July 26, 1932. J. M. BAHIMA PUIG ET AL 1,869,277

IMPROVED WARPING FRAME

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FIG. 1

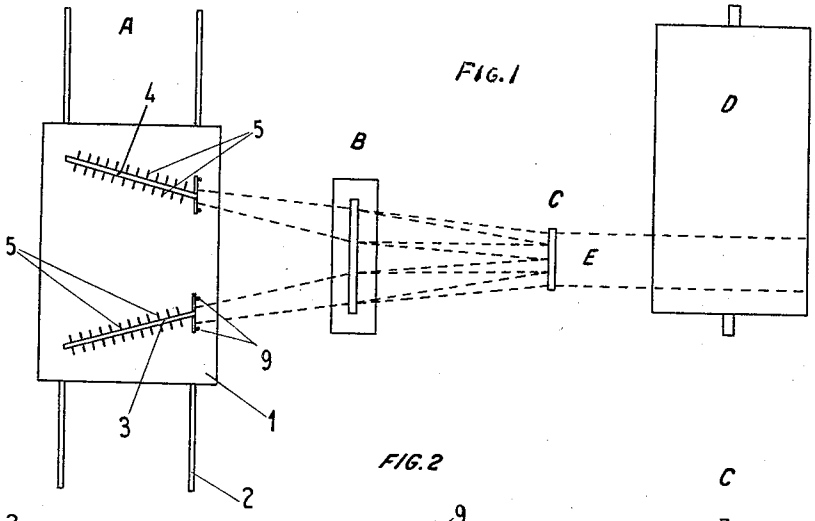


FIG. 2

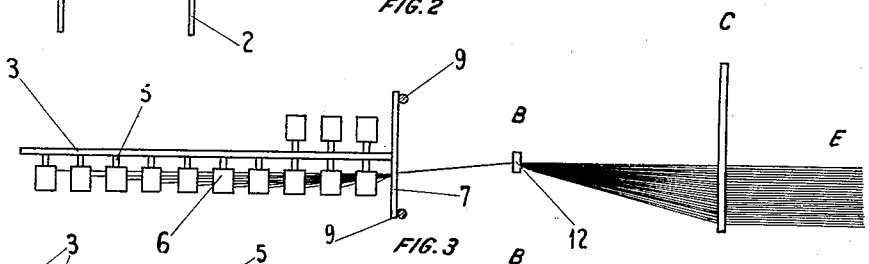


FIG. 3

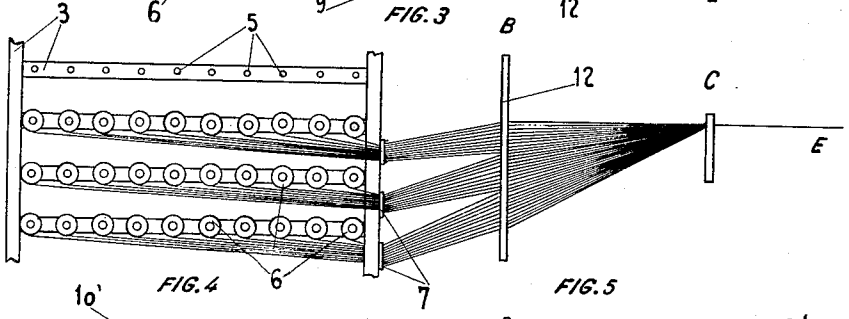


FIG. 4

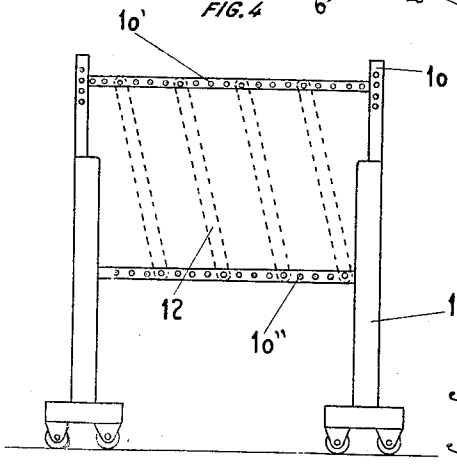
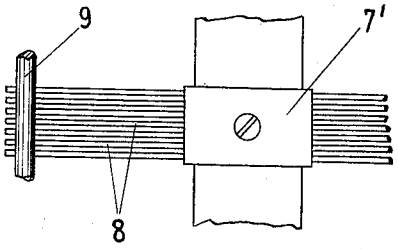


FIG. 5



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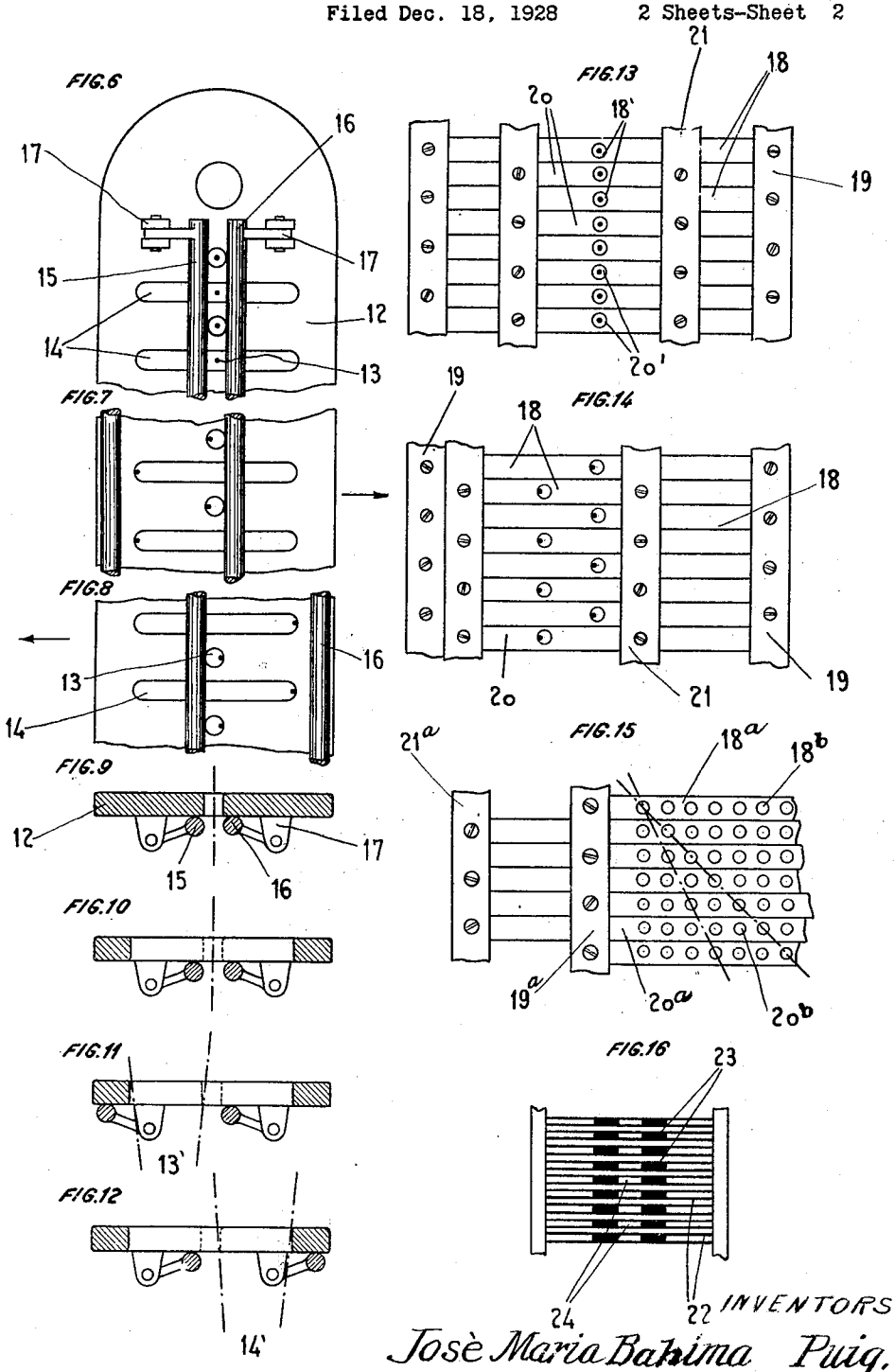
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UNITED STATES PATENT OFFICE

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IMPROVED WARPING FRAME

Application filed December 18, 1928, Serial No. 326,781, and in Spain September 12, 1928.

This invention relates to an improved warping frame.

In the warping frames at present in use, by the disposition of their component parts, the number of threads of each hank of warp formed is extremely limited, amounting at the very most to 400 as the practicable maximum, so that in the case of fine threads, of silk, for example, it is necessary to prepare a great number of hanks for each warp beam. For this reason the operation in question is always slow and expensive, since if it is attempted to increase the number of spools, the frame in which they are carried becomes extremely cumbersome and of little practical use. Serious difficulties also arise in the passage of the threads and the formation of the double cross at each hank obtained.

Furthermore, the varying frames of the kind referred to have the disadvantage that arises from the arrangement of the spools in the respective frames which results always in the greatest difficulty in knotting broken threads when such are not in the first series and therefore within reach of the hand of the operator.

In the warping frame of the present invention the formation of the whole of the warp can be effected at one time of any width, even when threads of silk have to be dealt with, in which case they have to be very great in number amounting to 20,000 or more.

In addition to the advantages which this warping frame presents, is the advantage that all the spools of thread are within reach of the hand of the operator in such a way that the operations of substituting them and knotting the broken threads can be carried out in a simple and convenient manner, and therefore with a great economy of time.

The warping frame herein referred to is hereinafter described with reference to the accompanying drawings in which the combination of elements composing it are represented diagrammatically by way of example.

In Figure 1 is shown in plan the whole of the improved warping frame.

Figures 2 and 3 show respectively in plan and in elevation the arrangement of the threads from the spools in which they are wound on to the winding drum of the hank formed.

Figure 4 shows in elevation the arrangement of guides for the threads leading from the frame which carries the spools.

Figure 5 is a detail of the frame which carries the spools just referred to.

Figures 6 to 12 inclusive are detail of one form of thread guide shown in Figure 4, in different phases of use and

Figures 13 to 16 are modifications of the said thread guide.

The warping frame described comprises: a frame A for carrying the spools, a movable thread guiding device B, a comb or reed with vertical teeth C and a winding drum D for the hank which is formed.

The reed C and the drum D are those commonly employed in the present warping frames, so that there will be no object in specially mentioning them in this description nor showing them in the accompanying drawings.

The frame A which carries the spools consists of a horizontal platform 1, mounted on wheels and adapted to move along the guides 2 arranged parallel to the shaft of the winding drum D. Mounted upon the platform are two vertical spool-carrying members 3 and 4, arranged to converge towards the said drum D and carrying on both sides thereof rows of spindles 5, for supporting the spools 6. The separation of the said members 3 and 4 may be as desired, but it is preferable to adopt that which is most convenient so that the operation of changing the spools can be freely performed.

At the front part of each of the members 3 and 4 is arranged a thread guide 7 for each row of spindles 6 (see Figure 5). This thread guide may be of any type of construction but in the example illustrated in the drawings it is formed by a series of teeth or spikes 8 (see Figure 5) (as many as there are spools plus one, including the respective row) duly spaced apart and fixed to a plate 7′ which in turn is fixed to the said member at its edge. As the arrangement of spools is symmetrical on both sides of each member the thread

guide mentioned may be double as is shown in the drawings, which facilitates its construction and erection. In order to prevent the threads from disengagement with the thread guide mentioned, when the frame A or the arrangement B is moved, there is provided a vertical rod 9 carried by the platform 1 and disposed adjacent and at right angles to the teeth 8 of said guide. With regard to the details of construction of the said frame, its dimensions, forms, accessories and materials employed therefor may vary.

The thread guiding device B consists of a frame 10 arranged vertically and carried by a support 11 of any system of construction and movable in any direction. In the frame 10 are mounted rods or bars 12, arranged vertically or inclined as shown in the drawings. In order to permit the use of bars of definite lengths the top cross bar 10^1 of the frame is adjustable in position and both the top cross bar and the lower one 10^{11} are provided with a series of holes for the fixation of the rods or bars 12.

The bars 12 may be of various patterns and in the case illustrated in Figures 6 to 12 they are of rectangular section and provided at their centres and longitudinally with holes 13 suitably spaced apart and between every two holes a transverse groove 14 is formed. On the face of the bars 12 which face the drum D, hinge devices 17 are provided at their ends and at convenient intermediate positions. The hinged devices 17 which extend the whole length of the bars are arranged in such a way that when they are drawn back towards the centre of the bar (see Figure 6) there is left between them a space which is practically equal to the diameter of the holes 13, and when they occupy the contrary position they leave the transverse grooves 14 completely uncovered.

In the modification of the bars 12 shown in Figures 13 and 14, they are formed as a series of small plates 18 provided with central holes 18^1, mounted between parallel bars 19, and spaced apart so that there pass between every two of them, other strips 20 similar to the first, with a hole 20^1 at its centre and mounted in their turn on the bar 21. The separation between these two bars 21 is less than that of the bars 19 and in this form, by means of the arrangement of guiding elements of a suitable kind, a lateral movement of the strips 20 with their bars 21 lengthwise of the strips 18 can be obtained as indicated in Figure 14. The form in which this bar is used for the formation of the silver with the threads which pass through the holes 18^1 and 20^1 will clearly be seen.

A modification of this construction is shown in Figure 15, in which the strips 18^a mounted on the bars 19^a, extend over the entire width of the frame 10, and are provided with holes 18^1 over their entire length for the passage of the threads and in like manner the movable strips 20^a are also constructed and supported on bars 21^a. This construction has the advantage that it permits of the rapid formation of lines of holes 18^b, 20^b of more or less inclination according to the particular requirements in each case.

Finally in Figure 16 is shown another modification of the bar 12 which is constituted by a comb or reed in which the small plates 22 are suitably separated from each other. Furthermore, every two of the said small plates are connected by members 23 forming a central passage 24. This system of construction of the bars 12 is similar to the general case described and requires the use of spindles 15 and 16.

The preparation of the warping frame with the warps described is effected as follows:

The spools 6 having been placed in the frame A and the bars 12 with the spindles 15 and 16 as shown in Figures 6, 9 and 10, the threads are passed from the spools in each horizontal row through the thread guide 7 corresponding thereto. For the sake of greater clearness in this description four bars 12 will be used one for each of the faces of the two members 3 and 4 of the frame which carries the spools. The threads on leaving 7 proceed to the respective bar 12, the preceding ones of the upper row of spools occupying the upper part of the bar mentioned. The threads referred to pass alternately through the holes 13 and through the grooves 14, and enter between the spindles 15 and 16 thus forming a surface of threads lengthwise of each of the bars, on leaving which the threads converge towards the comb or reed C through which they pass in a horizontal line. In the said comb or reed the preceding threads rejoin from all the bars 12 with which they unite to form the hank E which passes on to the winding drum D.

For the method of formation of the double cross in each hank of warp is as follows: As already stated the threads in each bar 12 pass through the holes 13 and through the central part of the openings 14 to enter between the spindles 15 and 16 (see Figures 6, 9 and 10). In this form the position of one of the spindles, 15 changes for example, and the whole of the arrangement B moves towards the right (in relation to the drawings) with the result that the threads which pass through the grooves 14 are applied against the extreme left of the corresponding grooves, but those which pass through the holes 13 are made to move in the same way, an opening having been formed through 13^1 (see Figures 7 and 11) through which the spindle passes. Accordingly the spindle 15 is disposed again in the original position and the spindle 16 draws back to the edge of the bar and proceeds in the same manner as before whereby an opening 14^1 (see Figures

8 and 12) is produced thus forming the double cross required.

It will be understood that with the warping frame herein described it is possible without any inconvenience to prepare warps of any width in one operation, that is to say apart from the formation of the hanks and the making up thereof it is sufficient that the comb or reed C be of the necessary amplitude in proportion to the convenient number of spools and the adequate number of bars 12 all of which can be accommodated in a very much reduced space.

The details of construction of the warping frame may be varied widely as may also its complementary elements.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a device of the character described, a thread guiding frame comprising a support, a plurality of bars carried by said support and having alternately disposed holes and slots formed throughout said bars, said holes and slots receiving and guiding the threads, and means associated with said bars for varying the respective positions of the threads received through the holes and slots of said bars.

2. In a device of the character described, a thread guiding frame comprising a support, a plurality of bars carried by said support and having alternately disposed holes and slots adapted to receive and guide the threads, and rods pivoted upon one face of said bars and movable to vary the relative positions of the threads received through the holes and slots of said bars.

3. In a device of the character described, a thread guiding frame comprising a support, a plurality of bars carried by said support and having alternately disposed circular holes and transverse slots formed substantially throughout the length of said bars, said holes and slots receiving and guiding the threads, and a pair of rods hinged oppositely to each other upon one face of the bars and movable to vary the respective positions of the threads received through the holes and slots of said bar, the relative positioning of said rods upon the bars being such that when in one of their positions, the space between them will be substantially equal to the diameter of the circular holes in the bars, and when in their opposite positions, the space between them will be substantially equal to the length of the transverse slots in said bars.

In witness whereof we have hereunto set our hands.

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