Nov. 3, 1931. R. LANGWIELER 1,830,279

DEVICE FOR MECHANICALLY LACING HANKS OF YARN

Filed Jan. 3, 1931 4 Sheets-Sheet 1

Fig. 2.

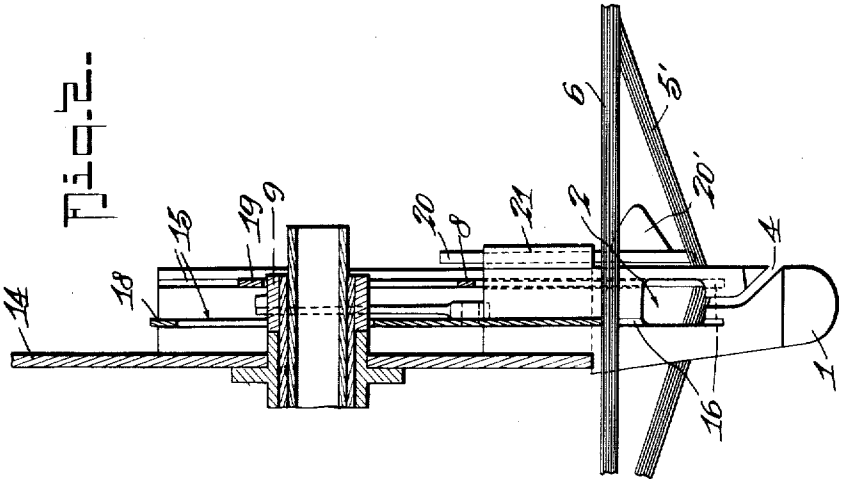
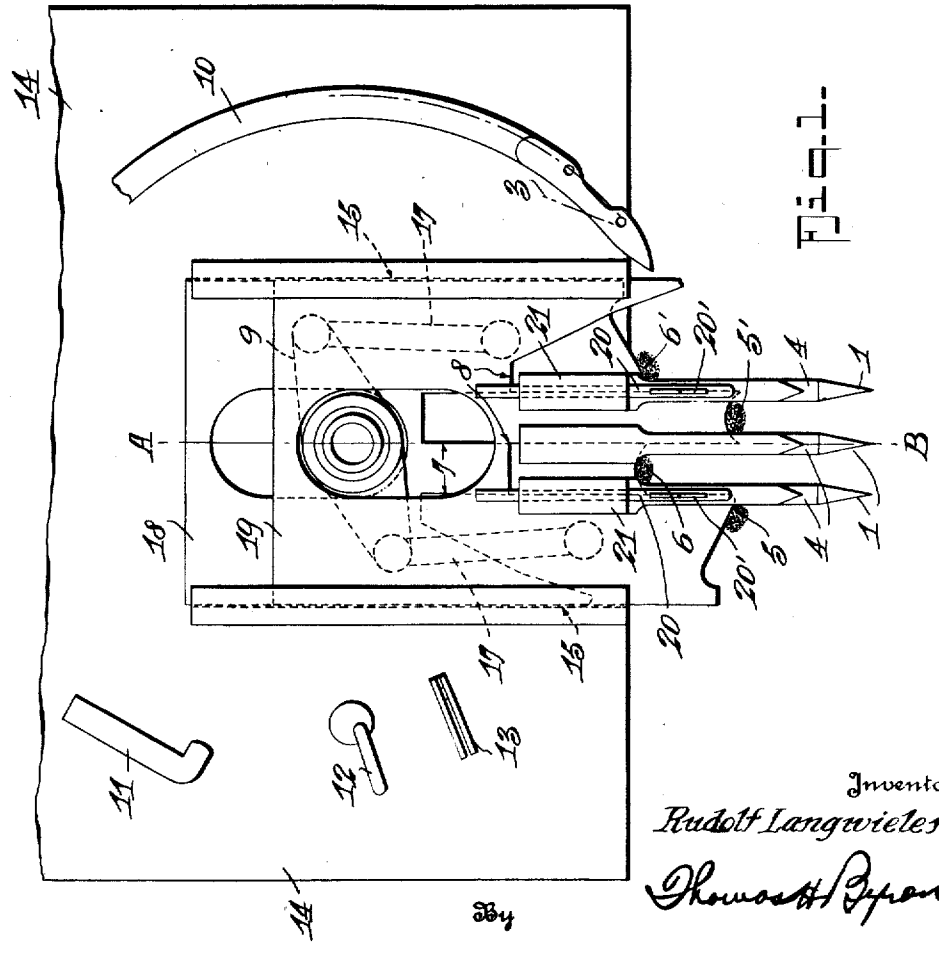


Fig. 1.



Inventor
Rudolf Langwieler.
By Thomas H. Dyson
Attorney

Nov. 3, 1931. R. LANGWIELER 1,830,279

DEVICE FOR MECHANICALLY LACING HANKS OF YARN

Filed Jan. 3, 1931 4 Sheets-Sheet 2

Fig. 3.

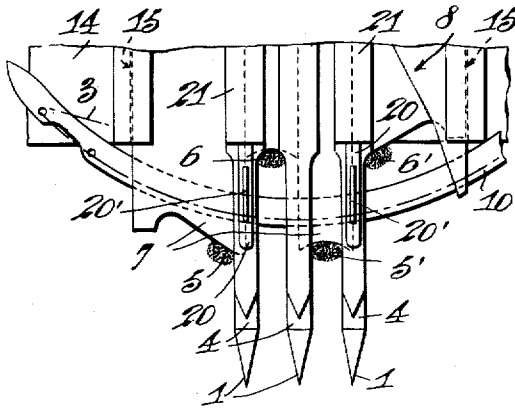


Fig. 4.

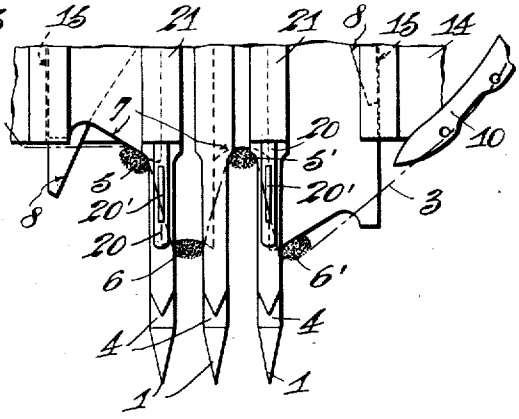


Fig. 5.

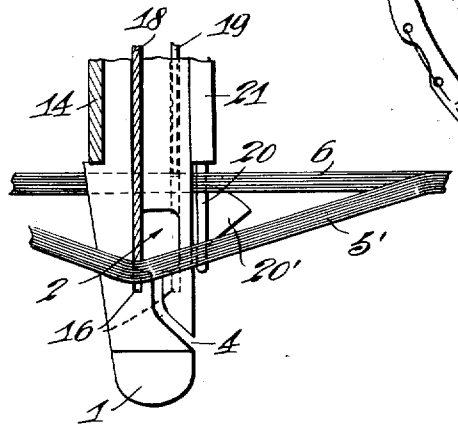


Fig. 6.

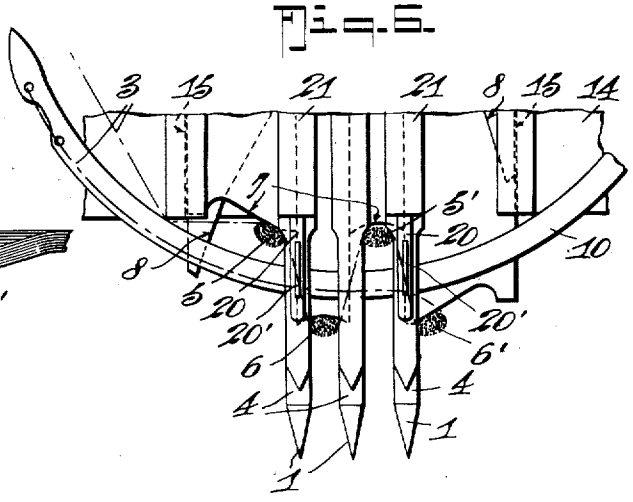
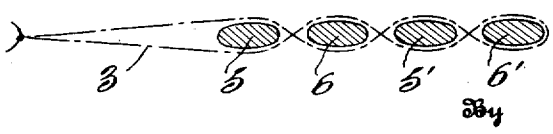


Fig. 7.



Inventor
Rudolf Langwieler.

By Thomas & Bacon

Attorney

Nov. 3, 1931. R. LANGWIELER 1,830,279

DEVICE FOR MECHANICALLY LACING HANKS OF YARN

Filed Jan. 3, 1931 4 Sheets-Sheet 3

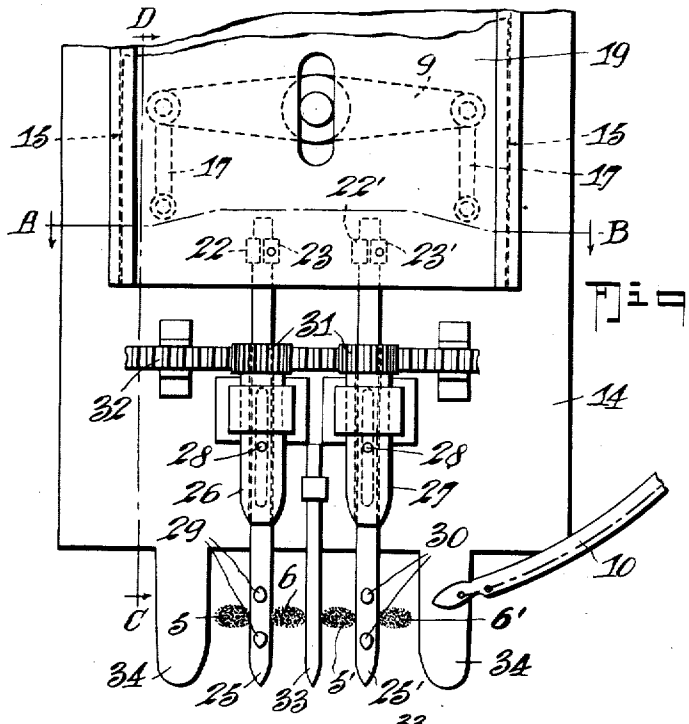


Fig. 8.

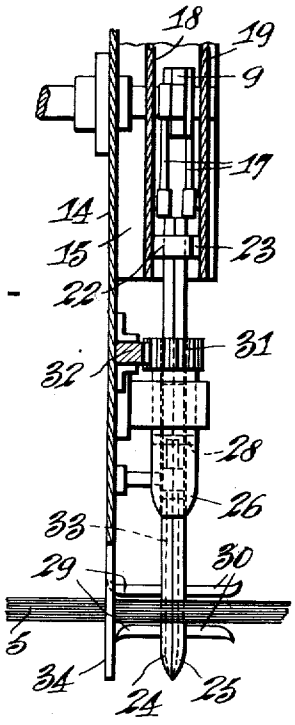


Fig. 9.

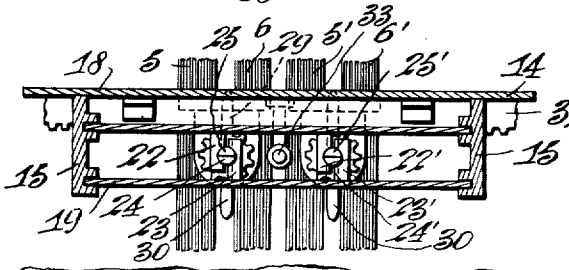


Fig. 10.

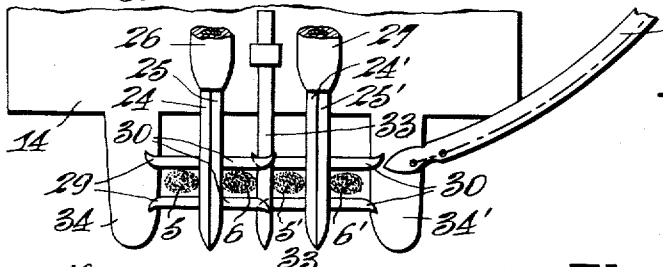


Fig. 11.

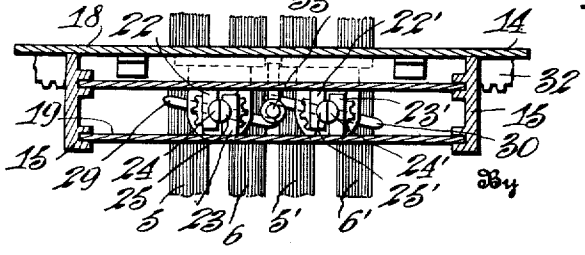


Fig. 12.

Inventor
Rudolf Langwieler.

By Thomas H. Byron

Attorney

Nov. 3, 1931. R. LANGWIELER 1,830,279

DEVICE FOR MECHANICALLY LACING HANKS OF YARN

Filed Jan. 3, 1931 4 Sheets-Sheet 4

Fig. 13.

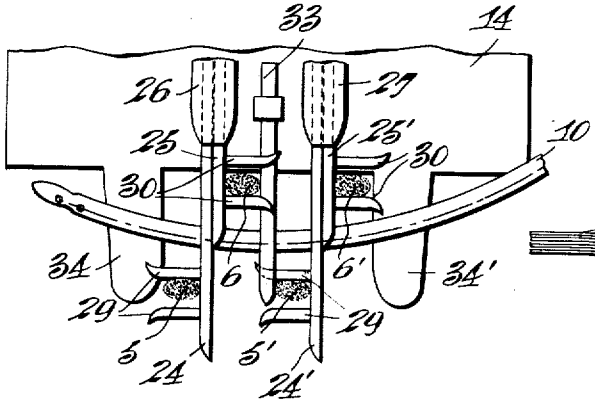


Fig. 14.

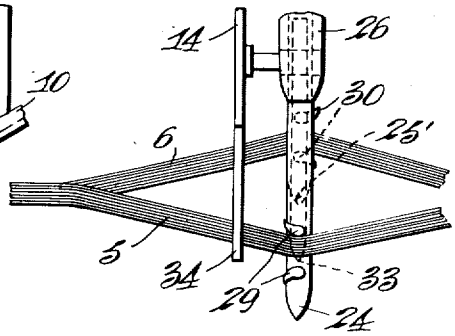


Fig. 16.

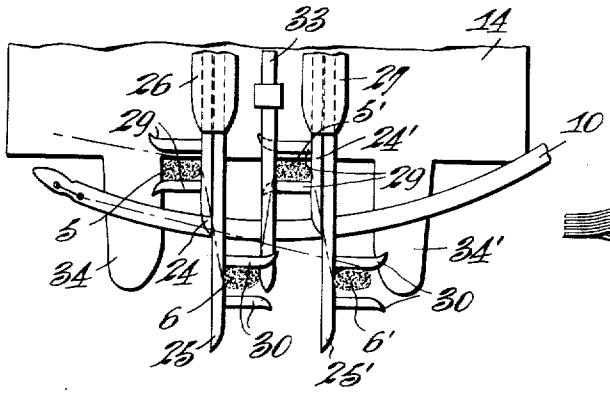
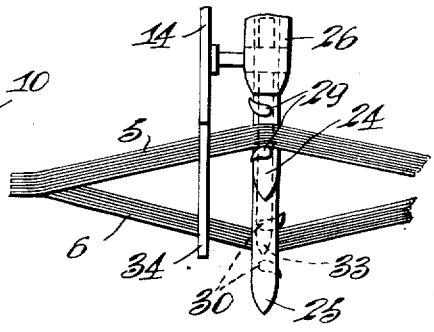


Fig. 15.



Inventor
Rudolf Langwieler.

By Thomas H. Byron

Attorney

Patented Nov. 3, 1931

1,830,279

UNITED STATES PATENT OFFICE

RUDOLF LANGWIELER, OF WUPPERTAL-OBERBARMEN, GERMANY, ASSIGNOR TO THE FIRM I. P. BEMBERG AKTIENGESELLSCHAFT, OF WUPPERTAL-OBERBARMEN, GERMANY, A CORPORATION OF GERMANY

DEVICE FOR MECHANICALLY LACING HANKS OF YARN

Application filed January 3, 1931, Serial No. 506,379, and in Germany July 29, 1929.

Originally the skeining of yarn hanks was effected in a simple manner by hand. The hank was divided by hand or by means of a lacing comb and the lacing thread drawn through first in one and then in other direction, zig-zag like, and the ends securely knotted so that a cross-wise binding, free from any running knot, was formed. This process had the disadvantage of being time-consuming to a considerable extent.

The subject of this invention is a mechanical lacing device which ensures a lacing free from running knots, and which, at the same time, operates in a thoroughly reliable and trouble-free manner and is of simple construction. The device consists of two slide members arranged on a supporting plate which are positively interconnected in such a way that when one moves upwardly the other moves downwardly. Each slide member is provided with downwardly directed dividing members. During the motion of the slide members the hank is alternately formed into a shed. Immediately adjacent and parallel to the said dividing members a swinging needle member is arranged, which guides the lacing thread through the shed formed. The dividing members may consist of tongue-shaped prolongations of the slide members which are notched at their ends for receiving the part-hanks and are so arranged with respect to one another that the tongues of the one slide member cover the gaps formed by the tongues of the other slide member.

In order to facilitate the division of the hank and to maintain the same division during the reverse motion of the slide-members it is advisable to arrange a special comb for the slide members. The prongs of the comb project out over the tongues of both dividing members so that on inserting the device first of all the hank is divided and thereupon only during the motion of the slide members the part-hanks are alternately stretched by the notches of the tongues, so that a shed is formed each time and the intermediate spaces which are produced permit the lacing thread to be smoothly passed through on practically a straight path. During the reverse motion following the first passage of the lacing thread the prongs of the comb remain in engagement, so that a sure maintenance of the same part-hank is ensured.

Preferably each prong of the comb has a rotary slider provided with a nose. In the starting position the nose of the slider lies in the direction of the threads; since it is narrower than the prongs it does not disturb the division of the hank when the device is inserted. Only after the part-hanks have been moved does the rotary disc actuate and the nose slides positively in the space between the part-hanks, as a result of which any depending threads of the upper part-hank are raised and united with the same, so that the needle device can pass freely through.

The dividing members may, however, also be constructed as separate dividing pins arranged on the sliding members. They consist of two halves which accurately fit on to one another throughout their whole length. Each half is provided with two transverse fingers disposed one above the other, the distance apart of which is adjusted to the thickness of the hank to be laced. Each dividing member is provided at its upper end with an annular groove or a collar and the slider plates are provided with a number of suitably constructed union members corresponding to the number of dividing halves, which embrace each annular groove or collar on both sides. The individual dividing members are rotatably mounted between these union members; for the purpose of rotation they have guiding members, provided with pinions, in which they are radially secured but are axially displaceable. A common movable toothed rod produces rotation of the pinions of the dividing member guides, and consequently of the dividing members themselves.

Between two dividing members consisting of the movable halves a simple dividing pin is arranged rigidly on the supporting plate.

In the position of rest the slide members are in the mean position; the dividing plane of each individual dividing member is parallel to the plane of the sliding members. The connecting members of each sliding member embrace the annular groove or the collar of each dividing member in such a way that the two halves are secured against axial displacement. In the position of rest, moreover, the fingers on the dividing members are vertical to the plane of the sliding members, so that the dividing members can be smoothly inserted into the hank. By displacement of the toothed rod the dividing members are rotated by way of the pinions and the guiding members in such a way that each of the connecting members of the sliding members on the two sides of the dividing members embrace only one dividing half. During the motion of the sliding members the halves of the dividing members provided with fingers disposed transverse to the hank are moved upwards and downwards, respectively. In this way, by the upward and downward motion of the part-hanks a shed is again produced, through which the lacing thread is guided by means of a needle arrangement. Since the shed is particularly well formed in consequence of the upward motion of the separate part-hanks, the passage of the needle arrangement is effected without any trouble, even in the case of yarn which is little suited for lacing.

The invention combines in itself several advantages. The cross-wise union, free from running knots is as yielding as the hand lacing referred to in the introduction; the hank may be loosened without any further preliminary to such an extent that it completely occupies the whole width of the lacing thread This represents a very considerable advantage, not only in dyeing but also in sorting. On the other hand the part-hanks in the lacing thread may be readily pushed together, which is advantageous when making bundles for transport purposes. Consequently the lacing device shows the further advantage that, in contradistinction to the known device, it permits simple and trouble-free insertion and withdrawal after lacing has been effected.

The drawings show two constructional forms of the invention by way of example.

Figure 1 shows in elevation a lacing device, in which the slide members are constructed as dividing members at their lower ends, in the first phase of the lacing process and with the lacing comb inserted in the yarn.

Figure 2 shows a section along the line A—B in Figure 1.

Figures 3, 4 and 6 show the device in further stages of the lacing process.

Figure 5 shows a section along the line C—D in Figure 4.

Figure 7 shows a section through the laced yarn at the point at which lacing has been effected.

Figure 8 shows in elevation another constructional form of the lacing device, having dividing pins on the slide members, during introduction of the same into the yarn.

Figure 9 shows a section along the line C—D of Figure 8.

Figure 10 shows a section along the line A—B of Figure 8.

Figure 11 shows in elevation the lower part of the lacing device after rotation of the dividing members, but before motion of the slide members.

Figure 12 shows another section along the line A—B of Figure 8 in which the dividing members are in the operative position.

Figure 13 shows the lower part of the lacing device after formation of the shed and with the needle arrangement passing through the same.

Figure 14 shows a side elevation of Figure 13.

Figure 15 shows a second shed, likewise with the needle arrangement passing through the same.

Figure 16 shows a side view of Figure 15.

The device consists of prongs 1 of a comb attached to a supporting plate 14 and two slide members 18, 19, provided with notches 7, 8, which slide in guides 15 of the carrying plate 14 and longitudinal grooves 16 in the prongs 1. The slide members 18, 19 are connected with a double-armed rocking lever 9 by way of links 17, which lever alternately moves one slide member upwards and at the same time the other slide member downwards. The prongs 1 are provided with apertures 2 having slots 4. A needle device 10 moves over a circular path through the said apertures 2. Further on the prongs 1 rotary slide members 20 are arranged in guides 21, the said slide members being provided with a nose 20′. Finally, on the carrying plate 14 there is a thread clip 11 and a thread-knotting device 12, 13.

During the lacing operation the device is inserted into the hank with the prongs 1 and the noses 20′ of the rotary slide members lying in the direction of the part-hanks, the hank being thereby divided into separate part-hanks. At the same time the slide member 19 presses the two hanks 5, 5′ in a downward direction, the hanks 6, 6′ remaining above, so that the apertures 2 in the prongs 1 are free, and the needle arrangement 10, known in itself and moving over a circular path, can draw the thread through (Figure 3). Before the needle arrangement 10 penetrates the apertures in the prongs the

rotary slide member 20 has been positively rotated through 90° in the space between the part-hanks, and in this way has lifted any depending threads, belonging to the upper part-hank up to the same, as a result of which the needle arrangement 10 has a free passage for its motion. The end of the thread 3 which is now drawn through the shed is secured by a clip 11, whereupon the needle arrangement 10 and the rotary slide member 20 return to their initial positions. Hereupon the two slide members 18, 19 interchange their position, so that now the hanks 6, 6′ are moved downwardly and the two hanks 5, 5′ are moved upwardly (Figure 4). In this way the lacing thread 3 takes up a zigzag position about the individual hanks. Before the lacing thread 3 is again drawn through the hanks by means of the needle arrangement 10 and is knotted at its end by means of a knotter 12 and tightening device 13, known in themselves, the nose 20′ rotates a second time within the space between the part-hanks. After the return of the needle arrangement 10 and the nose 20′ the device may now be withdrawn from the hank without any difficulty since the lacing thread 3 can readily leave the aperture 2 by way of the slot 4. As is seen in Figure 7, no running knot is in the lacing thread at the places of separation of the individual hanks, but the thread passes uniformly once over and once under the individual part-hanks.

In Figures 8–16 a further constructional form of the lacing device is shown. Two slide plates 18, 19 are arranged in guides 15 on the supporting plate 14; these slide plates are interconnected with a double armed lever 9 by way of links 17. On the slide plates 18, 19 connecting members 22, 23 and 22′, 23′ are alternately arranged; the said connecting members embrace an annular groove on the dividing pins 24, 25, 24′, 25′. The dividing pins 24, 25 and 24′, 25′ are divided along their whole length into two halves and they move in guides 26, 27. The dividing pins are prevented from rotating in the guides 26, 27 by means of pins 28, but they are capable of being displaced in the guides in an axial direction. Each dividing half is provided with two fingers 29, 30 and 29′, 30′. The guides 26, 27 carry toothed pinions 31 at the top; said pinions engage in a toothed rod 32. In addition, between the two dividing pins 24, 25 and 24′, 25′ a solid dividing pin 33 is provided. For the purpose of extreme limitation of the yarn hank tongues 34, 34′ are arranged on the supporting plate 14. The manner of operation of this device is as follows:

Before introduction into the hank the dividing pins 24, 25, 24′, 25′ are so positioned by means of the toothed rod 32 that the fingers 29, 30 and 29′, 30′ are parallel to the hank. The lacing device is now inserted transversely to the hank, as a result of which the part-hanks 5, 6 and 5′, 6′ are formed. Hereupon the dividing pins 24, 25 and 24′, 25′ are rotated by means of the toothed rod 32, by way of the toothed pinions 31 and the guides 26, 27, so that the fingers 29, 30, 29′, 30′ embrace the separate part-hanks, and, therefore, are situated transversely to the individual part-hanks. For the purpose of effecting the lacing, an upward or downward sliding of the slide plates 18, 19 is produced by rotation of the double armed lever 9, whereupon, in consequence of the connecting members 22, 23 and 22′, 23′ the dividing halves 24, 24′ are moved downwardly and the dividing halves 25, 25′ are moved upwardly. As a result of this operation a double shed formation takes place; it is impossible for individual threads to depend, since the part-hanks are completely embraced by the fingers 29, 30. 29′, 30′ (Figure 13). After this the lacing thread is carried through the shed by means of the needle arrangement 10. After the return of the needle arrangement 10 the slide plates 18, 19 are moved in opposite directions by means of the double armed lever 9 so that now the two dividing halves 25 and 25′ are moved downwardly and the two dividing halves 24 and 24′ are moved upwardly, whereby a shed is formed which is the reserve of that just mentioned (Figure 15). Hereupon the second half of the lacing thread is passed through the shed by means of the needle arrangement 10, after which the two ends of the thread are knotted in the known manner by means of a knotting arrangement and are cut off. After the return of the needle arrangement 10 the lacing device is again brought into the position of rest shown in Figure 8 and then withdrawn from the hank; the lacing is then completed as is seen in Figure 7.

What I claim is:

1. In a device for lacing yarn, in combination, sliding members interconnected one with the other, a supporting plate therefor, a plurality of dividing members attached to the side sliding members, the connection between these sliding members being such that the alternate raising and lowering of the members produces alternate sheds in a hank being laced.

2. A device as set forth in claim 1, in which a comb-like element is arranged at the lower ends of said sliding members.

3. A device as set forth in claim 1, in which a comb-like element is arranged at the lower ends of the sliding members, said comb-like elements possessing swinging portions which act to lift any depending filaments or threads of the hank.

4. A device as set forth in claim 1 in which the sliding members have associated therewith rotatable dividing members.

5. A device as set forth in claim 1 in which

the sliding members have associated therewith rotatable dividing members, said dividing members being maintained in a position parallel to the hank when the lacing device is not in operation, and capable of displacement when the device is in operation.

6. A device as set forth in claim 1 in which pinions are provided whereby a toothed rod may operate the said sliding members.

7. A lacing device for yarn hanks comprising a supporting means, two sliding members arranged on said means, said members being positively connected to one another and adapted to form an alternate shed in the hank, and a movable needle arrangement for introducing the lacing thread through the alternate shed of the hank.

8. A lacing device for yarn hanks comprising a supporting means, a double armed lever attached to said means, two alternately slidable parallel members arranged on said plate and connected with the double armed lever, said members ending in tongues provided with notches, the tongues of one sliding member being so arranged as to cover the gaps of the other sliding member and a needle arrangement adapted to lead the lacing thread on a path transverse to the shed formed by the slidable tongues.

9. A lacing device for yarn hanks comprising a supporting plate, prongs of a comb fixed at said plate adapted to form single part-hanks, a double armed lever oscillating on said plate, two slidable means connected to said lever and provided with means for forming the part-hanks into an alternating shed, and means for introducing the lacing thread through this shed.

10. A lacing device for yarn hanks comprising a supporting plate, prongs of a comb fixed at said plate and adapted to divide the hank into several bundles, a double armed lever pivotally mounted on said plate, two slidable means connected to said double armed lever and having tongue shaped elongations, said elongations moving alternately up and down being adapted to form the bundles into a varying shed, and means for leading the lacing thread through this shed.

11. A lacing device for yarn hanks comprising a supporting plate, prongs of a comb fixed at said plate and adapted to divide the hank into several bundles, a double armed lever pivotally mounted at the plate, two slidable means connected to said double armed lever and provided with means to stretch and press down the alternate bundles, tiltable noses fixed at the prongs of the comb adapting to swing into the formed shed and to lift depending threads of the bundles being in rest, and means for leading the lacing thread through the alternate shed of the bundles.

12. A lacing device for yarn hanks, comprising a support, a double armed lever pivotally mounted at said support, two slidable means connected to said lever and provided with means to divide the hank into bundles and alternately to lift and lower these bundles, and means for introducing the lacing thread into this alternate shed.

13. A lacing device for yarn hanks, comprising a support, two slidable means mounted on said support and capable of moving in contrary directions by positive interconnection, dividing members being radially secured by rotatable guide members, the dividing members consisting of two halves each half being provided with two fingers, said dividing members being moreover embraced by connecting means fixed at the slidable means and adapted to secure or release the halves in axial direction according to the rotation of the guide members and means for introducing the lacing thread through the shed formed by the fingers of the dividing means.

14. A lacing device for yarn hanks comprising a support, a double armed lever pivotally mounted on said support, two slidable means connected to the arms of said lever, rotatable dividing members consisting of two halves each of which being provided with two fingers, said halves being adapted to move in axial direction by influence of the slidable means, when the fingers are in transverse position, and a needle arrangement to introduce the lacing thread.

15. A lacing device for yarn hanks comprising a support, a double armed lever pivotally mounted on said support, two slidable means connected to the arms of said means, dividing members consisting of two halves and guided and radially secured by guiding members provided with pinions, a toothed rod for rotating alternately said guiding members with the dividing members, the halves of which provided with fingers and connected to the slidable means by connecting members, said members being adapted to prevent the halves from axial displacement when the fingers are situated parallel to the divided bundles of yarn, and to release the halves for axial displacement when the fingers are in transverse position to said bundles, and a needle arrangement for leading the thread in a curved path between the lifted and the lowered fingers of the halves.

16. A device for mechanically lacing hanks of yarn comprising, in combination, a support, sliding elements thereon and connected to one another adapted to form shears in the hanks, and a needle for lacing a tying string through the sheds thus formed.

17. A device as set forth in claim 16 in which means are provided to prevent the formation of loose filaments when the yarn hank is being laced.

18. A device as set forth in claim 16 in which means are provided to prevent the

formation of loose filaments when the yarn hank is being laced, said means comprising comb-like elements in operative connection with the sliding members.

19. A lacing device for yarn hanks comprising a supporting means, two sliding members arranged on said means, said members being positively connected to one another and adapted to form an alternate shed in the hank.

In testimony whereof I affix my signature.

RUDOLF LANGWIELER.

formation of loose filaments when the yarn hank is being laced, said means comprising comb-like elements in operative connection with the sliding members.

19. A lacing device for yarn hanks comprising a supporting means, two sliding members arranged on said means, said members being positively connected to one another and adapted to form an alternate shed in the hank.

In testimony whereof I affix my signature.

RUDOLF LANGWIELER.

CERTIFICATE OF CORRECTION.

Patent No. 1,830,279. Granted November 3, 1931, to

RUDOLF LANGWIELER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 122, claim 16, for the word "shears" read sheds; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of December, A. D. 1931.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

CERTIFICATE OF CORRECTION.

Patent No. 1,830,279. Granted November 3, 1931, to

RUDOLF LANGWIELER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 122, claim 16, for the word "shears" read sheds; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of December, A. D. 1931.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)