Sept. 30, 1947. F. LAMBACH 2,428,030

STRUCTURE FOR SUSPENDING A GUIDE BAR FROM A BRACKET OF A WARP KNITTING MACHINE

Filed Nov. 30, 1945 4 Sheets-Sheet 1

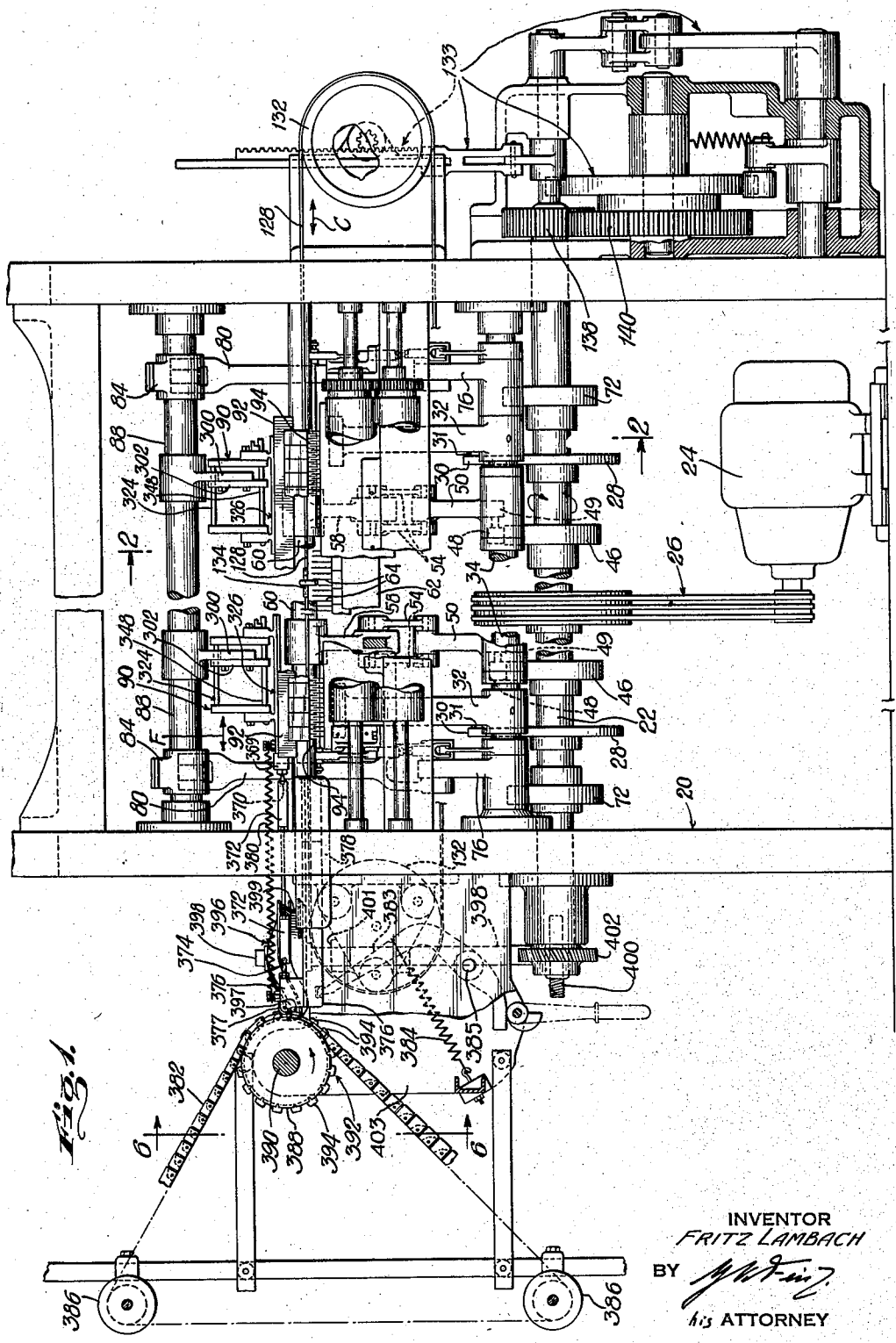


Fig. 1.

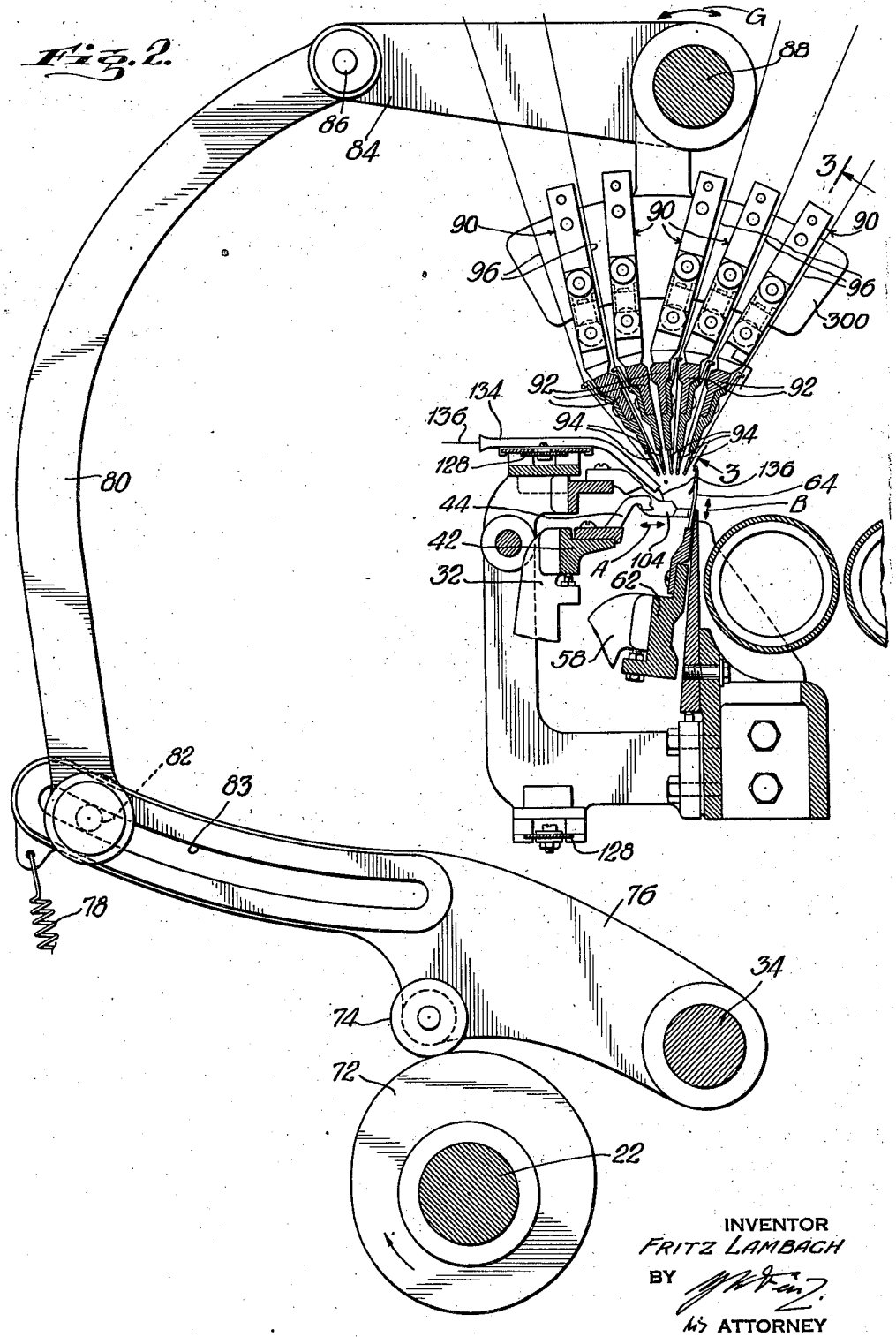
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Fig. 2.



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Fig. 5.

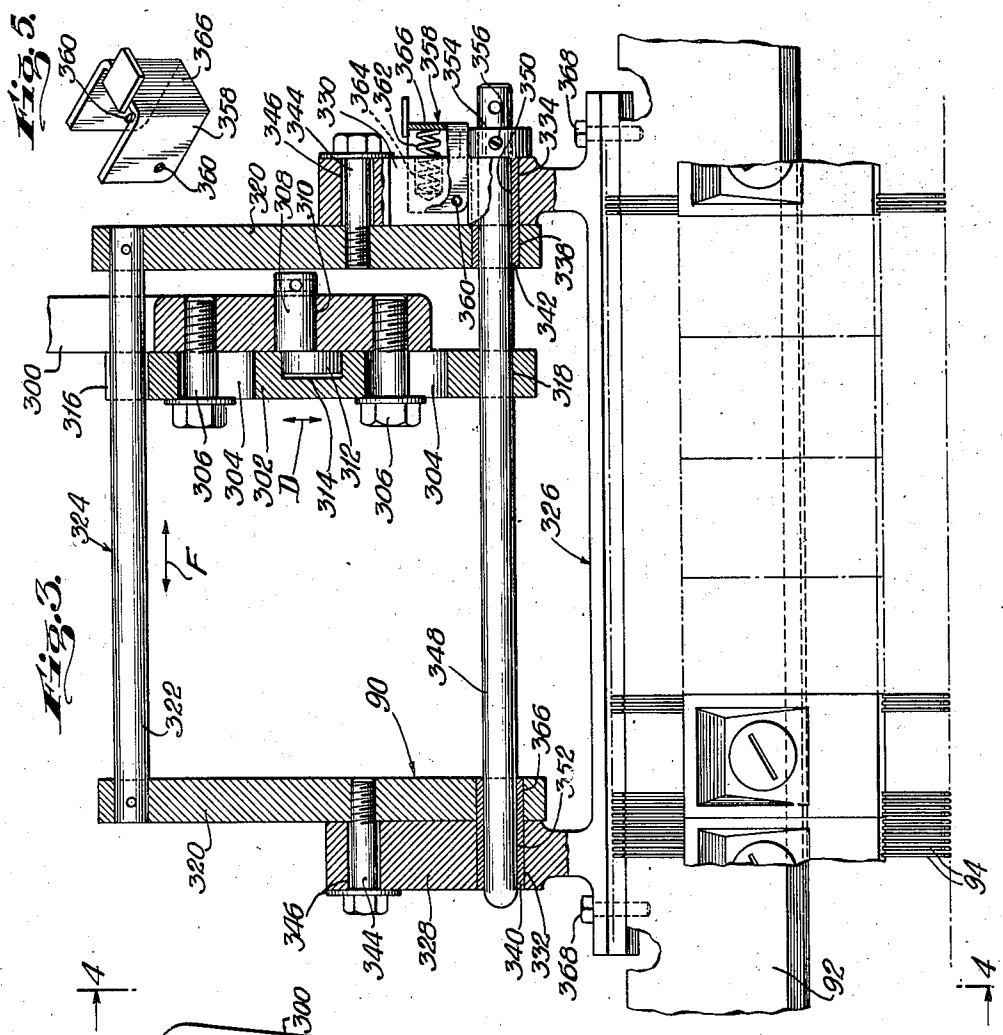
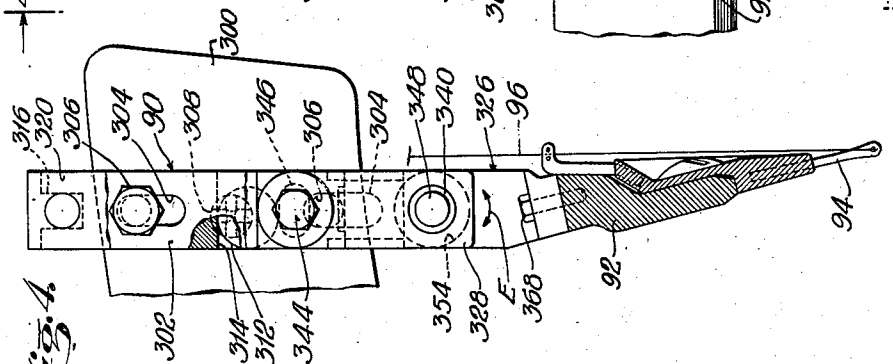


Fig. 3.

Fig. 4.



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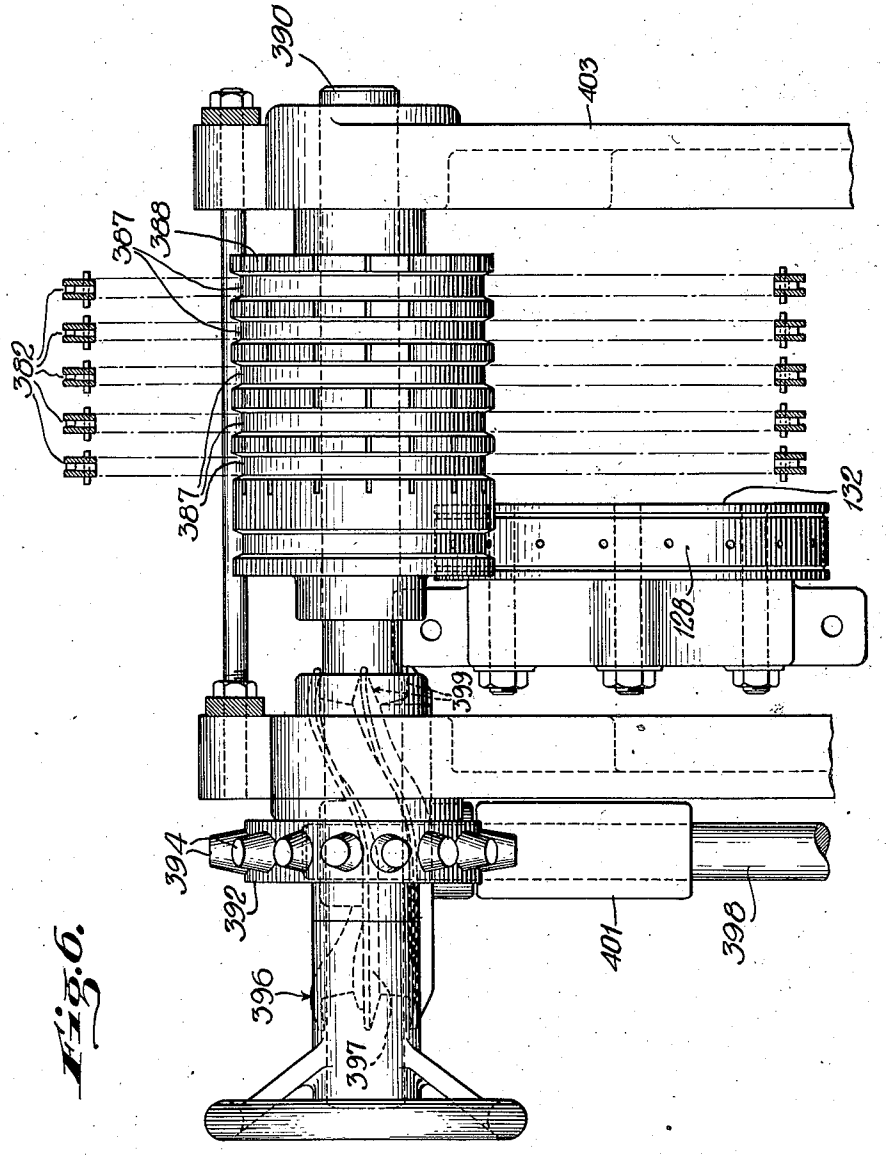


Fig. 6.

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STRUCTURE FOR SUSPENDING A GUIDE BAR FROM A BRACKET OF A WARP KNITTING MACHINE

Fritz Lambach, Tenafly, N. J.

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7 Claims. (Cl. 66—86)

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My invention relates to textile machines, and more particularly to warp knitting machines, wherein warp yarn drawn from warp beams is fed to the knitting implements by warp guides carried by a plurality of guide bars shiftably mounted on spaced brackets secured to a rockable guide bar shaft.

An object of my invention is to provide a structure for suspending a guide bar from a bracket of a warp knitting machine of above described type, which requires only a small space so as to avoid interference with the warp yarns during rocking movements of the guide bar shaft.

Another object of my invention is to provide a structure for suspending a guide bar from a bracket of a warp knitting machine of above described type, which permits a ready disengagement of the guide bar from the spaced brackets secured to the guide bar shaft.

A further object of my invention is to provide a structure for suspending a guide bar from a bracket of a warp knitting machine of above described type, which permits a ready adjustment of the guide bar relative to the needles of the machine.

In order to carry out my invention in practice I provide a structure for suspending a guide bar from a bracket of a warp knitting machine having a series of spaced brackets secured to a rockable guide bar shaft extending longitudinally of the machine, said structure comprising a supporting element, attaching means for attaching said supporting element to said bracket, a hanger shiftably mounted on said supporting element for shifting movements in a direction substantially parallel to the axis of said guide bar shaft, a guide bar carrier for carrying said guide bar, said guide bar carrier being adjustably mounted on said hanger for adjustments about an axis substantially parallel to the axis of said guide bar shaft, and holding means for holding said guide bar carrier in a predetermined position relative to said hanger.

The above mentioned objects and advantages as well as other objects and advantages will be more fully described in the following specification reference being had to the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a front elevational view of a warp knitting machine according to the invention, some parts being broken away and some parts being shown in section,

Fig. 2 is a vertical sectional view of the warp knitting machine, taken on line 2—2 of Fig. 1, some parts being broken away,

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Fig. 3 is a fragmentary sectional view taken on line 3—3 of Fig. 2 illustrating a structure connecting a guide bar with a bracket secured to the guide bar shaft,

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3,

Fig. 5 is a perspective view of the movable element of a safety device, and

Fig. 6 is a sectional view taken on line 6—6 of Fig. 1.

The drawings illustrate the invention as being applied to a warp knitting machine of a type known in the trade as "Kayloom machine," wherein one or more reciprocable filler thread carriers are arranged for laying filler thread substantially parallel to the series of needles and wherein reciprocable filler sinkers are arranged for placing the filler thread laid by said filler thread carrier or carriers into position to be incorporated into fabric produced by the knitting implements of the machine from warp yarns drawn from warp beams; it is understood, however, that the invention may also be applied to other types of warp knitting machines, for example machines known in the trade as "Tricot machines."

Referring now to Fig. 1, 20 generally indicates the frame of the warp knitting machine composed of several parts in any suitable manner. A main cam shaft 22 journalled in suitable bearings of the frame may be rotated by a motor 24 connected with said main cam shaft through a belt drive generally indicated by 26.

A series of filler sinkers 44 (see Fig. 2) mounted on a sinker bar 42 extending longitudinally of the machine and being supported by sinker bar rockers 32 may be reciprocated in a forward and backward direction A by means of a sinker bar drive (corresponding to the sinker bar drive disclosed in my copending patent applications Ser. #617,537 filed Sept. 20, 1945, and Ser. #620,113 filed Oct. 3, 1945), which includes a sinker bar cam 28 (Fig. 1) keyed to the main cam shaft 22 for cooperation with a roller 30 mounted on a spring-loaded rearwardly extending arm 31 of a sinker bar rocker 32 secured to a sinker bar shaft 34 journalled in suitable bearings of the frame 20.

A series of needles 64 (see Figs. 1 and 2) carried by a needle bar 62 extending longitudinally of the machine and being mounted on needle bar arms 58 swingably arranged on a needle bar shaft 60 may be reciprocated in an upward and downward direction B by means of a needle bar drive (corresponding to the needle bar drive

disclosed in my copending patent application Ser. #617,537 filed Sept. 20, 1945, and Ser. #620,113 filed Oct. 3, 1945), which includes a needle bar cam 46 keyed to the main cam shaft 22 for cooperation with a roller 48 mounted on a spring-loaded rearwardly extending arm 49 of a needle bar rocker 50, which is loosely arranged on the sinker bar shaft 34 and is swingably connected with the needle bar arm 58 through the medium of connecting links 54.

Furthermore, the warp knitting machine comprises an endless band 128 of flexible material trained around two drums 130 and 132 rotatably mounted in suitable bearings of brackets secured to the frame 20. The endless band 128 is arranged for carrying one or more filler thread carriers 134 receiving filler thread 136 from a filler thread supply (not shown). The drum 132 is connected with a carrier drive generally indicated by 133, which is operated by the main cam shaft 46 through the medium of gears 138 and 140. Said carrier drive corresponding to the carrier drive disclosed in my copending patent applications Ser. #617,537 filed Sept. 20, 1945, and Ser. #620,113 filed October 3, 1945, causes periodic reciprocating movements of the band 128 with the filler thread carriers 134 mounted thereon in the direction C of the longitudinal axis of the machine, whereby filler thread 136 is placed on stationary elements 104 for subsequent incorporation by the filler sinkers 44 into fabric produced by the needles 64 from warp yarns 96 drawn from rotatable warp beams (not shown).

According to Figs. 1 and 2, several guide bar cams 72 are keyed to the main cam shaft 22. Each of said guide bar cams cooperates with a roller 74 rotatably mounted on a rearwardly extending guide bar rocker 76 swingably mounted on the sinker bar shaft 34. A tension spring 78 stretched between the guide bar rocker 76 and a stationary point of the machine tends to urge the roller 74 against the surface of the guide bar cam 72. One end of a connecting link 80 is pivotally and adjustably connected with the guide bar rocker 76 by means of a pivot 82 adjustably arranged in a slot 83 of the guide bar rocker 76. The other end of said connecting link 80 is pivoted to one end of a guide bar arm 84 at 86. The other end of said guide bar arm 84 is keyed to a guide bar shaft 88 rotatably mounted in suitable bearings of the frame 20. A series of spaced brackets 300 is keyed to said guide bar shaft 88. Five supporting elements 302 (only one being shown in Fig. 1) are attached to each of said brackets 300 in a manner to be described hereinafter. A mounting structure generally indicated by 90 is slidably arranged in each of said supporting elements 302 for reciprocating movements in the direction F of the longitudinal axis of the machine as will be described hereinafter. The machine comprises five guide bars 92 extending longitudinally of the machine, each of them being secured to a series of said structures 90 in a row extending longitudinally of the machine. Each guide bar 92 carries a series of warp guides 94, by means of which the warp yarns 96 drawn from the rotatable warp beams (not shown) are fed to the needles 64. Above described guide bar drive 72, 74, 76, 80, 84, associated with the guide bar shaft 88 may impart periodic rocking movements in the direction of the arrow G to said guide bar shaft and the guide bars 92 with their warp guides 94 in dependence on the shape of the guide bar cam 72.

As mentioned above, the mounting structures 90, and of course the guide bars 92 connected therewith, may be reciprocated in the direction of the arrow F. The drive for imparting periodic shifting movements in the direction of the arrow F to the guide bars 92 and the warp guides 94 is as follows:

A helical gear 402 (see Fig. 1) keyed to the main cam shaft 22 is in mesh with a helical gear 400 keyed to the lower end of a vertical shaft 398 journalled in a suitable bearing 401 of a support 403 secured to the frame 20 of the machine. A cam gear 396 (see Figs. 1 and 6) is keyed to the upper end of said vertical shaft 398. Said cam gear 396 has two grooves 397 and 399, and each of said grooves has two substantially horizontal sections connected with each other by an inclined section. Each groove extends through substantially one-half of the circumference of the cam gear 396. The grooves 397 and 399 of the cam gear 396 are arranged for engagement with pins 394 of a pin gear 392 keyed to a horizontal shaft 390 journalled in suitable bearings 391 of the support 403. A drum 388 having five circular grooves 387 is keyed to the shaft 390. Five pattern chains 382 engaged with said grooves 387 are trained around said drum 388 and idle rollers 386. The machine comprises five carriages 376 (only one being shown in Fig. 1) slidably arranged for reciprocating movements in guides 378 mounted on the frame 20. Each carriage 376 is provided with a roller 377 for engagement with the elements of the pattern chain 382. A spring 384 acting on a lever 383 swingably mounted on the support 403 at 385 and engaged with the carriage 376 tends to urge the roller 377 against the pattern chain 382. Each carriage 376 is provided with an element 374 detachably mounted on said carriage. Said element 374 has a spherical portion in movable engagement with a spherical recess at one end of an adjustable connecting rod 372. A spherical recess at the other end of said connecting rod 372 is in engagement with a spherical portion of an element 370 detachably connected with a member 369 secured to the left-hand end of the mounting structure 90 arranged at the left-hand end of the machine. A spring 380 stretched between the carriage 376 and said mounting structure 90 tends to hold the connecting rod 372 in engagement with the spherical members 370 and 374. When the pattern chains 382 are advanced, the guide bars 92 secured to the structures 90 are shifted to the right (as viewed in Fig. 1) and to the left in the direction of the arrow F by means of the connecting rods 372 in dependence on the shape of the elements of the pattern chains 382. The ratio of the helical gears 400, 402 and the shape and arrangement of the grooves 397, 399 in the cam gear 396 is such, that the pin gear 392 and the drum 388 keyed to the shaft 390 carrying said pin gear are moved intermittently in two steps through two angles, each angle corresponding to the distance between two pins or one pitch, during one revolution of the main cam shaft. During the first step, the guide bar 92 with its guides 94 is shifted in one direction, and during the second step the guide bar 92 with its guides 94 is shifted in the opposite direction.

Hereinafter, a structure for suspending a guide bar 92 from a bracket 300 of the warp knitting machine will be described in detail.

As best shown in Figs. 3 and 4, each supporting element 302 having two elongated slots 304 is

secured to the bracket 300 by means of screws 306 passing through said slots 304 and screwed into threaded bores of the bracket 300. A cylindrical adjusting element 308 rotatably arranged in a bore 310 of the bracket 300 is provided with an eccentric disk-like portion 312 engaged with a recess 314 of the supporting element 302. When the screws 306 are loosened, the supporting element 302 may be adjusted in an upward or downward direction D by means of said adjusting element 308. Furthermore, said supporting element 302 has a recess 316 at its upper portion and a bore 318 at its lower portion.

A pair of side bars 320 connected with each other by a connecting rod 322 form a hanger generally indicated by 324. The connecting rod 322 of said hanger is in slidable engagement with said recess 316 of the supporting element 302.

A guide bar carrier generally indicated by 326 has a pair of upwardly extending arms 328, 330 contacting the side bars 320 of the hanger 324. Each of said arms 328, 330 is provided with an aperture 332, 334. The side bars 320 of the hanger 324 are likewise provided with an aperture 336, 338 respectively at their lower ends. A hollow sleeve 340 inserted into the aperture 336 of the left-hand side bar 320 and rigidly connected with the latter in a suitable manner extends from the side bar for loose engagement with the aperture 332 of the arm 328 of the guide bar carrier 326. Likewise, a hollow sleeve 342 inserted into the aperture 338 of the right-hand side bar 320 and rigidly connected with the latter extends from the side bar for loose engagement with the aperture 334 of the arm 330 of the guide bar carrier 326. Thus, the guide bar carrier 326 is swingably mounted on the sleeves 332 and 334, whereby the guide bar carrier 326 may be brought into various angular positions relative to the hanger 324 in the direction of the arrow E (see Fig. 4). Upon adjustment of such a predetermined angular position of the guide bar carrier 326, the guide bar carrier may be held in its position relative to the hanger 324 by means of screws 344 passing through elongated slots 346 of the arms 328, 330 and screwed into threaded bores of the side bars 320.

An engaging rod 348 is inserted into the registering bores 350, 318, 352 of the sleeve 342, the supporting elements 302, and the sleeve 340. A collar 354 secured to said engaging rod 348 by a screw 356 abuts against the surface of the arm 330 of the guide bar carrier 326, when the engaging rod 348 is in its engaging position. A locking element generally indicated by 358 (see Figs. 3 and 5) swingably mounted on the arm 330 at 360 is capable of engagement with said collar 354. A spring 362, one end of which is inserted into a bore 364 of the arm 330 and the other end of which is in engagement with the wall 366 of the locking element 358 tends to urge said locking element 358 into the engaging or locking position shown in Fig. 3, wherein the locking element 358 is in engagement with the collar 354 so as to prevent a displacement of the engaging rod 348 relative to the hanger 324. The guide bar 92 is secured to the guide bar carrier 326 by means of screws 368. As will be readily understood, the shiftable engagement of the engaging rod 348 with the bore 318 of the supporting element 302 and the shiftable engagement of the connecting rod 322 of the hanger 324 with the recess 316 of said supporting element permits shifting movements of the hanger 324 together with the guide bar carrier 326, the guide bar 92 and the guides 94 in the direction F of the longitudinal axis of the machine during the operation thereof.

If it is desired to remove the guide bar 92 from the machine, the locking element 358 of above described safety device is lifted about the pivot 360, so that the engaging rod 348 may be pulled out of the bores 352, 318, 350. The guide bar carrier 326 remains in connection with the hanger 324 by means of the sleeves 340, 342 and the screws 344. After removal of the engaging rod 348, the connecting rod 322 of the hanger 324 holding the guide bar carrier 326 and the guide bar 92 secured to the latter rests on the lower edge of the recess 316. When all engaging rods 348 are removed from all structures 90 in a row, the guide bar 92 with all structures 90 connected thereto may be lifted, whereby the connecting rod 322 of each of the hangers 320 is disengaged from the recess 316 open at the top, so that each hanger may be removed over the supporting element 302 and the arm of the bracket 300 for a removal of the guide bar 92 from the machine.

For a mounting of the guide bar in the machine, above described steps are reversed.

As will be readily understood, the adjusting element 308 permits a fine adjustment of the guides 94 relative to the needles of the machine in an upward or downward direction. Furthermore, the swingable arrangement of the guide bar carrier 326 about the sleeves 340, 342 and the adjusting screws 344 permit a fine adjustment of the guides 94 in a forward or backward direction relative to the needles.

I have described a preferred embodiment of my invention, but it is understood that this disclosure is for the purpose of illustration and that various omissions or changes in shape, proportion or arrangement in parts as well as the substitution of equivalent elements for those, herein shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. A structure for suspending a guide bar from a bracket of a warp knitting machine having a series of spaced brackets secured to a rockable guide bar shaft extending longitudinally of the machine, said structure comprising: a supporting element, attaching means for attaching said supporting element to said bracket, a hanger shiftably mounted on said supporting element for shifting movements in a direction substantially parallel to the axis of said guide bar shaft, a guide bar carrier for carrying said guide bar, said guide bar carrier being adjustably mounted on said hanger for adjustments about an axis substantially parallel to the axis of said guide bar shaft, and holding means for holding said guide bar carrier in a predetermined position relative to said hanger.

2. A structure for suspending a guide bar from a bracket of a warp knitting machine having a series of spaced brackets secured to a rockable guide bar shaft extending longitudinally of the machine, said structure comprising: a supporting element, adjusting means arranged on said bracket and associated with said supporting element for adjusting same in an upward and downward direction relative to said bracket, attaching means for attaching said supporting element in a predetermined position relative to said bracket, a hanger shiftably mounted on said supporting element for shifting movements in a direction substantially parallel to the axis of said

guide bar shaft, a guide bar carrier for carrying said guide bar, said guide bar carrier being adjustably mounted on said hanger for adjustments about an axis substantially parallel to the axis of said guide bar shaft, and holding means for holding said guide bar carrier in a predetermined position relative to said hanger.

3. In a structure as claimed in claim 2, said supporting element having a recess, and an eccentric adjusting element rotatably arranged in said bracket and engaged with said recess for adjusting said supporting element in an upward and downward direction relative to said backrest.

4. In a structure as claimed in claim 1, said hanger being disengageably mounted on said supporting element.

5. In a structure as claimed in claim 1, said supporting element having a recess at its upper end having a bore at its lower end, said hanger including a pair of side bars connected with each other by a connecting rod, each of said side bars having a bore at its lower portion, said connecting rod of the hanger being shiftably inserted into said recess at the upper end of the supporting element, an engaging rod inserted into said bores of the side bars and the supporting element, said engaging rod being shiftable in said bore of the supporting element, and locking means for locking said engaging rod in a predetermined position relative to said side bars of the hanger, said locking means being disengageable for a temporary removal of said engaging rod from said bores for a temporary disengagement of said hanger from said supporting element.

6. In a structure as claimed in claim 1, said supporting element having a recess at its upper end and having a bore at its lower end, said hanger including a pair of side bars connected with each other by a connecting rod, each of said side bars having a bore at its lower portion, said connecting rod of the hanger being shiftably inserted into said recess at the upper end of the supporting element, an engaging rod inserted into said bores of the side bars and the supporting element, said engaging rod being shiftable in said bore of the supporting element, locking means for locking said engaging rod in a predetermined position relative to said side bars of the

hanger, said locking means being disengageable for a temporary removal of said engaging rod from said bores for a temporary disengagement of said hanger from said supporting element, said guide bar carrier being adjustable about the axis of said engaging rod, and means for securing the attachment of said guide bar carrier to said hanger when said engaging rod is temporarily removed.

7. In a structure as claimed in claim 1, said supporting element having a recess at its upper end and having a bore at its lower end, said hanger including a pair of side bars connected with each other by a connecting rod, each of said side bars having an aperture at its lower portion, said guide bar carrier having a pair of upwardly extending arms, each of said arms having an aperture, a sleeve having a bore being inserted into each pair of apertures in said arms and said side bars for connecting said guide bar carrier with said hanger, said connecting rod of the hanger being shiftably inserted into said recess at the upper end of the supporting element, an engaging rod inserted into said bores of said sleeves and the supporting element, said engaging rod being shiftable in said bore of the supporting element, and locking means for locking said engaging rod in a predetermined position relative to said side bars of the hanger, said locking means being disengageable for a temporary removal of said engaging rod from said bores for a temporary disengagement of said hanger from said supporting element.

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