March 3, 1953 N. HOOPER 2,630,276

YARN BUILDING MOTION

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FIG. 1.

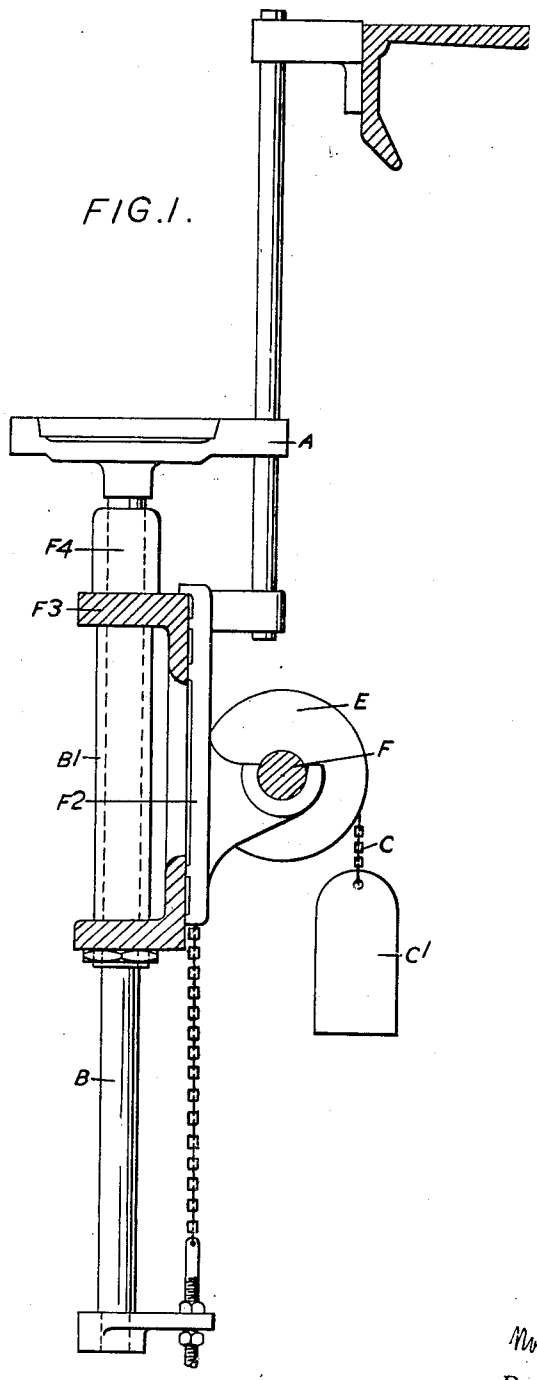

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FIG. 2.

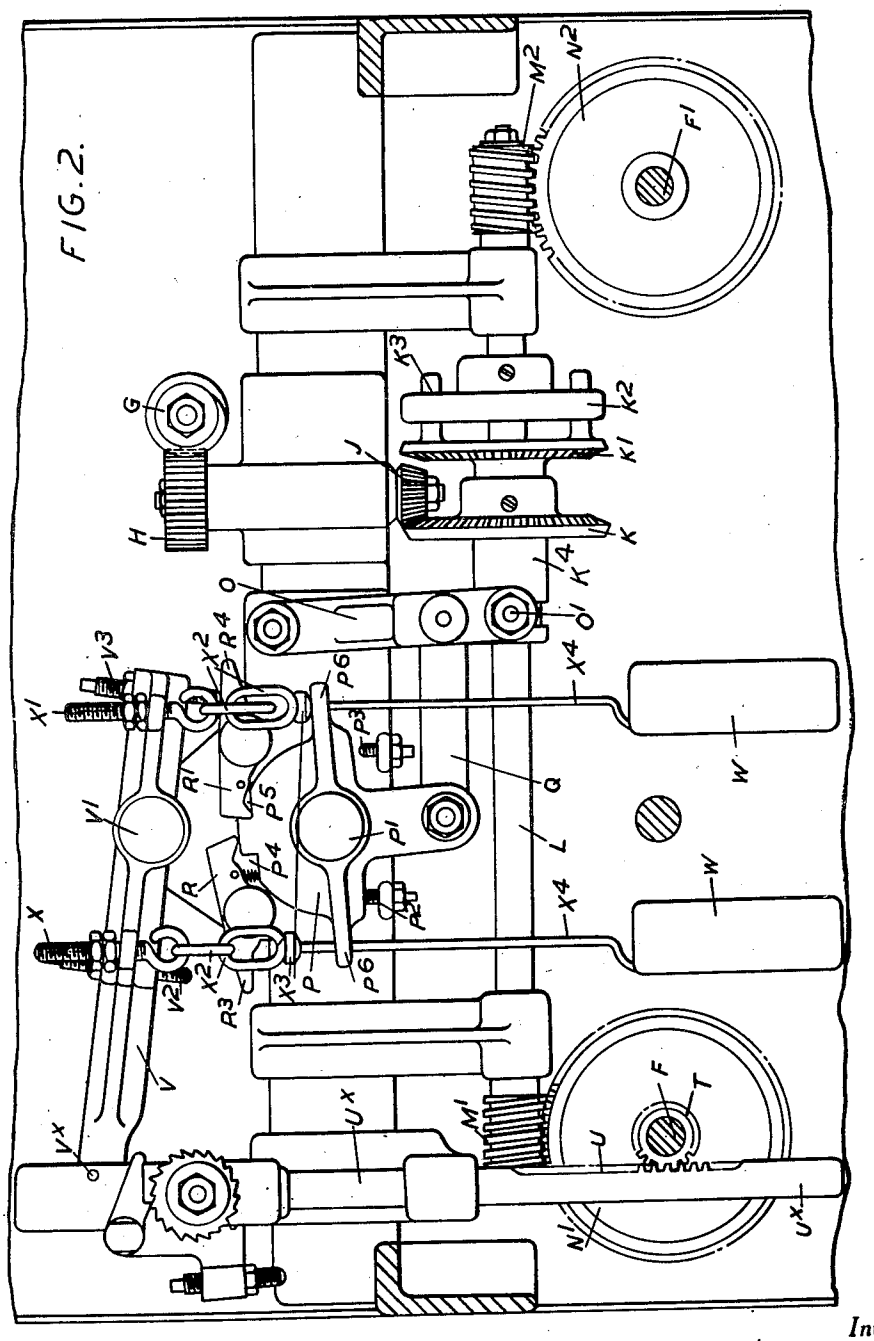

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FIG. 3.

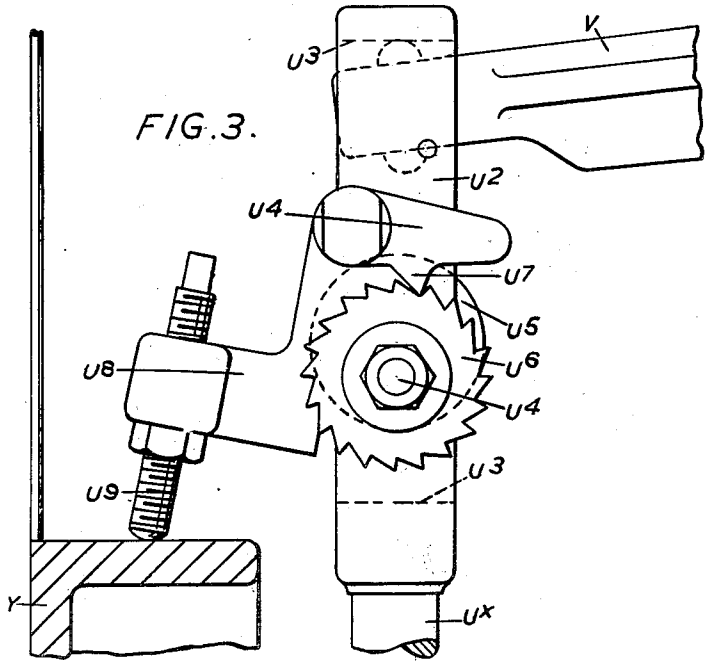
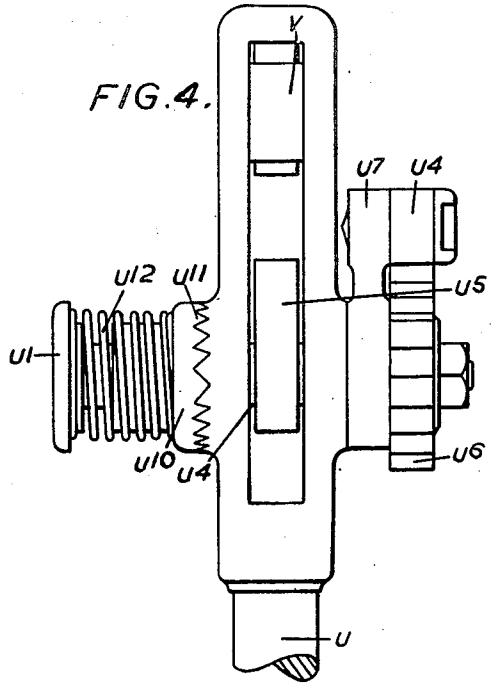


FIG. 4.



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UNITED STATES PATENT OFFICE

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YARN BUILDING MOTION

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8 Claims. (Cl. 242—43.3)

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This invention relates to a yarn building motion for ring doubling machines whereby all types of ring doubling bobbins can be built using the same building motion with very little alteration, that is to say a parallel build can be obtained on a double flanged doubler bobbin, a long lift build can be obtained with a short taper at the top on a doubler bobbin with a small top flange and a variable long lift build can be produced with a longer taper at the top on a single flanged bobbin and all these builds can be obtained without the use of heart cams.

A regular lifting and lowering motion is imparted to the builder rail by a lifter shaft which extends throughout the length of the machine and has fixed on it bosses from which are suspended flexible connections which are attached to lifter rods and pass over said bosses carrying weights which balance the builder rail and its attendant parts and reduce the torque on the lifter shaft to raise and lower such rails, the said lifter shaft being driven in alternate directions by reversing mechanism in combination with a trip motion for varying the angle of rotation of the lifter shaft, means being also provided for building a bobbin with or without a taper top and for altering the length and shape of the taper.

In the accompanying drawings,

Fig. 1 is an end section of part of a doubling frame building motion constructed in accordance with this invention.

Fig. 2 is a view of a reversing mechanism which is used in combination with the mechanism shown in Fig. 1, and

Figs. 3 and 4 are detached views of tapering mechanism which can be used in conjunction with the mechanism.

In the arrangement shown for carrying out the invention the builder rails A at each side of the machine are fixed to lifter rods B which are slidable in tubes B^1 attached to the framing F^3. Fixed to the bottom of each lifter rod B is a bracket to which is attached the lower end of a chain C, the upper end of which passes over and is fastened to a boss E fixed on a lifter shaft F which extends throughout the length of the machine at each side and is supported in brackets F^2 which are fixed to the framing F^3. A balance weight C^1 is suspended from each of the chains C to balance the lifter rods and builder rails and attendant parts and reduce the torque on the lifter shafts to raise and lower such rails.

The lifter shafts may be driven from the usual frame-end gearing by a change worm G, Fig. 2, meshing with a change worm wheel H

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fixed on the upper end of a short upright shaft on the lower end of which is fixed a bevel pinion J. This pinion is situated between two reversing bevel wheels K, K^1, which may be slidably keyed on a cross shaft L on one end of which is fixed a right hand worm M^1 and on the other end is fixed a left hand worm M^2 which mesh with corresponding worm wheels N^1, N^2, fixed on the lifter shafts F, F^1, so that such shafts are driven in opposite directions and the builder rails A at either side of the frame rise and fall together.

In one reversing arrangement one bevel wheel K^1 may be freely mounted on the cross shaft L and have projecting pins K^3 passing through slots or holes in a driving plate K^2 fixed on the cross shaft and the other bevel wheel K may be fixed on a long boss K^4 projecting from the freely mounted wheel and formed with an annular groove to engage a stud O^1 in a clutch fork lever O. This lever is connected by a link Q to a centrally disposed tail piece on a pivoted catch plate P which is held in either of two positions whilst one or other of the reversing bevel wheels is in gear with the bevel pinion by means of two pivoted catches R, R^1, and two adjustable stops P^2, P^3. For this purpose the pivoted catch plate P may be formed with two notches P^4, P^5, adapted to be engaged by one or other of the two pivoted catches and have the amount of its movement controlled by the two adjustable stops. Fixed on one of the lifter shafts is a pinion T which gears with a rack U on an upright rod that is slidable in bearings and may be formed at its upper end with a slot to receive one end of a two-armed tripping lever V that is fulcrummed vertically above the pivot of the catch plate as shown at V^1. Attached to this tripping lever at opposite sides of its fulcrum and at equal distances therefrom are two adjustable hooks or eye bolts X, X^1, each of which is connected through a lost motion device which may consist of two chain links X^2 to a head X^3 on the upper end of a rod X^4 that passes freely through a hole in a lug P^6 that extends from opposite sides of the catch plate P and suspended from the lower end of each rod is a weight W. Extending downwardly through two tapped holes in the tripping lever are two tripping screws V^2, V^3, which are adapted to be alternately engaged with tail pieces R^3, R^4, on the pivoted catches R, R^1.

With this arrangement as the ring rails A rise and fall, the rack U also rises and falls but over a shorter distance. This is effected by making the effective radius of the rack pinion T on the

lifter shaft less than the effective radius of the chain bosses on the lifter shafts and as the rack rises and falls it imparts a rocking motion to the tripping lever through a connection V^x between it and the upper end of the rack rod V^1. Whilst the rack is moving upwards one arm of the lever raises one of the weights through the connections described and lowers the other weight until the head on the weight rod rests upon the corresponding lug P^6 upon the pivoted catch plate whereupon the two links apertaining to such rod take up the rest of the movement. At the end of the upward movement of the rack, one of the tripping screws comes into contact with the tail piece of the pivoted catch that was in engagement with one of the notches in the catch plate and disengages it therefrom. Immediately this happens the weight turns the pivoted catch plate until it is arrested by coming in contact with one of the adjustable stops P^2, P^3, in which position the other notch is engaged by the other movable catch. This movement brings the reversing bevel wheel that was out of gear with the bevel pinion, into gear therewith and reverses the direction of movement of the lifter shafts. The rack now commences to descend, thereby reversing the movement of the tripping lever and weights and eventually bringing the other tripping screw into action to trip the other catch and restore the reversing bevel wheels to their former position.

The length and the relative position of the movement of the ring rails can be adjusted by setting the position of the tripping screws, and the amount of play that can take place in this portion of the mechanism can be adjusted by setting the stops which control the amount of movement of the pivoted catch plate.

The building motion described will build a bobbin without a taper top and in order to build a bobbin with a taper top the upper end of the rack rod is provided with a fitting U^2 containing a long slot U^3 in which the end of the trip lever V enters and this fitting carries a shaft U^4 which extends across the slot and is rotatable. Fixed on such shaft is an eccentric U^5 which is situated within the slot at some distance below the lever and fixed on the shaft outside the slot is a ratchet wheel U^6 that operates in conjunction with a pawl U^7 formed with a tail piece U^8 carrying an adjustable stop U^9 that is adapted to rest on a part Y of the machine frame.

During the upward movement of the rack rod a part of the eccentric comes in contact with a rounded portion on the underside of the tripping lever V and lifts that end of the latter, the length of stroke of the builder rail being determined by the part of the eccentric which comes in contact with the rounded projection and during this movement the pawl is disengaged from the ratchet wheel by the weight of its tail piece and the adjustable stop, and to prevent unwanted rotation of the ratchet wheel when the pawl is out of engagement with it the ratchet wheel is provided with a check device which may consist of a boss U^{10} slidably keyed on the shaft U^4 and having a serrated face U^{11} that is pressed against the corresponding face on the side of the fitting by means of a spring U^{12}.

With this arrangement each time the rack is approaching and arriving at the bottom of its stroke the pawl is brought into engagement with one of the teeth on the ratchet wheel by the adjustable stop screw coming in contact with the part of the machine frame and turns the ratchet wheel through the space of one tooth and causing another portion of the eccentric to be presented to the lever during the next upward movement of the rack rod, thus altering the length of the lift of the builder rail at each stroke and producing a taper at the top of the bobbin. The partial rotation of the ratchet wheel and eccentric takes place when the end of the trip lever or a rounded projection on the top thereof is in contact with the top of the slot in which position the rounded projection on its underside is out of contact with the eccentric or cam and there is therefore no load on the latter.

The length and shape of the taper on the bobbin can be varied by altering the shape of the eccentric or cam, and for a parallel bobbin, the cam and pawl may be removed and a concentric boss put in place of the cam. The building motion is, therefore, simply adapted for use with double-flange bobbins, bobbins with a small flange at the top, and bobbins with a tapered top, and a flange only at the base. The adjustments, as noted above, are simple, the adjustment for length and relative position of the lift being particularly simple.

The yarn building motion can also be employed for building yarn into cops or bobbins in spinning, twisting and like machines.

What I claim as my invention and desire to secure by Letters Patent in the United States is:

1. In a yarn building motion for ring doubling machines, a lifter shaft extending throughout the length of the machines, drive means for driving said lifter shaft, a reversing mechanism for reversing the direction of rotation of said lifter shaft, bosses fixed on said lifter shaft, flexible connections passing over said bosses and being positively driven thereby, a lifter rod and a balance weight attached to the ends of each flexible connection, a builder rail supported by each lifter rod, each balance weight balancing the corresponding lifter rod and builder rail and reducing the torque on the lifter shafts to raise and lower the rails, a slidably mounted rack, a pinion on the lifter shaft for imparting an up and down movement to such rack, a tripping lever to which a rocking motion is imparted by said rack, a pivoted catch plate operatively connected with said tripping lever so as to be rocked, lever means operatively connecting said catch plate with said reversing mechanism for shifting the latter so as to reverse the direction of rotation of said lifter shaft whenever said catch plate is rocked by said tripping lever so as two pivoted catches operatively connected to the tripping lever so as to be moved into and out of engagement with notches in the catch plate so as to arrest the catch plate and thereby said reversing mechanism while said tripping lever is being rocked and adjustable stops on the tripping lever for effecting such movement.

2. A yarn building motion for ring doubling machines, according to claim 1 wherein the reversing mechanism comprises two bevel wheels slidably and non-rotatably mounted on a cross shaft at opposite sides of a bevel pinion driven through a change worm and change worm wheel from existing gearing of the machine, and wherein said lever means include a clutch fork lever for imparting endwise movement to the two bevel wheels to shift one or other thereof into gear with the bevel pinion.

3. A yarn building motion for ring doubling machines according to claim 1, a fulcrum pivotally supporting said tripping lever and located vertically above the pivot of the catch plate, two

tripping screws mounted on the tripping lever equally spaced from said fulcrum and adapted to engage and release the pivoted catches, two adjustable eye bolts attached to the tripping lever at opposite sides of said fulcrum and at equal distances from the same, slotted lugs on said catch plate, two weighted rods, each rod passing through a slot in a lug on the pivoted catch plate and having a head on the upper end thereof, a lost motion device connecting each of said eye bolts with one of said rods, the arrangement being such that while the rack is moving upwards it raises one rod and lowers the other until the head thereon rests upon the corresponding lug of the pivoted catch plate whereupon the lost motion device takes the rest of the movement and at the end of the upright movement of the rack the tripping screw that is now in its bottom position moves the catch that was in engagement with the notch in the catch plate out of engagement therewith whereupon the other weighted rod turns the catch plate to shift the reversing mechanism and reverse the direction of rotation of the lifter shaft, in which position the catch plate is again held by the other catch engaging therewith, the rack now begins to move downwards and the reversal of the above described movement takes place.

4. A yarn building motion for ring doubling machines according to claim 3 wherein the tripping screws and thereby the releasing of the catches can be adjusted for determining the period during which said lifter shaft is rotated in the same direction and also the length of the movement of the builder rail, and adjustable stops are provided for regulating the amount of rocking movement of the catch plate whereby the amount of lost motion in the lost motion device can be regulated.

5. In a yarn-building motion for ring doubling machines, in combination, a supporting frame; at least one lifter shaft rotatably mounted on said supporting frame and extending throughout the length of the machine; means for driving said lifter shaft; a reversing mechanism for reversing the direction of rotation of said lifter shaft; a plurality of lifter rods slidably mounted on said supporting frame; a plurality of builder rails, each of said builder rails secured to one of said lifter rods; bosses fixed on said lifter shaft; flexible connections passing over said bosses and being positively driven thereby, one end of each flexible connection being attached to a lifter rod; balance weights attached to the other end of each of said flexible connections so as to balance the weight of said lifter rods, builder rails and attendant parts; a rack bar slidably mounted in said supporting frame for vertical movement; a pinion on said lifter shaft for imparting an up and down movement to said rack bar; a tripping lever to which a rocking motion is imparted by said rack bar; a pivoted catch plate operatively connected with said tripping lever so as to be rocked; lever means operatively connecting said catch plate with said reversing mechanism for shifting the latter so as to reverse the direction of rotation of said lifter shaft whenever said catch plate is rocked by the rocking motion of said tripping lever; two pivoted catches operatively connected to the tripping lever and adapted to alternately engage notches in said catch plate so as to arrest said catch plate and thereby said reversing mechanism while said tripping lever is being rocked; adjustable stops on the tripping lever for engaging said pivoted catches so as to disengage them; an eccentric rotatably mounted on the upper end of said rack bar engaging said tripping lever during the upward movement of said rack bar so as to rock said tripping lever; and a pivoted member mounted on said rack bar and actuated by said supporting frame during downward movement of said rack bar so as to be pivoted, said pivoted member being operatively connected to said eccentric so as to impart a partial turning movement to the same when pivoted whereby the position of said eccentric and the moment of engagement of the same with said tripping lever is gradually varied.

6. In a yarn-building motion for ring doubling machines, in combination, a supporting frame; at least one lifter shaft rotatably mounted on said supporting frame and extending throughout the length of the machine; means for driving said lifter shaft; a reversing mechanism for reversing the direction of rotation of said lifter shaft; a plurality of lifter rods slidably mounted on said supporting frame; a plurality of builder rails, each of said builder rails secured to one of said lifter rods; bosses fixed on said lifter shaft; flexible connections passing over said bosses and being positively driven thereby, one end of each flexible connection being attached to a lifter rod; balance weights attached to the other end of said flexible connections so as to balance the weight of each of said lifter rods, builder rails and attendant parts; a rack bar slidably mounted in said supporting frame for vertical movement; a pinion on said lifter shaft for imparting an up and down movement to said rack bar; a tripping lever to which a rocking motion is imparted by said rack bar; a pivoted catch plate operatively connected with said tripping lever so as to be rocked; lever means operatively connecting said catch plate with said reversing mechanism for shifting the latter so as to reverse the direction of rotation of said lifter shaft whenever said catch plate is rocked by the rocking motion of said tripping lever; two pivoted catches operatively connected to the tripping lever and adapted to alternately engage notches in said catch plate so as to arrest said catch plate and thereby said reversing mechanism while said tripping lever is being rocked; adjustable stops on the tripping lever for engaging said pivoted catches so as to disengage them; an eccentric rotatably mounted on the upper end of said rack bar engaging said tripping lever during the upward movement of said rack bar so as to rock said tripping lever; a pivoted member mounted on said rack bar and actuated by said supporting frame during downward movement of said rack bar so as to be pivoted, said pivoted member being operatively connected to said eccentric so as to impart a partial turning movement to the same when pivoted whereby the position of said eccentric and the moment of engagement of the same with said tripping lever is gradually varied; and an adjustable stop secured to said pivoted member engaging said supporting frame so as to cause actuation of said pivoted member during downward movement of said rack bar.

7. In a yarn-building motion for ring doubling machines, in combination, a supporting frame; at least one lifter shaft rotatably mounted on said supporting frame and extending throughout the length of the machine; means for driving said lifter shaft; a reversing mechanism for reversing the direction of rotation of said lifter shaft; a plurality of lifter rods slidably mounted on said

supporting frame; a plurality of builder rails, each of said builder rails secured to one of said lifter rods; bosses fixed on said lifter shaft; flexible connections passing over said bosses and being positively driven thereby, one end of each flexible connection being attached to a lifter rod; balance weights attached to the other end of each of said flexible connections so as to balance the weight of each of said lifter rods, builder rails and attendant parts; a rack bar slidably mounted in said supporting frame for vertical movement; a pinion on said lifter shaft for imparting an up and down movement to said rack bar; a tripping lever to which a rocking motion is imparted by said rack bar; a pivoted catch plate operatively connected with said tripping lever so as to be rocked; lever means operatively connecting said catch plate with said reversing mechanism for shifting the latter so as to reverse the direction of rotation of said lifter shaft whenever said catch plate is rocked by the rocking motion of said tripping lever; two pivoted catches operatively connected to the tripping lever and adapted to alternately engage notches in said catch plate so as to arrest said catch plate and thereby said reversing mechanism while said tripping lever is being rocked; adjustable stops on the tripping lever for engaging said pivoted catches so as to disengage them; an eccentric rotatably mounted on the upper end of said rack bar engaging said tripping lever during the upward movement of said rack bar so as to rock said tripping lever; a pivoted member mounted on said rack bar and actuated by said supporting frame during downward movement of said rack bar so as to be pivoted, said pivoted member being operatively connected to said eccentric so as to impart a partial turning movement to the same when pivoted whereby the position of said eccentric and the moment of engagement of the same with said tripping lever is gradually varied; an adjustable stop secured to said pivoted member engaging said supporting frame so as to cause actuation of said pivoted member during downward movement of said rack bar; and a check device preventing unwarranted rotation of said eccentric while said pivoted member is inoperative.

8. In a yarn-building motion for ring doubling machines, in combination, a supporting frame; at least one lifter shaft rotatably mounted on said supporting frame and extending throughout

the length of the machine; means for driving said lifter shaft; a reversing mechanism for reversing the direction of rotation of said lifter shaft; a plurality of lifter rods slidably mounted on said supporting frame; a plurality of builder rails, each of said builder rails secured to one of said lifter rods; a bar slidably mounted in said supporting frame for vertical movement; means on said lifter shaft for imparting an up and down movement to said bar; a tripping lever pivotally mounted on said supporting frame and operatively connected to said bar so as to be rocked by the same; a pivoted catch plate mounted on said supporting frame rockably between two positions; a lost motion device arranged between said tripping lever and said catch plate urging said catch plate to rock alternately from one position to the other position when said tripping lever is being rocked; catch means alternately arresting said catch plate in one of its positions and adapted to be disengaged by said tripping lever when the same is being rocked, and thereby permitting rocking of said catch plate by the action of said lost motion device; lever means operatively connecting said catch plate and said reversing mechanism so as to shift the latter whenever said catch plate is rocked by said lost motion device; an eccentric rotatably mounted on the upper end of said bar engaging said tripping lever during the upward movement of said bar so as to rock said tripping lever; and a pivoted member mounted on said bar and actuated by said supporting frame during downward movement of said bar so as to be pivoted, said pivoted member being operatively connected to said eccentric so as to impart a partial turning movement to the same when pivoted whereby the position of said eccentric and the moment of engagement of the same with said tripping lever is gradually varied.

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