

April 10, 1951

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2,548,719

TRAVERSE MOTION DRIVE FOR SPINNING AND TWISTER FRAMES

Filed Dec. 14, 1949

3 Sheets-Sheet 1

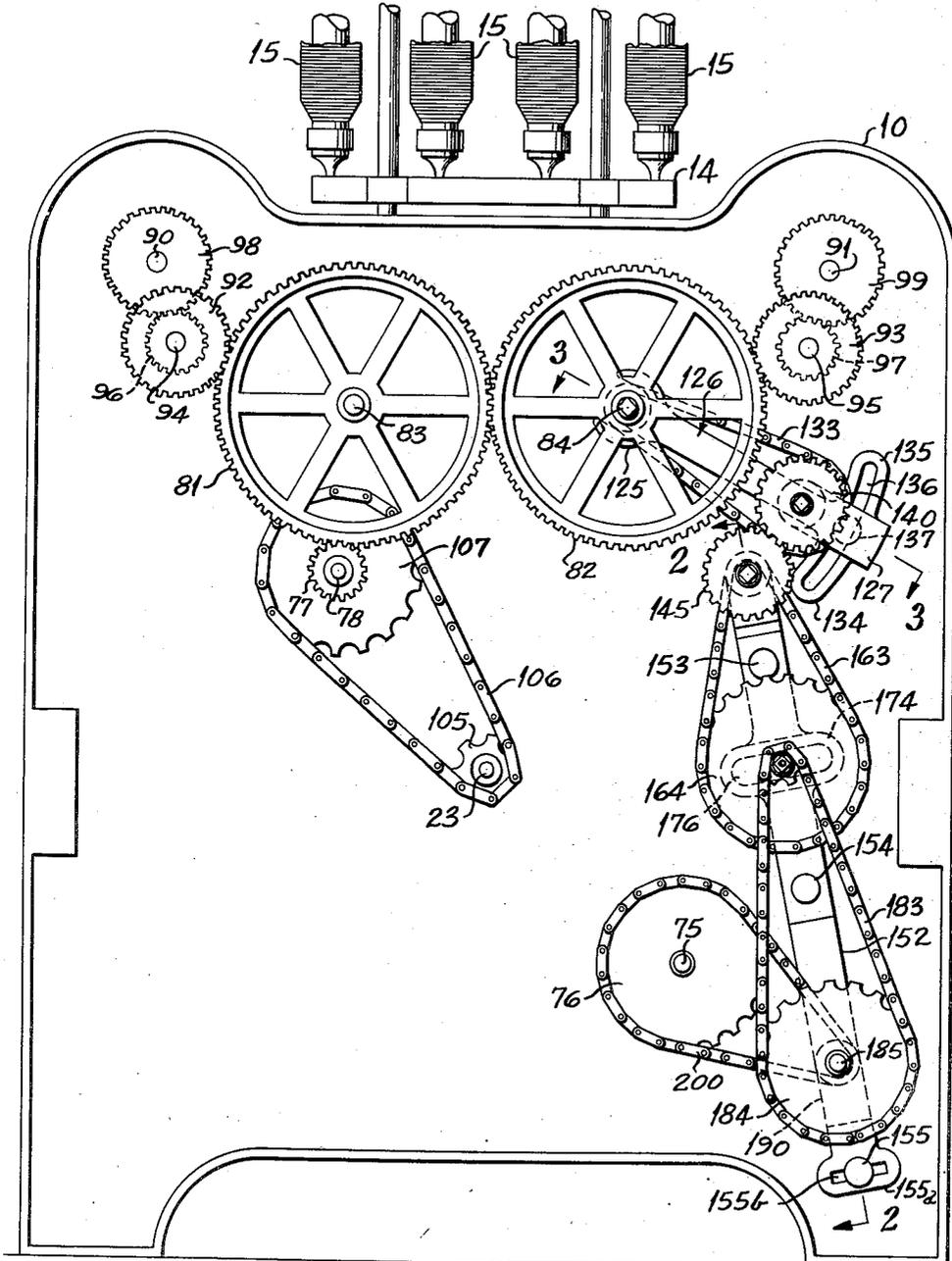


Fig-1

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3 Sheets-Sheet 2

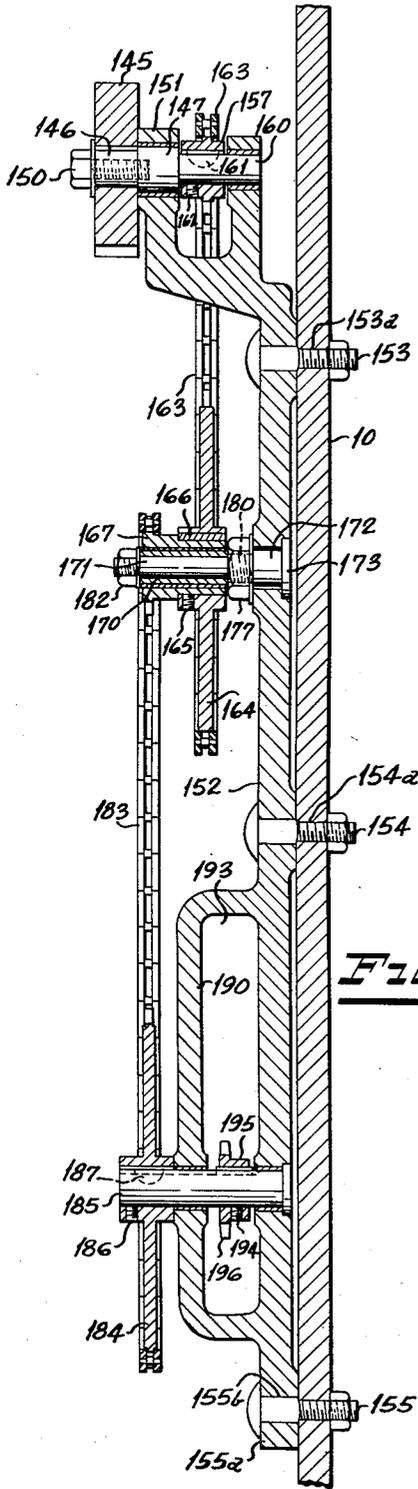


Fig-2

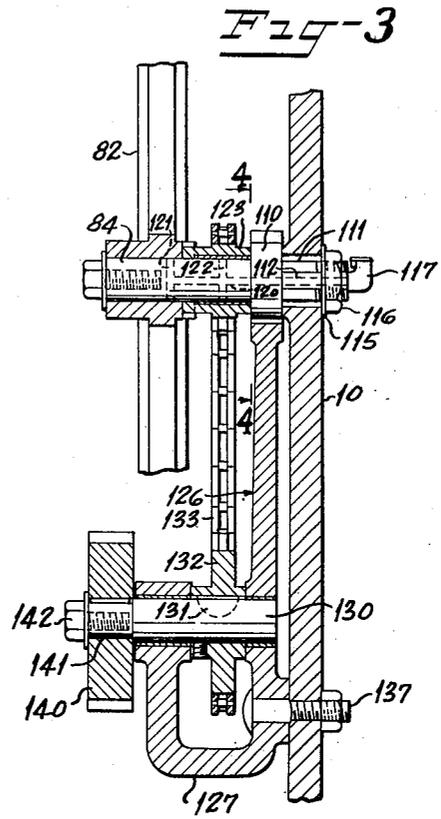


Fig-3

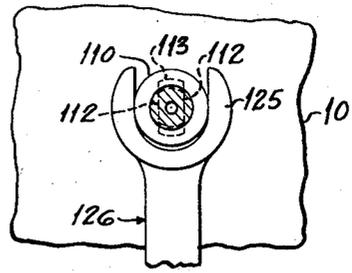


Fig-4

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3 Sheets-Sheet 3

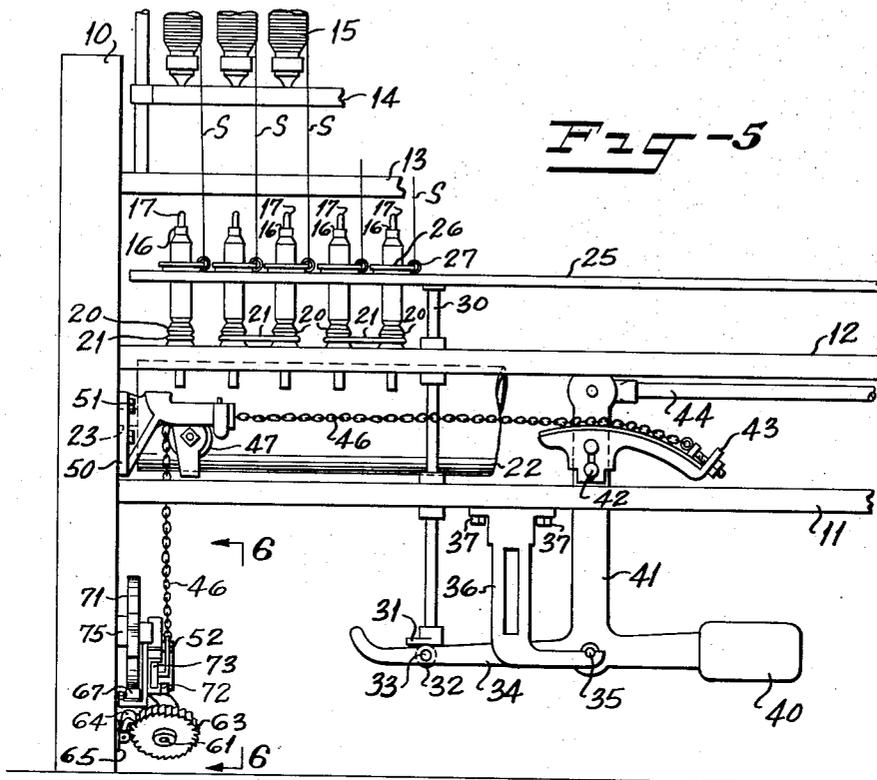


Fig-5

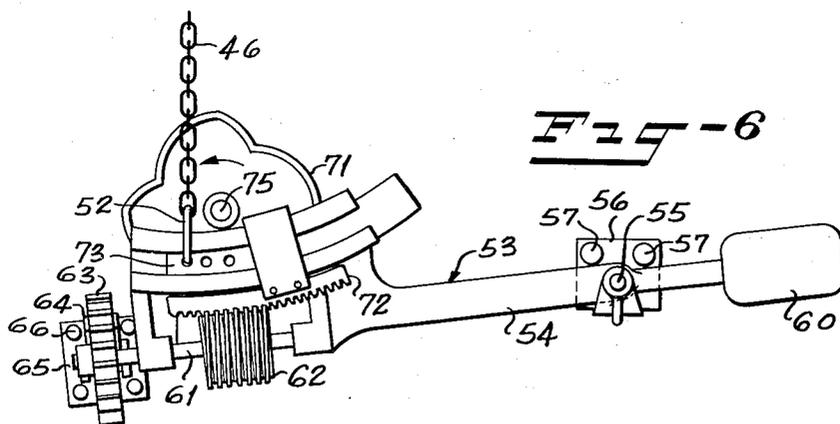


Fig-6

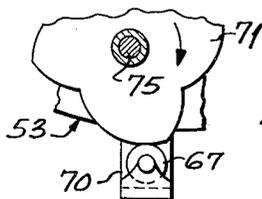


Fig-7

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UNITED STATES PATENT OFFICE

2,548,719

TRAVERSE MOTION DRIVE FOR SPINNING AND TWISTER FRAMES

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3 Claims. (Cl. 57—92)

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This invention relates to traverse motions for spinning frames, twister frames and the like, and more especially to an improved driving means for the builder cam.

Heretofore, the builder cam associated with the builder motion, which is a part of a traverse motion, on a spinning frame or the like has been driven through a series of gears including beveled gears and a worm and worm gear drive combination, the worm gear being fixed on the shaft on which the builder cam has been fixedly mounted. It is well known that a certain amount of back-lash is essential in beveled gears and in worm and worm gear drives and that the so-called pitman roll which rides against the builder cam has lifting effect against the builder cam as the high point of the cam moves toward and into engagement with the pitman roll.

On the other hand, immediately upon the high point of the cam moving out of engagement with the pitman roll, the builder motion is relieved, momentarily, of the weight of the ring rail and intervening parts and falls, by gravity, thus momentarily reversing the pressure on the beveled gears and the worm and worm gear combination. The ring rail will then remain stationary until any back-lash in these gears is overcome.

When the ring rail remains stationary, several rounds of yarn may be fed to the bobbins at a single point along their lengths. Now, when the yarn is withdrawn from these bobbins, such as on a winding machine or in the shuttle of a loom, several rounds of yarn may be withdrawn from the bobbins simultaneously as a result of these several rounds being formed by a momentary pause of the ring rail, and these rounds would become entangled and break or cause a defect in the fabric being woven or the packages of yarn being wound.

It is therefore an object of this invention to provide an improved chain drive mechanism for spinning frames and the like for transmitting rotation to the builder motion cam, the chain employed preferably being a silent type of chain, and through a series of chain and sprocket combinations reducing the rate of speed transmitted from the usual driving source of the spinning frame to obtain the same rate of speed of the builder cam as has heretofore been the case, without the necessity of using beveled gears or a worm and worm gear drive combination thus eliminating the back-lash which has heretofore resulted in the difficulties previously described.

It is another object of this invention to provide a combination spur gear and chain drive for

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transmitting rotation from the main cylinder shaft of the spinning frame, twister or the like to the builder motion cam, to not only avoid the occurrence of back-lash through the intervening connections but to also provide means for varying the speed of the builder motion cam relative to the speed of the bobbins by utilizing at least one of the spur gears as a change-gear. The purpose of varying the speed of the builder motion cam is to vary the speed at which the ring rail traverses, in a vertical plane, past the bobbins relative to the speed at which rotation is imparted to the bobbins to control the number of rounds fed to the bobbins in a predetermined length of the bobbins.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings in which—

Figure 1 is an end elevation looking at the head end of a spinning frame with the usual cover therefor removed and showing the improved chain drive mechanism for driving the builder motion cam;

Figure 2 is an enlarged vertical sectional view taken substantially along the line 2—2 in Figure 1;

Figure 3 is an enlarged sectional view taken substantially along the line 3—3 in Figure 1;

Figure 4 is a vertical sectional view taken substantially along the line 4—4 in Figure 3;

Figure 5 is a side elevation of one end of a spinning frame showing a traverse motion associated therewith and including a connection between the builder motion and the ring rail of the spinning frame;

Figure 6 is an enlarged elevation of the builder motion looking substantially along the line 6—6 in Figure 5;

Figure 7 is a fragmentary elevation looking at the opposite side of the builder motion shown in Figure 5 and showing the pitman roll engaging the builder cam.

Referring more specifically to the drawings the numeral 10 indicates a head end member of a spinning frame or the like to which one end of a main bottom rail 11 and one end of a bolster rail 12 are connected in a conventional manner. One end of an upper rail 13 is also secured in a conventional manner to the head frame member 10 and supports the usual draft rolls or the like, not shown, and also supports a creel stand 14 which supports a plurality of skewers 15.

Strands of yarn S from the skewers 15 are fed to a plurality of bobbins 16 mounted on spindles

17 having whorls 20 thereon over which a suitable belt 21 is mounted, the belt being also mounted on a centrally disposed main cylinder 22 which is fixed on a main drive shaft 23. The shaft 23 is driven in a conventional manner by means, not shown, disposed at the other end of the spinning frame from that shown in Figure 5.

The spinning frame has a conventional ring rail 25 having a plurality of rings 26 thereon and each ring having a traveler 27 mounted thereon through which the strands S pass to the bobbins 16 as the ring rail 25 reciprocates in a vertical plane by means of the usual builder motion to be presently described.

The ring rail 25 is supported at various points throughout its length on a plurality of conventional lifter rods 30, only one of which is shown in Figure 5. This lifter rod 30 slidably penetrates the bolster rail 12 and the bottom rail 11 and the lower end thereof has a shoe 31 fixedly mounted thereon which bears against a roller 32 rotatably mounted on a stub 33 in a conventional lifter arm 34.

The lifter arm 34 is oscillatably mounted intermediate its ends, as at 35, on a conventional bearing hanger 36 secured, as by screws 37, to the bottom rail 11 of the spinning frame. This conventional lifter arm 34 has a weight member 40 at its right hand end in Figure 5, or at its end remote from the roller 32, and also has an upwardly extending portion 41 integral therewith which has secured thereto, as by screws 42, a conventional chain arc 43.

The upper end of the upwardly extending portion 41 of the lifter arm 34 has pivotally connected thereto one end of an extension rod 44 which extends to similar lifter arms, not shown, for transmitting movement to the other conventional lifter rods, not shown, like the lifter rod 30 in Figure 4.

The chain arc 43, which is often referred to as quadrant, has one end of a conventional builder chain 46 connected thereto. This builder chain 46 extends over a conventional pulley 47 rotatably mounted in a bracket 50 secured, as by screws 51, to the head end frame member 10. The builder chain 46 extends downwardly from the pulley 47 and is connected at the lower end thereof to a hook member 52 of a conventional builder motion broadly designated at 53. There are various types of builder motions in use such as a bunch builder, a combination builder or a filling builder and these builder motions are slightly different from each other in construction and employ various shapes of builder cams. The builder motion 53 shown in Figures 5, 6 and 7 is of the type generally referred to as a bunch builder, but it is to be understood that the present invention will work equally as well with various types of builder motions and will greatly improve the operation of all three of the types of builder motions heretofore described.

The particular type of builder motion 53 shown in Figures 5, 6 and 7 includes a lever 54 oscillatably mounted intermediate its ends as at 55, on a bracket 56 secured, as by screws 57, to the head frame member 10. This lever 54 is irregular in shape at one end thereof and has a weight member 60 at the other end thereof. The irregularly shaped end of the lever 54 has a conventional worm shaft 61 rotatably mounted therein on which a worm 62 is fixedly mounted. The worm shaft 61 extends through the end of the lever 54 and has a conventional ratchet wheel 63 fixedly mounted thereon. This ratchet

wheel 63 is adapted to engage a ratchet pawl 64 pivotally mounted in a bracket 65 secured, as by screws 66, to the head end frame member 10. This pivoted ratchet pawl 64 engages the ratchet wheel 63 upon each downward stroke of the left-hand end of the lever 54 in Figure 6, and transmits a step in rotation to the shaft 61 upon each upward stroke of the left-hand end of the lever 54 in Figure 6.

The means for transmitting vertical movement to the lever 54 includes a pitman roll 67 rotatably mounted in a downwardly projecting portion 70 of the lever 54 (Figures 5 and 7). A conventional builder motion cam 71, which is shown as a four lobe cam but which may be of any desired shape such as a heart-shaped cam, is engaged by the pitman roll 67. The pitman roll 67 is urged against the periphery of the builder motion cam 71 due to the weight member 60 at the other end of the lever 54.

The worm 62 on the shaft 61 engages a rack 72 secured to a dove-tailed slide member 73 and upon step-by-step rotation being imparted to the conventional worm 62, like movement will be transmitted to the rack 72 so as to transmit step-by-step movement to the dove-tailed slide member 73, to which the hook member 52 is pivotally connected, for gradually changing the range of vertical movement of the ring rail in a conventional manner. The dove-tailed slide member 73 is mounted for sliding movement in the left-hand end of the lever 54 in Figure 6.

The builder motion cam 71 is fixedly mounted on one end of a builder cam shaft 75 which extends through and is rotatably mounted in the head end frame member 10 and has a sprocket wheel 76 fixedly mounted on its end remote from the cam 71 and within the head end frame member 10. This sprocket wheel 76 is a part of the present invention, relating to means for transmitting positive rotation to the shaft 75 on which the builder motion cam 71 is fixedly mounted.

Heretofore, a worm gear has been employed in lieu of the sprocket wheel 76 and has been driven through a worm and a series of gears, including a pair of beveled gears, and the primary object of this invention is to eliminate the use of beveled gears in the course of transmitting rotation to the cam shaft 75 from the main cylinder shaft 23 shown in the central portion of Figure 1. The purpose of eliminating the beveled gears will be later described in summarizing the operation of this apparatus.

Most of the parts of the conventional driving mechanism for the spinning frame or the like are retained in the head end frame member 10 and operate in conjunction with the present invention and these parts include a twist spur gear 77 rotatably mounted on a stub shaft 78 projecting from and fixedly mounted in the head end frame member 10. This twist gear 77 is driven in a manner to be presently described and imparts rotation to a left-hand interim gear 81 which, in turn, transmits rotation to a right-hand interim gear 82, these interim gears 81 and 82 are spur gears and are rotatably mounted on stub shafts 83 and 84, respectively, fixedly mounted in the head end frame member 10. The stub shaft 83 is conventional, and the stub shaft 84 is especially adapted to the present invention and will be later described in detail.

The interim gears 81 and 82 transmit rotation to front roll shafts 90 and 91 through gears 92 and 93, respectively, rotatably mounted on stub shafts 94 and 95 fixedly mounted in and project-

ing from the head end frame member 10. The gears 92 and 93 have pinions 96 and 97 fixed thereto, in a conventional manner, which, in turn, mesh with gears 98 and 99, respectively, fixedly mounted on the top roll shafts 90 and 91 respectively. This completes the description of the conventional gearing disposed within the head frame member 10.

Now, fixedly mounted on the main cylinder shaft 23 is a sprocket wheel 105 on which a sprocket chain 106 is mounted. This sprocket chain 106 is also mounted on a sprocket wheel 107 rotatably mounted on the stub shaft 78 and having the twist gear 77 secured thereto. Thus, rotation is transmitted from the shaft 23 through the sprocket wheels 105 and 107, and the sprocket chain 106, to the twist gear 77 which, in turn, transmits rotation to the interim gears 81 and 82.

The right-hand interim gear 82 (Figure 1) is rotatably mounted on the stub shaft 84 as heretofore described. Now, this stub shaft 84, as shown in detail in Figures 3 and 4, has an enlarged portion 110 integral therewith and a restricted threaded portion 111, this restricted threaded portion 111 having flats 112 on opposed sides thereof (Figure 4). The head end frame member has a vertically extending slot 113 therein which is slidably penetrated by the restricted threaded portion 111 of the stub shaft 84 and the flats of the restricted threaded portion 111 prevent the stub shaft 84 from rotating in the slot 113.

The outer end of the restricted threaded portion 111 has a washer 115 mounted thereon against which a nut 116 is driven home on the threaded end of the restricted portion 111. A suitable oil cup 117 is threadably mounted in one end of the stub shaft 84 and the stub shaft has communicating passageways 120, 121 and 122 therein for directing lubricant from the oil cup 117 to the interim gear 82 as well as to a sprocket wheel 123 which is also rotatably mounted on the stub shaft 84 and which is suitably secured to the interim gear 82 so that rotation of the interim gear 82 will cause like rotation to be imparted to the sprocket wheel 123.

The enlarged portion 110 of the stub shaft 84 has the forked end 125 of a change gear bracket, broadly designated at 126, loosely mounted thereon (Figure 4). This change gear bracket 126 has a substantially U-shaped portion 127 (Figure 3) integral with its end remote from the stub shaft 84 and in which a stub shaft 130 is rotatably mounted. Keyed on the stub shaft 130, as by a Woodruff key 131, is a sprocket wheel 132 which is disposed between the legs of the U-shaped portion 127 and has a sprocket chain 133 mounted thereon, this sprocket chain 133 also being mounted on the sprocket wheel 123 so as to transmit rotation from the sprocket wheel 123 to the sprocket wheel 132 and the shaft 130.

The end of the change gear bracket 126 forming the wall of the U-shaped member 127 adjacent the head end frame 10 has extended wing portions 134 and 135 provided with a curved slot which extends from adjacent one end of the wing portion 134 to adjacent the remote end of the wing portion 135. The radius point of this curved slot 136 is the center of the stub shaft 84 and this curved slot 136 is slidably penetrated by a bolt 137 for securing the change gear bracket 126 in adjusted position depending upon the size of change gear mounted thereon.

A spur change gear 140 is keyed to a restricted end portion 141 of the stub shaft 130 and is se-

cured thereon by any suitable means such as a cap screw 142 threadably embedded in the free end of the restricted portion 141. This change gear meshes with a second spur change gear 145 which is commonly known as a lay compound gear. The lay compound gear 145 is keyed to a restricted end portion 146 of a stub shaft 147 and is secured thereon as by a screw 150 (Figure 2). This stub shaft 147 is rotatably mounted in the forked upper end 151 of an improved traverse motion drive bracket broadly designated at 152. The builder motion drive bracket 152 and the change gear bracket 126 are essential parts of the present invention and they are designed in such a manner as to eliminate many of the gears and other parts heretofore required in driving the usual types of traverse motions. The traverse motion drive bracket 152 is secured, as by square shanked bolts 153, 154 and 155 to the head end frame member 10. The lower end of the builder motion bracket 152 has an enlarged portion 155a provided with a slot 155b which is penetrated by the screw 155 for purposes to be later described.

A sprocket wheel 157 is fixedly mounted on a restricted portion 160 of the stub shaft 147 and is keyed thereto, as by a Woodruff key 161, and is secured thereon as by a set screw 162. The sprocket wheel 157, which is a relatively small sprocket wheel, has a sprocket chain 163 preferably of the silent type, mounted thereon, this sprocket chain 163 is also mounted on a relatively large intermediate sprocket wheel 164. The sprocket wheel 164 is fixedly mounted, as by a set screw 165 (Figure 2) and a key 166, on the hub of a relatively small intermediate sprocket wheel 167. The small sprocket wheel 167 is rotatably mounted on a sleeve 170 which is slidably mounted on a restricted portion 171 of a stub shaft 172. The stub shaft 172 has a head portion 173 at one end thereof.

It will be observed in Figure 1 that the builder motion drive bracket 152 has an enlarged central portion 174 integral therewith having a transverse slot 176 therein. This transverse slot 176 is slidably penetrated by the stub shaft 172, this stub shaft being secured in the slot 176 by a lock nut 177 threadably mounted on a restricted threaded portion 180 of the stub shaft 172, this restricted threaded portion 180 being of slightly large diameter than the restricted portion 171 on which the sleeve 170 is mounted. The purpose of the slot 176 is to provide means for taking the slack out of the sprocket chains mounted on the various sprocket wheels on the bracket 152. The left-hand end of the stub shaft 172, in Figure 2, has a nut 182 threadably mounted thereon for securing the sleeve 170 against the shoulder formed by the restricted threaded portion 180. It is thus seen that the intermediate sprocket wheels 164 and 167 may rotate on the sleeve 170.

The small intermediate sprocket wheel 167 has a sprocket chain 183 mounted thereon which extends downwardly and which is also mounted on a relatively large lower sprocket wheel 184 fixedly mounted on a lower stub shaft 185, as by a set screw 186 and a Woodruff key 187. The stub shaft 185 (Figure 2) is mounted in a thickened or raised portion 190 integral with the lower portion of the builder motion drive bracket 152. This raised or thickened portion 190 has an opening 193 therein which is also spanned by the stub shaft 185, and disposed within the opening 193 and fixed on the shaft 185, as by a set screw 194 and a key 195, is a relatively small lower sprocket

wheel 196. This sprocket wheel 196 has a sprocket chain 200 mounted thereon which is also mounted on the sprocket wheel 76 heretofore described as being mounted on the rotatable cam shaft 75. The stub shafts 84, 136, 147, 172 and 185 are all provided with suitable friction bearings which are a usual part of structures of this type and a detailed description thereof is deemed unnecessary.

In mounting the traverse motion drive bracket 152 on the head member 10, the bracket 152 is first pivotally secured to the head member by either of the bolts 153, 154 and also by the bolt 155 penetrating the adjustment slot 155b. The chain 200 is then mounted on the sprocket wheels 76 and 196 and the bracket 152 is adjusted to take up any slack in the chain 200. The hole 153a or 154a is then drilled in the head frame member 10 for reception of the bolt 153 or 154, which may have been previously omitted, and the bolt 153 or 154 is tightened to hold the bracket 152 in adjusted position. All the sprocket chains shown in Figure 1 must be taut in order to prevent occurrence of back-lash in the traverse motion drive.

It is thus seen that rotation will be transmitted from the right-hand interim gear 82 to the sprocket wheel 123 and successively through the sprocket chain 133, the sprocket wheel 132, the change gear 149, the lay compound gear 145, the sprocket wheel 157, the sprocket chain 163, the sprocket wheel 164, and thus to the sprocket wheel 167 which rotates with the sprocket wheel 164. The sprocket wheel 167, in turn, transmits rotation to the sprocket wheel 184 through the sprocket chain 183. The sprocket wheel 184 fixedly mounted on the stub shaft 185 transmits rotation to the small sprocket wheel 196 which, in turn, transmits rotation to the sprocket wheel 76 through the sprocket chain 200 to thus drive the cam shaft and the builder motion cam 71 (Figures 6 and 7).

It is well known, to those familiar with the art, that the builder motion cam 71 must rotate at a very slow rate in comparison to the rate of rotation of the main cylinder 22 and its associated shaft 23. It is evident that it is necessary to provide a series of sprocket wheels and sprocket chains in combination so arranged as to gradually step down the speed between the right-hand interim gear 82 and the sprocket wheel 76 in order to bring about this extreme change in the rate of rotation between the main drive shaft 23 and the rotatable shaft 75 in Figure 1.

Now, in operation, the pitman roll 67 is urged against the periphery of the cam wheel 71 by the weight member 60 and, as the pitman roll 67 moves to the low points in the cam wheel 71, the left-hand end of the lever 54 moves upwardly thus permitting the chain arc 43 to move from left to right in Figure 4 by virtue of the weight 40 on the lifter arm 34. This will, of course, permit the roller 32 to move upwardly, with the arm 34, to elevate the ring rail through the medium of the lifter rod 30. Now, it is evident that during this lifting action of the lifter arm 34 and the lever 54, the builder cam 71 would exert very little resistance against the upward movement of the pitman roll 67 since the weights 50 and 60 act to facilitate this upward movement.

Upon the cam 71 moving so the pitman roll 67 moves toward the high point of the builder cam 71, the pressure exerted by the roll 67 against the cam 71 is increased due to the fact that the cam 71

must force the left-hand end of the lever 54 downwardly and, in so doing, must also force the builder chain 46 downwardly and must raise the weights 40 and 60. The improved driving means will cause the builder motion to operate evenly regardless of this reversal of pressure.

However, if the conventional type of drive apparatus were employed in transmitting rotation to the builder cam 71, pressure between the driving and the driven beveled gears, which are usual parts of the types of traverse motion drives heretofore in use, would be exerted in one direction during the time that the pitman roll 67 was lowered in Figures 6 and 7, from the low point of the builder motion cam 71 to the high point thereof and this pressure would be reversed as the pitman roll 67 moved away from the high point of the cam 71 and to the low point of the builder motion cam 71. It is evident that, heretofore, this caused a certain amount of back-lash between the beveled gears as the pitman roll 67 moved away from the apex of the high point of the builder motion cam 71 and, momentarily, this back-lash would have to be overcome between the two beveled gears heretofore employed and, during this interim, the ring rail 25 would remain stationary with the result that several rounds of yarn S would be applied to the bobbins 16 at one point along the length thereof. This would result in a faulty package, because wherever there were several rounds placed on a bobbin at a single point, all of these rounds would likely be withdrawn simultaneously from the bobbin in future operations, such as in the shuttle of a loom or in a winder or the like, and these several rounds of yarn would become knotted or entangled and this would result in an inferior material being woven on the loom or in an inferior package being wound on the winding machine, or it would cause the yarn to break thus requiring the ends to be pieced together and resulting in additional cost in future yarn processing operations.

It is thus seen that the improved driving means will overcome this back-lash and will cause the builder motion to operate in an even manner and will provide a more positive control of the same.

In the drawings and specification there has been set forth a preferred embodiment of the invention and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In a spinning frame, twister and the like having a head end member and being provided with a main drive shaft and a rotatable shaft rotatably mounted in the head end member, said spinning frame also having a builder motion cam fixedly mounted on the rotatable shaft and being provided with a builder motion having means thereon for engaging the builder motion cam, said spinning frame also having a pair of stub shafts thereon provided with a pair of intermeshing interim gears mounted thereon, a change gear bracket having a fork on one end loosely engaging one of said stub shafts, the other end of said change gear bracket having a U-shaped portion being provided with a spur gear and a sprocket wheel rotatably mounted thereon, the U-shaped portion of the change gear bracket also having wing portions integral therewith and being provided with an arcuate slot, means secured to said head end member and projecting through the arcuate slot for adjustably securing the change

gear bracket to the head end member, a driving connection between the interim gear having the change gear bracket engaging its stub shaft and the sprocket wheel mounted on said change gear bracket, means connecting the sprocket wheel with the change gear, a lay compound gear meshing with said change gear, a series of sprocket wheels and sprocket chains connecting the lay compound gear with the said rotatable shaft having the builder motion cam thereon, and means for transmitting rotation from the main drive shaft to the interim gears to, in turn, transmit rotation to the builder motion cam.

2. In a spinning frame, twister and the like having a head frame member and also having a builder motion and said builder motion including a builder motion cam for transmitting motion to the builder motion and a shaft rotatably mounted in the head frame member and on one end of which the builder motion cam is fixedly mounted, means for imparting rotation to the builder motion cam comprising a driven shaft, a series of sprocket chain and sprocket wheel combinations and a series of spur gears interposed between and interconnected with the series of sprocket chain and sprocket wheel combinations, driving connections between the series of sprocket chain and sprocket wheel combinations and the first-named shaft and the driven shaft, a traverse motion drive bracket for supporting at least a part of the sprocket wheel and sprocket chain combinations comprising an elongated member secured to the head frame member and having a forked portion at one end thereof and an enlarged portion intermediate the ends thereof and a raised portion at the other end thereof, a first stub shaft rotatably mounted in the forked portion, a first small sprocket wheel fixed on the first stub shaft, a second stub shaft fixedly mounted in the intermediate enlarged portion, a second and a third sprocket wheel rotatably mounted on the second stub shaft and a connection between the two last-named sprocket wheels to cause these last-named sprocket wheels to rotate in unison, said raised portion at one end of the elongated member having an opening therethrough, a third stub shaft rotatably mounted in the raised portion and extending through said opening, a fourth sprocket wheel fixed on the third stub shaft and being disposed within said opening, a fifth sprocket wheel fixed on one end of said third stub shaft and disposed exteriorly of said raised portion, a sprocket chain connecting the first small sprocket wheel with the second sprocket wheel intermediate the ends of the elongated member, another sprocket chain connecting the third sprocket wheel intermediate the ends of said elongated member with the fourth sprocket wheel, a sixth sprocket wheel fixedly mounted on the shaft on which the builder motion cam is mounted and a sprocket chain connecting the fifth sprocket wheel on the elongated member with the sixth sprocket wheel on the shaft on which the builder motion cam is mounted.

3. In a spinning frame, twister and the like having a head frame member and also having a builder motion and said builder motion including a builder motion cam for transmitting motion to the builder motion and a shaft rotatably mounted in the head frame member and on one end of which the builder motion cam is fixedly mounted, means for imparting rotation to the builder motion cam comprising a driven shaft, a

series of sprocket chain and sprocket wheel combinations and a series of spur gears interposed between and interconnected with the series of sprocket chain and sprocket wheel combinations, driving connections between the series of sprocket chain and sprocket wheel combinations and the first-named shaft and the driven shaft, a traverse motion drive bracket for supporting at least a part of the sprocket wheel and sprocket chain combinations comprising an elongated member secured to the head frame member and having a forked portion at one end thereof and an enlarged portion intermediate the ends thereof and a raised portion at the other end thereof, a first stub shaft rotatably mounted in the forked portion, a first small sprocket wheel fixed on the first stub shaft, a second stub shaft fixedly mounted in the intermediate enlarged portion, a second and a third sprocket wheel rotatably mounted on the second stub shaft and a connection between the two last-named sprocket wheels to cause these last-named sprocket wheels to rotate in unison, said raised portion at one end of the elongated member having an opening therethrough, a third stub shaft rotatably mounted in the raised portion and extending through said opening, a fourth sprocket wheel fixed on the third stub shaft and being disposed within said opening, a fifth sprocket wheel fixed on one end of said third stub shaft and disposed exteriorly of said raised portion, a sprocket chain connecting the first small sprocket wheel with the second sprocket wheel intermediate the ends of the elongated member, another sprocket chain connecting the third sprocket wheel intermediate the ends of said elongated member with the fourth sprocket wheel, a sixth sprocket wheel fixedly mounted on the shaft on which the builder motion cam is mounted, a sprocket chain connecting the fifth sprocket wheel on the elongated member with the sixth sprocket wheel on the shaft on which the builder motion cam is mounted, a change gear bracket disposed adjacent the upper end of said traverse motion drive bracket, said head frame member having a fourth stub shaft thereon on which at least one of the gears in said train of gears is rotatably mounted, a seventh sprocket wheel rotatably mounted on said fourth stub shaft projecting from the spinning frame and a driving connection between the last-named gear and the seventh sprocket wheel, a fifth stub shaft rotatably mounted in the change gear bracket, a spur change gear fixedly mounted on said fifth stub shaft, a spur lay gear fixedly mounted on said first stub shaft disposed in the fork of said traverse motion drive bracket and intermeshing with said change gear and an eighth sprocket wheel fixedly mounted on said fifth stub shaft and a sprocket chain connecting the eighth sprocket wheel on the shaft in the change gear bracket and the seventh sprocket wheel on the stub shaft projecting from the head frame member and means for adjusting said change gear bracket and a pivotal connection between said change gear bracket and the fourth stub shaft projecting from said head end frame member so as to permit adjustment of the change gear bracket about said fourth stub shaft for accommodating various sizes of the change gears.

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No references cited.