G, the innermost thread on the upper pins corresponds to the innermost thread on the lower pins, and so on. In all cases I am enabled to use open thread-lease, as from the automatic arrangement of my threads they can be adjusted alternately on the pins instead of placing four or more threads alternately, as is at present used on the upper reel-pins. If said warp-reel is rotating in one direction, the warp-threads are drawn against one of the rollers I, but when it is rotating in the opposite direction the warp-threads are drawn against the other roller.

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

1. The combination, with the warp-reel P, of the heck E, provided with guide-eyes *e*, the rod G, the rollers I, the frame A, for supporting said parts, and means for raising and lowering said frame, substantially as described.

2. The combination, with the warp-reel P, provided with the pins T T′, of the heck E, provided with the guide-eyes *e*, the rod G, the rollers I, the frame A, for supporting said parts, and means for raising and lowering said frame, substantially as described.

3. The combination, with the warp-reel P, of the heck E, provided with guide-eyes *e*, the rod G, the rollers I, the rod J, the frame A, for supporting said parts, and means for raising and lowering said frame, substantially as described.

In testimony of which invention I hereunto set my hand.

FRANCIS BERCKMANS.

Witnesses:
R. A. CAVIN,
JOHN W. STEWARD.