April 10, 1956 J. S. DUDLEY ET AL 2,740,996

NEEDLE BAR MECHANISM

Filed Oct. 18, 1951 3 Sheets-Sheet 1

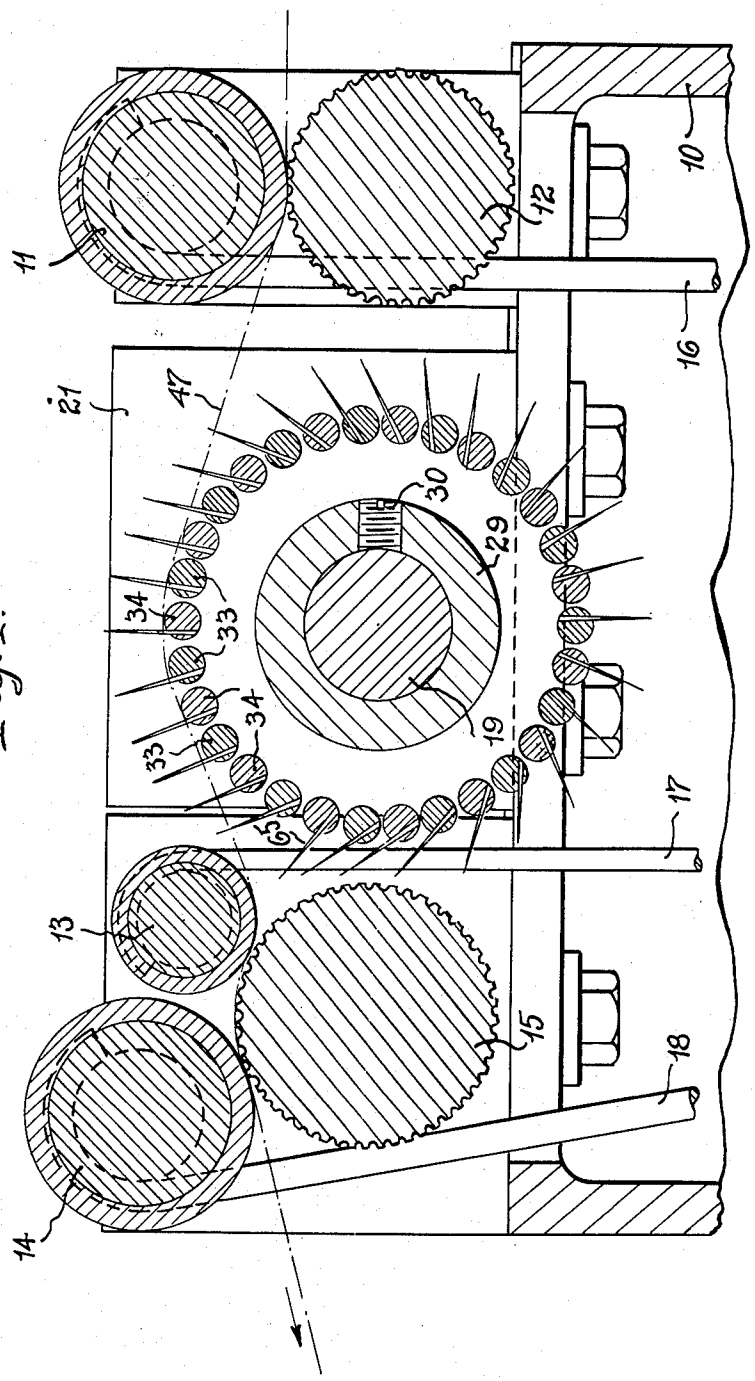


Fig. 1.

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3 Sheets-Sheet 2

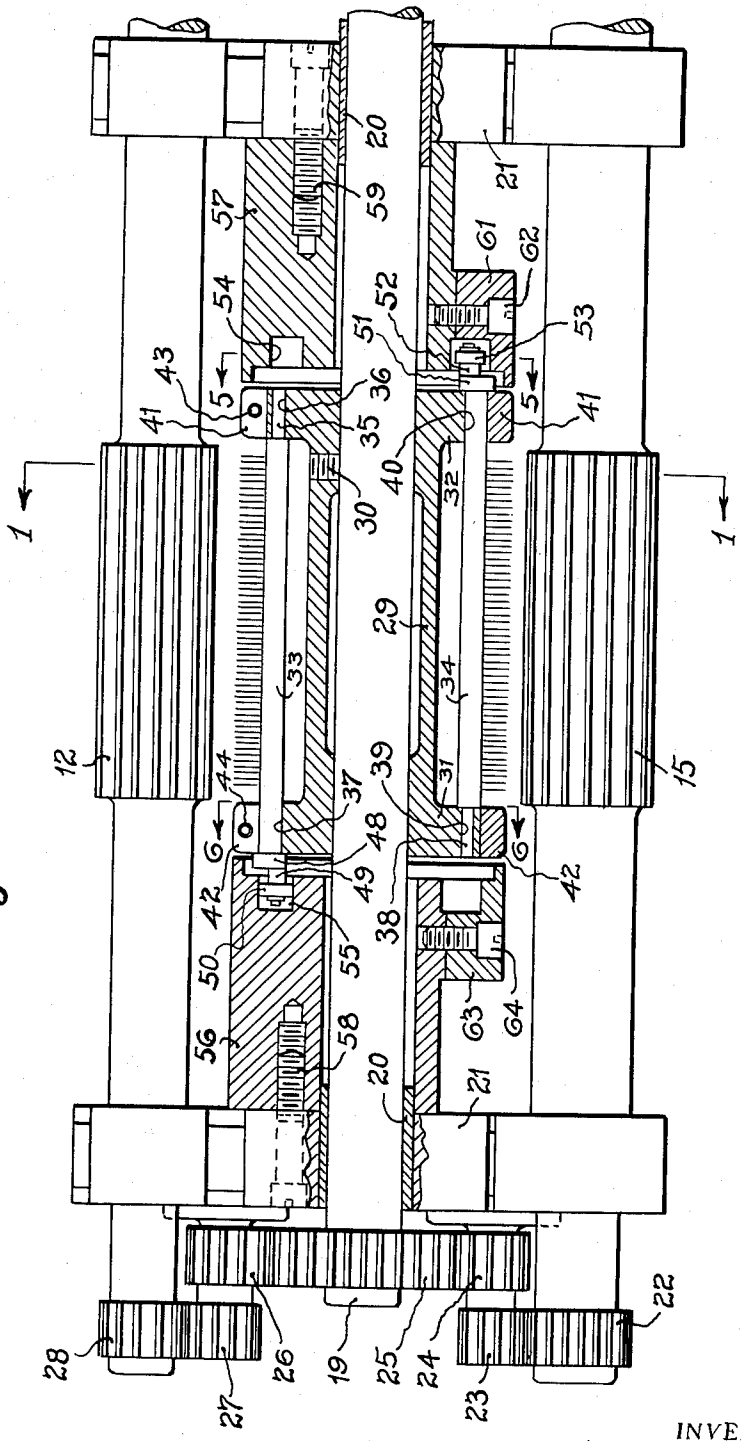


Fig. 2.

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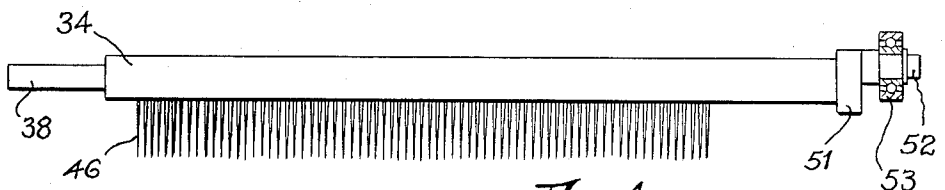


Fig. 4.

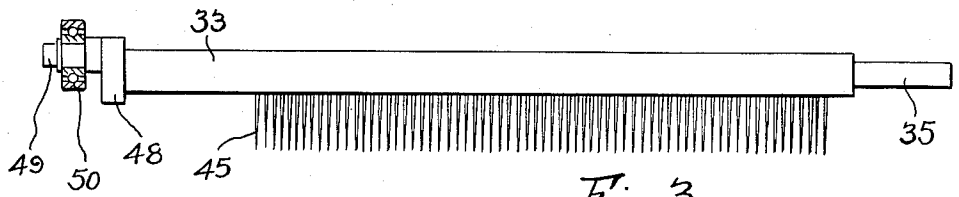


Fig. 3.

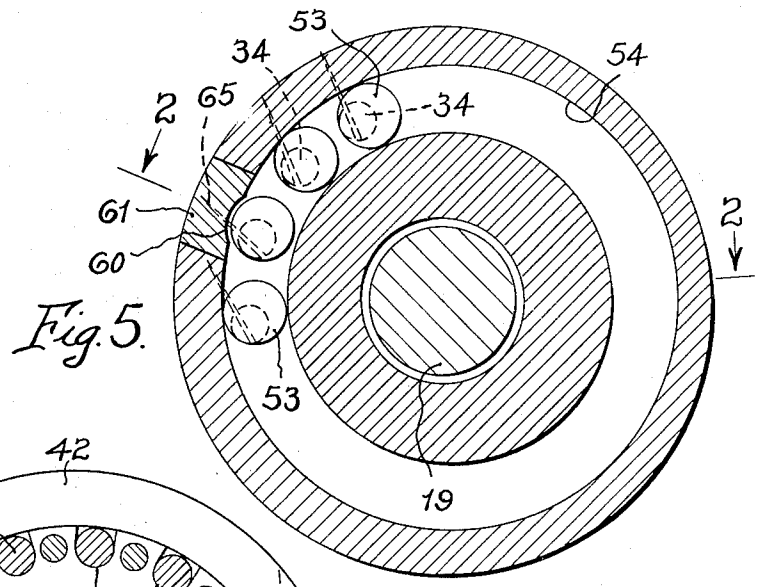


Fig. 5.

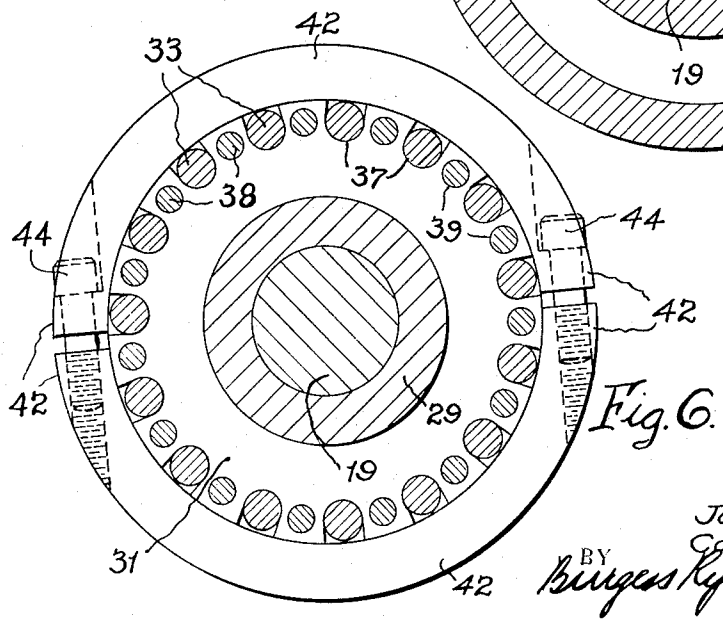


Fig. 6.

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2,740,996

NEEDLE BAR MECHANISM

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Application October 18, 1951, Serial No. 251,938

2 Claims. (Cl. 19—130)

This invention relates to the art of textile drafting and to a needle bar mechanism for drawing frames and similar machines for processing wool or other long fibers preparatory to spinning.

In the operation of such mechanisms, it has been customary to move the needle bars through a closed circuit including a working section, in which the needles of certain of the bars are engaged with the fibers under treatment, followed by an idle or non-working section. The common practice has been to control the needle bars by holding them against free rotation about their axes throughout the entire circuit, the primary purpose, of course, being to establish and maintain a desired orientation of the bars and their needles with respect to the fibers throughout the working section of the circuit.

One of the features of the present invention centers around the discovery that improvements in sliver and yarn uniformity result if the needle bars are released from such control prior to their withdrawal from the fibers, that is, at a point adjacent but in advance of the end of the working section. In the result, the needles of each bar, as it reaches that point, are free to move with and to be moved by the fibers themselves.

Other objects and features of the invention having to do with the mounting and removability of the needle bars will be apparent from the following description of the preferred form of the invention shown in the accompanying drawings.

In such drawings:

Fig. 1 is a longitudinal, vertical section on the line 1—1 of Fig. 2, of a drafting unit embodying the invention, parts being omitted for clearness of illustration;

Fig. 2 is a top plan view of the unit with the top rolls removed, partially broken out and in part sectioned as on the line 2—2 of Fig. 5;

Figs. 3 and 4 illustrate the needle bars;

Fig. 5 is a section of the line 5—5 of Fig. 2; and

Fig. 6 is a section on the line 6—6 of Fig. 2.

Referring first to Fig. 1 of the drawings, the illustrated unit is shown as incorporating a frame 10 on which are mounted top and bottom back rolls 11, 12, top front rolls 13, 14 and a bottom front roll 15. The top rolls are indicated as being held down by weight hooks 16, 17 and 18 respectively.

The needle bar mechanism is located between the back or feeding rolls and the front or drawing rolls and incorporates a shaft 19 journaled in bushings 20 (Fig. 2) which are supported by blocks 21 mounted on frame 10. The shaft of roll 15 is the driven shaft of the unit and shaft 19 and the shaft of roll 12 are driven from it through gears 22, 23, 24, 25, 26, 27 and 28. The desired draft between the back and front rolls and also the tension draft between shaft 19 and the back rolls is obtained by appropriate selection of these gears.

The needle bar mechanism comprises a frame or carrier in the form of a sleeve 29 mounted on and secured to shaft 19 as by set screw 30 and having at its ends,

flanges or spaced disks 31, 32 provided with peripherial openings for removably supporting the needle bars. Two series of such bars are employed, the bars of one series being like the bar 33 of Fig. 3 and the bars of the other series being like the bar 34 of Fig. 4. As will be recognized, the bars of the two series are of similar construction but reversed, end for end. The reduced ends 35 of the series of bars 33 are located in openings 36 of frame disk 32 and the opposite ends of these bars seat in slots 37 of disk 31. Similarly, the reduced ends 38 of the series of bars 34 are located in openings 39 of disk 31 and the opposite ends of these bars are seated in slots 40 in disk 32. In other words, as shown more particularly in Fig. 6, the periphery of each frame disk has a series of alternating holes and slots receiving the alternately, oppositely disposed needle bars. To complete the bearings for the large ends of the bars and to confine them in their slots, split collars 41 and 42 are clamped around the peripheries of the respective flanges 31 and 32 by studs 43 and 44. Each bar carries the usual series of needles 45 and 46, the control mechanism to be described serving to orient the needle bars wth respect to their axes and hence the needles in relation to the fibers 47 passing through the unit in the path generally indicated in Fig. 1.

In general, the control mechanism for the needle bars serves to hold erect or substantially normal to the travel of the fibers, the needles which are in engagement with the fibers or those which for convenience may be referred to as being in the working section of the cycle. It has been found, however, that if the bars and their needles continue to be locked throughout the entire working section of the cycle and the needles withdrawn from fibers simply by the rotation of the frame, the needles adjacent the exit end of the working section tend to drag and cause shading to occur in the resultant sliver and an uneven finished yarn. This dragging of the needles results from the fact that the fibers gripped and positively advanced by the front or drawing rolls travel several times as fast as the fibers held by the slower moving needles. In order to avoid such dragging, the present invention provides for the releasing or unlocking of the needle bars adjacent but in advance of the exit end of the working section so that prior to their withdrawal from the fibers by the rotation of shaft 19, each set of needles is free to be pulled forward by the fibers themselves, thus insuring that in the indicated zone, the fibers and needles travel at the same speed.

The primary control of the needle bars is effected by control elements preferably consisting of crank members mounted on the ends of the bars. Thus, as shown in Fig. 3, each bar 33 is provided with a head 48 at one end and carrying a crank pin 49 on which is mounted a bearing 50. Similarly, each bar 34 is provided with a head 51, crank pin 52 and bearing 53. These crank elements, or more particularly, their bearings, are arranged to trail the respective bars and to be located in and operated by appropriate cam tracks which, by determining the angular positions of the bars, lock the series of needles in correct relation to the fibers.

In this particular embodiment, two identical cam tracks 54 and 55 are utilized, the tracks being formed in the inner faces of blocks 56 and 57 adjacent the outer faces of disks 31 and 32 in position to receive the outer surfaces of bearings 50 and 53. The cam track blocks are seated on the bushings 20 and are secured to blocks 21 by studs 58 and 59. Thus, as shaft 19 is rotated, the positions of the needle bars and their needles are determined and held by the action of the stationary cam tracks on the trailing needle bar bearings.

In order to effect the release or unlocking of the nee-

dle bars, the control surface (herein the outer surface) of each cam track is terminated or, at least, interrupted, at such a point or zone as to permit the above described rocking of the bars by the action of the fibers on the needles. In this preferred form, a limited portion of the cam track **54** is enlarged and the enlargement, designated **60** in Fig. 5, is formed on the inner surface of a removable insert **61** normally held in place by screw **62**. A similar, aligned and removable insert **63** and screw **64** are provided for track **55**. It may be noted here that in Fig. 5, for clarity of illustration, the reduced ends **35** of intervening bars **33** are omitted, as also are the details of bearings **53** of the bars **34**.

It will be apparent from the foregoing that as each needle bar reaches a point where its trailing bearing enters the cam track enlargement, it is released from control by the cam track and becomes subject to control by the advancing fibers. By the action of the fibers engaged with the needles of the bar, it is rotated or rocked into a position approximately as indicated by the needles **65** in Figs. 1 and 5.

It is to be noted also that the inserts **61** and **63** provide a convenient method of removing any needle bar which requires replacement. This is effected, after removing top roll **13**, by rotating shaft **19** to bring the bar to be replaced opposite the inserts, removing the split rings **41** or **42**, as the case may be, and also the corresponding insert. The bar in question can then be moved lengthwise a distance sufficient to withdraw its reduced end from its disk or flange hole and the bar then bodily lifted outwardly.

It will be understood that the invention is capable of embodiment in numerous different forms and that the preferred form illustrated and described above in detail serves only to exemplify the principles of the invention.

In the light of the foregoing, the following is claimed:

1. A drawing frame needle bar mechanism comprising a rotatable needle bar frame incorporating rigid, spaced disk portions; a series of needle bars extending between and rotatably supported by said disk portions; a stationary continuous cam track adjacent the outer side

of each disk portion, each of said tracks including inner and outer track faces; trailing crank members mounted alternately on the opposite ends of the needle bars and engaged with the cam tracks to position the needle bars with respect to their axes whereby upon rotation of the disk portions the needles of said bars enter and withdraw from engagement with the fibers under treatment; each of said cam tracks having aligned removable portions embracing the zone of withdrawal of the needles from the fibers; each of said removable track portions incorporating on its outer track face an arcuate recess dimensioned to accommodate movement of the crank members to free the needle bars from cam track control in such zone.

2. A drawing frame needle bar mechanism comprising a rotatable needle bar frame incorporating rigid, spaced disk portions; a series of needle bars extending between and rotatably supported by said disk portions; a stationary cam track adjacent the outer side of at least one of said disk portions, said track including inner and outer track faces; needle bar crank members engaged with the said track to position the needle bars with respect to their axes, whereby upon rotation of the disk portions the needles of said bars enter and withdraw from engagement with the fibers under treatment; the outer track face having an arcuate recess adjacent the zone of withdrawal of the needles from the fibers and dimensioned to accommodate movement of the crank members to free the needle bars from cam track control in such zone.

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