(No Model.) 3 Sheets—Sheet 1.

# C. WHITAKER.

## FLY FRAME.

No. 554,409. Patented Feb. 11, 1896.

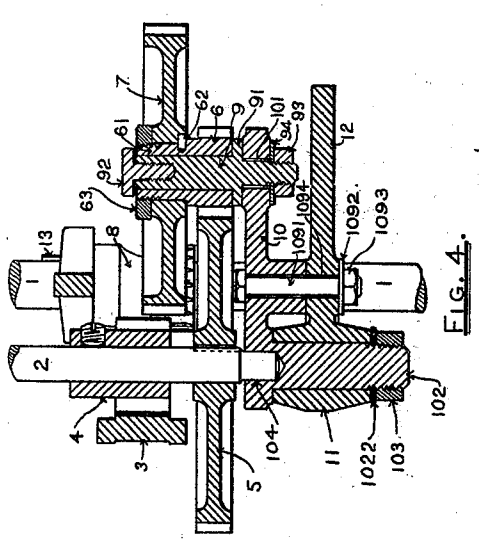

FIG. 4.

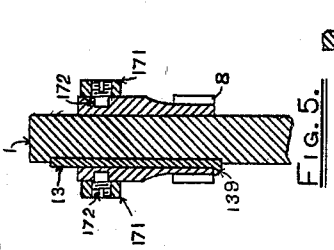

FIG. 5.

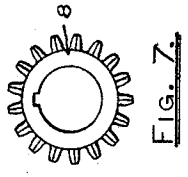

FIG. 7.

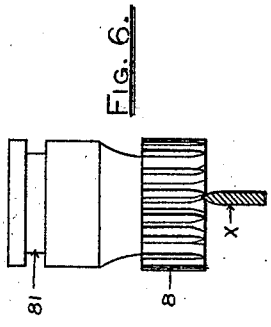

FIG. 6.

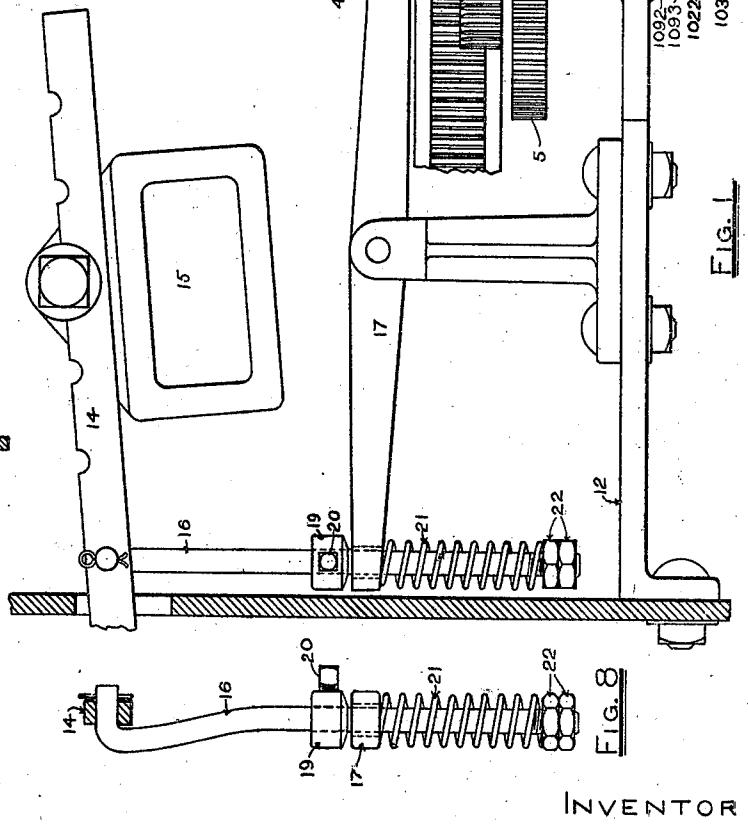

FIG. 1.



FIG. 8.

WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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## FLY FRAME.

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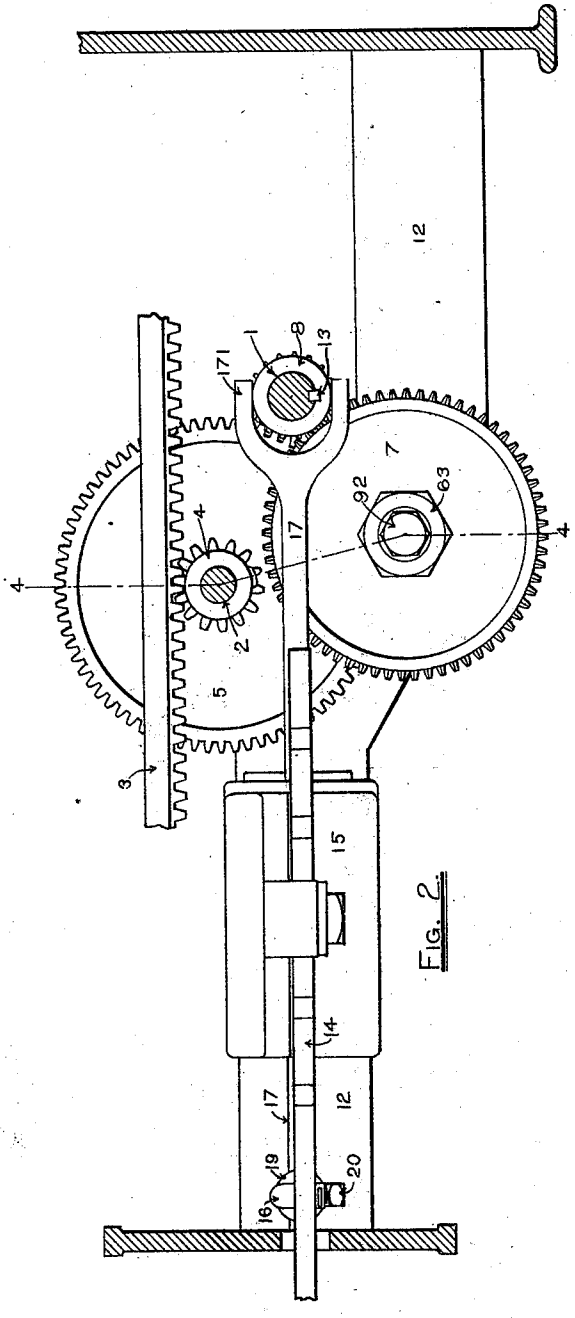


Fig. 2.

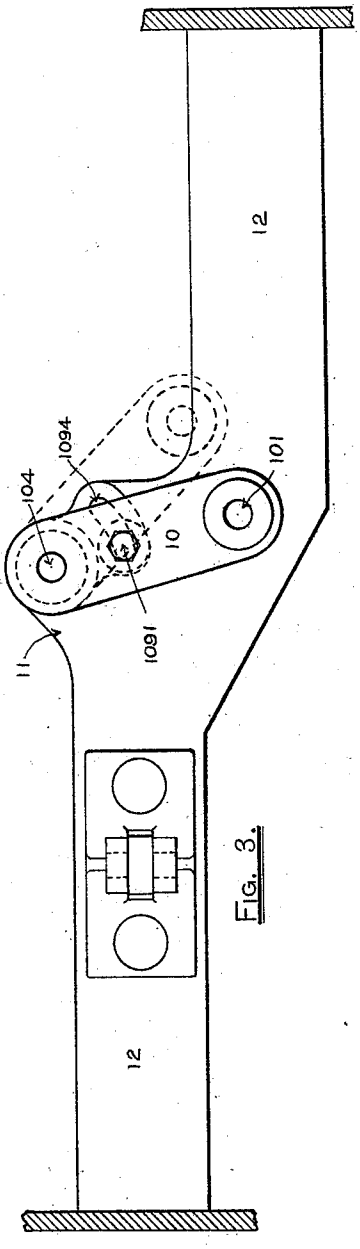


Fig. 3.

WITNESSES

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(No Model.) 3 Sheets—Sheet 3.

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## FLY FRAME.

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FIG. 10.

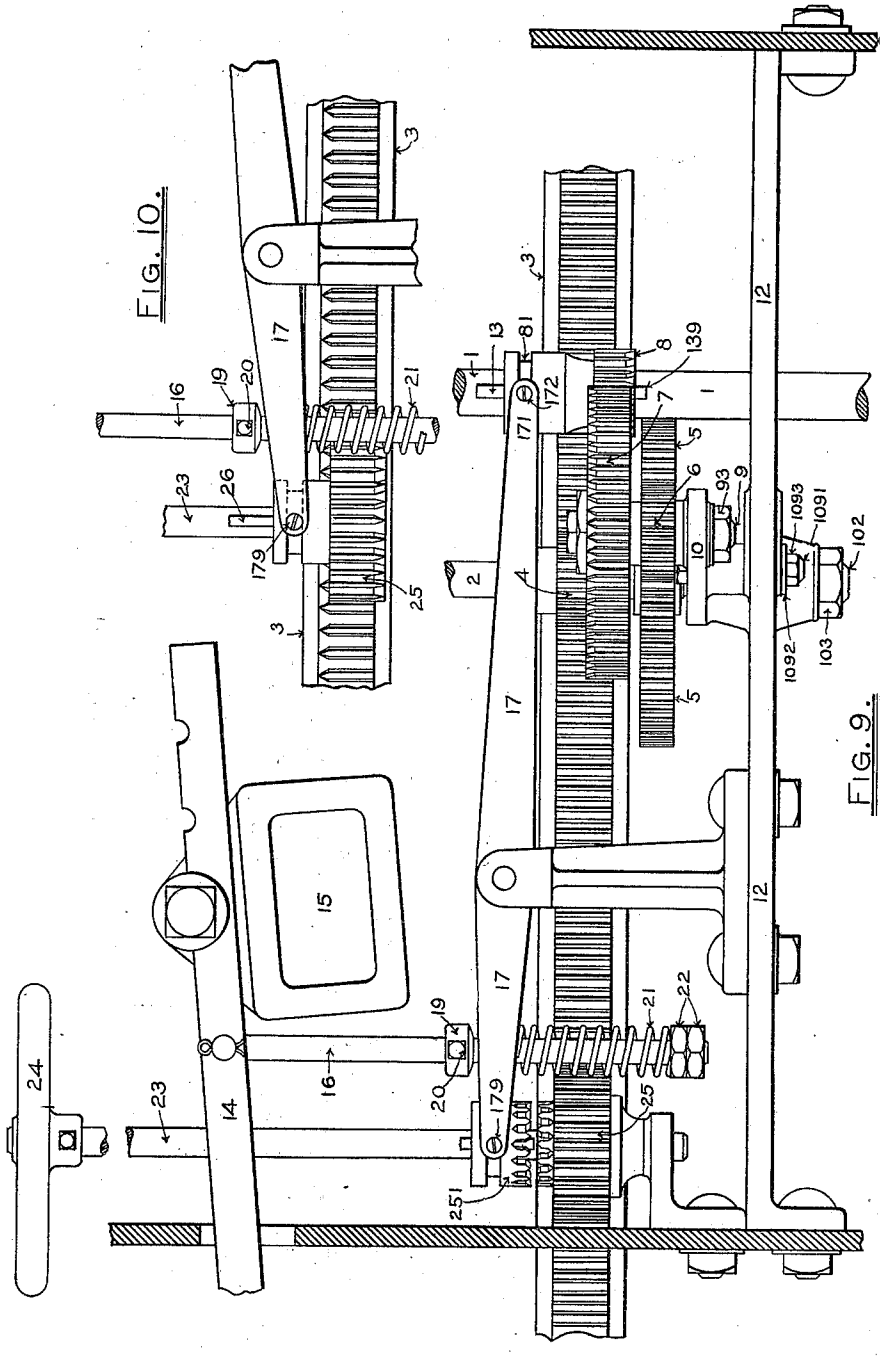


FIG. 9.

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# UNITED STATES PATENT OFFICE.

CHANNING WHITAKER, OF TYNGSBOROUGH, ASSIGNOR TO THE LOWELL MACHINE SHOP, OF LOWELL, MASSACHUSETTS.

## FLY-FRAME.

SPECIFICATION forming part of Letters Patent No. 554,409, dated February 11, 1896.

Application filed October 10, 1893. Renewed August 19, 1895. Serial No. 559,798. (No model.)

*To all whom it may concern:*

Be it known that I, CHANNING WHITAKER, a citizen of the United States, residing at Tyngsborough, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Fly-Frames, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to spinning-machines of the class known as "fly-frames." The first part thereof relates to the devices which are known as "tension-motions" and are employed in fly-frames for the purpose of communicating movement to the cone-rack and its connected belt-guide, in order to shift the cone-belt along the cone-pulleys, as is required during the filling of the bobbins. Various arrangements of transmitting-gearing and connections have been devised for the purpose heretofore, but the greater part of those with which I have become acquainted have included an unnecessarily large number of parts, and also have contained so large a number of gears, with a correspondingly great number of gear-contacts, that considerable play or lost motion has been found to occur, with its accompanying drawbacks and disadvantages. In practice the said devices commonly are so contrived and connected that whenever the automatic shipping devices of a machine in operation are actuated to effect the transfer of the driving-belt of the machine from the fast pulley upon the driving-shaft onto the loose pulley upon the said shaft, for the purpose of stopping the machine, a break or disconnection shall be occasioned in the rack-actuating train, all as will be understood by those skilled in the art, and for well-known purposes. United States Letters Patent No. 484,776, granted October 25, 1892, may be referred to as showing and describing certain forms and arrangements of the devices and connections in question.

The first part of the present invention is intended as an improvement upon the prior forms of the said devices known to me, and the objects thereof are to provide for the actuation of the cone-rack through the simplest possible train of transmitting-gearing, to provide for convenient and ready change in the said gearing such as will enable the rate of advance of the cone-rack to be varied as required, to provide in a convenient manner for occasioning a break or disconnection in the said gearing through the action of the stop-motion devices, to provide for ready re-engagement of the gearing after a break or disconnection, and to guard against an unintentional or undesired change in the relative position of one gear with respect to its mate through the space occupied by one or more teeth in consequence of the break or disconnection and recoil in the gearing.

The second part of my invention relates to the "winding-up devices," so called, which are employed in fly-frames for the purpose of effecting the return of the cone-rack to its starting position in the fly-frame after a set of bobbins has been filled to the desired extent with rovings, in order, by means of the cone-belt guide carried by the cone-rack, to lead the cone-belt back to the starting ends of the cone-pulleys, preparatory to beginning to wind upon a fresh set of bobbins. The object of this part of my invention is to provide for automatically connecting the said wind-up devices with the cone-rack when the fly-frame is stopped through the action of its automatic stop-motion devices, and for automatically disconnecting them therefrom when the fly-frame is restarted.

My present invention consists in certain novel constructions and combinations of parts, which I shall now proceed to describe with reference to the accompanying drawings, in which latter are presented the best embodiments thereof that have yet been devised by me, after which the characteristic features of the invention will be particularly pointed out and clearly defined in the claims at the close of this specification.

In the drawings, Figure 1 is a view, mostly in rear side elevation but with portions of the machine-framing in vertical section, of part of a fly-frame with the first part of my invention applied thereto, sufficient of the fly-frame being shown to render evident the relations and connections of my improved devices. Fig. 2 is a view of the same partly in plan and partly in horizontal section. Fig. 3 is a view in plan of certain supports here-

inafter described, part of the machine-framing being in horizontal section. Fig. 4 is a view in vertical section on line 4 4 of Fig. 2. Fig. 5 is a detail view in vertical section on line 5 5 of Fig. 1. Figs. 6 and 7 are detail views of the driving-pinion on the tumbling-shaft, Fig. 6 being in side elevation and Fig. 7 in inverted plan. Fig. 8 is a partly sectional detail view showing parts of the connections whereby the driving-pinion on the tumbling-shaft is moved lengthwise of the said shaft. Fig. 9 is a view similar to Fig. 1, but including the second part of my invention. Fig. 10 is a detail view illustrating a modification relating to the second part of the invention.

In the drawings, 1 is the tumbling-shaft of a fly-frame.

3 is the cone-rack.

4 is a pinion in engagement with the teeth of the cone-rack 3.

5 is a gear turning in unison with the pinion 4.

6 is a carrier-pinion meshing with the gear 5.

7 is a carrier-gear above the carrier-pinion 6 and connected with the latter so as to turn in unison therewith, and 8 is a driving-pinion rotating with the tumbling-shaft and meshing with the carrier-gear 7.

The pinion 4 and gear 5 are both fixed upon the short shaft 2, (see Fig. 4,) which at its lower end is stepped in the bearing 104, formed in the swinging arm 10, concentric with the axis on which the said arm turns, as shown most clearly in Figs. 3 and 4.

Through the described gearing, which, as shown, is made up of spur-gears and pinions, and which it is preferred should be constituted and arranged substantially as is shown, motion is transmitted automatically and intermittently from the tumbling-shaft 1 to the cone-rack 3 during the regular working of the fly-frame, and thereby the cone-rack is moved endwise gradually to shift the cone-belt upon the cone-pulleys, as will be understood. Obviously, a greater number of spur-gears and pinions may be employed in the transmitting-train, if desired, although I prefer the simple train shown in the drawings.

The carrier-gear 7 is a change-gear, and one size of such gear may be substituted for another, as may be required in order to transmit motion at the desired rate of speed from the tumbling-shaft 1 to the cone-rack 3. For the purpose of enabling the carrier-gear 7 to be removably connected with the carrier-pinion 6 any suitable known form of connections may be used. I have shown (see Fig. 4) the hub 61 of the carrier-pinion 6 extended for the reception thereon of the carrier-gear 7, and provided with a pin 62, which compels the carrier-pinion and carrier-gear to turn in unison, the carrier-gear being kept on the said hub by a nut 63, which is turned on the threaded upper end of the hub. As shown most clearly in Fig. 4, the connected carrier-pinion and carrier-gear turn upon the stud 9, which latter is provided with a flange 91, on which the lower side of the carrier-pinion rests, and they are held from rising on the said stud 9 by means of a screw 92, the threaded stem of the said screw entering a threaded hole in the end of the stud 9, and the edge of the flat head of the screw overlying the upper end of the hub of the carrier-pinion 6. The stud 9 is mounted on the swinging arm 10, which swings concentrically with the gear 5 and the pinion 4, the stud having its lower end passing through a hole 101 in the arm, and a nut 93 being placed upon its projecting threaded end and turned up tightly, a washer 94 being interposed between said nut and the under side of the arm 10. The arm 10 is provided with a journal 102, that is fitted to a bearing in a lug or lateral extension 11 on the cross-piece 12, forming part of the framework of the machine. The lower end of the journal 102 is threaded and projects below the bearing in the lug or extension 11, it receiving thereon the washer 1022 and the nut 103. After the arm 10 has been adjusted into the position required by the particular size of change-gear that it is designed to use it may be secured in such position by tightening up the nut 103. I prefer, however, to employ in addition the bolt 1091, (shown in Figs. 1, 3, and 4,) with its washer 1092 and nut 1093. The said bolt is passed through a hole in the arm 10 and through a slot 1094 that is formed in the cross-piece 12, the said slot being formed concentric with the axis on which the arm 10 swings, as shown clearly in Fig. 3.

In order that, when desired, a break or disconnection may be occasioned in the gearing intermediate the tumbling-shaft and the cone-rack, I mount the driving-pinion 8 upon the tumbling-shaft 1, with capacity for movement endwise of the latter, and connect the said pinion with the tumbling-shaft by a spline 13, Figs. 1 and 5, or the known equivalent thereof, so as to compel it to rotate in unison therewith. This enables the driving-pinion 8 to be moved along the shaft until it is out of mesh with the change-gear 7, and afterward to be reversely moved and placed again in mesh therewith. With the object in view of moving the pinion 8 automatically at the proper times I connect the same with the stop-motion devices in the following manner:

At 14 is part of the stop-motion lever and at 15 the weight hung thereon. At 16 is a rod having its upper end pivotally connected with the said lever 14 and its lower end passed through a hole in one end of a lever 17, the other end of the said lever being formed or provided with a fork 171, having projections 172 172, Fig. 5, preferably constituted by screw-studs, as shown, which enter a groove 81 in the hub of the pinion 8 on the tumbling-shaft. A collar 19 is mounted on the rod 16 above the lever 17, and it is held in the desired position of adjustment thereon by means of a clamping-screw 20, which passes through the collar and takes bearing

by its end against the surface of the rod. A spiral spring 21 is placed on the portion of the rod 16 which extends below the lever 17, and is held thereon and kept at the desired degree of compression by means of the nuts 22, which are turned on the threaded end of the rod. The connections and arrangements are such that whenever the stop-motion lever is turned through the action of its weight 15, so as to depress rod 16, the lever 17 is moved by the collar 19 striking thereagainst, so as to slide the driving-pinion 8 upward along the tumbling-shaft and move it out of mesh with the change-gear 7. By the reverse movement of the lever 14, which occurs when the automatic stopping devices are moved in the manner that is required for starting the fly-frame, the lever 17 is acted upon so as to cause the pinion 8 to be slid along the tumbling-shaft and again placed in mesh with gear 7. The spring 21 will yield, so as to avoid breakage, if this reverse movement of the pinion 8 is prevented or interrupted—as, for example, if a tooth or teeth thereof should strike against a tooth or teeth of the change-gear 7 in such manner as to arrest the said movement. The position normally occupied by the pinion 8 relatively to the change-gear 7, when in working engagement with the latter, is determined by the shoulder 139 at the lower end of spline 13, as shown in Fig. 5, the said shoulder acting as a stop to limit the descent of pinion 8 when the rod 16 is drawn upward so as to compress spring 21 against the under side of the left-hand arm of lever 17. The collar 19 is placed high enough on rod 16 to provide sufficient play to enable the pressure of the spring 21 to carry the pinion 8 into proper contact with shoulder 139.

In some cases I shall make the teeth of the carrier-gear 7 and the driving-pinion 8 sharp or pointed at the upper side of the said carrier-gear and lower side of said driving-pinion and of slightly greater breadth than usual, as is shown in Figs. 1, 6, and 7. I prefer this form of the said teeth. It facilitates re-engagement of the teeth of the driving-pinion 8 with those of the carrier-gear 7 after a disconnection or disengagement, as will be apparent, and to such an extent does it lessen the danger of the movement of pinion 8 toward its normal working position becoming prematurely arrested in the manner hereinbefore set forth that I contemplate omitting, sometimes, the spring 21 or other equivalent yielding arrangements.

Again, when pinion 8 is drawn out of mesh with gear 7 there usually occurs a slight recoil of the transmitting-gearing. With teeth on pinion 8 and gear 7 shaped as usual this recoil, even when less in extent than a tooth of gear 7, might occasion the loss of a tooth in the rotation of the said parts, for it might shift the position of the gear 7 backwardly, so that the teeth of the latter would prevent pinion 8 from descending until, at the beginning of the next movement of rotation of pinion 8, the teeth of the latter became shifted into proper position over the space of the gear 7. The pointed form of the teeth guards against this loss, for unless the recoil is enough to carry the point of a tooth on the gear 7 rearwardly past the point of the corresponding tooth on the pinion 8 the points of the teeth on each wheel will be guided back into the same spaces on the other wheel that were before occupied. In Fig. 6 one tooth of gear 7 is shown at $x$, it being represented in the position which would be occupied by it if, in consequence of the disconnection, gear 7 were moved backwardly by the recoil a distance equal to part of the width of a tooth. As will be seen, tooth $x$ will slide readily into the original space when pinion 8 is depressed. The pointed form of teeth permits the recoil to begin and continue gradually as the teeth on pinion 8 are drawn out of those of gear 7, and this causes a control to be exercised over the recoil until the separation is complete, thereby lessening the extent of the recoil.

The illustrated combination and arrangement of gearing is very simple. All of the gears are spur-gears. There are but three points therein at which the teeth of the rack and gears intermesh with each other. The change-gear is the gear in contact with the pinion on the tumbling-shaft. A difference of one tooth in a change-gear located at this point obviously will have less effect upon the movement communicated to the cone-rack than the like difference in a change-gear located at some point nearer the cone-rack. From this it follows that a finer adjustment may be secured through my devices than has been secured by the devices with which I previously have been acquainted. It follows, also, that if a tooth or teeth should be lost through recoil of the parts in consequence of the disengagement of the driving-pinion 8 from the carrier-gear 7 the effect will be minimized so far as concerns the extent to which the cone-rack is thereby altered in its position.

Fig. 9 illustrates the character of the second part of my invention and one means of reducing the same to practice. The same parts are shown in Fig. 9 that are shown in Fig. 1, and, in addition, there are shown in the former the wind-up shaft and certain clutching and unclutching devices that are combined with the said shaft. The wind-up shaft is represented at 23, the hand-wheel thereon at 24, and the gear on the said shaft which meshes with the cone-rack is represented at 25. As is well known to those skilled in the art, the cone-rack-actuating devices move the cone-rack gradually endwise in a fly-frame as the bobbins fill with roving.

When the desired amount of roving has been wound upon the bobbins the fly-frame is stopped, and in preparing to restart with a fresh set of empty bobbins the cone-rack is returned to its starting position in order to replace the cone-belt on the starting ends of the

cone-pulleys. It is customary to effect this return by hand by means of the wind-up shaft, the latter being turned by means of its hand-wheel 24. The construction heretofore in use is such that the wind-up shaft always, so far as known to me, has remained in operative gear connection with the cone-rack, and hence the said shaft has had movement of rotation communicated thereto from the cone-rack as the latter has been advanced by its actuating devices in the regular working of the fly-frame. This movement of rotation thus communicated from the cone-rack to the wind-up shaft is needless, and there is, therefore, an unnecessary and unprofitable expenditure of energy. Accordingly, proceeding on the basis that the wind-up shaft is required to be in operative connection with the cone-rack only at such times as it is to be employed in effecting the return of the cone-rack to its starting position, which is only after the regular operations of the machine have been arrested, I have so arranged and combined the parts that the wind-up shaft shall normally be kept out of operative connection with the cone-rack, and shall be thus held while the fly-frame is at work, and also that, when the operation of the machine is arrested through the action of the automatic stop-motion devices thereof, the wind-up shaft shall be placed in operative connection with the cone-rack, in order that it then may be employed for moving the latter by hand, as required. Thus in Fig. 9 the gear 25 is loose upon the wind-up shaft 23, and turns idly thereon as the rack is advanced by its actuating devices in the regular working of the fly-frame. The said gear is provided or formed with one half or member of a clutch, as shown, while the opposing half or member 251 of the clutch is splined upon the wind-up shaft 23. The said half or member 251 is engaged by projections 179 (preferably constituted by screw-studs) from the adjacent end of the lever 17, as shown. Thereby as the lever 17 is moved by the stop-motion lever 14 it moves the clutch half or member 251 on the wind-up shaft 23, in addition to moving the driving-pinion 8 on the tumbling-shaft, as hereinbefore described. In the descent of the stop-motion lever 14 the wind-up shaft 23 and its gear 25 are clutched together so as to place the wind-up shaft in operative connection with the cone-rack, and simultaneously therewith is effected the disengagement of the driving-pinion 8 from the carrier-gear 7, this last leaving the cone-rack free to be moved by hand by turning the wind-up shaft. When the stop-motion lever is raised into the position which it occupies during the running of the fly-frame, the clutch member 251 is raised simultaneously with the depression of the driving-pinion 8.

Fig. 10 shows a modification in which the gear 25 is free to slide lengthwise of shaft 23, being caused to turn therewith by spline 26, and is engaged by the adjacent end of lever 17 so as to be moved up and down by the said lever. In this modification the lower sides of the teeth of gear 25 and the upper sides of the teeth of the cone-rack are made pointed, similarly to the teeth of driving-pinion 8 and gear 7, and with the same reasons in view as in the case of the latter.

An application for a patent for improvements in fly-frames filed by me October 10, 1893, Serial No. 487,770, presents an arrangement of mechanism embodying a wind-up shaft which is held normally in a position in which it is out of gear connection with the cone-rack, the said shaft being moved bodily by hand when it is desired to prepare to wind up, in order to place the same in operative connection with the cone-rack. I contemplate combining such a movable wind-up shaft with other devices substantially like those which are presented in this case, for the purpose of moving the shaft by connections with the automatic stop-motion devices of the fly-frame. Inasmuch as it will be readily apparent how such combination is to be produced, it appears unnecessary to show the same.

While herein I have shown and described the driving-pinion 8 as mounted with capacity to move lengthwise of its shaft for purposes of disconnection, it is to be understood that I regard it as being within the broadest aspect of my invention to arrange so that some other gear or pinion in the transmitting-train between the tumbling-shaft and cone-rack shall thus be moved for the said purpose.

I claim as my invention—

1. The combination with the cone-rack, and devices for moving the same endwise as required for shifting the cone-belt, the said devices embracing intermeshing gears and a shaft on which one of said gears is splined, of a movable member of the stop-motion devices, and connections intermediate the said splined gear and the said movable member, whereby the splined gear is slid lengthwise of its shaft when the said member of the stop-motion devices is moved, and thereby is disengaged from the next gear, substantially as described.

2. The combination with the cone-rack, and devices for moving the same endwise as required for shifting the cone-belt, the said devices embracing intermeshing spur-gears and a shaft on which one of the said spur-gears is splined, of a movable member of the stop-motion devices, and connections intermediate the said splined gear and the said movable member, whereby the splined gear is slid lengthwise of its shaft when the said member of the stop-motion devices is moved, and thereby is disengaged from the next spur-gear, substantially as described.

3. The combination with the cone-rack, and devices for moving the same endwise as required for shifting the cone-belt, the said devices embracing intermeshing spur-gears and

a shaft on which one of the said gears is splined, of a movable member of the stop-motion devices, a lever for moving the splined gear along its shaft, and connections intermediate the said lever and the said movable member of the stop-motion devices whereby the lever may be moved from the said member, substantially as described.

4. The combination with the cone-rack, and devices for moving the same endwise as required for shifting the cone-belt, the said devices embracing intermeshing spur-gears and a shaft on which one of the said gears is splined, of a movable member of the stop-motion devices, and a lever connected with the said movable member and provided with a fork in engagement with the said splined gear, substantially as described.

5. The combination with the cone-rack, and devices for moving the same endwise as required for shifting the cone-belt, the said devices embracing intermeshing gears and a shaft on which one of the said gears is splined, of a movable member of the stop-motion devices, and yielding connections between the said splined gear and the said movable member whereby the said gear may be moved from the said member, substantially as described.

6. The combination with the cone-rack, and devices for moving the same endwise as required for shifting the cone-belt, the said devices embracing intermeshing gears and a shaft on which one of the said gears is splined, of a movable member of the stop-motion devices, a lever for moving the splined gear along its shaft, and yielding connections between the said lever and the said movable member of the stop-motion devices whereby the lever may be moved from the said member, substantially as described.

7. The combination with the cone-rack, and devices for moving the same endwise as required for shifting the cone-belt, the said devices embracing intermeshing spur-gears and a shaft on which one of the said gears is splined, of a movable member of the stop-motion devices, a lever for moving the splined gear along its shaft, and yielding connections between the said lever and the said movable member of the stop-motion devices whereby the lever may be moved from the said member, substantially as described.

8. The combination with the cone-rack, the tumbling-shaft, and devices between the tumbling-shaft and the cone-rack for moving the latter endwise as required for shifting the cone-belt, the said moving devices embracing intermeshing gears, one of which is splined upon the tumbling-shaft, of a movable member of the stop-motion devices, and connections intermediate the said splined gear and the said movable member whereby the splined gear is slid lengthwise of the tumbling-shaft when the said member of the stop-motion devices is moved, and thereby is disengaged from the next gear, substantially as described.

9. The combination with the cone-rack, the tumbling-shaft, and spur-gears between the tumbling-shaft and the cone-rack for moving the latter endwise as required for shifting the cone-belt, one of which spur-gears is splined upon the tumbling-shaft, of a movable member of the stop-motion devices, and connections intermediate the said splined gear and the said movable member whereby the splined gear is slid lengthwise of the tumbling-shaft when the said movable member of the stop-motion devices is moved, and thereby is disengaged from the next gear, substantially as described.

10. The combination with the cone-rack, the tumbling-shaft, and spur-gears between the tumbling-shaft and the cone-rack for moving the latter endwise as required for shifting the cone-belt, one of which spur-gears is splined upon the tumbling-shaft, of a lever for moving the said splined gear along the tumbling-shaft, and a movable member of the stop-motion devices connected with the said lever for operating the same to move the splined gear, substantially as described.

11. The combination with the cone-rack, the pinion 4 meshing therewith, the spur-gear 5 turning in unison with pinion 4, the pinion 6 meshing with gear 5, the spur-gear 7 turning in unison with pinion 6, the pinion 8 meshing with gear 7, the tumbling-shaft having pinion 8 splined thereon, a movable member of the stop-motion devices, and connections between the said member and the pinion 8 whereby the latter may be slid lengthwise of the tumbling-shaft, substantially as described.

12. The combination with the cone-rack, the pinion 4 meshing therewith, the spur-gear 5 turning in unison with pinion 4, the pinion 6 meshing with gear 5, the spur-gear 7 turning in unison with pinion 6, the pinion 8 meshing with gear 7, the tumbling-shaft having pinion 8 splined thereon, a movable member of the stop-motion devices, and a lever connected with said movable member and engaging with pinion 8 for moving the latter upon the tumbling-shaft, substantially as described.

13. The combination with the cone-rack, the tumbling-shaft, means for operating the former from the latter, the said means embracing spur-gears 7 and 8, one of which is movable in the line of its axis of rotation, the said gears having teeth that are pointed at the sides of the gears, a movable member of the stop-motion devices, and connections between the said member and the movable gear for moving the latter, substantially as described.

14. The combination with the cone-rack, the tumbling-shaft, and means for operating the former from the latter consisting of the pinion 4, gear 5, pinion 6, gear 7, and pinion 8, the last of which is splined upon the tumbling-shaft, the said gear 7 and pinion 8 having teeth that are pointed at the sides of the said gear and pinion, of a movable member

of the stop-motion devices, and a lever connected with the said member and engaging with pinion 8, substantially as described.

15. The combination with the cone-rack, the tumbling-shaft, means for operating the former from the latter consisting of the pinion 4, gear 5, pinion 6, change-gear 7, and pinion 8, the last of which is splined upon the tumbling-shaft, and the adjustable support for change-gear 7 and pinion 6, of a movable member of the stop-motion devices, and a lever connected with the said member and engaging with the pinion 8 to move the same, substantially as described.

16. The combination with the cone-rack, the wind-up shaft, means whereby to actuate the cone-rack from the said shaft, and a movable member of the stop-motion devices, of devices connected with the said member and operated thereby to place the wind-up shaft in and out of operative connection with the cone-rack, substantially as described.

17. The combination with the cone-rack, the wind-up shaft, a gear thereon for driving the cone-rack, and a movable member of the stop-motion devices, of devices connected with the said member and operated thereby to render the said gear respectively operative and inoperative as a driving connection intermediate the wind-up shaft and cone-rack, substantially as described.

18. The combination with the cone-rack, the wind-up shaft, a gear loosely mounted thereon and geared to the cone-rack, and a movable member of the stop-motion devices, of clutching devices operated by the said member and serving to connect the said gear with the wind-up shaft and disconnect it therefrom, substantially as described.

19. The combination with the cone-rack, the wind-up shaft, means whereby to actuate the cone-rack from the said shaft, the tumbling-shaft, means whereby to actuate the cone-rack from the tumbling-shaft, and a movable member of the stop-motion devices, of devices connected with said member and whereby simultaneously to place the wind-up shaft in operative connection with the cone-rack, and to break the connection between the cone-rack and the tumbling-shaft, substantially as described.

20. The combination with the cone-rack, the wind-up shaft, its gear loosely mounted thereon and engaging with the cone-rack, a clutch-hub on said shaft, the tumbling-shaft, the sliding pinion thereon, gearing intermediate said pinion and the cone-rack, and a movable member of the stop-motion devices, of a lever in connection with said member and engaging with said clutch-hub and sliding pinion to move the same on their respective shafts, substantially as described.

21. The combination with the cone-rack, the wind-up shaft, means whereby to actuate the cone-rack from the said shaft, the tumbling-shaft, and means whereby to actuate the cone-rack from the tumbling-shaft, of a controlling-lever whereby simultaneously to place the wind-up shaft in operative connection with the cone-rack, and to break the connection between the cone-rack and the tumbling-shaft, substantially as described.

22. The combination with the cone-rack, the wind-up shaft, its gear loosely mounted thereon and engaging with the cone-rack, a clutch-hub on said shaft, the tumbling-shaft, the sliding pinion thereon, and gearing intermediate said pinion and the cone-rack, of a lever engaging with said clutch-hub and sliding pinion and serving to move them simultaneously, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

CHANNING WHITAKER.

Witnesses:
MARY CAVERLY,
SAML. G. STEPHENS.