United States Patent [19]

Peter

[11] **3,789,887**

[45] **Feb. 5, 1974**

[54] **ARRANGEMENT FOR RECIPROCATING A WEFT INSERTER ROD**

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[22] Filed: **June 1, 1972**

[21] Appl. No.: **258,765**

[30] **Foreign Application Priority Data**

June 2, 1971 Switzerland 8030/71

[52] **U.S. Cl.** **139/123**

[51] **Int. Cl.** **D03d 47/00**

[58] **Field of Search** ..... 139/122 R, 127 R

[56] **References Cited**

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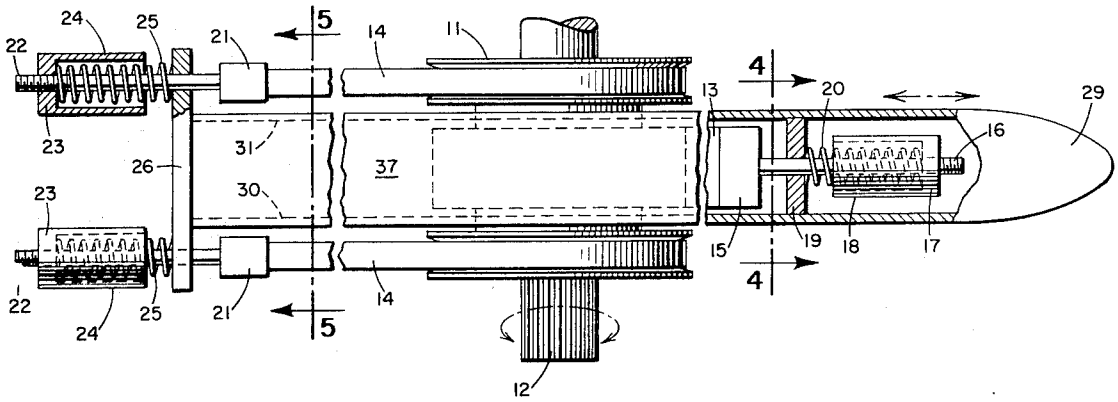
Attorney, Agent, or Firm—Donald D. Denton

[57] **ABSTRACT**

The present invention relates to an arrangement for reciprocating a weft inserter rod for inserting picks into a shed of a weaving machine. The arrangement comprises a driving wheel rotating in both clockwise and counterclockwise directions about a pivot and connecting means transmitting the movement of the driving wheel to reciprocating motion of the inserter rod.

12 Claims, 5 Drawing Figures



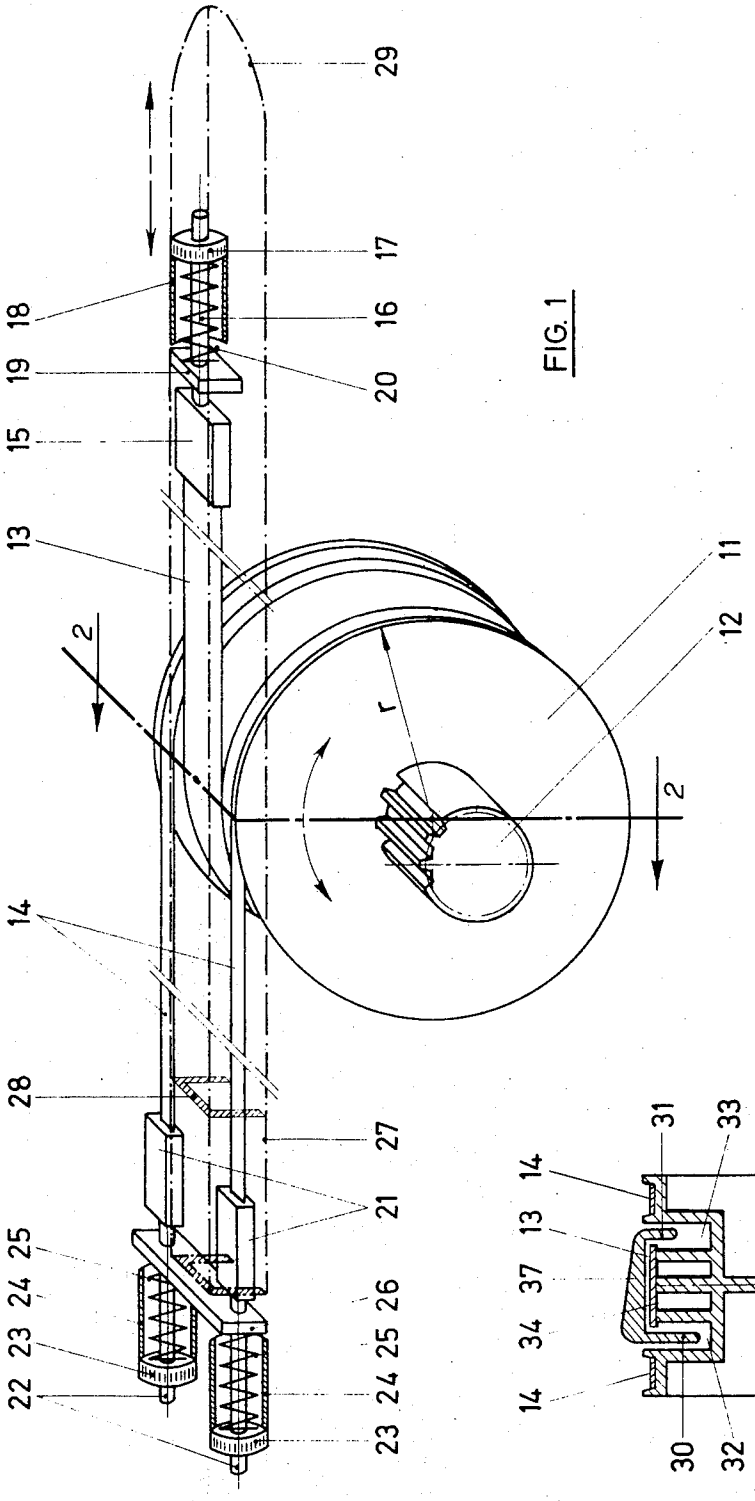

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FIG. 1

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FIG. 2

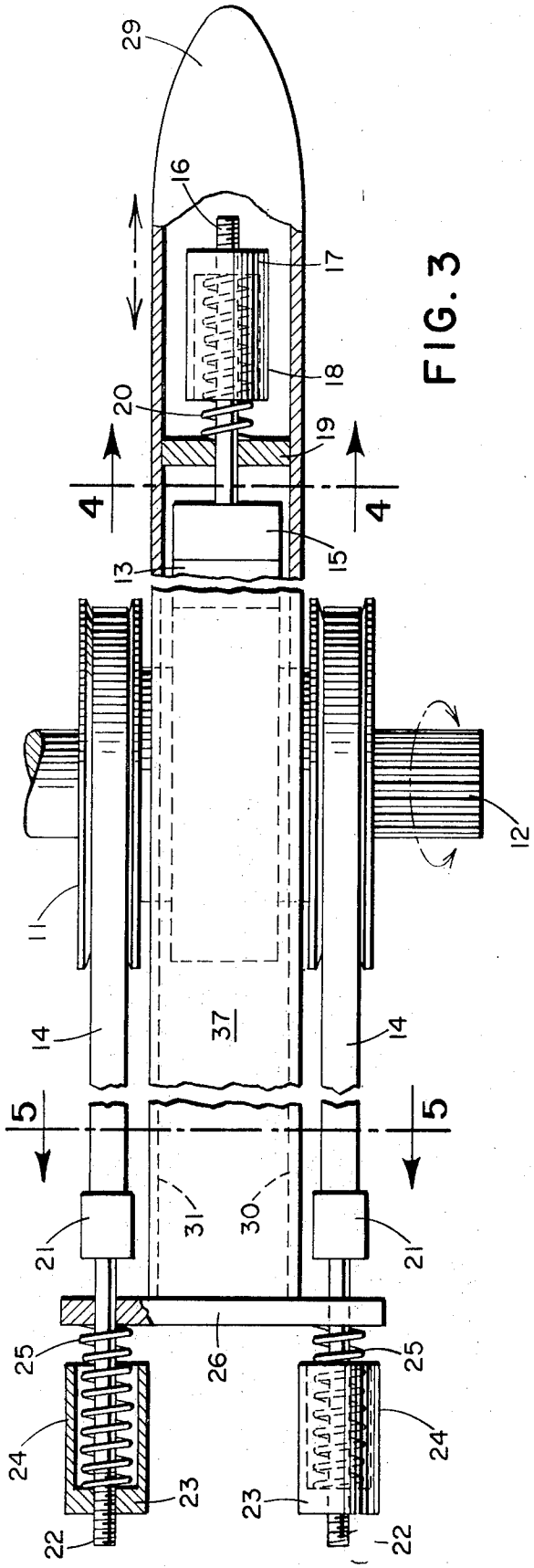

FIG. 3

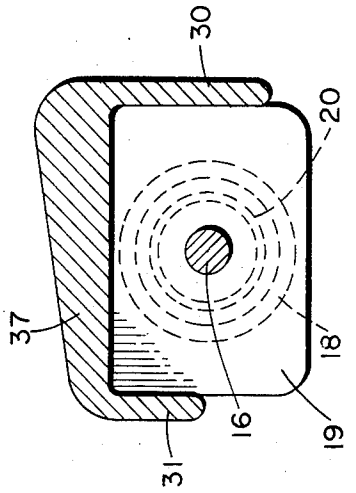

FIG. 5

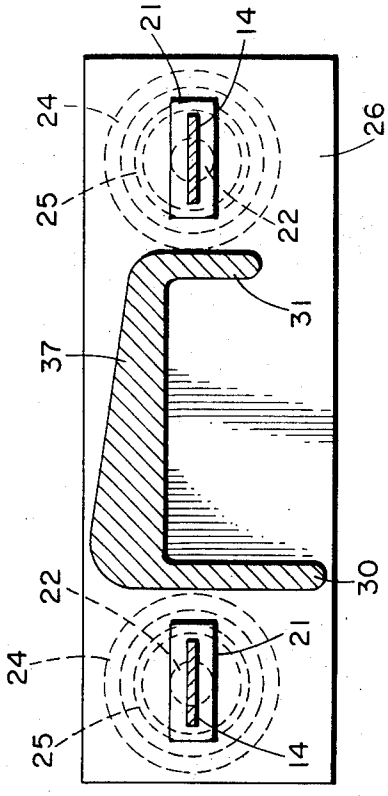

FIG. 4

ARRANGEMENT FOR RECIPROCATING A WEFT INSERTER ROD

BACKGROUND OF THE INVENTION

It is known to employ reciprocable rods for inserting weft yarns into a shed. Such rods engage the weft yarn externally of the shed and insert it into the latter. In most cases, there are two rods. Of these, one carries the weft yarn to the center of the shed and transfers it, there to the other rod which pulls it (or inserts it) completely through the shed.

It is already known to provide the inserter rod with a row of teeth and to drive it by means of a gearwheel meshing with the said row of teeth. In the case of another mode of driving, there is employed an endless drive belt which travels over rollers, the drive rod being secured to the said belt and entrained thereby.

The employment of toothing on the inserter or carrier rod has the disadvantage that the latter tends to become worn and that it suffers from the effect of a degree of play. In particular, such toothing involves a high pressure on the guide elements of the inserter rod and, therewith, a considerable degree of wear in the said guide system. Furthermore, there is a danger of soiling of the cloth due to soiled racks. Finally, the rack has a noteworthy weight and is noticeably noisy. On the other hand, not only do arrangements known at the present day and having drive belts for driving the inserter rod require deflecting or reversing pulleys, but furthermore the drive belts are subjected to alternating flexing. In the case of perforated drive belts, there is a tendency for notches to form, so that the belts are relatively quickly ruptured.

SUMMARY OF THE INVENTION

According to the present invention, these disadvantages are to be obviated. The present invention is characterized in that there is coupled to the inserter rod, at two locations, located in spaced relationship in the longitudinal direction of the said rod, a traction element with an end of each of the traction elements extending from the said spaced coupling locations towards each other and towards the driving wheel located between the coupled locations. Each traction element is adapted to be wound with the opposite direction of winding of the driving wheel and is secured thereto at its other end. The inserter rod forms a tangent to the driving wheel and the winding-on of each of the traction elements on the driving wheel commences at the location of contact of the tangent with the driving wheel.

Thus, the invention has the additional advantage of minimum length of the traction elements. This, in turn, gives rise to minimum weight and minimum elongation thereof. Additionally, the drive of the inserter rod is effected exclusively due to traction forces. If the driving wheel is disposed underneath the inserter rod, then only a small amount of space is required, so that utilization of the available space is of an advantageous nature.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be discussed with reference to an example of embodiment and with reference to the drawings, wherein:

FIG. 1 is a perspective view of an arrangement according to the invention,

FIG. 2 is a cross-section taken along the plane 2—2 of FIG. 1,

FIG. 3 is a plan view of the arrangement shown in FIG. 1 showing the weft thread inserter rod and its connection with the traction element,

FIG. 4 is a view in cross-section taken on the plane 4—4 of FIG. 3, and

FIG. 5 is a view in cross-section taken on the plane 5—5 of FIG. 3.

In both figures, like reference numerals designate like elements.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A drive wheel **11** is operatively connected and secured to a drive pinion **12.** A first traction element **13,** taking the form of a steel band or strip member, is wound in one direction of its winding on drive wheel **11** and one of its free ends is fastened to the drive wheel **11.** A second traction element **14,** consisting of two band or strip members, is wound in a direction opposite to that of traction element **13** on the wheel **11** and one end of each band of element **14** is also fastened to the drive wheel **11.** The securing locations of the traction elements **13,14** with the drive wheel **11** are not shown.

The traction element **13** is fastened to a band strap **15** assembled with a pin **16.** The latter is formed with a screwthread on which a nut **17** is screwed, which may be an adjustable nut means. The nut **17** furthermore carries a sleeve **18.** Disposed between the nut **17** and a plate **19** displaceable along the pin **16** is a compression spring **20.** The plate **19** is fastened to weft thread inserter rod **27.** Since the arrangement described above is covered in FIG. **1** by the weft yarn inserter rod **27,** this rod **27** has not been shown completely in FIG. **1** but merely indicated in dot-dash lines. The cross-section of the inserter rod has the shape of an upturned U, as shown and indicated for example at **28** in FIG. **1.**

Due to the action of the spring **20,** the nut **17** is, together with sleeve **18,** pressed away from the plate **19** and first traction element **13** is subjected, via the pin **16** and the strap **15,** to a traction force.

In analogous manner, each of the band members of second traction element **14** is fastened with a band strap **21** and each of the latter is assembled with a pin **22** having screwthreads thereon and in each instance a nut **23** threadedly engaged to the screwthreads. Each of the nuts **23,** which may be an adjustable nut means, carries a sleeve **24** disposed between the nut and a plate **26,** and in each instance a compression spring **25** is wrapped about one of each of the pins **22.** The plate **26** is common to both securing arrangements and is fastened to the inserter rod **27.** The pins **22** are adapted to slide in apertures formed in the plate **26.** The compression springs **25** press the nuts **23,** together with the sleeve **24,** away from the plate **26** secured to the inserter rod **27** and in this manner a traction force is exerted by the springs **25** on the traction element **14** (see FIG. **1**).

The arrangement of the coupling of first and second traction elements **13, 14** with the inserter rod **27** may also be such that traction springs or spring means are employed instead of the compression springs **20, 25.** Such a coupling would be obvious to any person skilled in the art, so that it is considered to be unnecessary to provide any special discussion thereof.

FIG. 1 shows a rod 27 the thickness of which (as indicated by 28) is constant over the entire cross-section. The form of the cross-section shown in FIG. 2 of the rod (or bar) here designated 37 is adapted to the shape of the shed. With regard to the cross-section of the said inserter rod or bar 37, FIG. 2 is therefore not a cross-section of FIG. 1. Disposed at the right-hand end of the inserter (carrier) rod 27 is, as may be seen in FIG. 1, the head 29 carrying a device (not shown) for retaining a weft thread. The inserter rod 27 may, if viewed from the ideal aspect, be considered to constitute the tangent to the driving wheel 11. The statement made in the definition of the invention with regard to this point is to be interpreted in this sense.

In operation of the loom, there is imparted, by means of a drive element (not shown) which may be for example a rack or a pivotal toothed segment, via the pinion 12, to the driving wheel 11 a movement of rotation about its axis alternatingly in the one and in the other direction. If it is rotated, for example, clockwise, then the traction element 14 is pulled towards the right; this pull is transmitted via the straps 21 and the pins 22 to the nuts 23 and from the latter via the springs 25 to the plate 26. Since the inserter rod 27 is secured to the latter, it will travel towards the right, whilst compressing the springs 25. If appropriate, the sleeves 24 then bear against the plate 26. The inserter rod 27 is fastened both with the plate 26 and also with the plate 19. Thus, the spacing between the nut 17 and the plate 19 is, under the action of the compression spring 20, increased by the amount by which the springs 25 were compressed. On the other hand, the moving rod 27 produces, via the elements 19, 20, 17, 16 and 15, entrainment of the traction element 13. The drive wheel 11 is rotated until the inserter rod 27 has covered the desired insertion travel. Thereby, the traction element 14 is wound more and more onto the drive wheel 11 and the traction element 13 is unwound more and more from the drive wheel 11.

The resilient tensioning of the traction elements 13 and 14 by means of the springs 20 and 25 serves for preventing "chattering" thereof and for making the accelerations of the rod 27 less abrupt. In addition, it serves also for compensating for the length variation in the traction elements 13, 14 in the event of deformation of the latter. By adjusting the nuts 17 and 23, it is possible to take account of changed conditions (by adjustment) or the tension of the traction elements 13, 14 may be varied. In particular, the resilient tensioning of the traction elements 13, 14 due to the springs 20, 25 is also important if the length of the wound-on traction elements 13, 14 is larger than the periphery of the drive wheel 11. Assuming that, in the left-hand position of the rod 27, the traction element 13 is wound-on three times over the periphery of the wheel 11 and the traction element 14 is wound-off almost completely therefrom; in this case, therefore, during the first complete rotation of the wheel 11 there will be wound-on a length of the bands of the element 13 which is equal to the periphery of the wheel. This is $2r\pi$, if r is the radius of the wheel 11. If the thickness of the band 12 is equal to d, then the periphery on which the outermost layer of the band 13 bears is $2(r+2d)\pi$. Thus, on the first complete rotation, this length of the band 13 is wound-off. This is, however, larger than the length of the pieces of the bands of element 14 which have been wound-on. The arrangement of the elements 15 to 20 and 21 to 26 serves substantially also for taking up these length differences.

The withdrawal of the inserter rod 27 is effected by rotation of the drive wheel 11 counterclockwise. Corresponding to the already described operational procedure, the traction element 13 is pulled and acts, via the elements 15, 16, 17, and 20, on the plate 19, the rod 27 travelling towards the left accompanied by compression of the spring 20. The "shortening" resulting from compression of the spring 20 is compensated for by the springs 25. The initially larger length and, finally, shorter length of the winding-off traction element 14 by comparison with the winding-on traction element 13 is compensated for by the springs 20, 25 in the manner described hereinabove.

As will be gathered from FIG. 2, the inserter rod 37 may be given a cross-section adapted to the loom. That figure also shows the two lateral walls 30 and 31 of the inserter (carrier) rod. These travel in two grooves 32, 33 formed in the drive wheel 11. Furthermore, it is advantageous to arrange the traction elements 13 and 14 in a plane in which the centroidal axis of the inserter rod is located. The said centroidal axis is designated 34 in FIG. 2, which is the axis through the center of gravity.

The individual elements constituting the traction elements 13, 14 need not necessarily consist of bands such as strips or tapes but may be of any elongated flexible material capable of being wound and unwound on a drive wheel. For example, they may consist of ropes, cords, wires, wire ropes, and the like.

It will be appreciated that various changes and modifications may be made within the skill of the art without departing from the spirit and scope of the invention.

What is claimed is:

1. Arrangement for reciprocating a weft yarn inserter rod for inserting picks in a shed, comprising a drive wheel rotatable in opposite directions about a pivot and connecting means transmitting the movement of the drive wheel to an inserter rod, characterized in that there is coupled to said inserter rod, at two spaced locations in the longitudinal direction of said rod a first and a second traction element, each of said traction elements extending from the said coupling locations towards each other and towards said drive wheel, said traction elements each secured to said drive wheel at its other end and adapted to be wound in the opposite direction of winding of the other element, said inserter rod forming a tangent to the drive wheel and the winding-on of the first and the second traction elements on said drive wheel commencing at the location at which the tangent contacts the drive wheel.

2. The arrangement according to claim 1 in which one of said traction elements comprises a pair of parallel individual traction members, each operatively secured to said drive wheel and said other traction element is a single individual traction member operatively secured to said drive wheel, said single individual traction member positioned between said pair of parallel individual traction members.

3. The arrangement according to claim 2 in which each of said traction members, between its coupling location on said inserter rod and the location at which winding-on on said drive wheel commences, is arranged in a plane in which the centroidal axis of said inserter rod is located.

4. The arrangement according to claim 2 in which each of said traction members is flexible and adaptable to be wound on and off said drive wheel.

5. The arrangement according to claim 2 in which each of said traction members is formed from a band.

6. The arrangement according to claim 2 in which each of said traction members is formed from a rope.

7. The arrangement according to claim 2 in which each of said traction members is formed from a wire.

8. The arrangement according to claim 4 in which each of said individual members is in more than one layer when in the wound-on condition on said drive wheel.

9. The arrangement according to claim 1 in which each of said first and second traction elements is coupled by a resilient means to said inserter rod, said resilient means exhibiting a bias which exerts a traction force on the traction element coupled to it.

10. The arrangement according to claim 9 in which said resilient means is spring actuated.

11. The arrangement according to claim 9 in which each of said traction elements, at its coupling location with said insertion rod, has spring means tensioned between a plate secured to the inserter rod and a nut means, said nut means adjustable in the longitudinal direction of the individual members and secured to said insertion rod.

12. The arrangement according to claim 11 in which said drive wheel is arranged below the inserter rod.

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